CONTENTS

Ph. D Regulation

CATEGORIES OF Ph.D STUDENTS

The Institute admits Ph. D students under the following categories:

REGULAR

1.1 A student in this category works full-time for his/her Ph. D degree. He/she receives assistantship from the Institute or fellowship from CSIR/UGC or any other recognized funding agency as applicable.

SPONSORED

1.2 A student in this category is sponsored by a recognized R&D organization, academic institution, government organization or industry for doing research in the Institute on a full- time basis. The Institute does not provide any assistantship/fellowship to such a student.

SELF-FINANCED

1.3 A student in this category works full-time towards the Ph. D Program. The Institute does not provide any assistantship/fellowship to such a student.

PROJECT-STAFF

1.4 This category refers to a student who is working on a sponsored project in the Institute and is admitted to the Ph. D Program to work on a full-time or part-time basis. The remaining duration of the project at the time of admission should be at least two year. If the project gets completed before the student completes his/her Ph. D Program, his/her category will be converted to that of SELF-FINANCED.

PART-TIME

1.5 A student in this category is a professionally employed person (including the staff of CIT Kokrajhar (Deemed to be University, MHRD, Govt. of India)), who pursues the PhD Programme while continuing the duties of his/her service. The Institute does not provide any assistantship/fellowship to such students.

CHANGE OF CATEGORY

2.1 The Chairman, Institute Ph. D Program Committee (IPPC) on recommendation of the Department Ph. D

Program Committee (DPPC) approves change from one category to another (except to regular category). Only the Chairman, Secretary and Senate approve change to the regular category from one category to any other category.

ADMISSION TO PhD PROGRAMME

Eligibility Criteria

3.1 The details of the eligibility criteria for admission to various Ph. D programs are given in Appendix-I. These criteria are revised by the Senate from time to time.

3.2 **ADMISSION PROCEDURE**

3.2.1 Admission to the Ph. D Programme of the Institute normally takes place in January and July every year. Advertisements are issued in November/December for the even semester (January - June) and May/June for the odd semester (July - December).

3.2.2 Admission to all categories of students is granted on the basis of admission test followed by interview usually during the month of December and June every year.

3.3.3 The following documents are to be furnished along with the application by candidates falling under Sponsored, Project Staff and Part-time categories:

Form I: Sponsorship letter for Sponsored category.

Form II: No objection certificate from Dean (R&D), CIT Kokrajhar (Deemed to be University, Govt. of India), for Project Staff category

Form III: No objection certificate from the employer for Part-time category.

ASSISTANTSHIP

4.1 Institute assistantships shall be available to eligible students as per prevailing norms.

4.2 Assistantships from external funding organizations shall be available as per terms and conditions of the concerned funding organizations.

4.3 Students receiving assistantships from the Institute or fellowships from any other funding agencies are required to perform academic duties as per prevailing norms.

4.4 The continuation of the assistantship/fellowship is subject to satisfactory performance of the assigned duties and satisfactory progress of the student in the Ph. D Program.

Leave Rule

Ordinary Leave

5.1 A full-time Ph. D student is eligible for 30 days leave for every completed year (calculated in terms of two consecutive semesters, from the time of his/her joining the program) Saturdays, Sundays or holidays during the leave period are counted towards leave, except for prefixed or suffixed holidays. Of the 30 days leave, a maximum of 15 days of leave is permitted in a semester. However, a maximum of 5 days of such leave is allowed to avail at a stretch if student having any teaching assignment. However, a student can accumulate leave, and avail a maximum of 30 days' leave at a time in a year. The maximum number of carried-over leave, from one completed year to another, is 15 days. Head of the Department sanctions leave on recommendation of the Supervisor.

Maternity/Paternity Leave

5.2 A student is eligible for 6 months maternity leave or 15 days of paternity leave as applicable only once during the Ph. D Program. The Head of the Department sanctions maternity/paternity leave on recommendation of the Supervisor and submission of a certificate from Senior Medical Officer /Medical Officer of the institute.

Different Acronym

'IPC' Institute Programme Committee

'IPPC' Institute PhD Program Committee

'DPPC' Department PhD Program Committee

'DC' Doctoral Committee

Academic leave

5.3 Academic leave is permitted on the following grounds.

5.3.1 To attend conferences/seminars/workshops/trainings/short-term courses. A maximum of 15 days of leave is permissible in a calendar year. A maximum of 30 days of leave in a calendar year is permissible for field trips

such as data collection, survey work, etc. The Head of the Department sanctions academic leave on recommendation of the Supervisor. Academic leave exceeding 30 days but up to a maximum of 60 days in a calendar year is approved by the Chairman, IPPC on recommendation of the Ph D coordinator, Supervisor and the Head of the Department. Academic leave of more than 60 days but up to a maximum of 12 months is also permissible to carry out part of the research in another institute/R&D Lab/industry in India or abroad. For sanction of such a leave, a letter of consent from the host institute is required. This leave is permissible only after the student has passed the comprehensive examination and has done part of the research work at CIT Kokrajhar.

5.3.2 On recommendations of the Supervisor, the doctoral committee (DC), the DPPC, Chairman, IPPC, and the Chairman, Senate approves such an academic leave. Such cases are also to be reported to the AOG. A student granted academic leave for one or more semesters, pays prescribed fees in every semester. If a registration date falls during the period of academic leave, a student completes the registration procedures at the expiry of his/her academic leave.

SUPERVISOR(S)

6.1 Every student admitted to the Ph. D Program undertakes research under the guidance of a faculty member of the Department in which he is admitted. The faculty member is called his/her Supervisor. The faculty member from other recognized Indian institutes/universities can be co-supervisor of the admitted students.

6.2 The following categories of persons can act as one of the Supervisors but not as a Coordinating Supervisor

i. A faculty nearing superannuation with less than 3years of service left at the Institute

ii. A faculty on contract (including a Visiting Faculty) with less than 3 years of service left at the time of appointment as a Supervisor.

iii. Professionals from industry for students. On recommendation of the DPPC and the Chairman IPPC, the Chairman Senate approves appointment of such a Supervisor.

6.3 In special cases, a student admitted to a Department (X) can have as his sole supervisor a faculty from another Department (Y), unless either of the departments X or Y does not agree. The reasons of

disagreement must be given in writing and the matter will then be decided in a joint meeting of the Secretary and Chairman DPPC of the two departments, Chairman IPPC and the Chairman of the Senate. A faculty member can take at most one student from outside his/her department in one academic year. The faculty and the department (X) will be identified before the admission takes place. In order to encourage such cross-disciplinary guidance, Department (X) may be allowed an increase in intake capacity if required. The Secretary DPPC of the Department X will handle the official processes and faculty will interact with this convener directly (without going through his / her Head) for matters relating to the concerned student. Reservation of slots can also apply in such cases.

APPOINTMENT OF SUPERVISOR(S)

7.1 The DPPC appoints Supervisor(s) to a student after obtaining mutual consent of both the student and the Supervisor(s).

7.2 The Supervisor(s) is identified and appointed at the earliest and within six months from the date of admission.

CHANGE/ADDITION OF SUPERVISOR(S)

8.1 If a student has only one Supervisor and the Supervisor goes on leave for more than 18 (eighteen) months, another Supervisor is appointed by the DPPC. Mutual consent of both the student and Supervisor(s) is taken for such cases.

8.2 If the Supervisor of a student under external category proceeds on a leave for more than 15 (fifteen) months, the Secretary DPPC or the Head of the Departments looks after the routine administrative issues. Otherwise, the DPPC may appoint a new Supervisor. Mutual consent of both the student and Supervisor(s) is taken for such cases.

8.3 The Chairman, Senate may permit a student to change his/her Supervisor(s) for valid reasons. Mutual consent of the student and supervisor(s) and recommendations of the DPPC and IPPC are required. Such cases are reported to the Senate.

DOCTORAL COMMITTEE (DC)

9.1 To monitor the progress of research of a student, there shall be a Doctoral Committee with the following composition:

i	Head of Department	Chairman
ii	Supervisor(s)	Member(s)
iii	Two other faculty members out of which one should be from Other department	Member

9.2 The DC is constituted by the DPPC in consultation with the Supervisor(s) within one month from the date of appointment of the Supervisor(s). The list is sent to the Chairman, IPPC for approval.

9.3 Until the DC is constituted, the DPPC performs the duties of the DC.

COURSE WORK

10.1 The DC of a student prescribes the courses a student has to register for every semester. However, the DPPC prescribes courses if the DC is not yet constituted.

10.2 A student of Engineering/Design/Technology Department with an entry level qualification of two-year Master's degree (after completion of 4-year Bachelor's degree) or three-year Master's degree (after completion of 3-year Bachelor's degree) registers for a minimum of 4 courses with at least 24 credits and has to obtain at least 60% in each course. Similarly, a student of Science and HSS Department with an entry level qualification of Master's degree (M. Tech/M. Phill) registers for a minimum of 4 courses with at least 24 credits and has to obtain a 60%.

10.3 A student with entry-level qualification other than those under Clause 10.2 above registers for a minimum of 6 courses with at least 36 credits and has to obtain at least 60% in each course.

10.4 Two of the registered courses may be taken as seminar/Project based courses. In a seminar course, a student delivers 2-4 seminars/projects. A brief report is submitted at least one week before the due date of every seminar. The DC members act as examiners for such seminars. One of the DC members coordinates the seminar course. Before registration, the DC and the DPPC decides the number (one or two) and the type of

the course taken as a seminar course.

10.5 Under normal circumstances, a student is required to complete all course work within two semesters, and registering for at least two courses in the first semester.

10.6 If at the end of any semester, a student maintains less than 60% in a course he/she will marked as fails in a course and he/she is allowed to repeat/substitute it in the following semester(s).

10.7 A repeat/substitute course may be registered during the summer term.

10.8 A student is not allowed to register for B Tech, B Des or MSc level courses. However, he may be allowed to audit these courses.

COMPREHENSIVE EXAMINATION

11.1 To test the overall competence and academic preparation of a student in the PhD Programme, a Comprehensive Examination is held within 12 months to 18 months from the date of admission.

11.2 Comprehensive Examination shall be held only after successful completion of course work.

11.3 The mode of Comprehensive Examination (Seminar or written or both) common to all students in a Department is decided by the DPPC and is intimated to the students.

11.4 The date of the Comprehensive Examination is informed to the student at least one month prior to the date of examination. The DPPC conducts Comprehensive Examinations for all Ph. D Students.

11.5 A student failing in the Comprehensive Examination in the first attempt is given a second attempt not before one month and within six months from the date of the first attempt. If the student fails in the second attempt, he/she is not allowed to continue in the Ph. D Program.

11.6 If a student inducted to the Ph. D Program while pursuing, M. Tech / M. Des fails in the Comprehensive Examination, he/she is allowed to complete project work of the M. Tech / M. Des and shall get an M. Tech / M. Des degree. He receives assistantship as per M. Tech / M. Des regulations.

11.7 If a student inducted to the Ph. D Program while pursuing B. Tech / B. Des, he/she shall be allowed to replace the B.Tech Projects by Ph. D level courses or he/she shall be allowed to drop the B.Tech Projects. Such a student can drop out of the dual degree Program at any time, but he/she shall be awarded a B.Tech degree

only after he/she passes the Ph. D comprehensive examination which must be of the Credit Waiver Written Comprehensive Examination (CWWCE) type. A student not wishing to keep his/her option of dropping out in the middle of the Ph. D Program, shall be able to take the ordinary comprehensive examination if he/she so desires.

11.8 All cases of failure in the Comprehensive Examination are reported to the Senate.

11.9 After Successful completion of Comprehensive Examination the reports are submitted to IPPC.

STATE-OF-THE-ART SEMINAR

12.1 Within 6 months of the successful completion of the Comprehensive Examination, a student presents a State-of-the-Art Seminar (SOAS). The presentation is open to all. In this, he/she presents literature survey and broad areas of research.

12.2 A student submits a write-up to the DC members at least one week before the date of the SOAS. A report on the successful completion of the SOAS, is submitted by the DC to the Chairman DPPC.

12.3 DPPC who communicates the same to the Chairman, IPPC. Within a month, a student delivers another SOAS if the first SOAS is not satisfactory

PROGRESS REVIEW

13.1 After the State-of-the-Art Seminar (clause 12), a student submits at-least one progress report for yearly evaluation to the DC. The DC schedules a meeting where the student presents his/her progress report. All such presentations are open to all. However, the DC may schedule more such meetings depending on the progress of the student.

13.2 The DC reviews the progress and submits a report to the Chairman, through IPPC.

13.3 Based on needs, the DC may fix a minimum number of working days (up to fifteen) twice a year for a student in part-time/Self-financing category to be present in CIT Kokrajhar for his/her research work.

ENROLMENT

14.1 Students of all categories shall have to enroll in person every semester on the stipulated date till the submission of their thesis.

14.2 They are required to pay the prescribed fees till the submission of their thesis within stipulated dates.

14.3 A student may be exempted from the prescribed fees for the last semester if he submits thesis within 30 days from beginning of the semester.

14.4 Semester drop: Up to two semesters may be dropped in the entire duration of the PhD Programme, on bonafide grounds. Except on medical grounds, semester drop is not permissible before successful completion of Comprehensive Examination by a student. On the recommendation of Supervisor, Chairman DPPC, Chairman IPPC and the Chairman Senate may approve a semester drop. Cases of semester drop are reported to the Senate. No assistantship is provided during the period of a semester drop. The period of semester drop is not counted in the prescribed time limit for completion of the Ph. D Program.

CONDUCT AND DISCIPLINE

15.1 Regulations for Conduct and Discipline are common for all students of CIT Kokrajhar, and these are the same as that prescribed in the institute Ordinance.

15.2 In addition, unauthorized absence for more than one month leads to disciplinary action, in the form of reduction of assistantship or even termination of studentship.

CANCELLATION OF STUDENTSHIP

16.1 The Ph. D studentship is liable to be cancelled for any of the following reasons:

i. Giving false information at the time of application/admission.

ii. Not conforming to the regulations of the Program.

iii. Failure in course work requirement.

iv. Failure in Comprehensive Examination.

v. Consistent lack of progress in research.

vi. Violation of discipline and conduct rules of the Institute.

vii. Not submitting a thesis within the stipulated period.

viii. Not enrolling for a semester within stipulated dates.

ix. Regular and Sponsored Full time category students, remaining absent for more than 6 (six) weeks in a semester, without sanctioned leave.

DURATION OF THE Ph. D PROGRAM

17.1 The duration of the Ph. D program is as follows

17.2 The minimum duration of the Ph. D Program (excluding dropped Semester (s) /maternity leave) is six semesters. If a student (s) has/have performed excellent publication in international standard he/she is/are eligible to submit their thesis in five semesters on the recommendation of Chairman IPPC and Chairman Senate through Chairman DPPC.

17.3 The maximum duration of the Ph. D Program is 6 years from the date of admission for a full-time student and 7 years for a part-time student.

SYNOPSIS OF THESIS

18.1 Prior to the submission of the thesis, a student submits the synopsis of thesis to the DC. The synopsis contains outline of the research contained in the thesis. A student shall be eligible synopsis presentation only when he/she publishes two journal papers of international standard with SCOPUS/SCI indexed and attended two seminars international/national repute.

18.2 The student makes a presentation of his/her thesis work before the DC in an open seminar (named as Synopsis Seminar). The synopsis is submitted one week before the Synopsis Seminar date.

18.3 If the DC approves the synopsis, the student is allowed to submit the synopsis of the thesis. The Coordinating Supervisor sends report of the Synopsis Seminar and Synopsis to the Chairman IPPC through the Chairman, DPPC.

18.4 If a student fails to submit the thesis within 3 months from the date of the Synopsis Seminar, he /she shall present another Synopsis seminar. His / Her synopsis has to be approved by the DC and sent to the Chairman, IPPC.

PANEL OF EXAMINERS

19.1 Two external Indian experts shall examine the thesis.

19.2 At least fifteen days prior to the submission of the thesis, the DC submits to the Chairman DPPC a panel of five examiners. The Chairman, DPPC forwards it to the Chairman IPPC. The Chairman, IPPC shall recommend the same to the Chairman Senate for the approval.

19.3 The list of examiners remains confidential with the office of the Chairman IPPC. The office of the Chairman IPPC makes all correspondence with the examiners. The name of the examiner is made available to the thesis Supervisor(s) after both the reports have been received.

SUBMISSION OF THESIS

20.1 Within three months of the acceptance of the synopsis by the DC, the student submits seven (or eight, if there are two supervisors) copies of his/her thesis in prescribed format and plagiarism check report of the thesis to the Academic Section.

20.2 Similarity index of the plagiarism check report is acceptable up to <10%.

THESIS REPORTS

21.1 Examiners are expected to send reports on the thesis within two months from the date of receipt of the thesis.

21.2 If an examiner does not send his/her report within two months, reminders are sent. If the report is not received in spite of reminders, the Chairman, IPPC replaces another examiner from the list.

21.3 If both the thesis examiners recommend the thesis for award of the Ph. D degree, the Chairman IPPC approves the conduct of a Viva-Voce. Corrections in the thesis, responses to comments of examiners are ratified by the DC.

21.4 If an examiner suggests re-submission of the thesis, the student is allowed to resubmit the thesis after due revision within the time stipulated by the DC.

21.5 If one examiner recommends the thesis, and the other rejects, the report of the first examiner is sent to the second examiner and vice-versa. The examiners are requested to review their recommendations. If after this, there is one acceptance and one rejection, the matter is placed before the Senate for possible replacement of the examiner who has rejected.

21.6 If both the examiners do not recommend the thesis for the award, the reports are sent to the DC which can

decide on one of the following based on their assessment.

21.6.1 If the DC is satisfied with the work already done and the contents of the thesis already submitted, it may request the Chairman Senate that the thesis may be sent to another set of examiners. Such a request has to be recommended by the DPPC and Chairman IPPC.

21.6.2 The DC may advise the student to augment the research and submit the synopsis again. If both the examiners do not recommend the thesis for the award for second time, the student is not awarded the degree and the registration is cancelled.

VIVA VOCE

22.1 In a Viva Voce, a student makes an oral presentation on his/her thesis. The presentation is open to all.

22.2 The following is the composition of the Viva Voce Board (VVB).

Chairman of the DC	Chairman
Supervisor(s)	Member(s)
One examiner of the thesis within the country	Member
A faculty member of another department to be nominated by the DPPC.	Member
One faculty member of the Department with knowledge of the subject of the thesis.	Member

The other members of the DC of the student will be invitees to the Oral Examination.

22.3 The VVB conducts the defense of the thesis by the candidate ensuring that he/she answers all the queries of the thesis examiners satisfactorily.

22.4 If the VVB finds the performance of the student unsatisfactory, the student shall be asked to reappear for another oral examination at a later date (not earlier than a month and not later than six months from the date of the first oral examination).

22.5 If the VVB finds the performance of the student unsatisfactory on the second occasion also, then the matter will be referred to the Senate for a decision.

22.6 The VVB may also recommend revisions to be made in the final version of the thesis after taking into

consideration the suggestions of the examiners who evaluated the thesis and the discussion at the Viva Voce. The Chairman of the VVB shall forward the report to the Chairman, IPPC, certifying that the recommended revisions by the VVB, if any, have been incorporated in all copies of the thesis, for award of the degree.

AWARD OF Ph. D DEGREE

23.1 If the Viva Voce Board recommends award of the degree, a student will be awarded the PhD degree on the recommendation of the Senate with the approval of the Board of Governors of the Institute.

LEGAL OTHER MATTERS

24.1 All other cases, not covered by the above, shall be referred to the Senate.

24.2 Any legal matter relating to Rules and Regulation under 1 – 24 shall be subjected to jurisdictions of Court(s).

ELLIGIBILITY CRITERIA FOR ADMISSION INTO Ph. D PROGRAM

The details of the eligibility criteria (i.e. minimum qualifications and experience) for admission to various Ph. D programs are given in this appendix. The Senate reviews the same, for admission to the Ph. D program from time to time. Relaxation in academic qualification for reserved categories of students is as per Government of India guidelines.

A. MINIMUM QUALIFICATIONS

Ph. D IN ENGINEERING

For admission to the Ph. D Program in Engineering departments, a candidate must satisfy one of the following criteria:

A.1.1 Master's degree in Engineering/Technology in a relevant area with a minimum CGPA of 6.5 or 60% of marks

A.1.2 Bachelor's degree in Engineering/Technology in a relevant area with a minimum CGPA of 8.5 or 80% of marks

A.1.3 A regular student of CIT Kokrajhar who is continuing his/her M. Tech studies and having a minimum CGPA of 8.0 at the end of second semester may be enrolled in the PhD Program of the Department in the beginning of his/her third semester of study. Such students can receive only Ph. D Degree.

A.1.4 A student of CIT Kokrajhar who is continuing his/her B. Tech studies and having a minimum CGPA of 8.5 at the end of sixth semester may be enrolled in the Ph. D Program of the Department in the beginning of his/her seventh semester of study. Such students can receive dual B. Tech and PhD Degree. Both the degrees will be awarded after completion of PhD degree.

B. Ph. D IN DESIGN

For admission to the Ph. D Program in Design, a candidate must satisfy one of the following criteria:

B.1.1 Candidates having M. Des/MFA/ MVA/M. Arch /M. Tech/ME degree in a relevant area, with a minimum CGPA of 6.5 or 60% of marks

B.1.2 Master's degree in computer Applications/Geography/Rural development/social Sciences with a minimum CGPA of 6.5 or 60% marks

B.1.3 Bachelor's degree in Design or Engineering/Technology in a relevant area with a minimum CGPA of 8.5 or 80% of marks

B.1.4 A two-year Post-graduate Diploma in Design (NID/CEPT or equivalent) with first class at Bachelor's level

B.1.5 BFA/BVA (4-year professional programme, after 10+2)/GD Art (5-year programme after 10^{th} standard) with one year professional experience, with a minimum CGPA of 7.5 or 70% of marks

B.1.6 A regular student of CIT Kokrajhar who is continuing his/her M. Des studies and having a minimum CGPA of 8.5 at the end of second semester may be enrolled in the Ph. D program of the Department in the beginning of his/her third semester of study. Such students can receive only Ph. D Degree.

B.1.7 A student of CIT Kokrajhar who is continuing his/her B. Des studies and having a minimum CGPA of 8.5 at the end of sixth semester may be enrolled in the Ph. D programme of the Department in the beginning of his/her seventh semester of study. Such students can receive dual B. Des and Ph. D Degree. Both the degrees will be awarded after completion of Ph. D degree.

C. Ph. D IN SCIENCE

For admission to the Ph. D Programme in Science departments, a candidate must satisfy one of the following criteria:

C.1.1 M.Sc / M.Phill degree in Science in a relevant area with a minimum CGPA of 6.5 or 60% of marks

C.1.2 M.Tech degree in Engineering/Technology/Design in a relevant area with a minimum CGPA of 6.5 or 60% of marks

C.1.3 Bachelor's degree in Engineering/Technology/Design in a relevant area with a minimum CGPA of 8.5 or 80%

D. Ph. D IN HUMANITIES AND SOCIAL SCIENCES

For admission to the PhD Programme in the department of Humanities and Social Sciences (HSS), a candidate must satisfy one of the following criteria:

D.1.1 M.A / M. Phill Master's degree in Arts/Commerce/Science in a relevant area with a minimum CGPA of 6.0 or 55% marks

D.1.2 Master's degree in Engineering/Technology/Design in a relevant area with a minimum CGPA of 6.5 or 60%marks.

D.1.3 Bachelor's degree in Engineering / Technology / Design in a relevant area with a minimum CGPA of 8.5 or 80% marks

E. MINIMUM EXPERIENCE FOR SPONSORED, PART-TIME AND EXTERNALCATEGORIES

E.1.1 Candidate in Sponsored, Part-time and External categories must be a regular employee of the sponsoring organization with at least one year of professional experience in the respective field.

FORM I -SPONSORSHIP LETTER

(This should by typed on the letter head of the sponsoring organization) Reference No:

Date:

The

The Director

Central Institute of Technology Kokrajhar, (Deemed to be University, MHRD, Govt. of India)

Sub : Sponsoring an Employee for Ph. D Program

Dear Sir,

We hereby sponsor the candidature of Mr/Ms .....who is an employee in our organisation, for joining PhD. Programme in .....at your Institute as a full - time student.

It is certified that he/she has completed 1(One) year of service in our organization/institute as a regular employee.

We shall relieve him/her of his/her duties in the organisation during the two years of the PhD. programme.

Signature and seal of the Sponsoring Authority

FORM II - NO-OBJECTION CERTIFICATE FOR CIT KOKRAJHAR PROJECT STAFF

(This should be typed on the letter head of the R&D Section of CIT Kokrajhar)

Reference No: Date:

The

The Director

Central Institute of Technology Kokrajhar (Deemed to be University, MHRD, Govt. of India)

Sub : No-Objection Certificate for CIT KOKTAJHAR's Project Staff

Dear Sir,

The R&D Section, of CIT Kokrajhar, has no objection if Mr./Ms./Mrs..... a Project employee in the project .....under.....department, is admitted to the PhD Programme in.....

Principal Investigator of the concerned project has agreed to allow him/her to attend classes/research work during the PhD Programme.

Signature and seal of the Dean (R&D)

FORM III NO-OBJECTION CERTIFICATE FOR PART-TIMESTUDENTS

(This should be typed on the letter head of the sponsoring organization) Reference No

Date:

The

The Director

Central Institute of Technology Kokrajhar (Deemed to be University, MHRD, Govt. of India)

Sub : No-Objection Certificate

Dear Sir,

We have no objection if Mr./Ms./Mrs. .....an employee in our organization, is admitted to the PhD programme in ..... at your institute as a PART-TIME student.

It is certified that he/she has completed one year of service in our organization/institute as a regularemployee.

We shall grant him/her leave of absence to attend classes/research works at IIT Guwahati during the PhD programme.

Signature and seal of the

Sponsoring Authority

ANNEXURE –I

1. The academic Senate approved additional set of guidelines, rules and regulations for Credit Waiver Written Comprehensive Examination (CWWCE) as noted below:

a. A Preamble to the syllabus for Credit Waiver Written Comprehensive Examination is required to be provided, clarifying the following points:

b. undergraduate courses taken in to consideration while setting syllabi for each of the question papers;

c. syllabi for individual question papers are to be designed in such a manner that overlapping areas among question papers could be avoided;

d. syllabi of every question paper should be self-contained, including Texts and References to be consulted by students; and

e. marks distributions across components of the syllabi of every question paper, are to be clearly specified;

2. duration of Credit Waiver Written Comprehensive Examination, shall be 3(three) hours for each of the three question papers;

3. Credit Waiver Written Comprehensive Examination, for all the three papers, shall be concluded and completed preferably within 7(seven) days;

4. each question paper of Credit Waiver Written Comprehensive Examination shall carry a total marks of 100;

5. pass percentage of marks for individual question papers shall be 60%;

6. if a student fails in all the 3(three) papers of the Credit Waiver Written Comprehensive Examination, he/she will have to compulsorily do course works;

7. if a student passes in 2(two) papers but fails in 1(one) paper, he/she will be allowed to clear the paper in second attempt within 3(three) months from the date of the first appearance;

8. if a student passes in 1(one) paper but fails in 2(two) papers, he/she will have two options to avail:

Option-I - to appear in all 3(three) papers in second attempt within 3(three) months from date of the first appearance, and clear them;

OR

Option-II - to compulsorily do course works.

9. Each academic Department should constitute its Credit Waiver Written Comprehensive Examination Committee (CWWCEC) consisting of at least 3(three) faculty members, including 1(one) member from an allied Departmen "out of which 1(One) may be nominated as the Convener.
    i. the term and functions of the CWWCEC shall broadly be as below:
    ii. the term of the CWWCEC is to be for 2(two)years;
    iii. the term the concerned subject faculty members of a Department are to set question papers and evaluate the same;
    iv. the Convener of the CWWCEC is to collect question papers, organize Credit Waiver Written Comprehensive Examination, and declare results, in full consultation with the CWWCEC;
    v. The Convener of the CWWCEC is to collect question papers, organize Credit Waiver Written Comprehensive Examination, and declare results, in full consultation with the CWWCEC;
    vi. The CWCEC shall be the sole authority for organizing and supervising Credit Waiver Written Comprehensive Examination of the Department/Centre, including moderation of question papers and declaration of results.

Minutes of the 9th Senate meeting of Central Institute of Technology Kokrajhar held on 19th March, 2020 in the Conference Hall of the Institute's Guest House

The Chairman, Senate, Central Institute of Technology Kokrajhar welcomed all the Members present in the meeting.

Item No. 09.01: **Confirmation of the Minutes of the 8thMeeting of the Senate held on 6thJanuary, 2020in the Director's conference hall of the institute.**

The minutes of the 8th meeting of the Senate were circulated to the members for seeking comments if any. As no comments were received from the members, the minutes of the 8th Meeting may be confirmed.

Resolution: After threadbare discussion, the members confirmed the Minutes of the 8th (eighth) Senate Meeting.

Item No. 09.02: **Proposal for approval of the revised course structure of the Diploma and UG programmes of the institute.**

Central Institute of Technology Kokrajhar had revised the course structure of all the semesters of its Diploma and Degree programmes in line with the model curriculums of AICTE. A draft of the same was placed before the meeting. Members were requested to comment on those.

Resolution: The Members approved the Diploma and UG course structures, and emphasized the following aspects in the regard.

- The Departmental BoSs were advised to consult external experts, including industry professional(s), particularly for syllabi for the Diploma programs, to finalize detail syllabi.
- All Departmental BoSs were requested to formulate the detailed syllabi for the 3rd Semester Diploma and UG programs to be placed in the next Senate meeting for approval that would be conducted tentatively before commencement of the next academic session 2020-21.

Item No. 09.03: **Proposed modifications in the students' evaluation process: Diploma and UG programs.**

In each Semester, the evaluation process for each course shall be conducted onthe basis of the procedures detailed in the following points.

a. In case of –

I. Theoretical subjects, the evaluation shall include continuous Teacher's assessments (TA) through quizzes, assignments, other forms of evaluation of class performance(s) throughout the Semester, Mid-Semester Examination, and class attendance (CA), followed by the End-Semester Examination.

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II. Laboratory courses / design / drawing / studio / workshop etc., the evaluation shall be on the basis of Teacher's assessments (TA) through quizzes, assignments, lab / studio / workshop record(s), other forms of lab / studio / workshop performance(s), viva, lab / studio / workshop attendance (CA), followed by the End-Semester Examination.

b. Evaluations in each semester (theory courses):

I. **Mid-Semester Examination** (full marks – **30;** duration **1.5 h**) →**15 marks** to be considered

II. **Teacher's assessment** (**TA**) (**20 marks**),

III. **Class attendance** (**CA**) (**5 marks**), and

IV. **End-Semester Examination** (**60 marks**) for a duration of 2.5 h

Mid-Semester, other teacher's assessments, and class attendance shall be recorded and evaluated by the concerned teacher(s), and altogether shall carry **40% weightage** in the final grades for the course.

The End-Semester Examination shall be carried out by the Institute's Exam Cell, and shall carry **60% weightage** in the final grades for the course.

c. Evaluations in each semester (labs / studios / workshops):

I. **Teacher's Assessment** (**TA**) (**35 marks**), – 20 marks for throughout the Semesterperformance10 marks for viva / quizzes / assignments5 marks for records / notebooks

II. **Attendance** (**CA**) (**5 marks**), and

III. **End-Semester Examination** (**60 marks**) – 50 marks for performance in the Exam10 marks for viva.

Teacher's assessments, and lab / studio / workshop, and attendance shall be recorded and evaluated by the concerned teacher(s), and altogether shall carry **40% weightage** in the final grades for the course.

The End-Semester Examination (labs / studios / workshops) shall be carried out by the concerned teacher(s) and shall carry **60% weightage** in the final grades for the course.

d. Question paper format for Examination in theory courses for Diploma and B.Tech programs:

Semester Examination QP: 10 MCQs (1 mark each) + 4 short-answer type (5 marks each) + 2 long-answer type (15 marks each)

Mid-Semester Examination QP: 5 MCQs (1 mark each) + 2 short-answer type (5 marks each) + 1 long-answer type (15 marks each)

The evaluation and grading of students in the Diploma and the UG programs are summarized in the following table.

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Table: Summary of the modifications in the Academic Regulations for Diploma (RA-1) and for UG(RA-2)

Continuous Evaluation (40% weightage) for theory		
Teacher's Assessment (Home Assignment, Quizzes, Group Discussion, Presentation etc.) (20)	Mid semester Marks (15)	Attendance (5)

Continuous Evaluation (40% weightage) for lab / studio / workshop			
Teacher's assessment (35)			Attendance (5)
Lab / workshop / studio performance throughout the Semester (20)	Viva (10)	Record(s) (5)	

Resolution: In each Semester, starting from batches admitted in 2019-20 Academic Session (2nd Semester) and the batches to be admitted in 2020-21 Academic Session, the evaluation process for each course shall be conducted on the basis of the procedures detailed in the following points.

d. In case of –

I. Theoretical subjects, the evaluation shall include continuous Teacher's assessments (TA) through quizzes, assignments, other forms of evaluation of class performance(s) throughout the Semester, Mid-Semester Examination, and class attendance (CA), followed by the End-Semester Examination.

II. Laboratory courses / design / drawing / studio / workshop etc., the evaluation shall be on the basis of Teacher's assessments (TA) through quizzes, assignments, lab / studio / workshop record(s), other forms of lab / studio / workshop performance(s), viva, lab / studio / workshop attendance (CA), followed by the End-Semester Examination.

e. Evaluations in each semester (theory courses):

I. **Mid-Semester Examination** (full marks – **30;** duration **1.5 h**) →**20 marks** to be considered,

II. **Teacher's assessment** (**TA**) (**20 marks**), and

III. **End-Semester Examination** (**60 marks**) for a duration of 2.5 h

Mid-Semester, other teacher's assessments, and class attendance shall be recorded and evaluated by the concerned teacher(s), and altogether shall carry **40% weightage** in the final grades for the course.

The End-Semester Examination shall be carried out by the Institute's Exam Cell, and shall carry **60% weightage** in the final grades for the course.

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Continuous Evaluation (40% weightage) for theory		
Teacher's Assessment (Home Assignment, Quizzes, Group Discussion, Presentation etc.) (20)	Mid-semester Marks (20)	Attendance (5)

f. Evaluations in each semester (labs / studios / workshops):

I. **Teacher's Assessment (TA) (40 marks)**, – 20 marks for throughout the Semesterperformance,10 marks for viva / quizzes / assignments,10 marks for records / notebooks, and

II. **End-Semester Examination (60 marks)** – 50 marks for performance in the Exam10 marks for viva.

Teacher's assessments, and lab / studio / workshop, and attendance shall be recorded and evaluated by the concerned teacher(s), and altogether shall carry **40% weightage** in the final grades for the course.

The End-Semester Examination (labs / studios / workshops) shall be carried out by the concerned teacher(s) and shall carry **60% weightage** in the final grades for the course.

Continuous Evaluation (40% weightage) for lab / studio / workshop		
Lab / workshop / studio performance throughout the Semester (20)	Viva (10)	Record(s) (10)

d.Question paper format for Examination in theory courses for Diploma and B.Tech programs:

More discussions are needed to have several question paper formats depending on various branches and disciplines of courses taught in the Diploma and UG programs. The Members resolved that the primary guiding principle should be that a question paper should cover all the modules included in the syllabus for the Exam.

Item No. 09.04: **Proposed modifications in the Academic Regulation (RA-4) for Ph.D Program.**

The following modification in the clause 17.2 regarding duration of Ph.D program may be considered by the Members.

17.2 The minimum duration of the PhD Programme (excluding dropped Semester (s) /maternity leave) is six semesters. If a student (s) has/have performed excellent publication in international standard he/she is/are eligible to submit their thesis in four semesters on the recommendation of Chairman, IPhDPC and Chairman Senate through Chairman, DPhDPC. In addition, submission of synopsis and thesis shall have to meet the criteria mentioned in clause 18 of the Regulation.

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Resolution: The Members resolved the following modification in the clause 17.2 regarding duration of Ph.D program.

17.2 The minimum duration of the PhD Programme (excluding dropped Semester (s) /maternity leave) is four semesters, provided it is recommended by the Chairman, IPhDPC and Chairman Senate through Chairman, DPhDPC. In addition, submission of synopsis and thesis shall have to meet the criteria mentioned in clause 18 of the Regulation.

The modified Academic Regulation-4 (RA-4) is attached with the Minutes as Annexure I.

Item No. 09.05: **Proposed modifications in the Academic Ordinance (OA).**

7.1 The letter grades, the corresponding grade points (on a 10-point scale), and their descriptions are as follows:

Letter grade	Grade point awarded	Description
O	10	Outstanding
AA	10	Excellent
AB	9	Very Good
BB	8	Good
BC	7	Above average
CC	6	Average
CD	5	Below average
DD	4	Pass
F	0	Fail

Relative grading system shall be implemented in grading students' performance in all the courses. The following calculations shall be implemented based on the arithmetic mean (μ_x) and the highest (X_{max}) marks obtained by students in a particular course.

$$A = [X_{max} - (\mu_x/2)] / 7$$

The range of marks determining the grades on the basis of the calculations are listed in the following table.

Table: Relative grades calculation matrix

Lower Range of Marks	Grade	Upper Range of Marks
$\mu_x/2 + 6A \leq$	AA	$\leq X_{max}$
$\mu_x/2 + 5A \leq$	AB	$< \mu_x/2 + 6A$
$\mu_x/2 + 4A \leq$	BB	$< \mu_x/2 + 5A$
$\mu_x/2 + 3A \leq$	BC	$< \mu_x/2 + 4A$
$\mu_x/2 + 2A \leq$	CC	$< \mu_x/2 + 3A$
$\mu_x/2 + A \leq$	CD	$< \mu_x/2 + 2A$
$\mu_x/2 \leq$	DD	$< \mu_x/2 + A$
	F	$< \mu_x/2$

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7.5 Final CGPA for Diploma in Engineering and Technology, and for UG programs shall becalculated as the weighted averages of the Yearly GPAs (Y_i), as detailed in the following table.

$$\text{CGPA} = \frac{\sum_{i=1}^{n} W_i Y_i}{\sum_{i=1}^{n} W_i}$$

$W_i \rightarrow$ Weightage for YGPA for the year "i" (Y_i)

4 – Year UG	3 – Year UG: Lateral Entry	3 – Year Diploma	2 – Year PG
W_1 =0.4 W_2 =0.6 W_3 =1.0 W_4 =1.0	W_1 =0 W_2 =1.0 W_3 =1.0 W_4 =1.0	W_1 =0.4 W_2 =0.6 W_3 =1.0	W_1 =1.0 W_2 =1.0

7.8 The instructor(s) shall submit all the marks through the Institute's ERP system, shall sign, and submit two copies of the submitted marks to the concerned Head of the Department by the due date specified in the concerned notification. The Head of the Department shall forward one copy of all the grades to the Academic Section by the due date specified in the concerned notification.

Resolution:

- The Members approved the modifications in clauses 7.1 and 7.5 of the Academic Ordinance (OA), as mentioned in the Agenda Item. The modified OA is attached with the Minutes as Annexure II.
- The Members resolved to include the steps mentioned in the clause 7.8, as part of the Academic Regulations (RA-1, 2, 3). The modified Academic Regulations are attached with the Minutes as Annexure III (A, B & C).

Item No. 09.09: Any other item with the permission of the Chair.

1. In view of the pandemic of novel corona virus (COVID-19), academic activities are postponed. The Members were urged to suggest necessary steps to deal with the emerging challenges in this regard.

   Resolution: The Members were unanimous to suggest that our focus should be on necessary modification(s) in the Academic Calendar, and compensatory academic activities, as and when opportunities come.

2. Functioning of the Institute's Exam Cell with respect to the affiliated programs.

   Resolution: The Members agreed that in reference to the MoM of the 6th Senate held on January 25, 2019, the Institute's Exam Cell is under the purview of the Dean-Academic Affairs Office, and hence all the results of the

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affiliated programs shall be ratified through the concerned Office, before submission to the affiliating body.

The Members resolved that the deadline for question paper submission, marks submission, completion of supplementary exams, as notified by the Dean-Academic Affairs Office and approved by the competent authority, need to be strictly followed in order to ensure timely declaration of results and promotion.

3. In view of the Deemed-to-be-University status of the Institute, formatting of the Institute's final transcripts, organization of Convocation was discussed briefly in the Meeting.

   Resolution: The Senate Members resolved that an Institute-level Committee to be formed by the Chairman Senate to discuss and take decision regarding organization of Convocation. The Members also agreed that a single transcript carrying all the final SGPAs and the final CGPA shall be formatted (with unique formatting for the letter grades), and placed in the next Senate for approval.

4. A discussion was held on the need for the mapping of the students in the affiliated program taking re-admission in the 2nd and 3rd semesters with CITK (Deemed to be University) system.

   Resolution: It was proposed that a committee will be formed by the honourable Director, CITK to look after the matter.

5. A discussion took place on the creation of new faculty positions such as Professor of Practice (with relevant industry experience), Adjunct Professor, and Honorary Professor.

   Resolution: All the departments were requested to prepare the list of requirements for their respective departments and to forward the same to the office of the Registrar for further processing.

6. The proposed new M.Des program in indigenous Artefacts and Design Heritage under MCD dept.

   Resolution: According to the LoA issued by MHRD for granting Deemed to be University status, **six De-novo PG programmes** are to be started by the institute. **Four out of these six** programmes has already been started from the academic session 2019-20. The remaining two programmes are:

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1. M.Des in Indigenous Artefacts and Design Heritage, and
2. M.Tech Agricultural Science and Technology.

In view of the financial constraints, and shortage of faculty recruitments, the Members noted that extensive inputs of infrastructure development, space development, and manpower recruitment are needed to initiate and to establish the proposed M.Tech programme in Agricultural Science and Technology. However, such extensive inputs are not needed to add the De-novo M.Des program in Indigenous Artefacts and Design Heritage in the MCD Department. The HoD, MCD was requested to compile a **Working Proposal** with all the requirements to start the programme.

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(Ms.Chaitali Brahma)
Ex-officio non-member Secretary
Senate, CIT Kokrajhar
Chaitali Brahma
Registrar
Central Institute of Technology
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Minutes of the 10th Senate meeting of Central Institute of Technology Kokrajhar held on 23rd December, 2020 through online mode

The Chairman, Senate, Central Institute of Technology Kokrajhar welcomed all the Members present in the meeting.

Item No. 10.01: **Confirmation of the Minutes of the 9th Meeting of the Senate of CIT Kokrajhar held on 19th March, 2020 in the Director's conference Hall.**

The Minutes of the 9th Meeting of the Senate held on 19th March, 2020 was circulated amongst the members. As no comments were received from the members, the minutes of the 9th Meeting may be confirmed.

Resolution: After threadbare discussion, the members confirmed the Minutes of the 9th (ninth) Senate Meeting.

Item No. 10.02: **Amendment in the Academic Regulation (RA-4) for Ph.D Program.**

An amendment in the clause no. 9.1 of the academic regulation for the PhD programme was done with due approval of the Chairman, Senate of the institute in June, 2020 as represented in the table shown below.

Clause No.	Original clause	Amended clause
9.1	To monitor the progress of research of a student, there shall be a Doctoral Committee with the following composition: i. Head of Department Chairman ii. Supervisor(s) Member(s) iii. Two other faculty members out of which one should be from Other department Member	To monitor the progress of research of a student, there will be a Doctoral Committee with the following composition: i. A faculty member other than the Supervisor(s) to be nominated by the DPPC Chairman ii. Supervisor(s) Member(s) iii. Two other faculty members of which one should preferably be from another department Member

The members were requested to give post facto approval on the same.

Resolution: The Members approved the amendment as proposed and executed.

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Item No. 10.03: **Proposal for revision of course codes of various courses/course works of the PG and PhD programmes of the institute.**

In the curriculum of the PG and PhD programmes, the course codes assigned to some of the courses/course works were not as per the instructions given in the academic ordinance of the institute. In view of this the course codes of those courses was reviewed and reframed as per the existing regulation. Drafts of those modified courses were placed in the meeting.

The members were requested to approve the drafts.

Resolution: The members approved the drafts as proposed.

Item No. 10.04: **Proposal for Approval of the 4th semester curriculum of the UG and Diploma programmes of the institute.**

In line with the model curriculums of AICTE, Central Institute of Technology Kokrajhar had finalised the curriculum of the 1st, 2nd and 3rd semesters of all the Diploma and Degree programmes of the institute. In a similar way, the drafts of the curriculum for the 4th semester of those programmes were also prepared to be implemented from the ensuing even semester session. A draft of the same was placed in the meeting.

Members were requested to comment on these.

Resolution: The curriculum for the 4th semester courses of the UG and Diploma programmes were approved by the members.

Item No. 10.05: **Approval of various forms/formats related to the PhD programmes of the institute.**

Keeping in view the current regulations and ordinances of the institute, various forms related to the PhD programmes were drafted for their smooth conduction and appropriate maintenance of records.

Members were requested to approve the formats.

Resolution: The members approved the forms/formats as proposed.

Item No. 10.06: **Proposal for amendment of the minimum eligibility criteria for PG and PhD admission.**

As per the current eligibility criteria of admission into various PG (M. Tech) programmes of the institute, a candidate should ***Pass B. Tech or Equivalent with a minimum CGPA of 6.5/10 or 60% of marks in***

aggregate in relevant disciplines (5% relaxation for SC/ST/PWD candidates). Similarly in case of PhD programmes, ***one should pass Master degree in relevant discipline with a minimum CGPA of 6.5/10 or 60% for Engineering or Grade B or 55% of marks in UGC 7 point scale for others***. As these criteria were not directly matching with the current AICTE regulations, the institute proposed to amend the criteria of admission into the PG and PhD programmes of the institute in terms of minimum eligible marks in qualifying examinations as per the existing regulations of AICTE. The institute also proposed to follow the regulations of AICTE as and when modified in this regard.

Members were requested to approve the proposal.

Resolution: The proposed amendments were approved by the members.

Item No. 10.07: **Amendment of the Rules and Regulations of UG Programme (RA-2) of the institute.:**

Section 4 of the Rules and Regulations of UG Programme (RA-2) of Central Institute of Technology Kokrajhar was with regard to change of branch for B.Tech students. The Clause 4.2 of the regulation was as follows:

"Change of branch shall be subject to the limitation that the strength of a branch should not fall below the existing strength by more than ten percent (10%) and should not go above the sanctioned intake by more than ten percent (10%)."

In the mentioned clause there was a 'difficulty', which was related to the number of students leaving a branch. On one hand the clause was restricting the number of students leaving a branch to ten percent of **existing strength** in the branch and on the other hand it was allowing ten percent of the **sanctioned strength** to enter a branch. To allow more and more students to study in their choice of branch in case of vacancy, the institute amended Clause 4.2 of RA-2 as follows:

"Change of branch shall be subject to the limitation that the strength of a branch should not fall below/go up by more than ten percent of the sanctioned strength."

The above-mentioned amendment was represented in the table shown below:

CLAUSE NO	ORIGINAL RA-2 APRIL 2020	AMENDMENT PROPOSED
4.2	Change of branch shall be subject to the limitation that the strength of a branch should not fall below the existing strength by more than ten percent (10%) and should not go above the sanctioned intake by more than ten percent (10%).	Change of branch shall be subject to the limitation that the strength of a branch should not fall below/go up by more than ten percent of the sanctioned strength.

The members were requested to offer post facto approval on the proposal.

Resolution: The members approved the amendment.

Item No. 10.08: **Academic Calendar of the institute.**

The academic calendar of the institute for the session 2020-21 was prepared and finalized by the academic calendar and time table committee. The same was presented in the meeting.

Members were requested to approve the same.

Resolution: The members approved the Academic calendar.

Item No. 10.09: **Reporting items.**

1. **Admission report**:

   Under the status of Deemed to be University, CIT Kokrajhar had started the following programmes from the academic session 2019-20 as per the revised rules and regulations.

   Diploma Programmes are:

   1. Electronics & Telecommunications Engineering,
   2. Computer Science and Engineering,
   3. Control and Instrumentation Engineering,
   4. Food Processing Technology,
   5. Civil Engineering and
   6. Animation and Multimedia Technology.

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U.G. (B. Tech. & B. Des.) Programmes are:

1. B. Tech. in Electronics & Communications Engineering,
2. B. Tech. in Computer Science & Engineering,
3. B. Tech. in Instrumentation Engineering,
4. B. Tech. in Food Engineering and Technology,
5. B. Tech. in Civil Engineering and
6. B. Design (Specialisation in Multimedia Communication and Design)

P.G programmes are:

1. M. Tech in Food Engineering and Technology,
2. M. Tech in Water Resources and Hydraulic Engineering,
3. M. Tech in Green Energy Technology,
4. M. Des (Specialized in Multimedia Communication and Design),
5. M. Tech in Computer Science & Engineering.

PhD programmes in various specializations was also started from the academic session 2019-20.

Status of admission into various programmes (Diploma, UG, PG and PhD) of the institute for the academic session 2020-21 were as follows:

Module/Branch	ET/ECE	CO/CSE	CAI/IE	FP/FPT	CT/CE	AM	**Total**
Diploma 1st sem	27	31	25	21	33	12	**149**
B.Tech 1st sem	40	68	37	26	45		**216**
B.Tech , Latera/ Vertical (3rd sem)	30	39	20	10	26		**125**
B.Des 1st sem	**23**						**23**
B.DesLatera/ Vertical (3rd sem)	**03**						**03**
M.Tech	**GET-07**	**CSE-10**	**FET-17**	**WR & H -18**			**52**
M.Des	**09**						**09**
PhD							**42**
TOTAL							**619**

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2. **Report on Training & Placement of the institute:**

The activities performed by the T&P cell during the reporting period (January, 2020-December, 2020) were as below:

1. **Facilitating off-campus industrial training of pre-final year students**

The T&P cell facilitated usually summer/winter training of nearly one month to students from all branches under degree and diploma programmes in different industries and organizations in both private and government sectors with the active cooperation of the various departments of Engineering&Technology. Basically, every department has their own training and placement coordinator and the collaborative effort with the T&P cell results a good output. Training comprises of generally information technology based sector/organization and core industry/organization based. Though due to COVID19 pandemic situation, the training was not possible in an effective way but a significant no. of students (265) undertook these trainings in 39 companies/organizations including IT sector, core company viz. private and Government along with departmental level. Therefore, under this specific situation this is satisfactory.

A detailed and consolidated training status is provided below.

Sl.No.	Industry/Organization	No. of Students		Branch/ Department
1.	Public work department (PWD) Road, Nalbari	06	42	CE
	Patshala Irrigation Divison	01		
	Internshala	02		
	Coursera	02		
	NHPC GERUKAMUKH	05		
	N. F Railway Maligaon	03		
	MSME, Guwahati	03		
	CIT Kokrajhar	17		

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	CIT, Irrigation Department, and Brahmaputra Board	01		
	Water resources department, Flood control and Drainage division Lalganj, Bihar	01		
	GUWAHATI MUNICIPAL CORPORATION, GUWAHATI	01		
2.	Internshala	28	52	CSE
	The Wings of Desire/Mozaruk businesses and Private limited(freelance)	02		
	Coursera	02		
	Skyfi lab	01		
	PPS Project Striker Pvt Ltd	01		
	3D Motion Creative	01		
	Swaymetrics	01		
	CIT Kokrajhar	10		
	Ogma Tech	01		
	Aspirevision Tech Education Pvt. Ltd	04		
	Mozaruk businesses and Private Ltd. (freelance)	01		
3.	Internshala	10	41	IT
	NET Infosys	01		
	Tech Booster Guwahati	06		
	Ogma Tech	01		
	Coursera	02		
	IOCL	04		
	Innovate Skill (NITTTR Chandigarh Start-Up)	10		
	Udemy	01		
	Skyfi lab	05		
	Career Launcher Data school	01		

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4.	Department of FET; CITK	44	48	FET
	Master India Brewing company	03		
	Varun beverage	01		
5.	Internshala	04	30	IE
	IOCL	13		
	Exposys Data Lab	06		
	CIT Kokrajhar	01		
	NTPC, Salakati	01		
	B.S.N.L (GUWAHATI)	03		
	Smart bridge educational services private limited	01		
	Bhagalpur college of engineering	01		
6.	Internshala	05	50	ECE
	Coursera	28		
	Exposys Data Lab	09		
	Tech Booster Guwahati	02		
	B.S.N.L (GUWAHATI)	01		
	IITG	01		
	CDAC, Silchar	04		
7.	KinderPass	01	02	MCD
	Stamurai	01		
	Total	265		

2. Consolidated Training Status of Prefinal year students

Sl. No.	Places where training is done	No. of candidates
1	CIT Kokrajhar	72
2	Internshala (online)	49
3	Coursera (online)	34
4	Exposys Data Labs (online)	15
5	IOCL Bongaigaon	13
6	Ennovate Skill (NITTTR Chandigarh Start-Up)	10

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7	Tech Booster Guwahati	8
8	Public work department (PWD) Road, Nalbari	6
9	BSNL, Guwahati	4
10	Skyfi Labs	6
11	NHPC, Gerukamukh	5
12	Aspirevision Tech Education	4
13	N.F. Railway Maligaon	3
14	C-DAC Silchar	3
15	IOCL Noonmati	3
16	Master india Brewing company,Changsari	3
17	MSME,Guwahati	3
18	Ogma Tech	2
19	The wings of Desire (NGO)	2
20	NTPC, Salakati	1
21	Water resources department, Flood control and Drainage division, Lalganj, Bihar	1
22	Career Launcher Dataschool	1
23	3D Motion Creative	1
24	Udemy	1
25	KinderPass	1
26	Bhagalpur college of engineering	1
27	Smartbridge Educational Services Private Ltd.	1
28	Mozaruk businesses and Private Ltd. (freelance)	1
29	Swaymetrics	1
30	Varun beverage	1
31	Brahmaputra Board	1
32	C-DAC Chennai	1
33	GUWAHATI MUNICIPAL CORPORATION	1
34	IIT Guwahati	1
35	IOCL Barauni	1
36	Patshala Irrigation Divison	1
37	PPS Project Striker Pvt Ltd	1

38	Stamurai	1
39	NET Infosys	1
Total		265

3. Placement Status of Pass out Students

Though in this year (2020) due to COVID19 pandemic situation, the Placement was not possible in an effective way but even under such condition no. of students were placed in some companies/industries, somebody is perusing higher studies and preparing for Government jobs. The detail status is provided below.

Sl No.	Company/ Organization/ Industry	Recruitment Mode	Position/Capacity	Branch	CTC
1.	Byju's	Off campus	Business Development Associate	All Branches	10LPA
2.	Extramarks Education	Off campus	Business Development Executive	All Branches	8LPA
3.	Cognizant	Off campus	Programmer Analyst Trainee	CS/IT/ECE/ IE	4LPA
4.	Capgemini	Off campus	Analyst	CS/IT/ECE/ IE	3.8LPA
5.	Wipro	Off campus	Graduate Engineer Trainee	CS/IT/ECE/ IE	3.5LPA
6.	CSS Corp	Off campus	Engineer Trainee	CS/IT/ECE/ IE	2.5LPA
7.	Ethussia	Off campus	Trainee	All Branches	2.5LPA
8.	Self employment	Off campus	Business proprietor	CE	3 LPA

9.	Government sector	Off campus	Contractual	CE	3.24 LPA
10.	Private sector	Off campus	Permanent	CE	2.4 LPA
11.	Anmol, kolkatta	Off campus	Shift Incharge	FET	2.22 LPA
12.	Brahmaputra Food's Pvt.Ltd. (Freshy), Guwahati.	Off campus	Production Executive at	FET	1.8 LPA
13.	Pepsi co, Guwahati.	Off campus	Production Executive	FET	1.68 LPA

3. **Report on NBA activities:**

Central Institute of Technology Kokrajhar had completed the registration process in the NBA portal (e-NBA) as a **TIER II** institute in January, 2018. At that time, the institute was affiliated to the following entities/Universities:

1. Gauhati University, Guwahati, Assam (for B. Tech programmes),
2. Assam Science and Technology University, Guwahati (for B. Des programme) and
3. Directorate of Technical Education, Government of Assam (for Diploma programmes).

Subsequently, the institute was upgraded to an autonomous "institution deemed to be University" by the Ministry of Human Resource Development (Now Ministry of Education) of the Government of India vide Notification No. F.9-1/2016-U3 (A) dated December 13, 2018. Accordingly, the institute applied to AICTE for

Central Institute of Technology Estd-2006 Kokrajhar

progressive closure of its existing programmes, and applied afresh as a new institute in the same campus for approval of its programmes under 'Deemed to be University" status. In response of the institute's application, Letter of Approval was issued by AICTE vide No. Eastern/2019-20/1-4629663461 dated March 18, 2019.

As an academically autonomous institute, CIT Kokrajhar had started 3-year Diploma programmes in six disciplines, 4-year U.G. (B.Tech& B. Des) programmes in six disciplines, 2-year PG programmes in five disciplines and PhD programmes in various specializations from the academic session 2019-20. In view of the current status and as per the guidelines of NBA, the institute now falls in **TIER I** category of institutions.

Accordingly, the institute applied to the member Secretary of NBA requesting for the modification of the status of CIT Kokrajhar in the e-portal of NBA. Based on the Institute's application, the status of the institute has been updated in the record of NBA on 29-10-2020.

As the institute has now been granted the status of TIER I category by NBA, the necessary activities for getting accreditations have been resumed at all relevant levels by following the new format of documents published by NBA.

4. **Report on various academic activities:**

In view of the unprecedented circumstances caused by COVID-19 pandemic condition, various measures were taken for smooth conduction of the academic activities with due approval of the competent authority of the institute. These were placed in the meeting.

Resolution: All the reports were noted by the members.

(Ms. Chaitali Brahma)
Non-member Secretary, Senate &
Registrar, CIT Kokrajhar

Chaitali Brahma
Registrar
Central Institute of Technology
Kokrajhar

Central Institute of Technology * Kokrajhar * Estd-2006

OA

ORDINANCE (DIPLOMA, UG, PG & PhD PROGRAMMES)

(Under Section 8 of MoA)

CENTRAL INSTITUTE OF TECHNOLOGY KOKRAJHAR

(Deemed to be university, MHRD, Govt. of India)

Kokrajhar, Assam – 783370

(Amended and approved in the ….. Meeting of …….. on …. / …. /2019)

1. DEFINITIONS

"CITK" means Central Institute of Technology Kokrajhar.

"MHRD" means Ministry of Human Resource Development.

"BoG" means Board of Governors.

"BoS" means Board of Studies.

"BTAD" means Bodoland Territorial Area Districts.

"AICTE" means All India Council for Technical Education

"Institute" means Central Institute of Technology Kokrajhar

"Undergraduate Program" / "UG Program" means four-year B.Tech / B.Des program offered by the Institute

"Postgraduate Program" / "PG Program" means two-year M.Tech / M.Des program offered by the Institute

"Course" means a paper taught in a UG Program e.g. Linear Algebra.

"HoD" means Head of the Department.

"GPA" means Grade Point Average.

"CGPA" means Cumulative Grade Point Average.

"SGPA" means Semester Grade Point Average.

"Senate" means Academic Senate of the Institute.

"Direct Entry" means students' intake in the 1st Semester, 1st year of the 4 year B.Tech /B.Des Program.

"Vertical Entry" means intake of Diploma holders in the relevant branch, passed out from CITK, in the 3rd Semester, 2nd year of the B.Tech / B.Des Program in the 3 + 3 (3 years Diploma + 3 years Degree) Modular Program.

"Lateral Entry" means intake of Diploma holders from other accredited Institutes / Colleges / Universities in the 3rd Semester, 2nd year of the B.Tech Program.

2. PROGRAMME

2.1 Central Institute of Technology Kokrajhar (CITK), Deemed to be University, MHRD, Govt. of India, shall offer Diploma, B.Tech, B.Des, M.Tech, M.Des, Ph.D programs in various disciplines, and these programs shall be governed by the Rules and Regulations of the respective programs.

2.2 Any newly introduced discipline in a particular program shall also be governed by the Rules and Regulations of the respective program of the Institute.

2.3 A student becomes eligible for the award of a Diploma / UG / PG / Ph.D degree after fulfilling all the academic requirements, including Training(s), as prescribed by the Rules and Regulations for the respective program.

3. ACADEMIC CALENDAR

3.1 Each academic session is divided into two semesters, each having approximately eighteen (18) weeks duration, with at least seventy (70) working days for classes in each semester: an Odd Semester (July - December) and an Even Semester (January - June).

3.2 The schedule of academic activities for a session, inclusive of dates for admission, registration, Semester and Mid-term Examinations, inter-Semester breaks etc., approved by the Senate, shall be laid down in the Academic Calendar for the session.

4. ADMISSION

4.1 Reservation of Seats

Reservation of shall be according to the Clause 21.3 of the MoA of the Institute.

5. ROLL NUMBER

5.1 Roll Number Structure

A roll number assigned to a student shall be an 8 or 11 digit code divided into five distinct parts. The breakup of the code is as described in the following scheme and in the subsequent descriptions:

CCCC / DD EE / F / GGG
[3]

Part 1 Part 2 Part 3 Part 4 Part 5

(i) Part 1
This part represents the year of admission for a student e.g. "2019" for a student taking admission in 2019-20 Academic Session. For Lateral and Vertical entry students, these four digits is an year earlier than the year they actually take admission into the Program.

(ii) Part 2
It is a two-digit code representing the program (following table), in which a student has taken admission e.g. "02" for B.Tech or "05" for M.Des.

Program	Code
Diploma	01
B.Tech	02
B.Des	03
M.Tech	04
M.Des	05
Ph.D	06

(iii) Part 3
It represents the code corresponding to the Department (following table), in which the student is enrolled e.g. "05" for Food Engineering and Technology Department.

Name of Department	Code
Civil Engineering	01
Computer Science Engineering	02
Electronics and Communication Engineering	03
Electrical Engineering (EE)	04
Food Engineering and Technology	05
Instrumentation Engineering	06
Mechanical Engineering (ME)	07
Multimedia Communication and Design	08
Chemistry	09
Humanities and Social Sciences	10
Mathematics	11
Physics	12
Combined Departments of EE and ME	13

(iv) Part 4
This part represents a single digit – "1" for Direct or "2" for Lateral and Vertical entry students.

(v) Part 5
This part represents a serial number corresponding to a student, who has taken admission in a program in a branch.

6. COURSE STRUCTURE

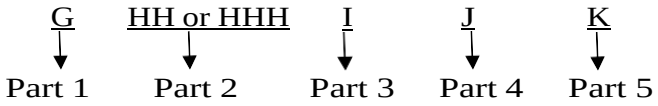
6.1 Credit

Teaching of a particular course in a program shall be reckoned in credits; Credits are assigned to the courses based on the following general pattern:

1 h Lecture (L) per week	2 credit
1 h Tutorial (T) per week	2 credit
1 h Studio Project	2 credit
1 h Practical (P) per week	1 credit
1 h Project Work	1 credit
1 h Seminar / Training / Industrial Training	1 credit

6.2 Course Description

Each of the courses to be taught in a program shall have a course name (to be named by the Departmental BoS) and a distinct course code, as per the following structure.



(i) Part 1

It represents the program (following table), in which the course is taught

Program	Code
Diploma	D
Undergraduate	U
Postgraduate (including Ph.D)	P

(ii) Part 2

It represents the code for the relevant offering Branch / Department (following table) e.g. “IE” for Instrumentation Engineering or “CSE” for Computer Science and Engineering.

Name of Department	Code
Civil Engineering	CE
Computer Science Engineering	CSE
Electronics and Communication Engineering	ECE
Electrical Engineering	EE
Food Engineering and Technology	FET
Instrumentation Engineering	IE

Mechanical Engineering	ME
Multimedia Communication and Design	MCD
Chemistry	CH
Humanities and Social Sciences	HSS
Mathematics	MA
Physics	PH

(iii) Part 3

This digit represents the Semester (e.g. 1 to 8), in which the course is taught.

(iv) Part 4

This digit stands for the type of the course i.e. it is 0 (zero) for a Compulsory Theory Course, 1 (one) for an Elective Course, 7 (seven) for a Lab, 8 for a Lab in an Elective Course, and 9 (nine) for projects / studio project, seminars, trainings etc.

(v) Part 5

This digit stands for Serial number according to the number of courses offered by the Department in a Semester of the program, e.g. "UFET401" and "UFET471" is the first compulsory theory and corresponding laboratory courses, respectively, in the 4th Semester B.Tech program offered by the Food Engineering and Technology Department.

7. GRADING SYSTEM

7.1 Based on the performance of a student, each student is awarded with a letter-grade in each subject at the end of a semester. The letter grades, the corresponding grade points (on a 10-point scale), and their descriptions are as follows:

Grade	Grade point awarded	Description
O	10	Outstanding
AA	10	Excellent
AB	9	Very Good
BB	8	Good
BC	7	Above average
CC	6	Average
CD	5	Below average
DD	4	Pass
F	0	Fail

Relative grading system shall be implemented in grading students' performance in all the courses. The following calculations shall be implemented based on the arithmetic mean (μ_x) and the highest (X_{max}) marks obtained by students in a particular course.

$$A = [X_{max} - (\mu_x/2)] / 7$$

The range of marks determining the grades on the basis of the calculations are listed in the following table.

Lower Limit of Marks	Grade	Upper Limit of Marks
$\mu_x/2 + 6A \leq$	AA	$\leq X_{max}$
$\mu_x/2 + 5A \leq$	AB	$< \mu_x/2 + 6A$
$\mu_x/2 + 4A \leq$	BB	$< \mu_x/2 + 5A$
$\mu_x/2 + 3A \leq$	BC	$< \mu_x/2 + 4A$
$\mu_x/2 + 2A \leq$	CC	$< \mu_x/2 + 3A$
$\mu_x/2 + A \leq$	CD	$< \mu_x/2 + 2A$
$\mu_x/2 \leq$	DD	$< \mu_x/2 + A$
	F	$< \mu_x/2$

7.2 A Semester Grade Point Average (SGPA) shall be computed for each semester, and the calculations shall be as follows:

$$SGPA = (C_1*G_1 + C_2*G_2 + C_3*G_3 + \ldots + C_n*G_n) / (C_1 + C_2 + C_3 + \ldots + C_n)$$

where, n is the number of courses registered in the semester,
C_i is the number of credits allotted to a particular course, and
G_i is the grade points corresponding to the grade awarded for the course.

7.3 A Cumulative Grade Point Average (CGPA) shall be computed at the end of each semester and communicated to the students along with the SGPA, and the grades obtained in that semester.

The CGPA gives the cumulative performance of the student from the first semester up to the end of the semester, to which it refers, and will be calculated as follows:

$$CGPA = (C_1*G_1 + C_2*G_2 + C_3*G_3 + \ldots + C_m*G_m) / (C_1 + C_2 + C_3 + \ldots + C_m)$$

where, m is the number of courses up to that semester,
C_i is the number of credits allotted to a particular course, and
G_i is the grade points corresponding to the grade awarded for the course.

Whenever a student repeats a course in any semester, the lower grade(s) obtained by him/her in the course is to be ignored in the computation of SGPA in the corresponding Semester, and CGPA from that semester onwards

7.4 Both SGPA and CGPA will be rounded off to the second place of decimal, and recorded as such. Whenever these CGPA are to be used for the purpose of determining the merit ranking of students, only the rounded off values shall be used.

7.5 Final CGPA for Diploma, UG, and PG programs shall be calculated as the weighted averages (the following formula) of the Yearly CGPAs (Y_i for i-th year), as detailed in the following table.

$$\text{CGPA} = \frac{\sum_{i=1}^{n} W_i Y_i}{\sum_{i=1}^{n} W_i}$$

$W_i \rightarrow$ Weightage for yearly CGPA for the i-th year (Y_i)

8.

4-Year UG	3-Year UG: Lateral Entry	3-Year Diploma	2-Year PG
W_1 =0.4 W_2 =0.6 W_3 =1.0 W_4 =1.0	W_1 = 0 W_2 =1.0 W_3 =1.0 W_4 =1.0	W_1 =0.4 W_2 =0.6 W_3 =1.0	W_1 =1.0 W_2 =1.0

7.6 There are, however, a few other academic requirements for certain programs, where a student shall be awarded with one of the two grades viz., "PP" - Passed and "NP" - Not Passed. All non-credit subjects (such as NCC / NSS, field visits etc.) belong to this category. No grade points are associated with these subjects, and performance in these subjects is not taken into account in the calculation of the SGPA or CGPA. However, the award of the degree is subject to obtaining a "PP" grade in all such subjects if introduced.

7.7 If comparison of the performance of a student of CITK with those of other institutes using conventional evaluation method is desired, the following formulae for converting SGPA / CGPA to percentage (%) of marks shall be used:

For SGPA / CGPA $\geq$ 9.0,
the equivalent % of Marks = 15 × CGPA – 50

For SGPA / CGPA < 9.0,
the equivalent % of Marks = 10 × GPA – 5.0

8 DISCIPLINE AND CONDUCT OF STUDENT

8.6 Ragging

Ragging in any form is banned. Any act of ragging, if reported / detected, shall be considered as gross indiscipline, and shall be severely dealt with, as per the UGC Rules.

8.7 Attendance

Students are expected to attend all (100%) classes (Lectures, Tutorials, Laboratories, Practical and Workshops, Studios, etc.). However, under unavoidable circumstances, as per the consideration of the concerned faculty instructor and approved by the concerned HoD, a student is required to have at least 75 percent attendance among the total number of classes held in a course.

In Extra Academic Activities (EAC), i.e. NCC, NSS etc., if introduced, a student must attend at least 75 percent of the total classes as also the camps, and some other pre-publicized programs as specified under course requirements.

8.8 Leave of Absence

A student shall have to submit an application to the concerned Head of the Department for a leave stating fully the reasons for the leave requested for along with supporting document(s). Such leave shall be granted by the Head of the Department.

(i) Application must be submitted to the concerned HoD prior to taking the leave. However, in case of leave in an emergency situation (including health-related issues), a student may submit the application with appropriate document(s) immediately after re-joining the regular academic activities.

(ii) It will be the responsibility of the student to intimate the Warden of the hostel in which he / she is residing, and the concerned instructors regarding his / her absence.

(iii) Under exceptional circumstances, the Dean-Academic Affairs, in consultation with the Chairman of the Senate, may relax any of the above requirements.

8.9 A student may not be allowed to appear in the End-Semester Examination due to the following reasons.

(i) If any disciplinary action is taken against him / her.

(ii) His / her attendance in the Lecture / Tutorial / Practical

classes has not been satisfactory during the semester, and/or,

(iii) His / her performance in the sessional work done during the semester has been unsatisfactory.

8.10 Withholding of Grades

Grades shall be withheld, when the student has not paid his / her dues or when there is a disciplinary action pending against him / her.

8.11 Termination from the Program

A student is required to leave the Institute on the following grounds.

(i) If a student fails to secure an SGPA of 2.0 in two consecutive semesters. However, if a student secures an SGPA below 2.0 in a Semester, he / she may still continue with a recommendation from the DUGPC, approved by the IUGPC. Subsequently, the student shall be issued a warning in this regard.

(ii) If a student is absent for more than 6 (six) weeks in a semester without sanctioned leave

(iii) A student may also be required to leave the Institute on disciplinary grounds.

(iv) On having been found to have produced false documents or having made false declaration at the time of seeking admission.

(v) On having been found to be pursuing regular studies and/or correspondence courses (leading to degree or diploma) in any other College, University or Institution.

(vi) On having been found to be concurrently employed and performing duty or carrying out business in contravention to academic schedules of the Institute and without approval from the Institute.

9 PROGRAM COMMITTEE

The Institute shall have program committees at the department level and at the institute level for the diploma, UG, PG and PhD programme. The detail structure and organization of these committees are given in APPENDIX-A.

10 REVISION OF THE ORDINANCE

The above contents of the document may be modified or revised as and when situation arises.

***

APPENDIX – A

CIT Kokrajhar Academic Organization Chart

Senate - highest body in academic matters: Director, Chairman; Dean-Academics, Member-Coordinator; all HoDs, all Professors as Members; three Professionals (outside experts) nominated by the Director; three persons nominated by Chairman-BoG; Registrar, non-member Secretary

Director- Chairman, Senate

Registrar

(Non-member Secretary to Senate, and admission and examination from administration)

Academic (Assistant) Registrar - non-member secretary to all IPCs, and examination and relevant students academic matters; coordinates with Examination

Dean Academics, Chairman to all IPCs (coordinates all academic activities with the Senate); Institutional Program Coordinators shall be Secretaries of the respective IPCs

- IUGPC (Institute Under Graduate Programme Committee) All Secretaries of DUGPC members
- IPGPC (Institute Post Graduate Programme Committee) All Secretaries of DPGPC members
- IPhDPC (Institute PhD Programme Committee) All Secretaries of DPhDPC members
- IDipPC (Institute Dip Programme Committee) All Secretaries of DDipPC members

Institute level committee (IPC) through Dean and Non-member secretary feeds to senate. Class time table and examination schedule will be executed.

Examination cell (department level DPCs secretaries through Hoods to feed information) to coordinate all examinations and results; functions with an independent office.

Departmental BoS HoD- Chairman, and Chairman to all the DPCs; BoS is composed of all the Secretaries of DPCs, all Professors in the Department; one other-Dept. Faculty nominated by the HoD

- Secretary (to coordinate) DUGPC (Department Under Graduate Programme Committee) consists of the Secretary and two faculties in the Department
- Secretary (to coordinate) DPGPC (Department Post Graduate graduate Programme Committee) consists of the Secretary and two faculties in the Department
- Secretary (to coordinate) DPhDPC (Department PhD Programme Committee) consists of the Secretary and two faculties in the Department
- Secretary (to coordinate) DDipPC (Department diploma Programme Committee) consists of the Secretary and two faculties in the Department

Department level committee (DPC) through Secretary and Head (Chairman) feeds to IPCs; all department should have independent office. Department level class-time table and examination to be managed by DPCs and Head.

RA-2

RULES AND REGULATIONS (UG PROGRAMME)

(Read with OA and under Section 8 of MoA)

CENTRAL INSTITUTE OF TECHNOLOGY KOKRAJHAR
(Deemed to be university, MHRD, Govt. of India)

Kokrajhar, Assam – 783370
(Amended and approved in the 7th Meeting of the Senate on June 4, 2019)

<table>
<tr><th colspan="2">B. Tech / B. Des Rules and Regulations</th></tr>
<tr><th colspan="2">1. PROGRAMS</th></tr>
<tr><td>1.1</td><td>The Institute shall offer the following B.Tech and B.Des programs:
<table>
<tr><th>B.Tech programs</th><th>Intake</th><th>Department</th></tr>
<tr><td>Civil Engineering</td><td>60</td><td>Civil Engineering</td></tr>
<tr><td>Computer Science and Engineering</td><td>90</td><td>Computer Science and Engineering</td></tr>
<tr><td>Electronics and Communication Engineering</td><td>60</td><td>Electronics and Communication Engineering</td></tr>
<tr><td>Food Engineering and Technology</td><td>60</td><td>Food Engineering and Technology</td></tr>
<tr><td>Instrumentation Engineering</td><td>60</td><td>Instrumentation Engineering</td></tr>
<tr><th>B.Des programs</th><th>Intake</th><th></th></tr>
<tr><td>Design</td><td>30</td><td>Multimedia Communication and Design</td></tr>
</table></td></tr>
<tr><th colspan="2">2. ADMISSION & REGISTRATION</th></tr>
<tr><td>2.1</td><td>The number of seats in each branch of the B.Tech / B.Des programs, as per the AICTE norms shall be approved by the Board of Governors (BoG) of the Institute. Reservation of seats, subject to fulfillment of eligibility criteria, shall be approved by the BoG of the Institute. The admission process, including conducting the CIT Degree Entrance Examination (CITDEE) and CIT Lateral Entrance Test (CITLET), shall be conducted and coordinated by the Admission Cell formed by the Institute from time to time. All B.Tech / B.Des admissions shall be carried out during Odd Semester only in each Academic Session.</td></tr>
<tr><td>2.2</td><td>Eligibility for B.Tech: The minimum marks shall be 50% at 10+2 level with compulsory subjects of Physics, Chemistry and Mathematics, subject to the condition that the student fulfills other criteria of admission. There shall be a relaxation of 5% marks in case of reserved category (SC/ST) students.
Eligibility for B.Des: The minimum marks shall be 50% at 10+2 level in any stream or an equivalent examination** from any Institute approved by Board/AICTE/Recognized University with not less than 50% marks, subject to the condition that the student fulfills other criteria of admission. A relaxation of 5% marks in case of reserved category (SC/ST) students shall be allowed.
** Minimum of 2 years Diploma after 10th Standard in relevant field (e.g., Visual Art, Fine Art, Commercial Art, Fashion Technology etc.) from any Govt. recognized Institute approved by State Technical Board / AICTE / University are eligible.</td></tr>
<tr><td>2.3</td><td>Reservation of seats for B.Tech / B.Des Programs for Direct Entry students shall be according to the Clause 4.1 of the OA</td></tr>
</table>

<table>
<tr><td>2.4</td><td>
<u>Admission pattern for B.Tech</u>: Admission tests for all B.Tech programs shall be conducted in the odd semester of each session as per the following pattern approved by the BoG of the Institute.
<table>
<tr><th>Year</th><th>Intake</th><th>Remark</th></tr>
<tr><td>1st</td><td>45 / 70</td><td>Direct Entry: 40% of the seats are reserved for students having valid JEE score and 60% through CIT Degree Entrance Examination (CITDEE), and the selection shall be on the basis of student' ranks in the relevant Entrance Examination</td></tr>
<tr><td rowspan="2">2nd</td><td>15 / 20</td><td>Vertical Entry: Diploma students passing out from the Institute in the relevant branch with the minimum qualifying marks of 65% for general candidates and 60% for ST and SC candidates.</td></tr>
<tr><td>6 / 9</td><td>Lateral entry: 10% of seats over and above 60 / 90 intake approved by the AICTE in a B.Tech degree program shall be admitted through Lateral Entry from accredited polytechnic Institutes / Colleges (as per AICTE mandatory requirements) and Diploma students passing out from CITK, who could not qualify for Vertical entry. The Lateral Entry students from the relevant branch, who qualify with a minimum of 60% marks (for General category) and with a minimum of 55% (for ST and SC categories) shall be selected on the basis of their ranks in the CITLET Entrance.
Candidates having Diploma in Animation & Multimedia Technology from CIT Kokrajhar with a minimum aggregate of 60% are eligible for admission in B.Tech CSE program on the basis of their ranks in the CITLET Entrance.</td></tr>
</table>
The vacant seat(s) in Direct and Lateral Entry categories (if any) shall be open for admission through Vertical Entry category.
<u>Admission pattern for B.Des</u>: Admission tests for the B.Des program shall be conducted in the odd semester of each session as per the following pattern approved by the BoG of the Institute.
<table>
<tr><th>Year</th><th>Intake</th><th>Remark</th></tr>
<tr><td>1st</td><td>25</td><td>Direct entry: All the eligible students shall be admitted according to their merit / rank in the UCEED</td></tr>
<tr><td>2nd</td><td>5</td><td>Vertical entry: Candidates having Diploma in Animation & Multimedia Technology course from CIT Kokrajhar with a minimum aggregate of 60% are eligible for this course and shall be admitted directly to the 3rd semester (2nd Year) of the B. Des. course.</td></tr>
</table>
</td></tr>
<tr><td>2.5</td><td>If, at any time after admission, it is found that a candidate has not fulfilled all the requirements specified by the Institute, the Institute may cancel the admission of the candidate, and report the matter to the Academic Senate for necessary action.</td></tr>
<tr><td>2.6</td><td>The Institute reserves the right to cancel the admission of any student and ask him / her to discontinue his / her studies at any stage of his / her UG program on the grounds of unsatisfactory academic performance or indiscipline or dishonest conduct.</td></tr>
</table>

2.7	Registration: All B.Tech / B.Des students shall register / renew their registration in each Semester, and in each of the Semester Examinations they appear. Students must complete their Registration / Renewal within the due dates, as notified by the Institute. Late registration with a fine (to be determined and notified by the Institute) is only permitted for a student with a valid cause of delay that is established by proper documentation to be produced by the concerned student.
2.8	The number of credits registered for during a semester should not be less than 30 credits and should not exceed 48 credits. The total L-T-P loading for a semester should not exceed 32 contact hours per week.
2.9	Only those students shall be permitted to register who have: a. cleared all Institute, Hostel and Library dues and fines (if any) of the previous semesters, b. paid all required advance payments of Institute and Hostel dues for the current semester, and c. not been debarred from registering on any specific ground. d. A student is required to register with the number of credits offered in a Semester by the concerned Department.
2.10	During registration following conditions must be fulfilled : a. A student must pass all first year courses before registering for the third year courses. b. Students obtaining grade "F" in any compulsory subject in any Semester may clear the backlog in the next appropriate semester when it is offered. c. Those who obtain grade "F" in an elective subject may similarly clear the backlog in the next appropriate Semester. d. In case of failure in Laboratory / Practical subject, the student shall have to reregister for it in the appropriate semester in the next academic session. e. Similarly, in case of failure in Extra Academic Activities, the student shall have to reregister for it in the appropriate semester of the next academic session.
2.11	Duration of B.Tech / B.Des program: A student is expected to complete all the requirements for B.Tech / B.Des program in eight (8) semesters. However, in case a student is unable to do so in his / her first attempt leading to repeated registration of Semester(s), he / she may be permitted for up to sixteen (16) consecutive semesters (from 1st semester registration of a Direct Entry student) / fourteen (14) semesters (from 3rd semester registration of a Lateral or a Vertical Entry student) to complete all the requirements of the Undergraduate degree program.
2.12	Temporary withdrawal from the Institute: A student admitted to B.Tech / B.Des program of the Institute may be permitted to withdraw temporarily from the Institute on the grounds of prolonged illness or grave calamity in the family for a period of one semester or more, provided: a. he / she applies to the Institute within at least 6 weeks of the commencement of the semester or from the date he / she last attended his / her classes whichever is later, stating fully the reasons for such withdrawal together with supporting documents and endorsement from his / her guardian. b. the Institute is satisfied that, counting the period of withdrawal, the student is likely to complete his/her requirements of the B. Tech. Degree within the time limits specified in clause 2.11. c. there are no outstanding dues or demands in the Institute / Hostel / Department / Library / NCC / NSS.

2.13	A student who has been granted temporary withdrawal from the Institute under the provisions of Clause 2.12 shall be required to pay fees/charges (except tuition fees and hostel dues) until his/her name is on the Roll List. However, fees once paid shall not be refunded.
2.14	Normally, a student shall be permitted only one such temporary withdrawal during his / her tenure as a student of the B.Tech / B.Des program.

3. CREDIT REQUIREMENTS OF B.TECH / B.DES PROGRAM

3.1

B.Tech / B.Des credit requirements: In order to qualify for a B.Tech / B.Des degree, a student is required to successfully complete the required range of 300-320 credits (for Direct Entry), or 210-220 credits (for Lateral and Vertical Entry).

The following table summarizes the break-up of the credit requirements in a B.Tech program

Sl. No.	Category	Guidelines for Credits* (Total 320)
1	Humanities and Social Sciences including Management courses	24
2	Basic Science courses	50
3	Engineering Science courses including workshop, drawing, basic electrical / mechanical / programming languages, etc.	48
4	Professional core courses	96
5	Professional Elective courses relevant to chosen specialization / branch	36
6	Open subjects – Electives from other technical and / or emerging subjects	36
7	Project work, seminar and internship / training in industry or elsewhere	30
8	Mandatory Courses [e.g. Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Knowledge Tradition]	Non-credit

*Minor variation is allowed as per the needs of a branch.

The following table summarizes the break-up of the credit requirements in the B.Des program

Sl. No.	Category	No. of class hours	Guidelines for Credits* (Total 320)
1	Lectures	64	128
2	Studios / Labs / Practical	172	172
3	Minor Project	8	8
4	Major Project	12	12

*Minor variation is allowed as per the needs of the Program.

3.2

Every B.Tech / B.Des. Program shall have a curriculum and syllabi for the courses prepared / reviewed / updated, from time to time, by the Departmental Undergraduate Program Committee (DUGPC), finalized by the Departmental BoS, followed by scrutiny of the Institute Undergraduate Program Committee (IUGPC), before final approval of the Senate.

The composition, and functions of the Departmental BoS, DUGPC, and IUGPC are indicated in the Appendix – A of the OA.

3.3	Medium of instruction, examination, assignment, presentations, and project reports shall be English.
3.4	The curriculum of a B.Tech program shall include Summer Training / Industrial Training for four (4) to six (6) weeks for every student after completion of the 6th Semester Examination, during their summer vacation. Summer Training / Industrial Training shall be evaluated against due credits, as deemed fit by the Departmental Board of Study.
3.5	Each B.Tech / B.Des student shall be assigned a Departmental Mentor, to be decided at the DUGPC and approved by the Departmental Board of Studies under the Chairmanship of the HoD. Each faculty in the Department shall be assigned with 15 – 20 Undergraduate students to guide / help them with their overall academic activities / preparations / studies, and provide them with insights regarding their career opportunities and avenues in their future, as their Departmental Mentor.
3.6	No Semester shall have more than six lecture-based theory courses and more than four laboratory / studio / practical courses.
	4. CHANGE OF BRANCH FOR B.TECH STUDENTS
4.1	The Institute may permit a student admitted in a B.Tech program in a branch to change to the B.Tech program of another branch after completion of the first two semesters. Such changes shall be permitted, in accordance with the provisions laid down hereinafter.
4.2	Change of branch shall be subject to the limitation that the strength of a branch should not fall below the existing strength by more than ten percent (10%) and should not go above the sanctioned intake by more than ten percent (10%).
4.3	Eligibility for Branch change: The students shall be considered eligible for Branch change if – a. he / she has successfully completed all the credits requirements in the first two semesters of the B.Tech program in their first attempt, without any backlog. b. He / she must have CGPA of 6.5 or more in the 1st two Semesters in the 1st year of B.Tech program.
4.4	Eligible students may enlist up to two choices of branches, in order of their preference, to which they wish to change over. Any alteration in their choice(s) shall not be permissible after submission of their applications.
4.5	The Institute shall invite applications at the beginning of the Odd Semester in each academic session, and the completed forms submitted by the last date, as notified by the Institute, from eligible candidate(s), as mentioned in 4.3, shall be considered.
4.6	Change of branch shall be made strictly in order of merit of the applicants. For this purpose the CGPA obtained at the end of the Second Semester shall be considered. In case of a tie, the applicants' ranks in the Entrance Examination during admission shall be considered.
4.7	All changes of branch made in accordance with the above rules shall be effective from the third semester of the applicants concerned. No change of branch shall be permitted after this.

4.8	All changes of branch shall be final and binding on the applicants. No student applicant shall be permitted, under any circumstances, to refuse the change of branch offered.
	5. PROMOTION CRITERIA
5.1	The instructor(s), after online marks and/or grade submission, shall submit two copies of the same to the concerned Head of the Department at the end of each Semester by the due date specified in the concerned notification. The Head of the Department, after due diligence and verification, shall forward all the grades to the Examination Cell (a part of the Office of the Dean-Academic Affairs) by the due date specified in the concerned notification.
5.2	All evaluated works in a subject, except the End-Semester answer scripts, shall be shown to the students promptly after the evaluation. End semester examination answer scripts, attendance sheets shall be preserved in the Examination Cell (a part of the Office of the Dean-Academic Affairs) for a period of three years.
5.3	Criteria for Promotion: The standards for promotion of a B.Tech / B.Des student from a lower semester to a higher semester shall be as follows: (i) Maximum number of THREE (3) 'F' grades in any Semester can be carried into the next higher Semester at any point of time during the UG program. (ii) All 1st Semester courses must be cleared before getting promoted to the 5th Semester, and all 2nd Semester subjects must be cleared before getting promoted to 6th Semester.
	6. EVALUATION OF B.TECH / B.DES STUDENTS
6.1	Evaluation of the theoretical subjects shall include continuous Teacher's assessments (TA) through quizzes, assignments, other forms of evaluation of class performance(s) throughout the Semester, Mid-Semester Examination, and class attendance (CA), followed by the End-Semester Examination. Evaluations in each semester (theory courses) shall consist of: **I. Mid-Semester Examination** (full marks – **30;** duration **1.5 h**) → **20 marks** to be considered, **II. Teacher's assessment** (**TA**) (**20 marks**), and **III. End-Semester Examination** (**60 marks**) for a duration of 2.5 h Mid-Semester, other teacher's assessments, and class attendance shall be recorded and evaluated by the concerned teacher(s), and altogether shall carry **40% weightage** in the final grades for the course. The End-Semester Examination shall be carried out by the Institute's Exam Cell, and shall carry **60% weightage** in the final grades for the course.
6.2	Laboratory courses / design / drawing / studio / workshop etc. shall be evaluated on the basis of Teacher's assessments (TA) through quizzes, assignments, lab / studio / workshop record(s), other forms of lab / studio / workshop performance(s), viva, lab / studio / workshop attendance (CA), followed by the End-Semester Examination. Evaluations in each semester (labs / studios / workshops) shall include: **I. Teacher's Assessment** (**TA**) (**40 marks**), – 20 marks for throughout the Semester performance, 10 marks for viva / quizzes / assignments, 10 marks for records / notebooks, and **II. End-Semester Examination** (**60 marks**) – 50 marks for performance in the Exam 10 marks for viva.

	Teacher's assessments, and lab / studio / workshop, and attendance shall be recorded and evaluated by the concerned teacher(s), and altogether shall carry **40% weightage** in the final grades for the course. The End-Semester Examination (labs / studios / workshops) shall be carried out by the concerned teacher(s) and shall carry **60% weightage** in the final grades for the course.
6.3	Evaluation of project: The evaluation of the project work shall be based on sessional work assigned by the teacher, seminar, project report and project evaluation by an appropriate committee, as appointed by the concerned Department. a. The project work is normally carried out in two stages, each spread over a semester – namely, 7th and 8th Semesters. At the end of the first stage (7th Semester), the student is required to submit a preliminary report of his/her work, and present it to the Internal Project Evaluation Committee, appointed by the concerned Department. The second stage of the work is continued in the following 8th Semester. b. The second stage of project work (in 8th Semester) is also evaluated in the same manner as the first stage. c. Those who fail in the first stage assessment shall be required to re-register for the first stage in the following appropriate semester. Likewise, those who obtain an 'F' grade in the project assessment shall be required to re-register for it in a subsequent appropriate semester.
6.4	The instructor(s) shall submit all the marks through the Institute's ERP system, shall sign, and submit two copies of the submitted marks to the concerned Head of the Department by the due date specified in the concerned notification. The Head of the Department shall forward one copy of all the grades to the Academic Section by the due date specified in the concerned notification.
7. ELIGIBILIITY FOR THE AWARD OF B.TECH / B.DES	
7.1	A student shall be declared to be eligible for the award of B.Tech / B.Des degree if he / she has: a. completed all the credit requirements for the degree with a grade "DD" or higher grade in each of the subjects (Theoretical, Laboratory, Studio, Workshop, Sessional etc), Seminar, Project etc. b. obtained a final CGPA of 5 or more at the completion of all the degree requirements. c. no dues to the Institute, Department, Hostels, NCC, NSS etc.; and d. no disciplinary action is pending against him / her.
7.2	a. A student scoring consistently a GPA of 8 or above in all courses in every semester shall be eligible for a B.Tech / B.Des degree with Distinction, and the nomenclature for such an exceptional achievement shall be "B.Tech / B.Des (Distinction)". b. Students securing highest CGPA in the respective branches shall be awarded with the "Department Gold medal - UG", and the student securing highest CGPA overall shall be awarded the "Institute Gold Medal –UG".
7.3	The award of B. Tech. / B. Des. degree must be recommended by the Senate and approved by the Board of Governors of the Institute

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Minutes of the Meeting of the Hon'ble Director, Registrar and all Deans held on 22-06-2021 at 10 AM online

Members Present:

1. Prof. Dr. T. G. Sitharam, Director, IITG & Director (Addl Charge) CITK (In the Chair)
2. Ms C. Brahma, Registrar, CITK
3. Prof. Dr. T. K. Maity, Dean (Faculty Affairs)
4. Prof. Dr. M. Goswami, Dean (P&D)
5. Prof. Dr. H. K. Kalita, Dean (Academic Affairs)
6. Dr. A. Mukherjee, Dean in-charge (R&D)
7. Dr. Bihung Brahma, Dean in-charge (Student Affairs)

Agenda:

1. Revision of modalities for Admission 2021
2. Revised fee structure
3. Any other matter with permission from the Chair

Minutes of the meeting

With permission from the Chair, Dean (Academic Affairs) presented the "*Proposed Modalities on the review of Admission Process-2021 as per the Meeting held on 18/06/2021 between Dean of Academic Affairs, Members of the Admission Committee and Assistant Registrar, Academic*".

The Hon'ble members discussed the same and decisions and remarks are enlisted item wise as follows:

Item	Decisions and/or Remarks
Proposed Modalities on the review of Admission Process-2021 as per the Meeting held on 18/06/2021 between Dean of Academic Affairs, Members of the Admission Committee and Assistant Registrar, Academic. *In view of the falling trend of student admission strength in the last few years and the poor response of the applicants for the session 2021-22, the following modalities have been prepared for immediate implementation.* ***1. General*** *a. Application window for all programs to be kept open till the 3rd week of July.*	All the points in item #1 (General) is accepted and approved for immediate execution.

b. *The date of entrance examination is proposed to be postponed until further notice.* c. *Re-Advertisement of Admission Notice in various regional and national Newspapers along with the extension Notice will be published.* d. *Updating the existing database of all public and private schools and colleges under BTR with their contact information like email id, WhatsApp No.s etc. is under process.* e. *Visit to some of the schools and colleges of the four districts by a group faculties/staffs will be organised within the first week of July, 2021. The visiting members will interact with Heads masters/principles/teachers/guardians/students and make a presentation on the Scope and admissions details of CIT Kokrajhar wherever possible.* f. *The posters and banners will be circulated to make them reachable to the remotest areas of the region.* g. *Sending of posters and leaflets to schools and colleges of different parts of the country will be continued.* h. *The Admission Flyer will be boosted on Social Media.* i. *Admission Notice will be sent to regional News Channels.* j. *A short video clip about CITK, its facilities and admission procedures will be launched in YouTube and Social media.*	
2. Review of Fee structure for All Programs *It has been noticed that with the hike of fee structure in 2018-19, there has been a steep drop in the strength of admitted students. It is a fact that Fee was hiked almost three/four times compared to the existing fee structure for the B. Tech and Diploma program students of the institute affiliated to Gauhati University and SCTE, Assam.* *Therefore, the members of the Admission Committee present in the meeting feel the necessity of reduction in the fee structure for all programs. Norms for reduction of fees is under the process of discussion among members, proposal for which will be submitted very soon.*	Since CITK is in the midst of the Admission Process 2021 and fee structure is already published, therefore a decision regarding this item #2 is deferred. Necessity of revising the fee structure may be discussed in the next meeting of the Senate.
3. Fee Waiver Scheme a. ***Tuition Fee Waiver****: In this scheme the tuition fee is completely waived off, and is applicable to the students belonging to EWS category as*	Decision with regard to item #3 is deferred as it lacks motivation in details and also source of funding.

per the AICTE Process Handbook 2021, in addition to the same which is already applicable to the students belonging to SC/ST/PWD category from any part of the country. However, the scheme is proposed for all EWS/BPL students belonging to the BTR region. b. ***Hostel Seat Rent Waiver**: The members of the Admission Committee have proposed to waive off the Hostel Seat rent of Rs. 500/- per month for students belonging to SC/ST/PWD/EWS category, as the Institute already receives fund from the Ministry annually for maintenance of the hostels specifically for these categories of students.* c. ***For students belonging to the BTR region:** In addition to the Tuition Fee Waiver scheme and Hostel seat rent waiver scheme as stated in (1) and (2), the students belonging to Below Poverty Line (BPL) families of the BTR region may be fully exempted or at least 50% waived from certain parts of the fee structure.* d. ***Fee waiver scheme for Top performers:** The members of the Admission Committee have proposed that, a scheme may be made wherein the top five students shortlisted as per their merit for Diploma and UG programme may be given admission completely free of cost or part of their fee waived off as in (3) only at the time of admission.* *This scheme may also be applied to at least one topper of each semester from each branch in Diploma and Undergraduate programs at the time of Renewal of Course in successive semesters. The scheme may also be extended to at least two toppers of each reserved category irrespective of their branch/region during the renewal of course registration.*	Once this is done, the item may be placed in the Senate meeting. Authority will individually take decision with regard to waiver as mentioned in item #3 for the poor and needy after proper verification of documents. In this regard, Dean (Academic Affairs) on one to one basis may propose to Hon'ble Director for his approval with proper justification.

The meeting ended with a vote of thanks from the Chair.

Annexure - 5 (A)

Course No.	Course Name	L	T	P	C	Course No.	Course Name	L	T	P	C
Semester I						**Semester II**					
UPH101	Engineering Physics	3	1	0	8	UCH201	Engineering Chemistry	3	1	0	8
UMA101	Engineering Mathematics-I	3	1	0	8	UMA201	Engineering Mathematics-II	3	1	0	8
UEE101	Basic Electrical Engineering	3	1	0	8	UCSE201	Programming for Problem Solving	4	1	0	10
UHSS101	English Communication	2	0	0	4	UCE201	Engineering Drawing and Computer Graphics	1	0	0	2
UME101	Engineering Workshop	1	0	0	2	UHSS201	Professional Ethics and Human Value	2	0	0	4
UPH171	Engineering Physics Lab	0	0	3	3	UCH271	Engineering Chemistry Lab	0	0	2	2
UEE171	Basic Electrical Engineering Lab	0	0	2	2	UCSE271	Programming for Problem Solving Lab	0	0	3	3
UHSS171	English Communication Practice	0	0	2	2	UCE271	Engineering Drawing and Computer Graphics Lab	0	0	4	4
UME171	Workshop Practice	0	0	4	4						
Contact Hours: 26		**12**	**3**	**11**	**41**	**Contact Hours: 26**		**13**	**3**	**9**	**41**
Semester III						**Semester IV**					
UMA301	Mathematics-III	3	0	0	6	UMA401	Numerical Methods and Computer Programming	3	0	0	6
UME302	Engineering Mechanics	3	0	0	6	UHSS401	Engineering Economics	3	0	0	6
UCE301	Surveying-I	3	0	0	6	UCE401	Surveying-II	3	0	0	6
UCE302	Fluid Mechanics	2	1	0	6	UCE402	Strength of Materials	3	0	0	6
UCE303	Engineering Geology	3	0	0	6	UCE403	Hydraulic Engineering	2	1	0	6
UCE304	Building Materials & Construction	3	0	0	6	UCE404	Concrete Technology	3	0	0	6
UCE371	Surveying-I Lab	0	0	2	2	UMA471	Numerical Methods and Computer Programming Lab	0	0	2	2
UCE372	Material Testing Lab	0	0	2	2	UCE471	Surveying-II Lab	0	0	2	2
UCE373	Fluid Mechanics & Hydraulics Lab	0	0	2	2	UCE472	Hydraulic Engineering Lab	0	0	2	2
UCE374	Engineering Geology Lab	0	0	2	2	UCE473	Concrete Technology Lab	0	0	2	2
UHSS371	Language Lab	0	0	2	2	UCE474	Civil Engineering Drawing	0	0	2	2
Contact Hours: 28		**17**	**1**	**10**	**46**	**Total Contact Hours 28**		**17**	**1**	**10**	**46**

Semester V						**Semester VI**					
UHSS501	Industrial Management and Entrepreneurship	3	0	0	6	UHSS601	Professional Communication	2	0	0	4
UCE501	Design of Structures-I	3	0	0	6	UCE601	Structural Analysis-II	2	1	0	6
UCE502	Transportation Engineering-I	2	1	0	6	UCE602	Transportation Engineering-II	2	1	0	6
UCE503	Structural Analysis-I	2	1	0	6	UCE603	Environmental Engineering-II	3	0	0	6
UCE504	Environmental Engineering-I	3	0	0	6	UCE604	Foundation Engineering	3	0	0	6
UCE505	Geotechnical Engineering	3	0	0	6	UCE605	Hydrology and Water Resources Engineering	2	1	0	6
UCE571	Transportation Engineering-I Lab	0	0	2	2	UCE671	Environmental Engineering-II Lab	0	0	2	2
UCE572	Environmental Engineering-I Lab	0	0	2	2	UCE672	Computer Aided Design	0	0	2	2
UCE573	Geotechnical Engineering Lab	0	0	2	2						
UCE591	Surveying Camp	0	0	2	2						
Total Contact Hours 26		**16**	**2**	**8**	**44**	**Total Contact Hours 21**		**14**	**3**	**4**	**38**
Semester VII						**Semester VIII**					
UCE701	Estimation & Costing	3	0	0	6	UCE801	Construction Engineering and Project Management	2	1	0	6
UCE702	Design of Structures-II	3	0	0	6	UCE802	Design of Structures-III	3	0	0	6
UCE711-UCE715	Elective-I	2	0	0	4	UCE811-UCE815	Elective-III	2	0	0	4
UCE716-UCE720	Elective-II	2	0	0	4	UCE816-UCE819	Elective-IV	2	0	0	4
UCE791	Major Project-I	0	0	8	8	UCE891	Major Project-II	0	0	8	8
UCE792	Industrial Training	0	0	2	2	UCE892	Grand Viva-Voce	0	0	2	2
Contact Hours: 20		**10**	**0**	**10**	**30**	Total Contact Hours: 20		9	1	**10**	**30**
Total Mandatory Credits: 316											

B.Tech Civil Engineering Syllabus Details

Semester V

Paper Code: UCE 501
Paper Name: Design of Structures-I **Credit: 06**
Total Contact Hours = 36 **L-T-P: 3 – 0 - 0**

Module I **Contact Hours: 10**
Introduction to Various Design Philosophies: Design of Rectangular Singly and Doubly Reinforced Sections by Working Stress Method, Limit State Method, Analysisand Design of Beams by Limit State Design Method.

Module II **Contact Hours: 07**
Behavior of RC Beam In Shear: Shear Strength of Beams with and without Shear Reinforcement, Minimum and Maximum Shear Reinforcement, Design of Beam in Shear, Development Length, Anchorage Bond, Flexural Bond, Failure of Beam Under Shear, Concept of Equivalent Shear andMoments.

Module III **Contact Hours: 07**
Design of Slab: Design of One Way and Two Way Solid Slabs, Circular Slab by Limit State Design Method, Serviceability, Control of Deflection and Cracking, Introduction to Flat Slabs.

Module IV **Contact Hours: 07**
Design of Columns: Effective Height of Columns, Minimum Eccentricity, Column under Axial Compression, Requirements for Reinforcement, Column with Helical Reinforcement, Column under Axial LoadandUni-Axial Bending, Column under Axial Load and Bi-Axial Bending.

Module V **Contact Hours: 05**
Design of Footing: Rectangular, square isolated and combined footing.Introduction to Raft footing.

Text/Reference Books:

1. *Reinforced Concrete Design, S U Pillai / Devdas Menon, Tata McGraw Hill, New Delhi*
2. *Reinforced Concrete Design, S.N. Sinha, Tata McGraw Hill, New Delhi*
3. *Reinforced Concrete, S.K. Mallick& A P Gupta, Oxford & IBH, New Delhi*
4. *Reinforced Concrete, Behaviour, Analysis and Design, P. Purushothaman, Tata McGraw Hill, New Delhi*
5. *RCC Structures, B C Punmia, Ashok K Jain, and Arun K Jain, Laxmi Publications, Delhi*
6. *Dayaratnam P. Limit State Design of Reinforced Concrete Structures New Delhi: Oxford Publishers;2008*

Gambhir M.L Fundamentals of Reinforced Concrete Design New Delhi: PHI Publisher; 2009.

7. Design of Reinforced Concrete Structures, N. Subramanian, Oxford University Press, New Delhi

Paper Code: UCE 502 **Credit: 06**
Paper Name: Transportation Engineering-I **L-T-P: 2-1-0**
Contact Hours: 36

Module I: Highway Planning **Contact Hours: 04**
Different modes of transportation, Characteristics of Road transportation, Highway development in world and India, Classification of Roads, Network patterns. Highway alignment –requirements and controlling factors. Engineering surveys for alignment. Typical cross sections of Urban and Rural roads -cross sectional elements. Introduction to IRC code and MORTH guidelines.

Module II: Highway Geometric Design **Contact Hours: 10**
Factors affecting geometric design. Sight distance -stopping sight distance, overtaking sight distance, sight distance at intersections. Design of horizontal alignment -super elevation, widening of pavements, transition curves, Set back distance, Curve resistance. Design of vertical alignment -gradients, summit and valley curves.

Module III: Traffic Engineering **Contact Hours: 08**
Road user, vehicle and traffic characteristics –Speed, volume, parking and accident studies. Concepts of PCU, capacity and level of service. Traffic signs and road markings -objectives, classification and uses. Principles of design of at-grade intersections –channelized, rotary and signal intersections. Introduction to grade separated intersections.

ModuleIV: Highway Materials **Contact Hours: 04**
Desirable properties, various tests and specifications of subgrade soil, road aggregates and bituminous materials. Marshall Mix Design.

ModuleV: Pavement Design **Contact Hours: 06**
Pavement components and their functions -Factors influencing the design of pavements -Design principles - Design of flexible and rigid pavements as per IRC.

Module VI: Pavement Construction and Maintenance **Contact Hours: 04**
Construction of gravel, WBM, bituminous and cement concrete roads. Pavement failures -Types and causes of failures in flexible and rigid pavements. Maintenance of highway pavements.

Text/Reference Books:

1. *Highway Engineering by S.K. Khanna & CEG Justo, Nemchand Bros.*
2. *Principles of Pavement Design by E.J Yoder &M.W.Wittezal, John Willey & Sons.*
3. *J. Khisty and B. K. Lall, Transportation Engineering: An Introduction, Prentice-Hall India, 2003.*
4. *P. Chakroborty and A. Das, Principles of Transportation Engineering, Prentice Hall of India Pvt. Ltd., 2003.*
5. *Relevant IRC Codes by IRC, Indian Roads Congress, Delhi.*
6. *Kadiyali, L.R, Traffic Engineering and Transport Planning, Khanna Publishers, New Delhi.*
7. *Kadiyali, L.R, and Lal, N. B. Principles and Practice of Highway Engineering, Khanna Publishers.*

Paper Code: UCE503 **Credit: 06**
Paper Name: Structural Analysis-I **L-T-P: 2-1-0**
Total contact hours: 36

Module I: Introduction to Structural analysis **Contact hours: 07**
Forms of structures, Loads and Forces, Free body diagram, conditions of equilibrium of forces, support and connections – reactions, Difference between determinate and indeterminate structures.

Module II: Statically Determinate Beams **Contact hours: 07**
Axial Thrust, Bending moment, Torsion & Shear Force in beams with concentrated load and distributed load. Points of contra flexures.

Module III: Deflection of Beams **Contact hours: 07**
Computation of slope and deflection by double integration, moment area method, conjugate beam method, unit load method, applications to simply supported, overhang and cantilever beams.

Module IV: Strain Energy and Virtual work **Contact hours: 05**
Strain energy for axial force, bending, shear and torsion. Castigliano's theorems and their applications to find deflection and redundant forces in simple cases.

Module V: Analysis of Pin-Jointed Structure **Contact hours:10**
Method of joints and sections, Graphical method, Deflection of joints, Truss with single redundancy, Maxwell's reciprocal theorem, Betti's theorem and their applications. Arches (Three hinge and Two hinge arch). Cables, Three hinge stiffening Girder.

Text/Reference Books:

1. Structural Analysis-I -- S.S. Bhavikatti,
2. Theory of Structural Analysis – Timoshenko & Young.
3. Structures – Marshall.
4. Structural analysis –Wilbur & Norris
5. Basic Structural analysis – C S Reddy

Subject Code: UCE 504
Subject Name: Environmental Engineering-I **Credit: 06**
Total hours: 36 **L-T-P: 3 – 0 – 0**

Module I: Introduction to Environmental Engineering **Contact hours 05**
Components of environment, relation between plant, animal and environment, ecosystem, man and ecology, Public Water Supply Scheme and Quantity of Water-Necessary and objectives of public water supply schemes– planning and financing,Quantity of water, rate of demand, factors affecting consumption-fluctuations in demand,its effect on design, design periods and capacities of different components, population growth and forecast, quantification of water demand through population forecasting

Module II: **Hydrological concepts and sources of water** **Contact hours 05**
Hydrological concepts, hydrological cycle, precipitation, types of precipitation, rainfall measurements, estimation of surface runoff, Sources of water- lakes, ponds, rivers, infiltration galleries, storage reservoirs, storage capacity by analytical method and mass curve method, types of wells, sanitary protection of wells, tests for yield of a well, Estimating yield of wells under steady state condition.

Module III: Quality of water and Conveyance of water **Contact hours07**
Quality of water, portable water, pure water, mineral water, Drinking water standards - Physical, chemical and biological analysis, water bore diseases. Conveyances of water -intakes, open Channels, and Pipes. Pipe Material- Cast Iron Pipes, Steel Pipes, Concrete Pipes, Pre-Stressed Concrete Pipes, Merits and Demerits, Pipe Joints - Spigot and Socket Joint, Flange Joint, Universal Pipe Joint, Expansion Joint, Flexible Joint. Pipe corrosion and remedial measures, Types and capacity of pumps – Selection of pumps, location of pumping station

Module III: Water Treatment **Contact hours: 09**
Objectives – Unit operations and processes – Principles, functions, and design of water treatment plant units, Screening, aerators, Coagulation and flocculation,Filtration-Types of filters- Working and Design of Rapid and Slow sand filters. Loss of head in filters, Pressure filters, Sand filters - Disinfection of water - Methods, Chlorination-Types, Factors affecting - Chlorine demands.

Module IV:Advanced Water Treatment **Contact hours: 05**
Water softening –Ion exchange, Lime-soda process, Electro dialysis - Colour, Taste and Odour removal-Adsorption-Aeration-Fluoridation-Defluoridation -Iron and Manganese removal -- MBR process

Module V: Water Distribution and Supply **Contact hours: 05**
Lay out of water distribution network-Methods of distribution-Analysis of distribution networks-Hardy cross method Principles of design of water supply in buildings – House service connection – Fixtures and fittings, systems of plumbing and types of plumbing.

Text/Reference Books:
1. B.C Punmia, "Water Supply Engineering", Laxmi Publications Pvt. Ltd., 2016
2. G S Birdie, Water Supply and Engineering, Dhanapat Rai Publishing Company, 2014
4. S.K.Garg, "Water Supply Engineering", Khanna Publishers. 2010
5. Peavy H S, Rowe, D.R. Tchobanaglous "Environmental Engineering" Mc GrawHill Education, 1984

6. APHA, Standard Methods Examination of Water and Wastewater, American Public Health Association, Washington DC, 1995

7. K N Dugal, Elements of Environmental Engineering, S Chand and Company Pvt Ltd, 2007
8. Mackenzie L Davis, Introduction to Environmental Engineering, McGrawhill Education (India), 2012
9. Metcalf &Eddy, "Waste Water Engineering", Tata Mc Grawhill Publishing Co Ltd, 2003
10. P Venugopala Rao, Environmental Engineering, PHI Learning Pvt Ltd, 2002
11. SubhashVerma, VarinderKanwar, Siby John, Water supply Engineering, Vikash Publishing, 2015

Paper Code: UCE505 **Credit: 6**
Paper Name: Geotechnical Engineering **L-T-P: 3-0-0**
Total contact hours: 36

Module I: Introduction to Soil Mechanics **Contact hours: 06**
Historical development of soil, Origin and types of soil, Identification and classification of soils, Index properties, phase relationship, consistency, sensitivity, clay mineralogy.

Module II: Permeability and Seepage **Contact hours: 06**
Soil water capillary phenomena, Darcy's law of permeability, Determination of Coefficient of permeability, Equivalent permeability for stratified soil, Flow nets – principles, construction and application, Effective stress analysis, quick sand condition, piping, filtration criteria.

Module III: Stress Distribution in Soil **Contact hours: 06**
Boussinesq and Westergaard's equation - Newmark's influence chart - principle, construction and use - Equivalent point load and other approximate methods - pressure bulb.

Module IV: Compaction and Consolidation of soil **Contact hours: 06**
Principle of compaction, Light and heavy compaction, field compaction control, factors affecting compaction, Terzaghi's theory of one-dimensional consolidation, Secondary Consolidation, estimation of consolidation settlement.

Module V: Shear Strength of Soil **Contact hours: 06**
Mohr-Coulomb failure criteria, Strength envelope, total and effective stress, pore pressure, evaluation of shear strength parameters, direct shear, triaxial shear, vane shear, unconfined compression test.

Module VI: Earth Pressure and Stability of slope **Contact hours: 06**
Introduction to earth pressure, Earth pressure at rest, active and passive condition, Rankine and Coulomb's earth pressure theories, Graphical Solutions, different types of slope failure, Stability of infinite and finite slope, slope protection.

Text/Reference Books:
1. Introduction to Soil Mechanics by BM Das, Galgotia Publication
2. Soil Mechanics and Foundation Engg. by BC Punmia, Dhanpat Rai & Sons.
3. Soil Mechanics by Gopal Ranjan& Rao, Dhanpat Rai & Sons.
4. Soil Mecanics by Whitman &Lambe, John Willey.
5. Soil Mechanics & Foundation Engg by VNS Murthy, Dhanpat Rai & Sons.

Paper Code: UCE571 **Credit: 2**
Paper Name: Transportation Engineering-I Lab **L-T-P: 0-0-2**
Total contact hours: 24

Lab Experiments:

1. Determination of aggregate crushing value.	**Contact Hours:02**
2. Determination of aggregate impact value.	**Contact Hours:02**
3. Determination of aggregate abrasion value.	**Contact Hours:02**
4. Determination of flakiness index and elongation index of aggregates.	**Contact Hours:02**
5. Determination of specific gravity and water absorption test on aggregates.	**Contact Hours: 02**
6. Determination of CBR value.	**Contact Hours:02**
7. Determination of penetration value of bitumen.	**Contact Hours:02**
8. Determination of ductility value of bitumen.	**Contact Hours:02**
9. Determination of softening point of bitumen.	**Contact Hours:02**
10. Determination of flash and fire point of bitumen.	**Contact Hours:02**
11. Determination of specific gravity of bitumen.	**Contact Hours:02**
12. Marshall Stability test.	**Contact Hours:02**

Text/Reference Books:

1. Relevant IS Codes and IRC Codes.
2. Highway Material Testing Laboratory Manual by Khanna S K and Justo, – CEG NemiChand& Bros.
3. M. L. Gambhir: Concrete Manual:Dhanpat Rai &Sons New – Delhi.

Subject Code: UCE572
Subject Name: Environmental Engineering-I Lab **Credit: 2**
Total contact hours: 24 **L-T-P: 0-0-2**

List of Experiments:

1. Introduction to standards, collection and preservation of samples, sampling techniques and laboratory equipment's. **Contact Hours:02**
2. Determination of total dissolved and suspended solids in water. **Contact Hours:02**
3. Determination of pH **Contact Hours:02**
4. Determination of conductivity **Contact Hours:02**
5. Determination of chlorides **Contact Hours:02**
6. Determination of turbidity and jar test **Contact Hours:02**
7. Determination of acidity of water **Contact Hours:02**
8. Determination of alkalinity of water **Contact Hours:02**
9. Determination of total hardness **Contact Hours:02**
10. Determination of residual chlorine **Contact Hours:02**
11. Determination of DO, BOD **Contact Hours:02**
12. Determination ofCOD **Contact Hours:02**

Paper Code: UCE573 **Credit: 2**
Paper Name: Geotechnical Engineering Lab **L-T-P: 0-0-2**
Total contact hours: 24

Lab Experiments:

1. Determination of moisture content (by oven drying) and specific gravity of soil **Contact Hours:02**
2. Particle size analysis of soil using dry and wet sieving **Contact Hours:02**
3. Particle size analysis soil using hydrometer **Contact Hours:02**
4. Determination of Liquid limit and plastic limit of soil **Contact Hours:02**
5. Determination of relative density of sand **Contact Hours:02**
6. Determination of filed density using sand replacement and core cutter method **Contact Hours:02**
7. Determination of MDD and OMC using standard **Contact Hours:02**
8. Determination of MDD and OMC using modified proctor test **Contact Hours:02**
9. Determination of coefficient of permeability using constant head and falling head test. **Contact Hours:02**
10. Determination of shear parameters using unconfined compression test **Contact Hours:02**
11. Determination of shear parameters using direct shear test **Contact Hours:02**
12. Demonstration of coefficient of consolidation **Contact Hours:02**

Diploma in Civil Engineering Syllabus Structure and Details(July2020onwards)

Course No.	CourseName	L	T	P	C	Course No.	CourseName	L	T	P	C
SemesterI						**SemesterII**					
DHSS101	CommunicationinEnglish	3	0	0	6	DHSS271	CommunicationinEnglishLab	0	0	2	2
DCH102	Chemistry-I(THEORY)	2	1	0	6	DCSE202	Computer Fundamentals &Programming	2	0	0	4
DCH172	Chemistry-I(PRACTICAL)	0	0	2	2	DCSE272	Computer Fundamentals &ProgrammingLab	0	0	2	2
DMA103	Mathematics-I	3	0	0	6	DEE203	Fundamentals of Electrical &ElectronicsEngineering	2	1	0	6
DME104	EngineeringDrawing	2	0	0	4	DEE273	Fundamentals of Electrical &ElectronicsEngineeringLab	0	0	2	2
DME174	EngineeringDrawingLab	0	0	2	2	DMA204	Mathematics-II	3	1	0	8
DME176	WorkshopPractice	0	1	4	6	DME205	EngineeringMechanics	3	0	0	6
DPH105	AppliedPhysics-I (THEORY)	2	1	0	6	DPH206	AppliedPhysics–II(THEORY)	2	1	0	6
DPH175	AppliedPhysics-I(PRACTICAL)	0	0	2	2	DPH276	AppliedPhysics-II(PRACTICAL)	0	0	2	2
Contact Hours:25		**12**	**3**	**10**	**40**	**Contact Hours:23**		**12**	**3**	**8**	**38**
SemesterIII						**SemesterIV**					
DHSS302	Engineering Economics andAccountancy	3	1	0	8	DCE401	StructuralAnalysis	3	1	0	8
DCE301	ConstructionMaterials	3	1	0	8	DCE402	WaterSupply&SanitaryInstallation	3	0	0	6
DCE302	Surveying-I	3	0	0	6	DCE403	FluidMechanics	3	0	0	6
DCE372	Surveying-ILab	0	0	2	2	DCE473	FluidMechanicsLab	0	0	2	2
DCE303	StrengthofMaterials	3	1	0	8	DCE404	Surveying-II	3	0	0	6
DCE304	EnvironmentalEngineering	3	0	0	6	DCE474	Surveying-IILab	0	0	2	2
DCE374	EnvironmentalEngineeringLab	0	0	2	2	DCE405	Building Construction & drawing inAutoCAD(Building Construction)	3	0	0	6
						DCE475	Building Construction & drawing inAutoCADLab(Computer Aided Building Drawing)	0	0	2	2
Contact Hours:22		**15**	**3**	**4**	**40**	**Total Contact Hours22**		**15**	**1**	**6**	**38**
SemesterV						**SemesterVI**					
DCE501	ConstructionTechnology	3	0	0	6	DCE601	Estimationandcosting	3	0	0	6
DCE502	ConcreteTechnology	3	0	0	6	DCE602	Designofsteelstructures	3	1	0	8
DCE572	ConcreteTechnologyLab	0	0	2	2	DCE603	ConstructionandprojectManagement	2	1	0	6
DCE503	GeotechnicalEngineering	3	0	0	6	DCE679	Project	0	0	10	10
DCE573	GeotechnicalEngineeringLab	0	0	2	2	DCE61*	Elective	3	1	0	8
DCE504	DesignofRCCStructures	3	1	0	8	DCE 605	Professional Practices-II	0	0	2	2
DCE505	TransportationEngineering	3	0	0	6	ElectivesubjectList					
DCE575	TransportationEngineeringLab	0	0	2	2	DCE611	ConstructionMethodsandMachinery				
DCE576	Professional Practices-I	0	0	2	2	DCE 612	WaterResourceEngineering				
						DCE 613	Computational Methods in CivilEngineering				
Total Contact Hours24		**15**	**1**	**8**	**40**	**Total Contact Hours26**		**11**	**3**	**12**	**40**
TotalMandatoryCredits: 236											

SemesterI

Papercode:DCH102
Papername:Chemistry-I(Theory) **Credit:6**
Totalcontact hours:40 **L-T-P:2-1-0**

UnitI:Periodictable,Atomicstructure (4L)
Electrons,protons,neutron,Atomicmass(A),atomicnumber(Z)isotopes,isobars,isotone,orbitandorbitals,electronic configuration (upto Z=30). Modernperiodictable, groups and periods.

UnitII:Electrochemistry
(5L)
Electrolytes,Faraday"slawofelectrolysis,Numericalproblems,applicationofelectrolysis,oxidationandreductions, Redox reactions.

UnitIII:Metallurgy (5L)
General principles of metallurgy, minerals, ore, gangue, slag, flux, roasting, calcination etc. Metallurgyof iron and alluminium, Manufacture of steel by Bessemer process, open hearth process and LD process,alloys.

UnitIV:Bulidingmaterials (3L)
Portlandcement,Typesofmanufacturing,settingandhardeningofcement,specialcement.Glass,Bricks.

UnitV:Lubricant (3L)
Defination,classificationoflubricants,important functionsoflubricants.

UnitVI:Polymerandpolymerization (4L)
Typesofpolymer,thermoplasticandthermosettingplastic,preparationandapplicationsofPE,PVC,PP,Perpex, Teflon, Bakelite, nylon, Naturalrubber, Syntheticrubber.

UnitVII:Organicchemistry (6L)
IUPACnomenclature,Alkane,alkene,alkyne, alcoholsynthesisandapplications.

UnitVIII:EnvironmentalChemistry (6L)
Defination,Typesofpollution,pollutants,Waterqualitymeasurements-
D.O,B.O.D,C.O.D,hardnessofwater,removalofhardnes, TDS, Green houseeffect,acidrain, Ozonelayer depletion.

UnitIX:Industrialchemistry (4L)
Ethanol manufacture from starch by fermentation, Fuels- Classifications, calorific values, natural gas,watergas,producer gas,LPG, poweralcohol. Petroleum-refining, octanenumber,cetanenumber.

Texts-Books/References:

1. S.Chawla;*AText BookofEngineering Chemistry*,DhanpatRai PublishingCo.
2. JainandJain;*EngineeringChemistry*,DhanpatRaiPublishingCo.
3. 3.V.R. Gowariker, N.V. Viswanathan, J. Sreedhar, *PolymerScience*, New AgeInternationalPublisher.

4. S.K. Ghosh Advanced General OrganicChemistry (A Modern Approach) (Set I & Ii) NCBAPublisher,New Delhi, 2009
5. B.Viswanathan,P.S.Raghavan;PracticalPhysicalChemistry,Viva
6. 6.Dr.S.Rattan; ExperimentsinAppliedChemistry,S.K.Kataria&Sons.
7. J.C.KuriacoseandJ.Rajaram;*ChemistryinEngineering*,TataMcGraw-HillPublishingCompanyLimited, New Delhi
8. Dr.S.RabindraandProf.B.K.Mishra;*EngineeringChemistry*,KumarandKumarPublishers (P)Ltd.Bangalore-40
9. SSKumar;*ATextBookofAppliedChemistry-I*,TataMcGrawHill,Delhi
10. Dr.G.H. Hugar;*ProgressiveApplied Chemistry –I andII*, EaglePrakashan
11. M.L.Sharma,P.N.Chaudhury,B.R,Khanal,D.R.Paudel;*EngineeringPracticalChemistry*,EktaBooks Distributors.

Papercode:DCH172
Papername:Chemistry-I(Practical) **Credit:2**
Totalcontacthours: N/A **L-T-P:0-0-2**

Experiment-1: Introduction to chemistry laboratory, precautions, name of common chemicals,apparatus,instruments etc.
Experiment-2: Volumetricanalysisandstudyofapparatususedtherein.
Experiment-3: Determinethedegreeoftemporaryhardnessofwaterby EDTAtitration.
Experiment-4: Determinationofsolubilityofasolidatroomtemperature.
Experiment-5: To verify the first law of electrolysis (electrolysis of copper sulphate solution usingcopperelectrode).
Experiment-6: DeterminationofpH ofunknown solutions.
Experiment-7: To determine the coefficient of viscosity of the alcohol by using *Ostwald's* viscometer.**Experiment-8:**Todeterminethesurfacetensionofthegivenliquidwithrespecttowateratroomtemperatureby using*Stalagnometer*.
Experiment-9 Preparationofstandardsolutionof Na_2CO_3
Experiment-10 DeterminationofstrengthofNaOHbytitratingwith0.1NHCL

Papername:Applied Physics– I(Theory)
Papercode: DPH105 **Credit: 06**
Totalcontact hours: 36hours **L-T-P:2-1-0**

Module1:UNITS& DIMENSION **Contacthours: 2**

1.1. Need of measurement and Unit in Engineering and Science definition of unit, fundamental andderivedquantitiesandtheirunits, differentsystemofunits (CGSandSI),Illustrations.

1.2Explanation of dimensions of physical quantities, dimensional equations of physical quantities andtheir useswithexamples.

Module2:BASICMECHANICS **Contact hours:12**

2.1 Introductiontoscalarandvectorquantities,representationof vector, addition, subtractionandmultiplication ofvectors, parallelogram law of vector addition, resolution of vector, dot and scalarproduct oftwo vectors(details notrequired).

2.2 Newton"slawsofmotion:Firstlaw,explanation,definitionofforce,Conceptof Inertia,typesof inertia(inertiaofrestandinertiaofmotion),Newton"ssecondlaw,momentum,impulse,mass&

weight,simpleproblems,Newton‟sthirdlaw,explanationanditsexamples,Principle ofconservation of linear momentum, statement and simple examples (e.g.recoil of a gun),numerical problems.

2.3 Circularmotion, timeperiodand angular velocity, relation between angular velocity andlinearvelocity,centripetaland centrifugal force,bendingof acycliston acurved path,bankingof roadsandrailwaytrack,numericalproblems.

2.4 Work, powerandenergy, itsconcept, unitsanddimension, Potential and Kinetic energy, itsmathematicalrelations,Principle ofconservationofenergy,itsproofin case of a free falling bodyundergravity,numerical problems.

2.5 SimpleHarmonicMotion,itsgeometricalrepresentationsand 1derivation ofits equations,definition of amplitude, time period, frequency, phase etc., mathematical relations and units,simplependulum&second‟spendulum,numericalproblems.

Module3:GRAVITYANDGRAVITATION **Contact hours:3**

3.1 Newton‟slawofgravitation,accelerationdueto gravity,relationbetween,„G‟and,„g‟,theirunits,variationof thevalueofgwithaltitudeanddepth,CentreofgravityandCentreofmass,Numerical problems

Module4:ELASTICPROPERTIESOFSOLID **Contact hours:3**

4.1 Deforming force, restoring force, Elastic and plastic bodies, explanation of stress and strain with theirtypes, Hook‟s law, elastic limit, Young‟s modulus, Bulk modulus, Rigidity modulus, Poisson‟s ratio,theirunitsand numericalproblems.

Module5:HEATANDTHERMODYNAMICS **Contact hours:10**

5.1 Conceptofheatandtemperature,thermometer,differentscales oftemperaturesandtheirconversionformulae, numericalproblems.

5.2 Thermal expansion:expansion of solid, linear, superficial and cubical expansion of solid, theircoefficients & their relations; Expansion of liquid: co-efficient of Real and Apparent expansion, theirrelation,variationofdensitywithtemperature,Anomalous expansionofwater (experimentaldeterminationnotnecessary).ConceptofAbsolutescale of temperature.

5.3 Calorimetry:Unitofheat,Jouleandcalorie,Specificheat,thermal capacity and waterequivalent.

5.4 Changeof stateofa body,meltingandfreezingpoint,effectofpressureonmelting point,latent heat, Evaporation, difference betweenvaporisation andevaporation, factors on which rate ofevaporationdepends.

5.5 Transmissionofheat,threemodesofheattransfer,conduction,convectionandRadiation,goodandbad conductor ofheat, coefficient ofthermalconductivity,its S.I.unitanddimension.

5.6 1st lawand2nd lawof thermodynamics,Joule‟slawandMechanicalequivalentof heat.

Module6:SOUND **Contacthours:6**

6.1 Wave Motion: amplitude, time period, frequency and wavelength, relation between

velocity,frequencyand wavelength.Transverse andlongitudinalwaveswith examples.

6.2 Propagation of sound wave:Expression of velocity of sound in air, Newton‟s formula andLaplace‟scorrection,Effectoftemperature,andpressureonvelocityofsound.

6.3 Audiblerange,ultrasonicandinfrasonicsound,applicationof ultrasonic sound to calculate thedepthof ocean.

6.4 Reflectionofsoundanditsapplication,Echoandreverberationofsound,acousticofbuilding

6.5 Doppler‟seffectwithMathematicalexpressions.

Books/ References:

1. Modern Approach to Physics Part I & II, DilipSarma, N G Chakraborty,andK N Sharma,Kalyani Publisher, NewDelhi.
2. Applied Physics Part I & II, Manpreet Singh, Dr. Major Singh, and Mrs. Hitashi Gupta,SKKataria&Sons-NewDelhi.
3. BasicAppliedPhysics,RKGaur,DhanpatRai Publication-NewDelhi.

Papername:AppliedPhysics-I(Practical)
Papercode:DPH175 **Credit:02**
Totalcontact hours:18hours **L-T-P:0-0-2**

1. VernierCallipers:To determinethevolumeofametallic/woodencube.
2. Screw Gauge:todetermine crosssectional areaofawire/ thicknessofa glasspiece.
3. Spherometer:To determinetheradiusof curvature ofconcave andconvexmirrors.
4. Todetermine the valueofaccelerationdueto gravity(g)ofaplace withsimplependulum.
5. Tomeasurethevelocityof soundin resonancetube.
6. TodeterminethefrequencyofatuningforkusingSonometer.
7. MeasurementofSpecificgravityofsolid,liquid,usingNicolsonhydrometer, Hare'sapparatusandspecificgravitybottles.
8. Todeterminetheatmosphericpressurebyusing Boyle'slawapparatus.
9. To determinewaterequivalentof acalorimeter bymethodofmixture.

Paper code:DMA103
Paper name:Mathematics-I **Credit:6**
Totalcontact hours:35 **L-T-P:3-0-0**

Module–I:ALGEBRA (20 HOURS)

- Vector and Scalar quantities – types of vectors, geometric representation of vectors, additionand subtraction of vectors, magnitude of a vector, product of a vector by a scalar, Modulevectorsi, j, k.
- Arithmeticandgeometricprogressions–nthtermofA.P.andG.P.,Geometricmeanbetweentwo numbers.
- Complexnumbers –origin,generalform,polarform,examples.Simpleproblems.
- Binomialtheorem– Factorials,positiveintegralvalues,binomialexpansion,rules,calculationofappropriatevalue.
- Logarithmandexponentialseries.
- Determinants:Definition,operationsandCramer‟sruleforsolvingsimultaneouslinearequations.
- Basicconcepts of permutationand Combinations.

Module-II:TRIGONOMETRY (15HOURS)

- Trigonometricfunctions andratios.

- Trigonometricfunctionsofalliedangles –half,double,triple, compoundangles.
- Additionandsubtractionformulae.
- Solutionoftrianglesusing properties.
- Simplificationoftrigonometricexpressionsusingdifferentformulae.
- Basicconceptofinversetrigonometricfunctionsandhyperbolicfunctions.

ReferenceBooks:

Sl.No.	Title	Author/Publisher
1	MathematicsforPolytechniques:Vol–I&II	TTTI,Bhopal
2	MathematicsforPolytechniques	S.P.Deshpande
3	EngineeringMathematics	I.B.Prasad
4	EngineeringMathematics	Grewal
5	PlainTrigonometry	Bansilal
6	CollegeAlgebra	ShahandDesai
7	MathematicsTextbookfor classXIandXII	NCERT

Paper code:DHSS101 **Credit:6**
Papername:COMMUNICATIONINENGLISH **L-T-P:3-0-0**
Totalcontact hours:39

Module1: Partsof Speech **Contacthours:3**

1.1 RecognitionandreviewofNouns,Pronouns,Verbs,Adverbs,Adjectives,Prepositions,Conjunctions,Interjections
1.2 Knowledgeof Subject,ObjectandComplimentofthe Verb
1.3 Herbals–Infinitival,GerundandPreposition.
.

Module2: Prepositionsoftime andplace **Contacthours:5**
2.1 Contextual teaching of prepositions of time - on, in , at, since, for, ago, before, to, past,to,from,till/until, by
2.2 prepositions of place: in, at, on, by, next to, beside, near, between, behind, in front of,under,below,over, above,across,through, to, into, towards,onto,from.

Module3: Clause,phrasesandRelative Clauses **Contacthours:2**
3.1 Basicdefinitionsofclauses andphrases
3.2 FocusonRelativePronouns andtheiruse insentences asrelativeclauses.

Module4: SubjectVerbAgreement **Contacthours:5**
4.1Rulesthatguidetheagreementofthesubjectto itsverb

Module5: SentencetypesandTransformationofsentences **Contacthours:5**
5.1 Assertive sentences, Exclamatory sentences, Interrogative sentences, Negativesentences, Compound sentences, complex sentences, simple sentences, Degrees ofComparison.

Module6 Voice **Contacthours:3**
6.1Changefrom ActiveVoice toPassiveVoice andviceversa

Module7: Punctuation **Contacthours:5**
7.1 Use of the comma, semi-colon, colon, apostrophe, exclamation mark, question mark andquotationmarks

Module8: Wordformation **Contacthours:2**
8.1Changeofonepartofspeechto theother:fromVerbsto Nouns,Nounsto Verbs,

AdjectivestoNouns,NounstoAdjectives,Verbsto adverbs,andAdverbstoVerbs

Module9: Affixation **Contacthours:2**
9.1PrefixesandSuffixesandnewwordformations

Module10: NominalCompounds **Contacthours:2**
10.1Commonnominalcompound

Module11: ParagraphWriting **Contacthours:5**
11.1DescriptiveParagraphonvariousrelated topics.

BOOKS RECOMMENDED: 1. Essential English Grammar with Answers by Raymond Murphy (CambridgeUniversityPress)
2. EnglishforPolytechnicsbyDrPapori RaniBarooah(EasternBookHousePublishers)
3. EnglishGrammarbyAnnieBrinda(Cambridge UniversityPress)

Papercodes:DME104/DME174
Paper name: Engineering Drawing / Engineering Drawing
LabDME104→L-T-P-C:2-0-0-4
DME174→L-T-P-C:0-0-2-2 **Totalcontacthours =48**

Module1.INTRODUCTION [Contact Hrs:5Hrs]

i. Drawingasamediumof communication,
ii. UseandcareofDrawingInstrumentsAssignments:
Such as Drawing of Horizontal and Vertical Lines, Square, Rectangle,MosaicPattern, AngularPattern,Stamping withcircular pattern.
iii. TypesofLinesandDimensioningasper15696/72

Module2.GEOMETRICALCONSTRUCTIONS [Contact Hrs=8Hrs.]

i. Freehandcurves,free handDrawing
ii. Constructionoftriangles, Perpendicular and anglesof300,450, 600,900
iii. ConstructionofRegularPolygons. .
iv. RegularPolygonsinscribedincircles.
v. Regularfiguresby usingT – squareandSet–square.

Module3.LETTERING,SCALES [ContactHrs =5 Hrs.]

i. Single Stroke Lettering Straight and Inclined by graph and Free hand Letters and digits as per15696/72
ii. Scale-RepresentativeFraction,TypesorScales
iii. SimpleproblemsonPlainandDiagonalScale
.

Module4.PROJECTIONOF POINTS [ContactHrs =5Hrs.]

i. Position/locationofPoints,Horizontalplane, Verticalplane.
ii. AssignmentsofSimpleproblemsondifferentquadrantsandFindthedistancebetweentwopoints.
iii. Position/LocationofPoints.

Module5.PROJECTIONOF LINES [ContactHrs =5Hrs.]

i. Position/locationofPoints,Horizontalplane, Verticalplane.
ii. AssignmentsofSimpleproblemsondifferentquadrantsandFindthedistancebetweentwopoints.
iii. Position/LocationofLines.

Module6.ORTHOGRAPHICPROJECTION [ContactHrs=5Hrs.]

i. TopView,Front Viewand SideViewof Simpleobjects, blockandmachinepartswithdimensionalscale.
ii. SectionalFront,TopandSide ViewsAsper IS–696forsimplepartsandblocks.

Module7.RIVETHEADSANDJOINTS [ContactHrs=5Hrs.]

i. DifferenttypesofRivet HeadsandJoints.
ii. TopandSectionalFrontviewsofLapand ButtJointswithsingledoublecoverplates.

Module8.ISOMETRICPROJECTION [Contact Hrs=5Hrs.]

i. IsometricProjectiontotruescale andisometricscale.

Module9.THREAD/ SCREWED [ContactHrs =5Hrs.]

i. ThreadProfiles(REFIS2043IS–554ETC.)
ii. ScrewedFastenings
iii. Representationof externalandinternalthreadedassemblysymbolic.
iv. Representationofthreads.
v. RepresentationofScrews,Bolts, NutsandCutter.

ReferenceBooks:

1. ElementaryEngineeringDrawing[PlaneandSolidGeometry]ByN.D. Bhatt,V.M.Panchal.
2. Geometrical andMachineDrawingByN.D.Bhatt

Papercode:DME176
Papername:WorkshopPractice **L-T-P-C: 0-1-4-6Totalcontact hours = 60**

Module1:Carpentry shop (TheoryandPractice:12hrs)

1.1 Introductionwiththeshop
1.2 Variousstructureof wood andtypes ofwood
1.3 Differenttypesoftools, machineandaccessoriesused inCarpentryshop
1.4 Safety Precautions in workshopDetailsofPracticalContents(3+3hrs)
Demo of different wood working tools and machinesDemoof different woodworkingprocesses
Simple joints like T joints etc.Onesimpleutility job.

Module2:Fitting Shop (Theoryand Practice:12hrs)

2.1 Introductionwiththefittingshop
2.2 Variousmarking, measuring, cutting,holdingand strikingtools
2.3 DifferentOperationslikechipping,filing,markingdrillingetc.
2.4 Working principle of drilling machine, lapping dies etc.Detailsof Practical Contents (3+3 hrs)
Demo of different fitting tools and machines and power toolsDemoof different processes in fitting shop
Squaring of a rectangular metal pieceOnesimple utility job.

Module3:Welding Shop (TheoryandPractice:12hrs)

3.1 Introduction
3.2 TypesofWelding,ArcWelding,GasWelding,GasCutting
3.3 Weldingofdissimilarmaterials,selectionofweldingrodmaterial,sizeofrodandworkpiece

3.4 Differenttypesofflames
3.5 ElementarysymbolicRepresentation
3.6 Safetyandprecautions
DetailsofPracticalContents(3+3hrs)
Demoofdifferentweldingtoolsandmachines
DemoofArcWelding,GasWelding,GasCutterandrebuildingofbrokenpartswithwelding
AnyoneCompositejobinvolvinglap jointweldingprocess.

Module4:MachineShop (Theory andPractice:12hrs)

4.1 Introduction
4.2 StudyofDifferenttypesofLathemachine,shapingmachine,Drillingmachine
4.3 StudyofDifferent types ofhandtoolsand machinetoolsandparts
4.4 Safety&precautions
DetailsofPracticalContents(3+3hrs)
Demo of different machines and their operationsPreferablyprepare asimple job.

Module5 Turningshop (6hrs)

Demooflathemachine, drilling machine
One job related to plane and taper turning , threading and knurlingOnejob related to drilling and tapping

Module6ElectricalShop (6hrs)

Demo of simple house wiring and use of toolsOnejob related to simplehousewiring
Fittings of cut outs, fuses and other simple fittings etc.DifferencebetweenSinglephasewiringandthreephasewiring

SuggestedText/ReferenceBooks:

(i) Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of WorkshopTechnology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited,Mumbai.
(ii) Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4thedition,Pearson Education IndiaEdition, 2002.
(iii)Gowri P. Hariharan and A. Suresh Babu,"Manufacturing Technology – I" PearsonEducation,2008.
(iv) Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice HallIndia,1998
(v) RaoP.N.,"ManufacturingTechnology",Vol.IandVol. II,TataMcGrawHillHouse,2017

SemesterII

Papername:AppliedPhysics –II(Theory)
Papercode:DPH206 **Credit:06**
Totalcontact hours:36hours **L-T-P:2-1-0**

Module1:LIGHT **Contact hours:5**

1.1 Reflection, Reflection on spherical mirror, idea of real and virtual image, mirror formula,sign conventions (mirror formula to be assumed), nature size and position of images ofdifferentpositions of objects, numerical problems.

1.2 Refraction, refractive index, critical angle, total internal reflection, between critical angleand refractive index, Prism, refraction through prism, minimum deviation, numericalproblems. Lens, refraction through lens (lens formula to be assumed of a lens), numericalproblems.

Module2:ELECTROSTAICS **Contact hours: 3**

2.1 ConceptofElectricchargeaccordingtomodernelectrontheory,unitofcharge,Inversesquarelaw,electricfield,Electriclineof force, electricintensity

2.2 Potentialatapointduetoapointcharge,relationbetweenintensityandpotentialwithdeductionof theformula

2.3 Capacityofacondenser,seriesandparallelcombination,differenttypeofcondenser,numericalproblems.

Module3:CURRENTELECTRICITY **Contacthours: 11**

3.1 potentialdifference andelectriccurrentwiththeir units.

3.2 Differencebetweenemf.andpotentialdifference;internalresistanceofcell.Voltaiccell;defectsofcell: localaction and polarization andtheir removal.

3.3 Differencebetweenprimaryandsecondarycellswithexamples,groupingofcells,series,parallelan d mixedcombinations of cells.

3.4 BasicD.C.Circuits:Ohm‟sLawanditsverification,mathematicalexpression,Kirchoff”sLaw,numerical problems.

3.5 Definitionofresistance,conductance,effectsoftemperatureonresistance,Seriesandparallelcombination ofresistance, resistanceper unit length,numerical problems.

3.6 HeatingEffectofCurrent:Joule‟slaw,electricityenergyandpower,numericalproblems

3.7 Thermoelectriceffect:Thermocouple,Seebeck effect,PeltiereffectandThomsoneffect.

3.8 Chemicaleffectofcurrent:electrolysis,Faradays‟slawsofelectrolysis.

Module4:MAGNETISM **Contacthours: 5**

4.1 Natureandartificialmagnets theories, different types of magnets, inducedmagnetism,natureofpolarities.

4.2 Inversesquarelaw,magneticintensityatend–onandbroad–sideonposition,uniformandnon–uniformfield, magneticmoment,coupleonamagnet in auniform field, Tangentlaw.

4.3 Elementsofterrestrialmagnetism

Module5:ELECTROMAGNETISM **Contacthours:4**

5.1 Magnetic effect of current, nature of magnetic field due to straight and circular conductor,due to solenoid, Fleming‟s left and right hand rules, effect of current following through twoparallelconductors.

5.2 Electro Magnetic induction: e. m. f. induced in a coil due to magnet, Faraday‟ s laws ofelectro– magneticinduction, LenzLaw, selfandmutual induction.

Module6:MODERNPHYSICS **Contacthours:4**

6.1 PhotoElectricEmission:explanationanddemonstrationofphotoelectriccurrent,photoelectric equationwith its physical signification.

6.2 NuclearEnergy:Atomic massunit,massenergyequivalence,massdefect

6.3 X-rays:Propertiesanditsapplicationinindustry(Productionapparatusnotnecessary)

6.4 Radio–activity:Naturalandartificialradioactivity,emissionofalpha,betaandgammaradiation,their propertiesand uses.

Module7:ELECTRONICS **Contacthours:2**

7.1Thermionicemission:vacuumtube,diodeandtriode,theirworkingprinciple,conceptofrectifier and amplifier, useof diodeas rectifier.

Module8:SEMI –CONDUCTORPHYSICS **Contacthours:2**

8.1 Concept of semiconductors, properties and basic principle, intrinsic and extrinsicsemiconductor,p-type and n-type semiconductor.

SuggestedReferencebooks.

1. Modern Approach to Physics Part I & II, DilipSarma, N G Chakraborty,andK N Sharma,Kalyani Publisher, NewDelhi.
2. Applied Physics Part I & II, Manpreet Singh, Dr. Major Singh, and Mrs. Hitashi Gupta,S KKataria&Sons-NewDelhi.
3. BasicAppliedPhysics,RKGaur,DhanpatRai Publication-New Delhi

Papername:AppliedPhysics-II(Practical)
Papercode:DPH276 **Credit:02**
Totalcontact hours:20hours **L-T-P:0-0-2**

1. To verify the laws of reflection using a plane mirror and to study the characteristics of imageformed.
2. Todeterminetherefractiveindexofthematerial oftheglassslab bypin method.
3. Todeterminethe focallengthofaconvexlensbyU-Vmethod.
4. Todeterminethefocallengthofaconvexlensbyplanemirror method.
5. Todraw I-Dcurveandtodeterminetherefractiveindexofthematerialofaprism.
6. Tolocate thepoles ofabar magnet andto measurethemagneticlength.
7. Toplotmagneticlinesof forceof abar magnetwithnorth polepointingnorthand tolocate theneutral point/to plot magnetic lines of force of a bar magnet with south pole pointing north and tolocatetheneutral point.
8. ToverifyOhm‟slawbyAmmeter-voltmetermethod.
9. To find equivalent resistance using voltmeter with I. Three resistances connected in series II. Threeresistancesconnectedin parallel.
10. To measure the unknown resistance of the material of a wire by meter bridge using Wheatstonebridgeprinciple.

Papername:Mathematics –II
Papercode:DMA204 **Credit:08**
Totalcontacthours:40hours **L-T-P:3-1-0**

MODULEI: CALCULUS-I (16HOURS)

a. DifferentialCalculus

- Sets:Definition,typesandoperationonSets.
- Relation:Definition, domainandrange,equivalencerelation.
- Functions:definition,typesoffunctions.
- Limits:Conceptandevaluationoflimits,indeterminateforms,L"Hospital"s Rule.
- Differentiation:Differentiationbyfirstprinciple.Differentiationofsum,productandquotient,functionoffunction,Chainrule.Differentiationoftrigonometric,inversetrigonometric,hyperbolic, logarithmicand parametricfunctions,applications.
- Basicconceptsofpartial differentiation.

b. IntegralCalculus

- Integration:Definitionandfundamentalproperties.
- Methodsofintegration –integrationbysubstitution,byparts,partialfractions
- Applications

MODULE-II:STATISTICS (10HOURS)

- MeasuresofCentralTendency:Mean,MedianandModeandempiricalrelationshipbetweentheman d related problems.
- MeasuresofDispersion:Range,MeanDeviation,StandardDeviation,Quartiledeviation.
- Correlation

MODULE-III:CO-ORDINATEGEOMETRY (14HOURS)

- Co-ordinateSystems,Cartesianandpolarco-ordinates,distancebetweentwopoints,sectionformula,areaof triangle,collinearly and co-planarity.
- StraightLine:Definition,generalandstandardformofequations,intersectionofstraightlines:angle between them, bisector ofangle between them.
- Changeofco-ordinate axes,shiftingof originandrotationofaxes.
- Circle:Standardequationsandsimpleproblems,tangentandnormal.
- Basicideaofparabola, ellipseandhyperbola,their standardequationsandbasicproperties.

BooksforReference:-

Sl.No.	Nameofthebooks	Author/Publisher	Edition/Year
1.	MathematicsforPolytechniques	TTTI,Bhopal	Latest
2.	MathematicsforPolytechniques	S.P.Deshpande	Latest
3.	EngineeringMathematics	I.B.Prasad	Latest
4	AtextBookMatrices	ShantiNarayan,S.Chand&Co.NewDelhi	1998
5	IntroductiontoStatistics	L.Choudhury,KitapGhar,Guwahati.	Latest
6	FundamentalofStatistics	Kapoor& Gupta	Latest
7	MathematicsTextbookforclassX Iand XII	NCERT	Latest

Papercode:DME205
Papername:EngineeringMechanics **L-T-P-C: 3-0-0-6**
Totalhours : 41 hours

Module1:ForcesandMoments **(12hrs)**
Force,MomentandCouple,Resultantofforces,Forcesinspace.Equilibrium,FBD,Generalequationsofequilibrium,

Module2:Friction **(8 hrs)**
Introductiontodry friction.Lawsoffriction,friction ofsimplemachines-inclinedplanes, Screwjacks.

Module4:Centerofgravityandmoment ofinertia **(8 hrs)**
Centerofgravityofaxes,volumeandcompositebodies:Areamomentofinertiaandmassmomentofinertiaforplanefiguresand bodies.

Module5:Motion **(5 hrs)**
Linear and circular motion, Linear and angular velocities and acceleration,Units relation in betweencentrifugal force, Its uses in Engineering problems. Angle of banking super elevation problems. Bodiesmovingon alevel circular path, skidding, overturning.

Module6:Work,Powerand Energy **(3hrs)**
Work, power and Energy definition and application, Potential and kinetic energy-definition and Unitsand theirEngineering problems.

Module7:SimpleLifting Machines **(5 hrs)**
Definition and importance of Simple Machines. Law of Machine, problems. Simple lifting Machines – simpleWheelandaxle,differentialwheelandaxle andscrewjack(simple) problems.DefinitionM.A, V.Randefficiencyandtheirrelationship.Simple problems

Referencebooks:

1. EngineeringMechanics:STimoshenko&DHYoung.McGrowHillInt.
2. EngineeringMechanics:RS Khurmi. SChand &Co.
3. EngineeringMechanics:RKBansal.LaxmiPublication(P)Ltd
4. EngineeringMechanics:KLKumar.McGrowHillPublishingCo.
5. IrvingH.Shames(2006), EngineeringMechanics, 4thEdition,PrenticeHall
6. F. P. Beer and E. R. Johnston (2011), Vector Mechanics for Engineers, Vol I – Statics,Vol II, –Dynamics, 9th Ed, TataMcGraw Hill
7. R.C. Hibbler (2006), Engineering Mechanics: Principles of Statics andDynamics,Pearson Press

Papercode:DEE203
Papername:FundamentalsofElectrical&ElectronicsEngineering **Credit: 6**
Totalcontact hours: 34 **L-T-P:2-1-0**

Module 1: **Contacthours:2**
Introduction:Sourcesofenergy;Generalstructureofelectricalpowersystems,Powertransmissionanddistributionvia overheadlines and undergroundcables.

Module 2: **Contacthours:8**
DC circuits: Definitions of active, passive, linear, non-linear circuits elements and networks, Kirchoff‟slaws,Nodalandmeshanalysis,voltageandcurrentsources,networktheorems,superposition.Thevenin‟s,Norton‟s,maximumpowertransfer,Millman‟s,andreciprocitytheorems,analysisofsimplecircuits with DC excitation.

Module 3: **Contacthours:10**

SinglephaseACcircuits:generationofsinglephasesinusoidalEMF,instantaneous,averageandeffectivevalue, formandpeakfactor,examplesofotheralternatingwaveformsandaverageandeffectivevaluecalculations,conc eptofphasorandphasordiagrams,laggingandleadingofphasors,pure resistive, inductive and capacitive circuits, power factor, complex power, R-L, R-C and R-L-Cseriescircuits, parallel AC circuits,series and parallel resonance.

Module 4: **Contacthours:4**

SemiconductorDevices:

Reviewofatomicstructure,IntrinsicandExtrinsicsemiconductors,currentcarriersinsemiconductors,P-typeandN-type materials,P-N junction,biasing,characteristic curve,load line,Zenerdiode.

Specialsemiconductordevices(Qualitativeonly)–tunneldiode,backwarddiode,varactorandPINdiode,their construction,operation and applications.

Module 5: **Contacthours:3**

Bipolartransistor(Qualitativeonly):ConstructionandschematicrepresentationofPNPandNPNtransistors,for mationofPNP/NPNjunctions,energybanddiagram;transistormechanismandprincipleof transistors.

Module 6: **Contacthours:2**

Bipolartransistor(Qualitativeonly):

Differenttypesof

biasingsystem,biasstabilisation,analysisofCE,CB&CCconfiguration,theirI/P&O/Pcharacteristics, transistor rating and specifications.

Module 7: **Contacthours:3**

RectifierCircuits:

Halfwaveandfullwaverectifier(Qualitativeonly):ripplefactor,rectificationefficiency,PeakInverseVoltage.

Filtering(passive)andvoltageregulation(Qualitativeonly):Capacitorfilter,Inductorfilter,,,T"filter,,,π"filter.

Zener asvoltageregulator.

Module 8: **Contacthours:2**

Cathode Ray Oscilloscope: Construction features of cathode ray tube, concept of dual beam CRO;application of CRO for different electrical measurements: amplitude frequency and phase of sine wave,Lissajousfigure.

Books/ References:

1. D.P.Kothari&I.J.Nagrath,"BasicElectricalEngineering",TataMcGrawHill,2010.
2. D.C.Kulshreshtha,"BasicElectricalEngineering",McGrawHill,2009.
3. B.L.Thereja,A.K.Thereja,"ATextbookofElectricalTechnology",S.Chand
4. JacobMillman,"ElectronicsDevices&Circuits",McGrawHillEducation;4edition(2015).
5. Boyestad&Nashelsky,"ElectronicsDevicesandcircuittheory",PearsonEducationIndia;11th edition(2015).
6. S.Salivahanan&N.SureshKumar,"ElectronicDevicesandCircuits",McGrawHillEducation;Fourthedition (2017).

7. AlbertMalvino&DavidBates,"ElectronicPrinciples",TataMcGrawHillPublication,2010.
8. A.K.Maini,"AnalogCircuits",KhannaPublishingHouse,Ed.2018.

Papercode:DEE273
Papername:Fundamentalsofelectrical&electronicsengineeringlab **Credit: 2Totalcontacthours:16** **L-T-P:0-0-2**

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter,ammeter,rheostat and wattmeter.
2. Makeameasuredresistancefromagivenrheostat
3. VerificationofKirchhoff‟slaws
4. VerificationofSuperpositiontheorem
5. VerificationofThevenin‟stheorem
6. P-NJunction
6. Half-waverectifiercircuit
7. Full-waverectifiercircuit
8. V- Icharacteristics oftransistors
9. Wiring

Papercode:DHSS271
Papername:COMMUNICATIONINENGLISHLAB **Credit:2**
Totalcontact hours:39L-T-P-C:0-0-2

Module1:SpeakingandListeningpractices
1.1 PracticesofsoundsofEnglish
1.2 ProperBodylanguagewhilespeaking
1.3 Presentationandpublicspeakingpractices
1.4 Practicingtoenhancelisteningskills
1.5 Differenttypesofistening
1.6 Goodlisteningpractices
1.7 Overcomingbarrierstoeffectivelistening

Module1: Business Writing **Contacthours:3**
1.1 LetterWritingFormalletterformats,
1.2 practiceofletterwritingindifferentsituations:Orderletter,Complaintletter,LetterofAdjustment,Quotationletter ,Letter totheEditor,Application forleaveofabsence
1.3 JobApplicationand CoverLetter,formatofajob application
1.4 Resume,CurriculumVitae,biodata.

Module2: ParagraphWritingandSummaryWriting **Contacthours:5**
2.1Definition,CohesionandLinkageusingTransitionwordsoneverydaytopics
2.2.Practicing howto composecoherentpassages.
2.3 Definition,UseofTransitionwords,importantpointstorememberwhilesummarizing
2.4 Explain and practicinghowto arriveatasummaryofaparagraph /text

Module4EmailWriting **Contacthours:5**
4.1 writingtheperfecte-mail,
4.2 stepstotheperfecte-mail,formalandinformalgreetings,requeststhroughane-mail,writinganapology,complaintandseeking helpandinformationin ane-mail,
4.3 informingaboutafileattachedin inan email,writingtheformalendingofane-mail
4.3Explainingandpracticing howtowriteformalandinformalemails

Module3: Reportwriting **Contacthours:2**
3.1 Definition,typesofreportswithafocusonannualreport,non-profitannualreport,technicalandacademicreport,
3.2 necessityandpurposeofwritingareport,qualitiesofagoodreport,
3.3 languageused in areport,

3.4differentformatsofreportsand samplereports

Module5: Facinganinterview **Contacthours:5**

5.1 Howtoapproach,whattospeak,howtospeakinaninterviewandanswerinterviewquestions,thebusinesse tiquettestomaintain
5.2 body language, negative body language, handling an awkward situation in an interview, the dresscode
5.3 Successfuljobinterviewpractices
5.4 Perfecthandshake,pointsto rememberwhileapplyingforajob

Module6 BritishEnglishandAmericanEnglish **Contacthours:3**

6.1 DifferencebetweenAmericanandBritishEnglishwords–vocabularyandspelling
6.2 Pronunciationandaccents

BOOKSRECOMMENDED:
1. Student‟shandbookofWritten English andPhoneticsbyDrPaporiRaniBarooah(Eastern Book HousePublishers)
2. Strengtheningyourwriting -V.R.Nayaranswami(OrientLongman)

PaperCode:DCSE202 **Credit:4**
PaperName:ComputerFundamentalsandProgramming **L-T-P: 2-0-0TotalContact Hours:35**

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Module1:Computer Fundamentals **Contacthours:10**

1.1 Briefhistory
1.2 Blockdiagramanddifferentcomponents
1.3 Memory& it‟sdifferenttypes
1.4 I/Odevices
1.5 IntroductiontoOperatingSystem,TypesandRoleofOS
1.6 Computerlanguages,translatorsoftware,editor.
1.7 Data,differenttypesofdata,informationanditscharacteristics
1.8 Introductiontocomputernetworkandtheinternet

Module2:NumberSystemandcodes **Contacthours:10**

2.1 Differentnumbersystems-decimal,binary,octal,hexadecimalnumbersystem
2.2 NumberConversions
2.3 1‟sand2‟sComplement,subtractionusingcomplements.
2.4 Differentcodes-ASCII,BCD,Ex-3,Gray
2.5 Conversionfrom Graytobinaryandvice-versa
2.6 BCDAddition.

Module3:Introductionto Cprogramming **Contact hours:15**

3.1 Fundamentalsofprogramming-Algorithm&Flowchart
3.2 Sourcecodeandobjectcode
3.3 BasicstructureofCprograms
3.4 ExecutingaCprogram
3.5 CTokens, Keywordsand Identifier,Constants, Variables,Storage ClassandDatatypes.
3.6 Operatorsandexpression
3.7 InputOutputfunctionlikeprintf,scanf,getchar,putchar,gets,puts
3.8 DecisionmakingandbranchingusingIF..Else,Switch
3.9 Loopingusingfor,while,anddo-while
3.10 Array

Books/ References:

1. ComputerFundamentalsPaperbackbyPritiSinha PradeepK.Sinha(Author),BPBPublication

2. ByronGottfried,"ProgrammingwithC",TataMcGrawHill.
3. HerbertSchildt,"ThecompleteReferenceC", TMH
4. Balagurusamy,E.(2019).*ProgramminginANSIC,8/e*.McGraw-HillEducation.
5. YashwantKanetkar,"LetusC",BPBPublication
6. Henrry Mulish, Herbert L. Cooper, "The Spirit of C: An Introduction to Modern Programming",Jaico Books.
7. BriainW.KenighamandDennisRitchie,"CProgramminglanguage",PrenticeHallofIndia.

PaperCode:DCSE272 **Credit:2**
PaperName:ComputerFundamentalsandProgrammingLab **L-T-P: 0-0-2Totalcontact hours:32**

Module1:BasicCommandsforComputerSystem **Contacthours:2**

Module2:PreparationofDocuments **Contacthours:6**
2.1 IntroductiontoWordprocessing:Openingadocument,preparingdocuments,insertingdiagramsand tables
2.2 Editingdocument-(a)Character,wordandlineediting,(b)MarginSetting,Paragraphalignment, (c)BlockOperations,(d)Spell Checker,(e)Savingadocument,(f)Mailmerge.

Module3:InformationPresentationthroughSpread Sheet **Contacthours:8**
3.1 ApplicationofSpreadSheet
3.2 Structureofspreadsheets
3.3 Preparingtableforsimpledataandnumericoperations
3.4 Usingformulaeandfunctionsinexcel operations,Creationofgraphs,Piecharts,barcharts.

Module4:PreparationofpresentationContacthours:6
4.1 Creationofelectronicslidesonanytopic
4.2 Practiceofanimationeffect
4.3 Presentationofslides

Module5:Programmingin C **Contacthours:10**
5.1 EditingaCprogram
5.2 Definingvariablesandassigningvaluestovariables
5.3 Arithmeticandrelationaloperators,arithmeticexpressionsandtheirevaluation
5.4 Practiceoninput/outputfunctionslikegetchar,putchar,gets,puts,scanf,printfetc.
5.5 Programmingexerciseonsimpleifstatement,If..elsestatement,switchstatement
5.6 Programmingexerciseonloopingwithdo-while,while,forloopandarray.

Books/ References:

1. Foundations of Information Technology Coursebook 9: Windows 7 and MS Office 2007 (With MSOffice2010 Updates)-*Sangeeta Panchal,Alka Sabharwal*
2. MicrosoftOffice2016StepbyStepbyJoanLambertandCurtisFrye
3. HerbertSchildt,"ThecompleteReferenceC",TMH
4. YashwantKanetkar,"LetusC",BPBPublication
5. Balagurusamy,E.(2019).*ProgramminginANSIC,8/e*.McGraw-HillEducation.
6. Henrry Mulish, Herbert L. Cooper, "The Spirit of C: An Introduction to Modern Programming", JaicoBooks.
7. BriainW.Kenigham andDennisRitchie,"CProgramminglanguage",PrenticeHallofIndia.

SemesterIII

Papercode:DHSS302:(EngineeringEconomicsandAccountancy)

Credit:08To

talcontact hours:52 **L-T-P:3-1-0**

Part-AEngineeringEconomics

Module1:Introductionto Economics **Contacthours:4**

1.1 DefinitionofEconomics,Itsutility andscopeoftheStudy.
1.2 DefinitionofEngineeringEconomics
1.3 MeaningandconceptsofUtility,Consumption,value,price,GoodsandNationalincome,Inflation .
1.4 Wants,DefinitionandCharacteristics
1.5 WealthandWelfare–Definition,meaningandtypes.

Module2:DemandandSupply **Contacthours:6**

2.1 Meaningandtypesof Demand
2.2 ThelawofDemand,itslimitations
2.3 PreparationofDemandSchedule
2.4 MeaningofSupply
2.5 Thelawofsupply,itslimitations
2.6 Preparationofsupplyschedule

Module3:Production **Contacthours:4**

3.1 MeaningandfactorsofProduction
3.2 Factorsdeterminingefficiencyoflabour
3.3 Saving,investmentandcapitalformation
3.4 MeaningofProductionFunction

Module4:Money **Contacthours:3**

4.1 MeaningofMoney
4.2 TypesofMoney
4.3 FunctionsofMoney

Module5:BankingOrganisation **Contacthours:3**

5.1 CentralBank– its functions
5.2 CommercialBanks– itsfunctions

Module6: Pricing **Contacthours:4**

6.1 ObjectiveofPricingPolicy
6.2 Pricedeterminants
6.3 Pricediscrimination

Part-B:Accountancy

Module7:Introductionto BookKeeping andAccountancy **Contacthours:5**

7.1 DefinitionandobjectivesofBookKeeping
7.2 NeedandAdvantages ofBookKeeping
7.3 DefinitionofAccounting
7.4 Differencebetweenbookkeepingandaccounting
7.5 DoubleEntrySystems–mainfeatures
7.6 AdvantageanddisadvantagesofDouble EntrySystem

Module8:IntroductiontoComputerisedAccountingSystem **Contacthours:3**

8.1 ComponentsofComputerisedAccountingSoftware
8.2 Needfor ComputerisedAccounting
8.3 DifferencebetweencomputerisedAccountingandManualAccounting

Module9:Transaction **Contacthours:3**
9.1 Definition
9.2 MeaningofAccount
9.3 ClassificationofAccounts:TraditionalApproachandModern Approach
9.4 MeaningofDebitandCredit
9.5 Rules ofDebitandCredit

Module10:JournalandLedger **Contacthours:5**
10.1 MeaningofJournal
10.2 Recordingof Transactionin Journal
10.3 MeaningofLedger
10.4 Objective andUtilityofLedger
10.5 PostingandBalancingof Ledger
10.6 DistinctionbetweenJournalandLedger
10.7 NamesofDifferentBooksof Accounts

Module11:CashBook **Contacthours:5**
11.1 MeaningandImportanceofCashBook
11.2 CharacteristicsandAdvantagesofCashBook
11.3 Discount–TradeDiscount andCashDiscount
11.4 DifferentTypesofCashBook:Singlecolumncashbook,DoublecolumnCashBookandTriplecolumnCashbook
11.5 BankReconciliationStatement – BasicIdea

Module12:TrialBalanceandErrorin Accounting **Contacthours:3**
12.1 MeaningandObjectsofTrialBalance
12.2 Mainfeatures andAdvantageofTrialBalance
12.3 PreparationofTrialBalance
12.4 Typesof Errorin Accounting

Module13:ComponentsofFinalAccounts **Contacthours:4**
13.1 Meaningandobjectives ofTradingAccount
13.2 ContentsofTradingAccount
13.3 Meaningandobjectives ofProfitandLossAccount
13.4 ContentsofProfitandLoss Account
13.5 MeaningofDepreciation, revenueexpenditure andcapitalexpenditure
13.6 ContentsofBalanceSheet

Books/ References:

1.Introductory Micro Economics- Sandeep Garg- Dhanpat Rai Publication Pvt. Ltd. New Delhi.2.IntroductoryMacroEconomics-SandeepGarg-DhanpatRaiPublicationPvt.Ltd.NewDelhi.
3. TheoryandPracticeofAccountancy-B.B.Dam,R.A.Sarda,R.Barman,B.Kalita-CapitalPublishingCompany,Guwahati-5.
4. Book-Keeping & Accountancy- Juneja. Chawla &Saksena- Kalyani Publisher, New Delhi-110002.5.Tally.ERP 9forBeginners- TallySolutionsPvt.Ltd.-SahajEnterprises, Bangalore.

Papercode:DCE301: ConstructionMaterials **Credit:08**
Totalcontact hours:40 **L-T-P:3-1-0**

Module 1: Rock:Classification,quarryinganddressing. **Contact hour 04**

Module 2: Bricks:Manufacturingprocesses,classificationandproperties.Flooring and roofingtiles. **Contact hour 07**

Module 3: Production,propertiesandusesoflime;cementandsand-mortar.Concrete: Plainandreinforced. **Contact hour 09**

Module 4: Timber:Types,defects,methodsofseasoning,methodsofpreservation, timber products. **Contact hour 07**

Module 5: Ironandstructuralsteel:Manufacturingprocesses,properties,defects. **Contact hour 05**

Module 6: Typesandusesofpaints;varnishes anddistemper. Soundandheatinsulting materials;Glasses;plasticsand asphalticmaterials. **Contact hour 08**

Books/References:

1. CivilEngineeringMaterials,TTTI,Chandigarh,TataMcGrawHill,NewDelhi
2. EngineeringMaterials,SushilKumar,MetropolitanPublishers,NewDelhi
3. EngineeringMaterials,Rangwala,S.C.,CharotarPublishingHouse,Anand,India
4. EngineeringMaterials,KPRoyChowdhury,Oxford&IBH, NewDelhi

Paper Code:DCE302:Surveying-I **Credit:06**
Totalcontact hours:34 **L-T-P:3-0-0**

Module1: **Contacthours:8**
Introduction, classification of survey, chain surveying - principle, instruments used, procedure, Problems anderrorsin chain survey.

Module2: **Contact hours:8**
Compass surveying:types,descriptionanduses,measurementofbearingsinWCBandQBsystems,localattractionand relatedproblems.

Module3: **Contact hours:9**
Levelling:differentiallevelling,bookingandreductionoflevels,relatedproblemsandpractices.

Module4: **Contact hours:9**
Contouring:Principles,methodsandapplications,contourgradient.

Books/ References:

1. Surveying-Vol-I,B.C.Punamia,Laxmi Publications,NewDelhi.
2. Surveying& LevellingVol.-I,T.P.Kanetkar& S.V.Kulkarni,PuneVidyarthiGrihaPrakashan,Pune.
3. SurveyingVol.-I,S.K.Duggal,TataMcGrawHill,NewDelhi.
4. SurveyingandLevelling,N.N.Basak,TataMcGrawHill,NewDelhi.

Paper Code:DCE372:Surveying-ILab **Credit:02**
Totalcontact hours:24 **L-T-P:0-0-2**

Module1: **Contacthours:6**
Chain Surveying

Module2: **Contact hours:6**
Compass:Traversing

Module3: **Contact hours:6**
Levelling:ObservationusingDumpylevelandstaff,Flylevelling

Module4: **Contact hours:6**
Contouring:DirectandIndirectmethod

Books/ References:

5. Surveying-Vol-I,B.C.Punamia,Laxmi Publications,NewDelhi.
6. Surveying& LevellingVol.-I,T.P.Kanetkar& S.V.Kulkarni,PuneVidyarthiGrihaPrakashan,Pune.
7. SurveyingVol.-I,S.K.Duggal,TataMcGrawHill,NewDelhi.
8. SurveyingandLevelling,N.N.Basak,TataMcGrawHill,NewDelhi.

PaperCode:DCE303 **Credit:08**
PaperName:Strength ofMaterials **L-T-P:3-1-0**
Totalcontacthours:45

Module1: Simplestressesandstrains **Contact hours:**
9Concept ofStress&Strain,normal &shearingstress,strains,stress-strainrelationship,generalizedHooke‟slaw,modulusofElasticity,modulusofRigidity,Bulkmodulus,Hoopstress,Lateralstrain,Poisson‟sratioandVolumetricstrain,Elasticmoduliandtherelationshipbetweenthem,stress–straindiagramformildsteel.

Module2: Torsion **Contacthours:7**
Derivationoftorsionequationanditsassumptions.Applicationsoftheequationofthehollowandsolidcircularshafts,torsionalrigidity.

Module3: Shearforces andbendingmoments. **Contacthours:7**
Relationshipsbetweenload,Shearingforce,Bendingmoment,ShearforceandBendingmoment diagrams.

Module4:Stresses inbeams. **Contacthours:8**
Theoryofsimplebendingstressesinbeams,Bendingandshearstressdistributionovercross-sectionsofdeterminatebeams.

Module5: Principal stressandstrain **Contact hours:**
7Normalstress,tangentialstress,principalstresses,principalplanes,Mohr‟scircleofstressesandstrainandrelatedproblems.

Module6:ColumnsandStruts. **Contacthours:7**
AxiallyloadedCompressionmembers,Crushingload,Bucklingload,Colums,Euler,RankineandSecantformulaeand related problems.

Books/References:

1. Strengthofmeterials&mechanicsofstructures,B.C.Punmia,StandardPublishers&Dristributers,Delhi.
2. MechanicsofMaterials,J.M.GeraandS.P.Timoshenko,CBSPublishers& Distributors,Delhi.

PaperCode:DCE304:EnvironmentalEngineering: **L–T–P:CR**
Totalcontact hours:44 **3-0– 0:06**

ModuleI: **ContactHour06**
Introduction, estimation of quantity of water, per capita demand, design period and factors consideredforselection ofdesign period.Populationforecasting.

Module2: **ContactHour08**
Sourcesofwaterandtheirsuitabilitywithregardtoquality&quantity,storagecapacityof reservoirs,waterquality parameters,standards.

Module3: **ContactHour20**
Water treatment plant Layout plan, estimation of raw water discharge for treatment plant, treatment ofwater-screenings, sedimentation, coagulation and flocculation, types of coagulants, optimum dose ofcoagulants, mixing devices, design of flocculation unit. theory of filtration, types of filters and theircomparison, design of rapid sand filter, washing of filter, disinfection, methods of removing hardnessdistributionsystem,methodsofwatersupplyandstorage

Module4: **ContactHour10**
Seweragesystem,estimationofwastewaterdischargeinasewerin seweragesystem,hydraulicdesignofsewers,estimationofstormwaterdischargeinurbanarea,characteristicsofsewage,strength of sewage, population equivalent, treatment of sewage- primary and secondary treatments,oxidationsponds,sewagedisposal,self–purificationofstreams,sludgedigestionanddisposal,conceptofairpollution control

Books/References:

Books:1.EnvironmentalEngineeringVol.I:WaterSupplyEngineering,S.K.Garg,KhannaPublications, Delhi,2009.

2. EnvironmentalEngineeringVolII:SewageDisposalandAirPollutionEngineering,S.K.Garg,KhannaPublications, Delhi,2009.

3. EnvironmentalEngineering,Peavy,Tachobanoglous&Rowe,McGrawHillInternational,N.Y.,1985.

4. WastewaterEngineering:Treatment,DisposalandReuse,Metcalf&Eddy,TataMcGrawHill,NewDelhi,2003.

5. Water Supply Engineering (Environmental Engineering Vol. I): P. N. Modi, Standard Book House, N.Delhi.2010.

6. WaterSupply&SanitaryEngineering,G.S.BirdiandJ.S.Bindie,DhanpatRaiPublishingCo.,NewDelhi,1998.

DCE374:EnvironmentalEngineeringLab **L – T –**
P:CRTotal Contact hour:26 **0-0–2 :02**

ModuleI: **ContactHour:02**

INTRODUCTIONTOSTANDARDS,COLLECTIONANDPRESERVATIONOFSAMPLES,SAMPLINGTECHNIQUES AND LABORATORYEQUPIMENTS

Module2: **ContactHour:02**

EXPERIMENT ON DETERMINATION OF TOTAL DISSOLVEDANDSUSPENDED SOLIDS INWATER

Module3: **ContactHour: 02**

EXPERIMENTONDETERMINATIONOFpH

Module4: **ContactHour:02**

EXPERIMENTONDETERMINATIONOFCONDUCTIVITY

Module5: **ContactHour:02**

EXPERIMENTONDETERMINATIONOFCHLORIDES

Module6: **ContactHour:02**

EXPERIMENTONDETERMINATIONOFTURBIDITYANDJARTEST

Module7: **ContactHour:02**

EXPERIMENTONDETERMINATIONOFACIDITYOFWATER

Module8: **ContactHour:02**

EXPERIMENTONDETERMINATIONOFALKALINITYOFWATER

Module9: **ContactHour:02**

EXPERIMENTONDETERMINATIONOFTOTALHARDNESS

Module10: **ContactHour:02**

EXPERIMENTONDETERMINATIONOFRESIDUALCHLORINE

Module11: **ContactHour:06**

EXPERIMENTONDETERMINATIONOFDO,BOD,COD

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DCE401:StructuralAnalysis **L– T–P:CR**
Totalcontacthour:35 **3 -1– 0:08**

UnitI **Contact hours 07**

Three Hinged Arch, Cables and Suspension Bridges: Equilibrium of a loadedcord,Vectordiagram,Cablecarryinguniformlydistributedload,Suspensionbridgewith three-hingedstiffening girder.

UnitII **Contact hours 07**

InfluenceLineDiagramforReaction,Shear,BendingMomentandtheirmaximum & minimum values for determinate beams, Arches and trusses, ILD forconcentrated load, for uniformly distributed load, for single pointed load, forwheelload.

UnitIII **Contact hours 07**

Deflections by moment- area, Conjugate beam and energy methods, Virtual work,Unitload method, Deflection by strain energymethod.

UnitIV **Contact hours 07**

Degreeofindeterminacyandstability,Determiningdegreeofindeterminacy,Principlesofsuper position,Betti‟slaw,Castigliano‟stheorems&applications.

UnitV **Contact hours 07**

Analysis of indeterminate beams by strain- energy: Strain energy due to bending,analysis of beams and rigid frames by strain energy method and virtual workmethods,Principleof virtual work fordeformablebodies.

Books:

1. Theory and Analysis of Structures (Vol. II), O.P. Jain and A S Arya, Nem Chand & Brothers,Roorkee,India.
2. BasicStructuralAnalysis,CSReddy,TataMcGrawHill,NewDelhi.
3. AnalysisofStructuresVol.I&II,VNVazarani&M.M.Ratwani,KhannaPublications,Delhi.
4. ElementaryStructuralAnalysis,S. Utku,CHNoris, andJ.B.Wilbur,McGraw Hill,N.Y.
5. TheoryofStructures,TimoshenkoandYoung,McGrawHill,N.Y.

DCE402:WaterSupplyandSanitaryInstallation: L – T – P:CRTotalcontacthours:30 3 -0 – 0 :06

UnitI: Sources ofwatersupply **Contact hours 07**
Surface runoff, precipitation, measurement of rainfall, types of sources, surfacesource, underground sources, wells, tube wells and method of construction, typesof pumps with fittings.

Unit II: Collection of surface water and its conveyance through pipes **(06 hours)**canalintake, reservoirintake,riverintake,portableintake,typeofpipes,methodsof layout of pipes, corrosion in pipes and their remedial measures, appurtenancesin distribution system.

UnitIII: Sanitary systems. (**05hours**)
Conservancy andwatercarriagesystems,systemsofsewerage, constructionandmaintenanceof privies, Septictanks,imhofftanks

UnitIV: Sewers **(07hours)**
Materialsforsewers,shapesofsewers,jointsin sewers,layingandtestingofsewers,ventilationofsewers,cleaningofsewers, sewer appurtenances.

UnitV:Plumbingequipmentsandoperations (**06 hours)**Water supply and sanitary fittings, house drainage, concepts of rural water supplyandsanitation.

DCE403:Fluid Mechanics L – T– P:CR
Totalcontacthours:33 3 -0 – 0 :06

UnitI (9 Hours)

Properties of fluid: Mass, Mass Density, Specific Weight, Specific Volume Specific Gravity,Viscosity,Compressibility,BulkModulus,SurfaceTensionandCapillarity.Fluidstatics– Pascal‟s Law, Hydrostatic Law, Types of Pressure, Pressure measuring device: Manometers andpressuregauges

UnitII (9 hours)

Fundamentals of fluid flow: Fluid Motion, Types of Fluid Flow, Continuity Equation, VelocityandAcceleration, Bernoulli‟sEquation, Venturi meter,Orificemeter,Pitot Tube

UnitIII **(9 Hours)**

Fluidflowinpipes-Darcy-Weisbachequation,MajorandMinorHeadloss,HydraulicandTotalEnergy,FlowthroughSyphon,Pipe sinSeriesandParallel,EquivalentPipe,PipeNetwork.

UnitIV **(6 Hours)**

DimensionalAnalysisandDynamicSimilitude-DefinitionsofReynoldsNumber,FroudeNumber,MachNumber, Weber *Number*andEuler Number;Buckingham‟sπ-Theorem.

Text/ReferenceBooks:

1. FluidMechanicsandMachinery,C.S.P.Ojha,R.BerndtssonandP.N.Chadramouli,OxfordUniversit yPress, 2010

2. HydraulicsandFluidMechanics,PMModiandS MSeth,StandardBookHouse

3. TheoryandApplicationsofFluidMechanics,K.Subramanya,TataMcGrawHill

4. FluidMechanicswithEngineeringApplications,R.L.Daugherty,J.B.FranziniandE.J.Finnemore,I nternationalStudent Edition, Mc GrawHill.

DCE473:Fluid Mechanics Lab **L – T– P:CR**
Totalcontacthours:20 **3 -0 – 0 :06**
TotalnoofExperiments:10

ListofExperiments:

1. StabilityofFloatingBody **Contacthour 2**
2. VerificationofBernoulli‟sTheorem **Contacthour2**
3. Venturimeter **Contacthour2**
4. Orificemeter **Contacthour2**
5. PitotTube **Contacthour2**
6. FlowVisualization **Contacthour2**
7. VortexFlow **Contacthour2**
8. Lossesin Pipes **Contacthour2**
9. PipesinSeries **Contacthour2**
10. Pipesinparallel **Contacthour2**

DCE404:Surveying-II **L – T – P:CR**
TotalContacthour:35 **3 -0 – 0 :06**

UnitI **Contact hour:09**
Planetablesurveying:methodsofplanetabling,two-pointandthree-pointproblemsandtheirsolutions,errors in plane tabling.

UnitII **Contact hour:09**
Theodolite-descriptionandadjustmentoftransittheodolite,measurementofanglesandsettingout lines.

UnitIII **Contact hour:09**
Trigonometricallevelling-Heightanddistanceofobjectswithaccessibleandinaccessiblebase,terrestrialrefraction, determination ofdifferenceinelevation.

UnitIV **Contact hour:08**
Tacheometry-Principles,fieldobservations,reductionofreadings,applications.

Books:
1. Surveying-Vol-I,B.C.Punamia,LaxmiPublications,NewDelhi.
2. Surveying&LevellingVol.-I,T.P.Kanetkar&S.V.Kulkarni,PuneVidyarthiGrihaPrakashan,Pune.
3. SurveyingVol.-I,S.K. Duggal,TataMcGrawHill,NewDelhi.
4. SurveyingandLevelling,N.N.Basak,TataMcGrawHill,NewDelhi.

DCE474:Surveying-II **L – T – P:CR**
TotalContacthour:20 **0 -0 – 2 :02**

1. Planetablesurveyingbymethodofradiation. **Contacthour:02**
2. Planetablesurveyingbymethodofintersection. **Contacthour:02**
3. Planetablesurveyingbytraversing. **Contacthour:02**
4. Two-pointandthreepoint-problemin planetablesurveying. **Contacthour:02**
5. Horizontalangleby repetitionmethodusingtheodolite. **Contacthour:02**
6. Horizontalanglebyreiterationmethodusingtheodolite. **Contacthour:02**
7. Todetermineverticalangle usingtheodolite. **Contacthour:02**
8. Todeterminetheheightanddistanceof anobjectbytrigonometricallevelling. **Contacthour:02**
9. TodeterminetheconstantsKand Cofatacheometer. **Contacthour:02**
10. Todeterminetheheightanddistanceof anobjectbytacheometricsurveying. **Contacthour:02**

DCE405:BuildingConstruction **L – T – P**
:CRTotalcontacthours:35 **3 -0 – 0:06**

UnitI:Foundation. **Contacthours:05**
Introduction,functionsoffoundation,typesoffoundation.

UnitII:Brickmasonry. **Contacthours:04**
Introduction,Generalprinciplesinbrickmasonry construction,Bondinbrickmasonry.

UnitIII:FormworkandScaffolding. **Contact hours:**
04Typesofformwork,typesofformsfordifferentstructuralmembers,Componentpartsandtypesofscaf folding.

UnitIV: Doors and windows. **Contact hours:**
05Introduction,componentpartsofdoors andwindows, sizesof doors andwindows,types of doorsand windows.

UnitV: Arches andlintels. **Contacthours:05**
Componentpartsandclassificationofarchesandlintels.

UnitVI: Roofsandfloors **Contacthours:05**
IntroductionandClassificationofroofsandroofcoverings,Introductionandcomponentsofafloor,types offloors,cement concreteand mosaicfloors.

UnitVII: Stairs **Contacthours:03**
Introduction,componentpartsofstaircase,dimensionsofastep,classificationofstairs,Protectiveand Decorativefinishes.

UnitVIII:Dampproofcourses. **Contacthours:04**
Causesofdampness,methodsandmaterialsusedfordamp proofing.

Books:

1. BuildingConstruction,B.C.Punmia,LaxmiPublishers,NewDelhi.
2. BuildingConstruction,ShushilKumar,StandardPublishers,Delhi.
3. MaintenanceofBuilding,A.C.Panchdhari,NewAgeInternational,New Delhi.
4. BuildingConstructionVolItoIV, W.B.Mackey, OrientLongman, Mumbai.

DCE475:Computer Aided Building Drawing

Totalcontacthours:20 **L– T – P: CR**
0-0 – 2 : 02

1. Drawing of building components **ContactHours:04**
2. Drawing of plan of residential building **ContactHours:04**
3. Drawing of cross section of residential building **ContactHours:04**
4. Drawing of elevation of residential building **ContactHours:02**
5. Drawing of public building **ContactHours:02**
6. Drawing of different types of Stair **ContactHours:04**

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Paper Code: DCE501 **Credit: 6**
Paper Name: Construction Technology **L-T-P: 3-0-0**
Total contact hours: 36

Unit I: Roads **Contact hours: 09**
Roads classification, Geometrical features of roads, Construction of WBM, Black top and concrete pavements including grade and base courses. Equipment used for road construction, features of hilly roads.

Unit II: Railways **Contact hours:09**
Components of Railway tracks, Construction and Maintenance of tracks.

Unit III: Bridges and Culverts **Contact hours: 09**
Types of bridges/culverts, criteria for selection of sites, Construction and maintenance of bridges/culverts.

Unit IV: Hydraulic Structures **Contact hours:09**
Construction details of dam, construction details of canals/other hydraulic structures

Text Books/References

1. Highway Engineering, S K Khanna and C E G Justo, Nem Chand and Brothers, Roorkee, India.
2. A Text Book of Railway Engineering, Arora &Saxena, Dhanpat Rai and Sons, New Delhi.
3. Elements of Bridge Engineering, J Victor, Oxford and IBH, New Delhi.
4. Irrigation Engineering & Hydraulic Structures, S.K. Garg, Khanna Publishers, Delhi.
5. Text Book of Railway Engineering, B.L. Gupta, Standard Publishers, New Delhi

Paper Code: DCE502 **Credit: 6**
Paper Name: Concrete Technology **L-T-P: 3-0-0**
Total contact hours: 36

Unit I: Concrete **Contact hours: 07**
Concrete: Importance, Production of concrete, operations involved, grades, Ingredients, yield of concrete.

Unit II: Ingredients of concrete **Contact hours:08**
Aggregates: Classification, Characteristics and properties of aggregates; Cement: Composition, Varieties and respective advantages; Water: Quality, Mixing and Curing.

Unit III: Rheology of concrete **Contact hours:07**
Properties of green and hardened concrete, Rheology and mix proportioning.

Unit IV: Admixtures **Contact hours:07**

Types of admixture and compounds; Quality Control - Influencing Parameters, advantages, measure of variability and Statistical Quality Control.

Unit V: Special Concrete **Contact hours:07**

Ferro-Cement, Polymer Concrete Composites, lightweight &fibre reinforced concrete, Guniting.

Text Books/References

1. Concrete Technology, M S Shetty, S. Chand & Company, New Delhi.
2. Concrete Technology, M L Gambhir, Tata McGraw Hill, New Delhi.
3. Properties of Concrete, A. M. Neville, Longman, ELBS, London.
4. Concrete Manual: Laboratory Testing for Quality Control of Concrete, M L Gambhir, Dhanpat Rai & Sons, New Delhi.
5. Concrete for Construction, V K Raina, Tata McGraw Hill, New Delhi.

DCE572: Concrete Technology Lab: **L – T – P : 02**
0 - 0 – 2 : 02

Experiment No.	Name of the experiment	Contact hour
1	Consistency test of cement	**Contact hour02**
2	Initial and final setting time of cement	**Contact hour02**
3	Slump cone test of concrete	**Contact hour02**
4	Compaction test of concrete	**Contact hour02**
5	Flow table test	**Contact hour02**
6	Los Angeles abrasion test of aggregate	**Contact hour02**
7	Water absorption test on aggregate	**Contact hour02**
8	Flakiness Index and elongation Index test of aggregate	**Contact hour02**
9	Specific gravity test of aggregate	**Contact hour02**

Paper Code: DCE503 **Credit: 6**
Paper Name: Geotechnical Engineering **L-T-P: 3-0-0**
Total contact hours: 36

Unit I: Introduction **Contact hours:08**

Origin of Soil, Physical properties of Soil, Phases of soil, Measurement of physical properties, Partial size distribution, Plasticity indices, soil classification, Field identification, Clay properties and mineralogy, Void ratio, Porosity, Degree of Saturation, Water content, Unit Weights, Specific Gravity– their relationships, Relative density, Consistency limits determination and various indices – Significance and Importance, Classifications

Unit II: Permeability and Seepage: **Contact hours:07**

Types of soil water, Darcy‟s law and its limitations constant head and variable head permeameters pumping tests, Factors effecting coefficient of permeability, permeability ofstratified soils. Total, neutral and effective stresses, No flow downward flow andupward flow conditions, quick sand

conditions, critical hydraulics gradient

.

Unit III: Compaction: **Contact hours:07**

Soil compaction; mechanism of compaction, Factors effecting compaction – water content, compactiveeffort, Nature of soil. Compaction tests. Effect of compaction on physical and engineering properties of soils.

Unit IV: Consolidation: **Contact hours:07**

Oedometer Test, e-p and e-log p curves – compression index,coefficient of compressibility and coefficient of volume decrease. Terzaghi‟s one dimensional consolidation theory assumption, derivation andapplication,initial compression, primary compression. Normallyconsolidated, over consolidated and under consolidated clays.

.

Unit V: Shear Strength of Soil: **Contact hours:07**

Mohr circle of stress, Mohr coulomb failure theory sheartests – shear box, unconfined compression, and triaxial compression tests, fieldvane shear tests, shear parameters, types of shear tests in the laboratory based on drainageconditions

Text Books/Reference:

1. Soil Mechanics and Foundation Engineering, Dr. B.C. Punmia, A.K. Jain and A.K. Jain.
2. Textbook of Geotechnical Engineering, Iqbal H. Khan, PHI
3. Fundamentals of Geotechnical Engineering, B.M. Das, Brookes &Cole Publications, London

CE573: Geotechnical Engineering Lab: **L – T – P : 02**
0 - 0 – 2 : 02

Experiment No.	Name of the experiment	
1	Determination of water content of soil by oven drying.	**Contact hour02**
2	Determination of specific gravity of soil.	**Contact hour 02**
3	Determination of field density by core cutter method.	**Contact hour 02**
4	Determination of field density by sand replacement method.	**Contact hour 02**
5	Determination grain size determination by dry & wet sieving.	**Contact hour 02**
6	Determination of liquid limit and plastic limit.	**Contact hour 02**
7	Determination of permeability by constant head test.	**Contact hour 02**
8	Determination of permeability by falling head test	**Contact hour 02**

Reference Books:

1. Laboratory manual for soil testing by Dr. D.K. Maharaj , Katson Books

Paper Code: DCE504 **Credit: 4**
Paper Name: Design of RCC Structures **L-T-P: 4-0-0**
Total contact hours: 48

Unit I **Contact Hours 10**
Introduction of Design Concepts; Working Stress Method of Design, Design of Rectangular and Flanged Beams for Flexure (singly and doubly reinforced).

Unit II **Contact Hours 10**
Limit State Method of Design for flexure, shear, torsion and compression.

Unit III **Contact Hours 10**
Design of rectangular and flanges beams for bond, shear and torsion.

Unit IV **Contact Hours 08**
One-way, Two Way and Continuous slabs.

Unit V **Contact Hours 10**
Axially and Eccentrically Loaded Short Columns; axially and eccentrically loaded long columns; isolated footings

Text Books/References

1. Reinforced Concrete Design, S U Pillai / Devdas Menon, Tata McGraw Hill, New Delhi
2. Reinforced Concrete Design, S.N. Sinha, Tata McGraw Hill, New Delhi
3. Design of RCC Structures, M L Gambhir, Macmillan India Ltd, Delhi
4. Reinforced Concrete, S.K. Mallick& A P Gupta, Oxford & IBH, New Delhi
5. Reinforced Concrete, Behaviour, Analysis and Design, P. Purushotham, Tata McGraw Hill, New Delhi
6. RCC Structures, B C Punmia, Ashok K Jain, and Arun K Jain, Laxmi Publications, Delhi
7. Design of Reinforced Concrete Structures, N. Subramanian, Oxford University Press, New Delhi

Paper Code: DCE505 **Credit: 6**
Paper Name: Transportation Engineering **L-T-P: 3-0-0**
Total contact hours: 34

Unit I: Introduction **Contact hours: 5**
Highway development and planning, Classification of roads, road development in India, Highway alignment.

Unit II: Highway Geometric design **Contact hours: 6**
Geometric design – factors, considerations; design of Cross sectional elements, Sight distance, horizontal and vertical alignment, intersections, problems.
.

Unit III: Highway TrafficContact hours: 6
Traffic Engineering and Control, Traffic Control Devices, Traffic Characteristics, Traffic studies, Design of Parking facilities, Highway Lightings, problems.

Unit IV: Pavement design, road construction and materials
Contact hours: 12
Design of pavements – Design of flexible pavements as per IRC, CBR Methods, Design of Rigid pavements, recommendations for design of concrete roads, problems, Construction of roads – Earthen roads – W.B.M. roads – Bitumens roads – cement concrete roads – Pavement materials, aggregates and bitumen tests, desirable properties of materials, problems.

Unit V: Railway Engineering **Contact hours: 5**
Introduction to Railway Engineering, Permanent way, Rails, sleepers, ballast; Geometrics for broad guage, cent defficiency; points and crossing, station yard

Reference Books:

1. Highway Engineering, S K Khanna and C E G Justo, Nem Chand & Brothers, Roorkee, India
2. A Text Book of Railway Engineering, Arora &Saxena, Dhanpat Rai & Sons, Delhi

CE575: Transportation Engineering Lab: L – T – P : CR
0 - 0 – 2 : 02

Experiment No.	Name of the experiment	
1	Sieve analysis of aggregates	**Contact hour: 2**
2	Specific gravity and water absorption test on aggregates	**Contact hour: 2**
3	Shape test on aggregates- flakiness index and elongation index test	**Contact hour: 2**
4	Impact test on aggregates	**Contact hour: 2**
5	Crushing test on aggregates	**Contact hour: 2**
6	Abrasion test on aggregates by Los Angel‟s Abrasion Test	**Contact hour: 2**
7	Penetration test of bitumen	**Contact hour: 2**
8	Ductility test of bitumen	**Contact hour: 2**
9	Softening point test of bitumen	**Contact hour: 2**
10	Flash and fire point of bitumen	**Contact hour: 2**
11	Viscosity test of bitumen	**Contact hour: 2**

Reference Books:

1. Highway Engineering, S K Khanna and C E G Justo, Nem Chand & Brothers, Roorkee, India

Paper Code: DCE576Credit: 2
Paper Name: Professional Practices-I **L-T-P: 0-0-2**
Total contact hours: 26

Exposure to practical aspects of Civil Engineering through site visits to various construction sites.

B.Tech Computer Science and Engineering Syllabus Structure and Details
(July 2019 onwards)

Course No.	Course Name	L	T	P	C	Course No.	Course Name	L	T	P	C
Semester I						**Semester II**					
UPH101	Engineering Physics	3	1	0	8	UCH201	Engineering Chemistry	3	1	0	8
UMA101	Engineering Mathematics-I	3	1	0	8	UMA201	Engineering Mathematics-II	3	1	0	8
UEE101	Basic Electrical Engineering	3	1	0	8	UCSE201	Programming for Problem Solving	4	1	0	10
UHSS101	English Communication	2	0	0	4	UCE201	Engineering Drawing and Computer Graphics	1	0	0	2
UME101	Engineering Workshop	1	0	0	2	UHSS201	Professional Ethics and Human Value	2	0	0	4
UPH171	Engineering Physics Lab	0	0	3	3	UCH271	Engineering Chemistry Lab	0	0	2	2
UEE171	Basic Electrical Engineering Lab	0	0	2	2	UCSE271	Programming for Problem Solving Lab	0	0	3	3
UHSS171	English Communication Practice	0	0	2	2	UCE271	Engineering Drawing and Computer Graphics Lab	0	0	4	4
UME171	Workshop Practice	0	0	4	4						
Contact Hours: 26		**12**	**3**	**11**	**41**	**Contact Hours: 26**		**13**	**3**	**9**	**41**
Semester III						**Semester IV**					
UECE306	Digital Electronics & Logic Design	3	0	0	6	UCSE401	Computer Organization & Architecture	3	0	0	6
UCSE301	Data Structures & Algorithms	3	1	0	8	UCSE402	Probability Theory and Random Process	2	0	0	4
UMA302	Discrete Mathematics	3	1	0	8	UCSE403	Design & Analysis of Algorithms	3	0	0	6
UCSE302	Elementary Number Theory and Algebra	3	0	0	6	UCSE404	Database Management Systems	3	0	0	6
UCSE303	Object Oriented Programming using Java	3	0	0	6	UHSS401	Engineering Economics	3	0	0	6
UCSE373	Object Oriented Programming Lab	0	0	3	3	UCH401	Environmental Sciences	2	0	0	0
UCSE371	Data Structures & Algorithms Lab	0	0	3	3	UHSS471	Language Lab	0	0	2	2
UCSE374	System Software Lab	0	1	3	5	UCSE473	Design & Analysis of Algorithms Lab	0	0	3	3
						UCSE474	Database Management Systems Lab	0	0	3	3
Total Contact Hours 27		**15**	**3**	**9**	**45**	**Total Contact Hours 24**		**16**	**0**	**8**	**36**
Semester V						**Semester VI**					
UCSE501	Computer Networks	3	0	0	6	UCSE601	Complier Design	3	0	0	6
UCSE502	Operating Systems	3	0	0	6	UCSE602	Software Engineering	2	0	0	4
UCSE503	Formal Language & Automata Theory	3	0	0	6	UCSE603	Machine Learning	3	0	0	6
UCSE51*	Professional Elective-I	3	0	0	6	UCSE61*	Professional Elective-II	3	0	0	6
UHSS501	Industrial Management Entrepreneurship	3	0	0	6	UCSE675	Implementation of Programming Languages Laboratory	0	2	3	7
UCSE571	Computer Networks Lab	0	0	3	3	UCSE672	Software Engineering Laboratory	0	0	3	3
UCSE572	Operating Systems Lab	0	0	3	3	UHSS601	Professional Communication	2	0	0	4
UCSE573	Hardware Laboratory	0	1	3	5	UCSE601	Complier Design Laboratory	0	0	3	3
						UCSE691	Design Lab	0	0	2	2
Total Contact Hours 25		**15**	**1**	**9**	**41**	**Total Contact Hours 26**		**13**	**2**	**11**	**41**
Semester VII						**Semester VIII**					
UCSE701	Optimization	3	0	0	6	UCSE81*	Professional Elective-V	3	0	0	6
UCSE71*	Professional Elective-III	3	0	0	6	**	Open Elective-III	3	0	0	6
UCSE71*	Professional Elective-IV	3	0	0	6	**	Open Elective-IV	3	0	0	6
**	Open Elective-I	3	0	0	6	UECE893	Project II	0	0	12	12
UCSE792	Project I	0	0	8	8	UECE894	Grand Viva	0	0	2	2
UCSE794	Industrial Training	0	0	0	0						
Total Contact Hours: 20		**12**	**0**	**8**	**32**	**Total Contact Hours: 23**		**9**	**0**	**14**	**32**
Total Mandatory Credits: 310											

Semester I

Paper code: UPH101
Paper name: Engineering Physics Credit: 8
Total contact hours: 40L-T-P: 3-1-0

1. **Mathematical Physics:**
   Vector and Scalar field, grad, divergence, curl, Laplacian, line integral, surface integral, volume integral, physical examples in the context of electricity and magnetism, Stokes theorem, Gauss theorem (No proof). [5]

2. **Electrodynamics:**
   Gauss Law of electrostatics, Biot-Savart Law, Ampere‟s Law, Displacement current, Equation of Continuity, Maxwell‟s equations in differential and integral form, Maxwell‟s wave equation in free space, propagation of EM wave in free space, transverse nature of EM wave. [6]

3. **Heat and thermodynamics**:
   Thermodynamic system and state variables, Heat &Work, Zeroth Law, 1st and 2nd laws of thermodynamics, Isothermal and adiabatic changes, Carnot theorem, Carnot engine, entropy, pyrometer. [5]

4. **Wave and Oscillations:**
   - Transverse wave on a string, reflection and transmission of waves at boundary, impedance matching, standing waves and their eigen frequencies, acoustics waves and speed of sound.
   - Simple harmonic motion**,** Damped oscillation-its differential equation, energy decay in a damped oscillation, Forced vibration, Resonance, Sharpness of resonance and quality factor. [8]

5. **Introduction to Quantum Mechanics:**
   Wave-Particle duality, Black body radiation, Photoelectric effect, Compton effect, Uncertainty principle, wave function, the Schrodinger time dependent and time independent equations, application of Schrodinger equation for free particle in one dimensional infinite potential box. [6]

6. **Optics and Optoelectronics:**
   - Huygens‟ Principle, superposition of waves and interference of light, Young‟s double slit experiment, Newton‟s rings, Diffraction, Single slit diffraction, grating.
   - LASER: Einstein‟s theory of matter radiation interaction and A and B coefficients, amplification of light by population inversion, properties of laser: monochromaticity, coherence, directionality and brightness, different types of laser: gas lasers (He-Ne) and solid state laser (Ruby), applications of laser in science, engineering and medicine.
   - Light emitting diodes (LED): device structure, materials, characteristics and figures of merit. [10]

Books / References:

1. *Engineering Physics, Malik and Singh, Tata Mc Graw Hill*
2. *Engineering Physics, Naidu, Pearson*
3. *Engineering Physics, Gupta & Gaur, Dhanpat Rai*
4. *Quantum Mechanics, Ajay Ghatak S. Lokanathan, Trinity*
5. *Quantum Mechanics: A Text Book for undergraduates, Mahesh C Jain, TMH*
6. *Thermodynamics and kinetic theory of gases*, W. Pauli, Dover Publications, 2010
7. *Electromagnetic Theory, Prabir K. Basu&HrishikeshDhasmana, AneBooks*
8. *Introduction to Electrodynamics, David Griffiths*
9. *Electricity, magnetism and light, W. Saslow*
10. *Oscillations and waves in physics, Ian G. Main,*
11. *The physics of vibrations and waves, H.J. Pain,*
12. *Arthur Beiser, Concepts of Modern Physics (Sixth Edition), Tata McGraw-Hill Publication, New Delhi (1988).*

Paper Name: Engineering Physics Lab **Credit: 3**
Paper code: UPH171 **L-T-P: 0-0-3**

List of experiments:

Experiment No 1: To determine the magnetic moment of a bar magnet and the horizontal component of the earth's magnetic field.

Experiment No 2: To study the Hall Effect in semiconductor (Germanium Crystal) and then to calculate the Hall coefficient.

Experiment No 3: To Verify Stefan-Boltzmann law of thermal radiation by electrical method.

Experiment No 4: To determine the coefficient of thermal conductivityof a bad conductor (glass) by using Lee‟s Disc apparatus.

Experiment No 5: Tostudy the variation of time period of a bar pendulum about different axes and determine the value of acceleration due to gravity (g) at the place.

Experiment No 6: To determine the wavelength of sodium light by measuring the diameters of Newton's Rings.

Experiment No 7: To determine the wavelength of Laser light by using diffraction grating.

Experiment No 8: To determine the grating element by using sodium vapour lamp.

Experiment No 9: To determine the value of Planck's constant with the help of vacuum phototube.

Experiment No 10: To study the current flowing through an external circuit by a potentiometer and determine the internal resistance of a standard cell.

Paper code: UMA101
Paper name: Engineering Mathematics-I **Credit: 8**
Total contact hours: 40L-T-P: 3-1-0

Module 1: Calculus-I **(15hours)**

Successive derivative, Libnitz‟s Theorem, Tangentand Normal, Derivation of arc length (Cartesian and Polar coordinates), curvature, partial derivatives, homogeneous functions. Expansions of functions using Taylor‟s theorem

Beta and Gamma functions and their properties,applications of definite integrals.

Module2: Sequences and Series **(10 hours)**

Convergence of sequence and series, tests for convergence (Comparison test, Ratio test,Cauchy‟s Root test),Fourier series, Change of intervals, Half range sine and cosine series.

Module 3:Multivariable Calculus **(15 hours)**

Differentiation of vector functions, scalar and vector filed, gradient of a scalar function, directional derivatives,divergence, curl and their properties, integration of vector functions, line, surface and volume integral, Green‟s, Gauss‟s and Stoke‟s Theorems.

Textbooks/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition,Pearson,Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi,2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi,11thReprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics

Paper code: UHSS101
Paper name: ENGLISH COMMUNICATION **Credit: 4**
Total contact hours:39 **L-T-P: 2-0-0**

Module 1: Vocabulary Building: 1.1 Word Formation 1.2 Root words from foreign languages and their use in English 1.3 Understanding prefixes and suffixes to form derivatives 1.4 Antonyms and Synonyms, Functional Vocabulary,Idioms and Phrasal Verbs	**Contact hours: 3**
Module 2: Basic Writing Skills 1.1 Sentence Structure 1.2 use of phrases and clauses in sentences 1.3 Importance of proper punctuation 1.4 Creating Coherence 1.5 Organizing Principles of paragraph in documents	**Contact hours: 4**

1.6 technicques of writing precisely	
Module 3: Identifying Common Errors in Writing 1.1 Subject-verb Agreement 1.2 Noun-pronoun agreement 1.3 Effective Principles of Sentence Structure 1.4 Misplaced Modifiers 1.5 Articles 1.6 Prepositions 1.7 Redundancies 1.8 Cliches	**Contact hours: 4**
Module 4: Nature and Style of Sensible Writing 1.1 Describing 1.2 Defining 1.3 Classifying 1.4 Providing examples or evidence 1.5 Writing Introduction and Conclusio	**Contact hours: 4**
Module 5: Business Writing 1.5 Letter Writing, Memo, Report 1.6 Email 1.7 CV, Resume	**Contact hours: 4**
Module 6: Oral Communication (The Unit involves interactive practice sessions in language Lab) 6.1 IPA Symbols, pronunciation, Intonation, Stress and Rhythm 6.2 Listening Comprehension 6.3 Common Everyday Situations: Conversation and dialogues 6.4 Communication at work place 6.5 Interviews 6.6 Formal Presentations	**Contact hours: 4**
Module 7: Learning Language through Literature 7.1 Novel: R.K. Narayan *The Guide* 7.2 Poem: John Keats *Ode to a Nightingale* and *Ode to a Gracian Urn*	**Contact hours: 4**

BOOKS RECOMMENDED:

(1) Practical English Usage, Michael Swan, OUP,1995
(2) Remedial English Grammar, F.T. Wood, Macmillan, 2007
(3) On Writing Well, William Zinsser, Harper Resource Book, 2001
(4) Study Writing, Liz Hamp-Lyons and Ben Heasely, CUP, 2006
(5) Communication Skills, Sanjay Kumar and PushpLata, OUP, 2011
(6) Exercises in Spoken English, Parts-I-III, CIEFL, Hyderabad, OUP

Paper code: UHSS171;
Paper name: English Communication PracticeCredit: 2
Total contact hours:40L-T-P-C: 0-0-2-2

Module 1Listening Practices 1.1 Enhancing listening skills 1.2 Different types of listening 1.3 How to be a good listener 1.4 Barriers to Effective Listening	**Contact hours: 3**
Module 2: Speaking Skills 2.1 The sounds of English 2.2 Benefits of Speaking 2.3 Self Development through Speaking Skills	**Contact hours: 4**
Module 3: Reading Skills 3.1 Definition 3.2 Kinds of reading 3.3 Critical Reading Practices 3.4 Reading Method 3.5 Reading Speed Skimming Scanning Active Reading	**Contact hours: 4**
Module 4: Writing Skills 4.1 Purpose 4.2 Importance of Style 4.3 Essay 4.4 Business Writing	Contact hours: 4
Module 5: Remedial English Grammar 5.1 Tense 5.2 Subject Verb agreement 5.3 Relative Clauses 5.4 Prepositions 5.5 Understanding voice changes	

BOOKS and Software RECOMMENDED:

(1) Practical English Usage, Michael Swan, OUP,1995
(2) Remedial English Grammar, F.T. Wood, Macmillan, 2007
(3) On Writing Well, William Zinsser, Harper Resource Book, 2001
(4) Study Writing, Liz Hamp-Lyons and Ben Heasely, CUP, 2006
(5) Communication Skills, Sanjay Kumar and PushpLata, OUP, 2011
(6) Exercises in Spoken English, Parts-I-III, CIEFL, Hyderabad, OUP
(7) Study Skills in English, Michael J.Wallace, CUP]
(8) Sky Pronunciation
(9) Tense Buster
(10) Business Writing

Paper code: UME101
Paper name: Engineering Workshop **Credits: 2**
Total contact hours: 12 **L-T-P: 1-0-0**

Module 1: Carpentry shop (2 hrs)

i. Introduction with the shop
ii. Various structure of wood and types of wood
iii. Different types of tools, machine and accessories used in Carpentry shop
iv. Safety Precautions in workshop

Module 2: Fitting Shop (2 hrs)

i. Introduction with the fitting shop
ii. Various marking, measuring, cutting, holding and striking tools
iii. Different Operations like chipping, filing, marking drilling etc.
iv. Working principle of drilling machine, lapping dies etc.

Module 3: Welding Shop (2 hrs)

i. Introduction
ii. Types of Welding, Arc Welding, Gas Welding, Gas Cutting
iii. Welding of dissimilar materials, selection of welding rod material, size of rod and work piece
iv. 3 Different types of flames
v. Elementary symbolic Representation
vi. Safety and precautions

Module 4: Machine Shop (2 hrs)

i. Introduction
ii. Study of Different types of Lathe machine, shaping machine, Drilling machine
iii. Study of Different types of hand tools and machine tools and parts
iv. Safety & precautions

Module 5 :Turning shop (2 hrs)

i. Introduction
ii. Various marking, measuring, cutting, holding, and string tools
iii. Working principle of Drilling machine, tapping, dies, its uses
iv. Safety precautions

Module 6: Electrical Shop (2 hrs)

i. Introduction
ii. Various terms and instruments used in electrical wiring
iii. Study of different tools used in simple house wiring
iv. Difference between ac and dc line

Suggested Text/Reference Books:

(i) Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
(ii) Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
(iii) Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGraw Hill House, 2017.

Paper code: UME171
Paper name: Workshop PracticeCredits: 4
Total contact hours: 36 L-T-P: 0-0-4

Module 1: Carpentry shop (6 hrs)

Demo of different wood working tools and machines
Demo of different wood working processes
Simple joints like T joints, Cross halving joint, dovetail joint etc.
One simple utility job.

Module 2: Fitting Shop (6 hrs)

Demo of different fitting tools and machines and power tools
Demo of different processes in fitting shop
Squaring of a rectangular metal piece
Making a V-block of metal piece
One simple utility job.

Module 3: Welding Shop (6 hrs)

Demo of different welding tools and machines
Demo of Arc Welding, Gas Welding, Gas Cutter and rebuilding of broken parts with welding
Any one Composite job involving lap joint welding process.

Module 4: Machine Shop (6hrs)

Demo of different machines and their operations
Preferably prepare a simple job (e.g Turning operation etc)

Module 5 Turning shop (6 hrs)

Demo of lathe machine, drilling machine
One job related to plane and taper turning , threading and knurling
One job related to drilling and tapping

Module 6 Electrical Shop (6 hrs)

Demo of simple house wiring and use of tools
One job related to simple house wiring
Fittings of cut outs, fuses and other simple fittings etc.
Difference between Single phase wiring and three phase wiring

Paper code: UEE101
Paper name: Basic Electrical Engineering **Credit: 8**
Total contact hours: 40 **L-T-P: 3-1-0**

Module 1: Contact hours: 2
Introduction: Sources of energy; General structure of electrical power systems, Power transmission and distribution via overhead lines and underground cables.

Module 2: Contact hours: 6
DC circuits: Definitions of active, passive, linear, non-linear circuits elements and networks, Kirchoff's laws, Nodal and mesh analysis, voltage and current sources, network theoremssuperposition. Thevenin's, Norton's, maximum power transfer, millman's, and reciprocity
theorems, analysis of simple circuits with DC excitation.

Module 3: Contact hours: 8
Single phase AC circuits: generation of single phase sinusoidal EMF, instantaneous, average and effective value, form and peak factor, examples of other alternating waveforms and average and effective value calculations, concept of phasor and phasor diagrams, lagging and leading of phasors, pure resistive, inductive and capacitive circuits, power factor, complex power, R-L, R-C and R-L-C series circuits, parallel AC circuits, series and parallel resonance.

Module 4: Contact hours: 4
Three phase AC circuits: Generation of three phase EMF, delta and star connections, line and phase value of emf and current, solutions of simple 3-phase balance circuits with resistive and inductive loads, 3-phase power, comparison between 3-phase and 1-phase systems, applications of 3-phase systems.

Module 5: Contact hours: 5
Magnetic circuits: Ampere's circuital law, B-H curve, definition of mmf, flux, flux-density and reluctance, comparison between electric and magnetic circuits, series, parallel and series-parallel circuits and their solutions, energy stored in magnetic circuit, lifting magnets, electromagnetic induction, self and mutual inductance, hysteresis and eddy current losses.

Module 6: Contact hours: 5
Electrical machines: Introduction of electrical machines, classifications (DC and AC machines), transformers, technical specifications, reading of nameplate data, general applications (especially 1-phase and 3-phae induction motors).

Module 7: Contact hours: 5
Electrical measuring instruments: Classification of instruments, essentials of indicating type instruments – deflecting torque, controlling torque, damping, types of indicating instruments, MC and MI type ammeters and voltmeters, extension of range, use of shunts and multiplier, errors and compensation.

Module 8: Contact hours: 5
Electrical installations: Electrical wiring and type, fuse and its ratings, types of wires and cables, LT switch gears: MCB, ELCB, MCCB etc. Earthing and its importance. Electrochemical power sources: primary and secondary cells, classifications of secondary cells based on applications, Lead-acid cell, electrical characteristics of lead-acid cell, maintenance, charging methods of batteries.

Books / References:

(i) D.P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
(ii) D.C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.
(iii) B.L. Thereja, A.K. Thereja, “ A Textbook of Electrical Technology”, S.Chand

Paper code: UEE171
Paper name: Basic Electrical Engineering Lab **Credit: 2**
Total contact hours: 18 **L-T-P: 0-0-2**

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, rheostat and wattmeter.
2. Make a measured resistance from a given rheostat
3. Verification of Kirchhoff’s laws
4. Verification of Superposition theorem
5. Verification of Thevenin’s theorem
6. Verification of Maximum Power Transfer theorem
7. Measurement of voltage, current, power and power factor in single phase AC circuits.
8. Measurement of lamp’s filament resistance.
9. Wiring

Semester II

Paper code: UCH201
Paper name: Engineering Chemistry **Credit: 8**
Total contact hours: 40 **L-T-P: 3-1-0**

UNIT:1 Molecular Structure and Quantum Mechanics: Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.Molecular orbital and quantum mechanics: Schrodinger equation, Eigen function, orthogonal and orthonormal. (6L)

UNIT:2 Electrochemistry: Electrochemical Cells – EMF of a cell, Electrodes, reference electrodes, application of Nernst equation and related problems. Principle of fuel cell, lead acid battery. Corrosion and material oxidation (4L)

UNIT:3 Reaction dynamics and Thermodynamics: Reaction laws: rate and order; molecularity; first and second order kinetics; (Arrhenious equation) catalysis. Laws and applications of thermodynamics, 1st law and 2nd law, Carnot cycle and related problems.
(8L)

UNIT:4 Instrumental Methods of Analysis: Introduction to sophisticated instrumental techniques for characterization of compounds, materials, metals such as Powder X-ray diffraction, surface area, IR, UV,-Vis, NMR, SEM, TEM and GCMS (3L)

UNIT:5Structure, Reactivity of Organic Molecules and Synthesis of Drug Molecule: Concept of electron displacement and their applications, types of intermediate organic species, brief study of some addition, elimination and substitution reaction, cyclization and ring openings. Benzyne reaction, Chichibabin reaction, Hoffman Exhaustive reactions, few important name reactions, to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule. (5L)

UNIT:6 Polymerization: Concepts, classifications and industrial applications; polymerization processes, degree of polymerization (addition and condensation polymerization); preparation, structure and use of some common polymers: plastic (PE, PP, PVC, Bakelite), rubber (natural rubber, SBR, NBR), fibre (nylon 6,6; polyester); conducting and semiconducting polymers.
(4L)

UNIT:7Industrial Chemistry: Solid liquid and gaseous fuels; constituents of coal, carbonization of coal, coal analysis, proximate and ultimate analysis, classification of coal, petroleum, gasoline. Octane number, cetane number, aviation fuel, natural gas, water gas.
(4L)

UNIT:8 Materials Engineering: Concept of nano-chemistry, new forms of carbon, S.W.C.N.T., M.W.C.N.T., Liquid crystals. (4L)

UNIT:9 Biochemistry: Carbohydrates, lipids, amino acids, proteins, Nucleic acid– DNA and RNA, Vitamins and hormones – sources and application. (2L)

Paper name: Engineering Chemistry Lab **Credit: 2**
Papercode: UCH271 **L-T-P: 0-0-2**

Experiment-1: Aim of the experiment:*To determine the coefficient of viscosity of the glycerol by using Ostwald's viscometer*.

Experiment-2: Aim of the experiment:*To determine the surface tension of the given liquid with respect to water at room temperature by using Stalagnometer*.

Experiment-3: Aim of the experiment:*To identify acid radicals be dry and wet tests.*

Experiment-4 Aim of the experiment:*To identify basic radicals be dry and wet tests*

Experiment-5 Aim of the experiment:*Preparation of standard solution of* Na_2CO_3

Experiment-6 Aim of the experiment:*Preparation of standard solution of oxalic acid.*

Experiment-7 Aim of the experiment:*Determination of strength of* H_2SO_4 *by titrating with 0.1 N* Na_2CO_3

Experiment-8 Aim of the experiment:*Determination of strength of NaOH by titrating with 0.1 N HCL*

Experiment-9 Aim of the experiment:*Redox Titration* $KMnO_4$ *Vs* $H_2C_2O_4$

Experiment-10 Aim of the experiment:*Introduction to sophisticated instruments like FT-IR, UV-Visible and GC*

Text/Reference Books:

1. S. Chawla, *A Text Book of Engineering Chemistry*, Dhanpat Rai Publishing Co.
2. Jain and Jain, *Engineering Chemistry*, Dhanpat Rai Publishing Co.
3. Atkins, *Physical Chemistry*, Oxford.
4. J. D. Lee, *Concise Inorganic Chemistry*, Blackwell Science.
5. V.R. Gowariker, N.V. Viswanathan, J. Sreedhar, *Polymer Science*, New Age International Publisher.
6. A.K. Chandra, *Introductory Quantum Chemistry*, 4th Edition, McGraw-Hill
7. S.K. Ghosh Advanced General Organic Chemistry (A Modern Approach) (Set I & Ii) NCBA Publisher, New Delhi, 2009
8. B. Viswanathan, P. S. Raghavan, Practical Physical Chemistry, Viva
9. Dr. S. Rattan, Experiments in Applied Chemistry, S. K. Kataria& Sons.

Paper code: UMA201
Paper name: Engineering Mathematics-II **Credit: 8**
Total contact hours: 40 **L-T-P: 3-1-0**

Module –1: Matrices **(10 hours)**

Inverse and rank of a matrix,rank-nullity theorem, System of linear equations, Symmetric, skewsymmetric and orthogonal matrices, Determinants, Eigenvalues and eigenvectors, diagonalisation of matrices,Cayley-Hamilton Theorem.

Module-2: **First order ordinary differential equations** **(10 hours)**

Exact, linear and Bernoulli"s equations, Euler"s equations, Equations not of first degree,equations solvable for p, equations solvable for x and y, and Clairaut"sform.

Module -3:Ordinary differential equations of higher orders **(8 hours)**

Second order linear differential equations with constant and variable coefficients, method of variation of parameters, Cauchy-Euler equation,System of linear differential equations.

Module-4: **Probability and Statistics** **(12 hours)**

Probability spaces, conditional probability, independence; Discrete and continuous random variables and their properties, Independent random variables; Expectation of Discrete and continuous random variables, Moments, mean and variance.

Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions.

Reference /Text Books

1. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
2. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.

3. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.

7. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
8. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley India, 2009.
9. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
10. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
11. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
12. G.F. Simmons and S.G. Krantz, Differential Equations, Tata McGraw Hill, 2007.

Paper code: UCSE201
Paper name: Programming for Problem Solving **Credit: 10**
Total contact hours: 75 **L-T-P: 4-1-0**

Module 1: Introduction to ProgrammingContact hours: 10

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)
Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm. Flowchart/Pseudocode with examples.
From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code

Module 2: Arithmetic expressions and precedenceContact hours: 7

Module 3: Conditional Branching and LoopsContact hours: 8

Writing and evaluation of conditionals and consequent branching
Iteration and loops

Module 4:ArraysContact hours: 7

Arrays (1-D, 2-D), Integer arrays and Strings

Module 5: Basic AlgorithmsContact hours: 8

Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

Module 6:FunctionContact hours: 8

Functions (including using built in libraries), Parameter passing in functions, call by value,
Passing arrays to functions: idea of call by reference

Module 7:RecursionContact hours: 5

Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

Module 8:StructureContact hours: 6

Structures, Defining structures and Array of Structures

Module 9:PointersContact hours: 8

Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

Module 10:File handlingContact hours: 8

Books / References:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Paper code: UCSE271
Paper name: Programming for Problem Solving Lab **Credit: 3**
Total contact hours: 45 **L-T-P: 0-0-3**

The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment
Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions
Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures
Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series
Tutorial 5: 1D Arrays: searching, sorting:
Lab 5: 1D Array manipulation
Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations
Tutorial 7: Functions, call by value:
Lab 7: Simple functions
Tutorial 8 and 9: Numerical methods (Root finding, numerical differentiation, numericalintegration):
Lab 8 and 9: Programming for solving Numerical methods problems
Tutorial 10: Recursion, structure of recursive calls
Lab 10: Recursive functions
Tutorial 11: Pointers, structures and dynamic memory allocation
Lab 11: Pointers and structures
Tutorial 12: File handling:
Lab 12: File operations

Paper code: UCE201
Paper name: Engineering Drawing and Computer GraphicsCredit: 2
Total contact hours: 12 **L-T-P: 1-0-0**

Module 1: Theory of Lettering and Plane Curves **Contact hours: 2**

Essentials of lettering, Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

Module 2: Theory of Projection of Points, Lines and Plane SurfacesContact hours: 2

Introduction to orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes – Determination of true lengths and true inclinations by rotating line method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

Module 3: Theory of Projection of Solids Contact hours: 2

Introduction to the concepts and description of methods of drawing projections of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method.

Module 4: Theory of Projection of Sectioned Solids and Development of Surfaces
Contact hours: 2
Introduction to the concepts and description of sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids, cylinders and cones.

Module 5: Theory of Isometric and perspective projections Contact hours: 2

Principles of isometric projection – Introduction to the concepts and description of isometric scale – Isometric projections of simple solids and truncated solids – Prisms, pyramids, cylinders, cones-combination of two solid objects in simple vertical positions – Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

Module 6: Basics of AutoCAD Contact hours: 2

Introduction to AutoCAD, Basics of AutoCAD: applicability and capability, DRAW tools, MODIFY tools, TEXT, DIMENSION, PROPERTIES.

Books / References:

1. *Bhatt N.D. and Panchal V.M., —Engineering Drawing‖, Charotar Publishing House, 50th Edition, 2010.*
2. *Basant Agarwal and Agarwal C.M., —Engineering Drawing, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.*
3. *Venugopal K. and Prabhu Raja V., —Engineering Graphics, New Age International (P) Limited, 2008.*
4. *Natrajan K.V., —A text book of Engineering Graphics, Dhanalakshmi Publishers, Chennai, 2009.*
5. *Gopalakrishna K.R., —Engineering Drawing (Vol. I&II combined), Subhas Stores, Bangalore, 2007.*
6. *N S Parthasarathy And Vela Murali, —Engineering Graphics, Oxford University, Press, New Delhi, 2015.*
7. *Shah M.B., and Rana B.C., —Engineering Drawing, Pearson, 2nd Edition, 2009.*

Paper code: UCE271
Paper name: Engineering Drawing and Computer Graphics Lab Credit: 4
Total contact hours: 48 L-T-P: 0-0-4

Module 1: Lettering and drawingplane curvesContact hours: 8

Lettering, Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

Module 2: Drawing projection of points, lines and plane surfacesContact hours: 8

Drawing orthographic projection-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes – Determination of true lengths and true inclinations by rotating line method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

Module 3: Drawing projection of solids **Contact hours: 8**

Drawing projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method.

Module 4: Drawing projection of sectioned solids and development of surfaces
Contact hours: 8
Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids, cylinders and cones.

Module 5: Drawing isometric and perspective projections **Contact hours: 8**

Drawing isometric projections – isometric scale –Isometric projections of simple solids and truncated solids – Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions – Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

Module 6: AutoCAD practice **Contact hours: 8**

Familiarization of AutoCAD application software, Use of DRAW tools, MODIFY tools, TEXT, DIMENSION, PROPERTIES.

Paper code: UHSS201
Paper name: Professional ethics and human values **Credit: 4**
Total contact hours: 40 **L-T-P-C: 2-0-0-4**

Module 1: Engineering Ethics Senses of „engineering ethics" – variety of moral issues – types of inquiry – moral dilemmas – moral autonomy – Kohlberg"s theory – Gilligan"s theory – consensus and controversy – professions and professionalism – professional ideals and virtues – theories about right action – self-interest – customs and religion – uses of ethical theories	**Contact hours: 4**
Module 2: Engineering as Social Experimentation Engineering as experimentation – engineers as responsible experimenters – codes of ethics – a balanced outlook on law – the challenger case study	**Contact hours: 4**
Module 3: Responsibility for safety Safety and risk – assessment of safety and risk – risk benefit analysis – reducing risk	**Contact hours: 4**
Module 4: Responsibilities and Rights Collegiality and loyalty – respect for authority – collective bargaining – confidentiality – conflicts of interest – occupational crime – professional rights – employee rights – intellectual property rights – discrimination	**Contact hours: 4**
Module 5: Global issues Multinational corporations – environmental ethics – computer ethics – weapons development – engineers as managers – consulting engineers – engineers as expert witnesses and advisors – moral leadership – sample code of conduct	**Contact hours: 4**

TEXTBOOKS/REFERENCES:

1. Mike Martin and Roland Schinzinger, "*Ethics in Engineering*", McGraw Hill, New York, 1996.
2. Charles D Fleddermann, "*Engineering Ethics*", prentice Hall, New Mexico, 1999.
3. LauraSchlesinger, "*How Could You Do That: The Abdication of Character, Courage, and Conscience*", Harper Collins, New York, 1996.
4. Stephen Carter, "*Integrity*", Basic Books, New York, 1996.

Semester III

UECE306: Digital Electronics & Logic Design **Credit: 6**
Total Contact Hours: 45 **L-T-P: 3-0-0**

Module 1: **Contact hours: 15**
Digital system and binary numbers: Signed binary numbers, binary codes, cyclic codes, error detecting and correcting codes, hamming codes.
Floating point representation
Gate-level minimization: The map method up to five variable, don‟t care conditions, POS simplification, NAND and NOR implementation, QuineMc-Clusky method (Tabular method).

Module 2: **Contact hours: 10**
Combinational Logic: Combinational circuits, analysis procedure, design procedure, binary adder-subtractor, decimal adder, binary multiplier, magnitude comparator, decoders, encoders, multiplexers

Module 3: **Contact hours: 10**
Synchronous Sequential logic: Sequential circuits, storage elements: latches, flip flops, analysis of clocked sequential circuits, state reduction and assignments, design procedure.
Registers and counters: Shift registers, ripple counter, synchronous counter, other counters.

Module 4: **Contact hours: 6**
Memory and programmable logic: RAM, ROM, PLA, PAL.
Design at the register transfer level: ASMs, design example, design with multiplexers.

Module 5: **Contact hours: 4**
Asynchronous sequential logic: Analysis procedure, circuit with latches, design procedure, reduction of state and flow table, race free state assignment, hazards.

Books/References:

1. *M. Morris Mano and M. D. Ciletti,* **Digital Design**, *4th Edition, Pearson Education*
2. R. H. Katz and G. Boriello, **Contemporary Logic Design**, 2/e, Prentice Hall of India, 2009.
3. A. P. Malvino, D. P. Leach and G.Saha, **Digital Principles and Applications**, 7/e, McGraw Hill, 2010.
4. Z. Kohavi and N. Jha, **Switching and Finite Automata Theory**, 3/e, Cambridge University Press, 2010.
5. S. C. Lee, **Digital Circuits and Logic Design**, Prentice Hall of India, 2006.
6. J. F. Wakerly, **Digital Design Principles and Practices**, 4/e, Prentice Hall of India, 2008.

UCSE301: Data Structures and Algorithms **Credit: 8**
Total Contact Hours: 60 **L-T-P:3-1-0**

Module 1: **Contact hours: 14**

Introduction: Basic Terminology, Elementary Data Organization, Algorithm, Efficiency of an Algorithm, Abstract Data Types (ADT).

Performance of algorithms: space and time complexity measures, asymptotic, worst case and average case analyses, lower and upper bounds. Operations on data;

Arrays: Definition, Single and Multidimensional Arrays, Representation of Arrays: Row Major Order, and Column Major Order, Application of arrays, Sparse Matrices and their representations.

Linked lists: Array Implementation and Dynamic Implementation of Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List- Insertion, Deletion, Traversal, PolynomialRepresentation and Addition, Generalized Linked List.

Module 2: **Contact hours: 10**

Stacks: Abstract Data Type, Primitive Stack operations: Push & Pop, Array and Linked Implementation of Stack in C, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression, Recursion, Tower of Hanoi Problem, Simulating Recursion, Principles of recursion, Tail recursion, Removal of recursion

Queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation of queues in C, Dequeue and Priority Queue.

Module 3: **Contact hours: 6**

Trees: Basic terminology, Binary Trees, Binary Tree Representation: Array Representation and Dynamic Representation, Complete Binary Tree, Algebraic Expressions, Extended Binary Trees, Array and Linked Representation of Binary trees,Tree Traversal algorithms: Inorder, Preorder and Postorder, Threaded Binary trees, Traversing Threaded Binary trees, Huffman algorithm. Application of trees;

Module 4: **Contact hours: 10**

Graphs: Terminology, Sequential and linked Representations of Graphs: Adjacency Matrices, Adjacency List, Adjacency Multi list, Graph Traversal : Depth First Search and Breadth First Search, Connected Component, Spanning Trees, Minimum Cost Spanning Trees: Prims and Kruskal algorithm. Transistive Closure and Shortest Path algorithm: Warshal Algorithm and Dijikstra Algorithm, Introduction to Activity Networks

Module 5: **Contact hours: 12**

Searching: Sequential search, Binary Search, Comparison and Analysis
Internal Sorting: Insertion Sort, Selection, Bubble Sort, Quick Sort, Two Way Merge Sort, Heap Sort, Radix Sort, Practical consideration for Internal Sorting.

Search Trees: Binary Search Trees(BST), Insertion and Deletion in BST, Complexity of Search Algorithm, AVL trees, Introduction to m-way Search Trees, B Trees & B+ Trees

Module 6: **Contact hours: 8**

Hashing: Hash Function, Collision Resolution Strategies
Storage Management: Garbage Collection and Compaction.
File Structures: Sequential and Direct Access, Relative files, Indexed files, B+ tree as index, Multi-index files, Hashed files.

Books/References:

1. Data Structures and Algorithms, A. V. Aho, J. E. Hoppcroft, J. E. Ullman,

Addision Wesley.
2. Fundamentals of Data Structures, E. Horowitzz, S. Sahni, Galgotia Publ.
3. Data Structures using C, A.S. Tanenbbaum
4. Algorithms, Data Structures, and Problem Solving, Addision Wesley.
5. Data Mangement and File Structures, Loomis, Marry, PHI
6. Data Structures & Algorithm Analysis in C++, M. A. Weiss, Addision Wesley.
7. Theory and Problems of Data Structures, Lipshutz, McGraw Hill.
8. Learning with C++, Neil Graham, MacGraw Hill

UMA302: Discrete Mathematics **Credit: 8**
Total Contact Hours: 60 **L-T-P: 3-1-0**

Module 1: **Contact hours: 10**
Sets, Relations and Functions:
Basic operations on sets, Cartesian products, disjoint union (sum) and power sets. Different types of relations, their compositions and inverses. Different types of functions, their compositions and inverses.

Module 2: **Contact hours: 10**
Propositional Logic**:**
Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic,introduction to first order logic and first order theory.

Module 3: **Contact hours: 10**
Partially ordered sets**:**
Complete partial ordering, chain, lattice, complete, distributive, modular and complemented lattices, Boolean and pseudo Boolean lattices.

Module 4: **Contact hours: 15**
Algebraic Structures**:**
Algebraic structures with one binary operation – semigroup, monoid and group. Cosets, Lagrange‟s theorem, subgroup, normal subgroup, homomorphism. Congruence relation and quotient structures. Algebraic structures with two binary operations- ring, integral domain, and field. Boolean algebra and Boolean ring (Definitions and simple examples only).

Module 5: **Contact hours: 15**
Introduction to Graphs**:**
Graphs and their basic properties – degree, path, cycle, subgraph, isomorphism, Eulerian and Hamiltonian graph, walk, trees.

Books/References:

1.C. L. Liu, Elements of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 2000.
2. R. C. Penner, Discrete Mathematics: Proof Techniques and Mathematical Structures, WorldScientific, 1999.
3. R. L. Graham, D. E. Knuth, and O. Patashnik, Concrete Mathematics, 2nd Ed., AddisonWesley, 1994.
4. K. H. Rosen, Discrete Mathematics and its Applications, 6th Ed., Tata McGraw-Hill, 2007.
5. J. L. Hein, Discrete Structures, Logic, and Computability, 3rd Ed., Jones and Bartlett, 2010.
6. N. Deo, Graph Theory, Prentice Hall of India, 1974.
7. S. Lipschutz and M. L. Lipson, Schaum's Outline of Theory and Problems of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 1999.

8. J. P. Tremblay and R. P. Manohar, Discrete Mathematics with Applications to Computer Science, Tata McGraw-Hill, 1997.

UCSE302: Elementary Number Theory and Algebra **Credit: 6**
Total Contact Hours: 45 **L-T-P: 3-0-0**

Module 1: **Contact hours: 25**

Number theory: Well ordering principle, principle of mathematical induction; Division algorithm, GCD and LCM, Euclidean algorithm, linear Diophantine equation; Primes, the fundamental theorem of arithmetic; Properties of congruences, linear congruences, chinese remainder theorem; Fermat's little theorem; Arithmetic functions, Mobius inversion formula, Euler's theorem; Primitive roots; Introduction to cryptography, RSA cryptosystem, distribution of primes.

Module 2: **Contact hours: 20**

Algebra: Groups, subgroups, cyclic groups, permutation groups, Cayley's theorem, cosets and Lagrange's theorem, normal subgroups, quotient groups, homomorphisms and isomorphism theorems; Rings, integral domains, ideals, quotient rings, prime and maximal ideals, ring homomorphisms, field of quotients, polynomial rings, factorization in polynomial rings, fields, characteristic of a field, field extensions, splitting fields, finite fields.

Books/ References:

1. D. M. Burton, Elementary Number Theory, 7th Ed., McGraw Hill, 2017.
2. J. A. Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa, 1998.
3. I. Niven, S. Zuckerman and H. L. Montgomery, An Introduction to the Theory of Numbers, 5th Ed., Wiley-India, 1991.
4. G. A. Jones and J. M. Jones, Elementary Number Theory, Springer, 1998
5. K. H. Rosen, Elementary Number Theory and its Applications, Pearson, 2015
6. I. N. Herstein, Topics in Algebra, Wiley, 2004.
7. J. B. Fraleigh, A First Course in Abstract Algebra, Addison Wesley, 2002.
8. Kenneth H Rosen, Discrete Mathematics and Its Applications, McGraw Hill Education; 7 edition

UCSE303: Object Oriented Programming using Java **Credit: 6**
Total Contact Hours: 45 **L-T-P: 3-0-0**

Module 1: **Contact hours: 4**

Basics of Java

Features of Java, Byte Code and Java Virtual Machine, JDK, Data types, Operator, Control Statements – If , else, nested if, if-else ladders, Switch, while, do-while, for, for-each, break, continue.

Module 2: **Contact hours: 3**

Array and String

Single and Multidimensional Array, String class, StringBuffer class, Operations on string, Command line argument, Use of Wrapper Class.

Module 3: **Contact hours: 8**

Classes, Objects and Methods

Class, Object, Object reference, Constructor, Constructor Overloading, Method Overloading, Recursion, Passing and Returning object form Method, new operator, this and static keyword, finalize() method, Access control, modifiers, Nested class, Inner class, Anonymous inner class, Abstract class.

Module 4: **Contact hours: 10**

Inheritance and Interfaces
Use of Inheritance, Inheriting Data members and Methods, constructor in inheritance, Multilevel Inheritance – method overriding Handle multilevel constructors – super keyword,Stop Inheritance - Final keywords, Creation and Implementation of an interface, Interface reference, instanceof operator, Interface inheritance, Dynamic method dispatch,Understanding of Java Object Class,Comparison between Abstract Class and interface, Understanding of System.out.println – statements.

Module 5: **Contact hours: 4**
Package
Use of Package, CLASSPATH, Import statement, Static import, Access control

Exception Handling
Exception and Error, Use of try, catch, throw, throws and finally, Built in Exception, Custom exception, Throwable Class.

Module 6: **Contact hours: 5**
Multithreaded Programming
Use of Multithread programming, Thread class and Runnable interface, Thread priority, Thread synchronization, Thread communication, Deadlock

Module 7: **Contact hours: 6**
IO Programming
Introduction to Stream, Byte Stream, Character stream, Readers and Writers, File Class, File InputStream, File Output Stream, InputStreamReader, OutputStreamWriter, FileReader, FileWriter, Buffered Reader
Collection Classes
List, AbstractList, ArrayList, LinkedList, Enumeration, Vector, Properties, Introuduction to Java.util package

Module 8: **Contact hours: 5**
Networking with java.net
InetAddress class,Socket class, DatagramSocket class, DatagramPacket class
Introduction to Object orientation
Introduction to Object orientation, Modeling as a Design Technique Modeling Concepts,abstraction, The three models, Class Model, State model and Interaction model.

Books/References:
1. Java Fundamentals A comprehensive introduction By Herbert Schildt, Dale Skrien, McGraw Hill Education.
2. Programming with Java A Primer – E.Balaguruswamy,McGrawhill
3. The Complete Reference, Java 2 (Fourth Edition), Herbert Schild, - TMH.
4. Core Java Volume-I Fundamentals Horstmann& Cornell, - Pearson Education. - Eight Edition
5. Object Oriented Modeling and Design with UML Michael Blaha and James Rambaugh – PEARSON second edition 6) UML Distilled: A Brief Guide to the Standard Object Modeling Language (3rd Edition) by Martin Fowler

UCSE374: System Software Lab **Credit: 5**
Total Contact Hours: 15 **L-T-P: 0-1-3**

Module 1: **Contact hours: 4**
Overview of Unix system, commands and utilities;
Basic Linux administration and installation: grub, rpm, yum, disk partitioning; basic Linux utilities, logging, backup, authentication;

Module 2: **Contact hours: 4**
Internet mail system: send mail, elm, mail administration;
Program maintenance: make, sccs, debugging with gdb and ddd;
Archiving: shar, tar; shell use: redirection, .cshrc, environment variables;

Module 3: **Contact hours: 5**
Regular expression parsing: grep, egrep, sed, awk; Unix system calls related to processes, the file structure & devices and inter-process communication;
Shell programming: bash; scripting Languages like Perl, Python, Java Script;

Module 4: **Contact hours: 2**
Documentation and presentation: document writing and slides using LaTex.

Books/ References:

1. E. Nemeth, G. Snyder and T. R. Hein, Linux Administration Handbook, Prentice Hall PTR, 2002.
2. L. Wall, T. Christainsen and J. Orwant, Programming PERL, 3rd Ed, OReilly, 1999.
3. B.W. Kernighan and R. Pike, The UNIX Programming Environment, Pearson, 2015.
4. S. Kochan and P. Wood, Unix Shell programming, 3rd Ed, SAMS, 2003.
5. S. Das, Unix System V.4 Concepts and Applications, 3rd Ed, Tata Mcgraw-Hill, 2003.
6. J. Corbet, A. Rubini, G. Kroah-Hartman, Linux Device Drivers 3rd Edition, O'Reilly & Associates, 2005.
7. D. Flanagan, Javascript: The Definitive Guide, Fifth Edition, O'REILLY, 2006.
8. W.R. Stevens and S.A. Rago, Advanced Programming in the UNIX Environment, 3rd Edition, Addison-Wesley, 2013.
9. L. Lamport, LaTeX: A Document Preparation System, 2nd Edition, Addison-Wesley Series, 1994.

UCSE371: Data Structures and Algorithms Lab **Credit: 3**

Total Contact Hours: 45 **L-T-P: 0-0-3**

Laboratory Experiments:
Linear Data Structure
1 Implementation of array operations
2 Stacks and Queues: adding, deleting elements Circular Queue: Adding & deleting elements
3 Merging Problem: Evaluation of expressions operations on Multiple stacks & queues:
4 Implementation of linked lists: inserting, deleting, inverting a linked list. Implementation of stacks & queues usinglinked lists
5 Polynomial addition, Polynomial multiplication
Non Linear Data Structure
6 Recursive and Non-recursive traversal of Trees
7 Threaded binary tree traversal. AVL tree implementation
8 Application of Trees. Application of sorting and searching algorithms
9 Hash tables implementation: searching, inserting and deleting, searching &sorting techniques.

Laboratory Experiments may get modified in consonance with the material covered in UCSE301.

Paper code: UCSE373
Paper name: Object Oriented Programming Lab **Credit: 3**
Total Contact Hours: 45 **L-T-P: 0-0-3**

Laboratory Experiments will be set in consonance with the material covered in UCSE303.

Semester IV

Computer Organization and Architecture (UCSE401)

L-T-P: 3-0-0

Credits: 6

Prerequisites:UECE306: Digital Electronics and Logic Design

Module –I: Introduction (5L)
Generations of computers, Stored programmed Architecture, Basic Components and their interconnection in a computer System, different abstraction levels of computation from problem definition to circuit level implementation, review of digital circuits and digital components.

Module-II: Arithmetic (8L)
Data representation – signed bit, 2's complement, fixed point and floating-point representation (single precision and double precision), different arithmetic algorithms – signed multiplication, restoring and non-restoring division, systolic array multiplication, floating point arithmetic algorithms basic ALU organization.

Module III: CPU Design (6L)
Instruction Set Architecture (ISA): Von Neumann vs. Data Flow. Instruction set, Instruction format, Instruction mode: ISA design trade off, addressing modes, Register Transfer Language and micro operation, design of control unit: microprogrammed and hardwired control unit.

Module IV: Memory (6L)
Memory hierarchy, design of semiconductor memories – SRAM, DRAM, different ROMs, Cache memory – cache mapping techniques, cache replacement algorithms, virtual memory, optical disk – data read/write techniques, magnetic disk -read/write techniques.

Module V: I/O (5L)
Programmed I/O, Concept of handshaking, Polled and Interrupt driven I/O, DMA data transfer; I/O subsystems: I/O interfacing

Module VI: Pipelining and Parallelism (5L)
Basic concepts of pipelining, speedup computation, different pipelining – arithmetic, instruction, stalls in pipelining, remedy from stall, introduction to parallel Processing.

Text Books:

1. M. M. Mano, "Computer System Architecture", Pearson, 3rd Ed., 2007.

2. Stallings, "Computer Organization & Architecture", 8th Ed., Pearson Education, 2009.

3. Hamacher, Zaky, Vranesic, "Computer Organization", TMG, 5th Ed., 2011.

Reference Books:

2. Hennessey and Patterson, "Computer Architecture: A quantitative Approach", 5th Ed., Morgan Kaufman Publication, 2012.

Probability Theory and Random Process (UCSE402)

L-T-P:2-0-0

Credits: 4

Module I: Probability Theory: Definitions of Probability, Axioms of Probability, Probability Spaces, Properties of Probabilities, Joint and Conditional Probabilities, Independent Events, Baye's Theorem and Applications.

Module II: Random Variables: Introduction, Definition of random variable, Discrete and continuous random variables. Probability Distribution Functions, Probability Mass Functions, Probability Density Functions, Joint Distribution of Two Variables, Conditional Probability Distribution and Density, Independent Random Variables, Marginal Probability Distribution, Correlation and Regression.

Module III: Statistical Averages: Functions of Random Variables and Random Vectors, Statistical Averages, Characteristic Function of Random Variables, Inequalities of Chebyshev and Schwartz, Convergence Concepts, Central Limit Theorem and its significant.

Module IV: Random Processes: Stationarity, Ergodicity, Covariance Function and their Properties, Spectral Representation, Weiner-Kinchine Theorem, Linear operations, Gaussian Function, Poisson Processes, Markov Model.

Text Books:

i) Peebles, P. Probability, Random Variables and Random Signal Principles, 4th Edition, McGrew Hill
II) Veerarajan, T. Probability, Statistics and Random Process,3rd Edition, McGraw Hill New Delhi

Reference Books:

I) Papoulis, A. and UnnikrishnaPillai, S., Probability, Random variables and Stochastic Processes, McGraw Hill
II) Gardner, W. A: Introduction to Random Processes, (2/e), McGraw Hill.
III) H. Stark & J.W. Woods: Probability, Random Processes and Estimations Theory for Engineers, (2/e), Prentice Hall.

Design & Analysis of Algorithms (UCSE403)

L-T-P: 3-0-0

Credits: 6

Prerequisites:

UCSE201 Programming for Problem Solving

UCSE301 Data Structures and Algorithms

Detailed Syllabus:

Module 1: Introduction [3L]:
Introduction to the RAM machine of computer, asymptotic notations and their mathematical importance, Time and Space Complexity, best, average and worst case. Introduction to the algorithm paradigms – recursion, divide and conquer, greedy, dynamic programming etc.

Module 2: [3L] Recursion:
Definition, time and space complexity evaluation of different recursive algorithms – factorial, tower of Hanoi etc.

Module 3: [5L] Divide and Conquer:
Basic idea, design and complexity evaluations of different algorithms – binary search, merge sort, quick sort etc.

Module 4: [5L] Greedy Method:
Basic idea, design and complexity evaluations of different algorithms- knapsack problem (fractional), Minimum Spanning Tree etc.

Module 5: [5L] Dynamic Programming:
Basic idea, design and complexity evaluations of different algorithms- Rod cutting problem, matrix chain multiplication etc.

Module 6: [4L] Branch and Bound and Backtracking:
Basic concepts, concepts of lower bound, Traveling Salesperson problem, 8 queens' problem etc.

Module 7: [4L] Graph:
Definition, Graph traversal algorithms – BFS and DFS, graph colouring algorithm, Hamiltonian path and cycle, Shortest path algorithm.

Module 8: [5L] NP completeness:
Basic concepts of reduction, reduction problems – Hamiltonian path to Hamiltonian Cycle and vice versa, classes – P, NP, NP hard, NP Complete, SAT problem, Cook's Theorem and applications

Text Book:

1. Introduction to Algorithms, by Cormen, Leiserson, Rivest, and Stein, MIT Press, Third Edition, 2009.
2. A. Aho, J.Hopcroft and J.Ullman "The Design and Analysis of Algorithms"

Reference Books:

1. Computer Algorithms, by Horowitz, Sahni, and Rajasekaran, Silicon Press, 2007.
2. Design And Analysis Of Algorithms 2nd Edition by Dave and Himanshu, Pearson India,2013.

Database Management Systems (UCSE404)

L-T-P:3-0-0

Credits: 6

Module 1: Foundations [3L]
Introduction: Database System Concepts and architecture, Data models, scheme and instances, Data independence Database language and Interface.

Module 2: Entity Relationship Model and Relational Data Model and Language [9L]
Data Modelling Using the Entity-Relationship Model: ER model concepts, Notations for ER diagram, Extended E.R. model, Relation-ships of higher degree.Relational Data Model and Languages: Relational data Model concepts, constraints, relational algebra. Relational Calculus, Tuple and Domain calculus. SQL, data definitions queries and up-dates in SQL, QBE, Data definitions, queries and up-dates in QBE

Module 3: DBMS Software [5L]
Example DBMS System (MySQL/ORACLE/INGRESS/SYBASE), Basic architecture. Data definitions Data Manipulation.

Module 4: Database Design [7L]
Functional dependencies, Normal forms, First, second, and third functional personal normal forms. BCNF. Multivalued dependencies Fourth Normal form. Join Dependencies and fifth Normal form, Inclusion Dependencies.

Module 5: Query Processing and Optimisation [5L]
Algorithms for executing query operations, Heuristics for query optimisations.

Module 6: Transaction and Concurrency [6L]
Transaction and system concepts, schedules and Recoverability serializability of schedules.

Concurrency Control Techniques:Locking Techniques for concurrency control Time stamping and concurrency control.

Suggested Text Books & References:

1. Raghu Ramakrishnan and Johannes Gehkre, “Database Management System”, Mc. Graw Hill, Third Edition
2. Elmasri, RamexShamkant B. Navathe, "Fundamentals of Data base Systems".
3. Jeffry D. Ulman, "Principles of Data Base Systems", Second Edition Galgotia Pub.
4. Date, C.J. "An Introduction to Database System", Vol. I, II &IIIrd, Addison-Welsey.
5. Prakash, Naveen., "Introduction to Database Management", Tata McGraw Hill

ENGINEERING ECONOMICS (UHSS401)

L-T-P:3-0-0

Credits: 6
No of Lectures: 45

Module I: Definition of Economics, Consumer behaviour,Utility analysis and demand analysis, Kinds of Demand, Law of Demand and Law of Supply, Elasticity of Demand: Types and Measurement, Scope of Economics including economics of environment and e-commerce.

Module II: Market forms-Perfect and Imperfect markets, Features of Perfect competition, Monopoly and Monopolistic competition, Price and output determination under Perfect Competition, Monopoly, Monopolistic and Oligopoly etc. Concept of Production function, Cost Analysis, Estimation of cost function-Profit and Break Even Analysis.

Module III: National Income,GNP and NNP,Per-Capita Income ,Theory of Production, Concepts of Production, Production function, Law of variable proportions and Law of Return to scale, Source of Public Revenue-Tax Revenue and Non-Tax Revenue, Direct and Indirect Tax, Inflation and Deflation. Banking-Definition-Types and function of Bank. Concept of Investment Analysis.

Module IV: Features of Indian Economy, Economic Reforms in India-Concept of Economic Liberalization, Privatization and Globalization, Unemployment Problem in India-Types, Causes, remedial measures and recent employment generation scheme of Government of India.

ModuleV: International Trade, Gains from International Trade, The World Trading Environment and Multinational Corporations, BPO etc. Function and Role of IMF, World Bank and WTO.Concept of Stock Exchange Market and Market for Securities.

Reference Books:

I)Samuelson, P. A. and W. D. Nordhaus , Economics, McGraw Hill, New York
II) Mishra, Sasmita (2009), Engineering Economics and Costing, Prentice Hall of India Pvt. Limited
III) Sarma, G. and Debnath , A. , Engineering Economics , Kalyani Publishers , New –Delhi
IV) Dwivedy, D. N. (6th ed), Managerial Economics, Vikas Publishing House
V) Mishra, R, Engineering Economics, University Science Press, New Delhi
VI) Datt&Sundharam (latest edition), Indian Economy, S. Chand Publication, New Delhi
VII) Misra&Puri (latest edition), Indian Economy, Himalaya Publishing House
VIII) Ahmed , A and Begum , G , Engineering Economics ,Chandra Prakesh , Guwahati

Environmental Sciences (UCH401)

(Mandatory non-credit course)

L-T-P:2-0-0 (26 hours)

Credits: 0

Module I: General [1 L]

Basic idea of environment and basic concepts related to perspectives. Man, society and environment and their inter relationship.

Module II: Ecosystem [1 L]

Ecosystem, biotic and a biotic component. Open system, closed system, species, population, community. Ecological balance and consequence of change.

Module III: Population dynamics and Environment [2L]

Mathematics of population growth and associated problems. Different types of resources, renewable, non-renewable and potentially renewable resources and effects of population growth on resources and environment. Environmental impact assessment.

Module IV: Air pollution and Control: [4+3+3+2 L]

Atmospheric composition and energy balance:[4L]Different layers of atmosphere, tropopause, stratopause and mesopause. Conductive and Convective and Radiation heat transfer and concepts of blackbody. Global temperature model (Earth as black body and Earth's albedo) Greenhouse effect and it's consequence on global climate change, sea water level, agriculture and marine food.

Atmospheric dispersion of pollutants: [3L] Atmospheric stability, Temperature and Radiation inversions, Adiabatic lapse rate and ambient lapse rate, maximum mixing depth, ventilation coefficient.

Air pollutants sources and biochemical effects: [3L] Toxic chemicals in the air, suspended particulate matter, carbon dioxide, sulphur dioxide, oxides of nitrogen, lead, carbon monoxide. Primary and secondary pollutants, criteria pollutants, sulphurous smog and photochemical smog. CFC and its impact on depletion of ozone layer.

Standards and Control measures:[2L] Industrial commercial and residential air quality standard. Electrostatic precipitator, Cyclone separator, bag house, catalytic converter, scrubber (Venturi).

Module 5: Water Pollution and Control: [2+1+3 L]

Important parameters:[2L] Effect of Oxygen demanding wastes, pathogens, nutrients, dissolved oxygen, Concepts of BOD and COD and BOD reaction rate constant.

Basics of ground water flow: [1L] Aquifers, Hydraulic gradient and ground water flow.

Water treatment:[3L]Drinking water treatment (Coagulation, Flocculation, sedimentation, filtration, disinfection). Waste water treatment, Primary and secondary treatments (Activated sludge process, trickling filters, rotating biological contactor, oxidation ponds) and tertiary treatment.

Module 6: Land Pollution: [2L]Municipal, Industrial, commercial, agricultural and hazardous solid wastes. Recovery and conversion methods. Waste management, land filling, incineration and composting.

Module 7: Noise pollution: [2L] Definition of noise pollution, Concept of decibel (dB) and effects of noise pollution, noise classification and control of noise pollution.

References Books:

1. Masters, G.M., "Introduction to Environmental Engineering and Science" Prentice – Hall of India Pvt. Ltd., 1991.
2. Basak: Environmental Engineering TMH
3. Nebel, B.J., "Environmental Science", Prentice – Hall Inc., 1987
4. Odum, E.P., "Ecology: The link between the natural and social Sciences", IBH Publishing Com., Delhi.
5. Environmental Management – N.K. Uberoi, EXCELL BOOKS.
6. Fundamentals of Environmental Studies by D.K. Sinha, & A.D. Mukherjee.
7. Environmental Chemistry by A. K. De, New Age International.
8. Environmental Management- Mukherjee, Vikas.
9. Water Pollution and Management – Varshney C.K., New Age International.
10. Water chemistry – Venkateswarlu K.S., New Age International.
11. Water Pollution: Causes, Effects & Control – Goel P.K., New Age International
12. Environmental Pollution Control Engineering – Rao C.S., New Age International
13. Land Treatment of Waste Water – Goghil M.B., New Age International
14. Environmental Pollution Analysis – Khopkar S.M., New Age International
15. Soil Erosion & Conservation – Tripathi R.P., New Age International
16. Environmental Impact Assessments – Barthwal R.R., New Age International

Language Lab (UHSS471)

L-T-P: 0-0-2

Credits- 2

Module 1: Pronunciation Skills (4 hours)

1.1 Introduction of English Speech sounds
1.2 Vowel sounds, diphthongs and thripthongs
1.3 IPA Symbols
1.4 Transcription

Module II: Business Writing (8 hours)

2.1 Vocabularies used in Business Writing
2.2 Successful Letters
2.3 Successful E-mails
2.4 Resume
2.5 Report Writing

Module 3: Remedial Grammars (6 hours)

3.1 Tense and subject-verb agreement
3.2 Relative Clauses
3.3 Prepositions
3.4 Preposition
3.5 Phrasal Verbs

Module 4: Public Speaking Skills and Presentation Skills (6 hours)

Module 5: Interview Skills (8 hours)

5.1 Understanding Interview
5.2 Types of interviews
5.3 Group Discussion
5.4 Telephonic Interview

Module 6: Life Skills and Soft Skills (8 hours)

BOOKS and Software RECOMMENDED:

(1) Soft Skills, S. Hariharan, N.Sundararajan, S.P.Shanmugapriya MJP Publishers, Chennai
(2) Communication Skills, Sanjay Kumar and PushpLata, OUP, 2011
(3) Exercises in Spoken English, Parts-I-III, CIEFL, Hyderabad, OUP
(4) Business Writing
(5) Sky Pronunciation
(6) Tense Buster

Design & Analysis of Algorithms Lab (UCSE473)

L-T-P: 0-0-3

Credits- 3

Lab Experiments:

 # 1: Recursion: factorial, tower of Hanoi etc.

#2: Divide and Conquer: binary search, merge sort, quick sort etc.

#3: Greedy Method: knapsack problem (fractional), Minimum Spanning Tree etc.

#4: Dynamic Programming: Rod cutting problem, matrix chain multiplication etc.

#5: Branch and Bound and Backtracking: Traveling Salesperson problem, 8 queens' problem etc.

#6: Graph: BFS and DFS, graph colouring Shortest path.

Database Management Systems Lab (UCSE474)

L-T-P: 0-0-3

Credits: 3

#1: Draw E-R diagram and convert entities and relationships to relation table for a given scenario. Two assignments shall be carried out i.e. consider two different scenarios (eg. bank, college)

#2: Write relational algebra queries for a given set of relations.

Perform the following:

Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)

Altering a Table, Dropping/Truncating/Renaming Tables, Backing up / Restoring a Database.

#3: For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregate functions (group by and having clause), Queries involving- Date Functions, String Functions , Math Functions Join Queries- Inner Join, Outer Join Subqueries- With IN clause, With EXISTS clause

#4: For a given set of relation tables perform the following

Creating Views (with and without check option), Dropping views, Selecting from a view

#5: Write a Pl/SQL program using FOR loop to insert ten rows into a database table.

#6: Given the table EMPLOYEE (EmpNo, Name, Salary, Designation, DeptID) write a cursor to select the five highest paid employees from the table.

#7: Illustrate how you can embed PL/SQL in a high-level host language such as C/Java And demonstrates how a banking debit transaction might be done.

#8: Given an integer i, write a PL/SQL procedure to insert the tuple (i, 'xxx') into a given relation

#9: Connecting/Executing Database from client side using programming language like (PHP/Java/C/C++/Dart etc.)

#10:A Lab project/projects as determined by the instructor.

Tools and Tutorials

1. MySQL Software, https://www.mysql.com/
2. MySQL Workbench, ER -> DB Model, https://www.mysql.com/products/workbench/
3. SQL and PL/SQL tutorial: https://www.w3schools.com/sql/, http://www.plsqltutorial.com/

DiplomaComputer Science and Engineering Syllabus Structure
(July 2020 onwards)

Course No.	Course Name	L	T	P	C	Course No.	Course Name	L	T	P	C
Semester I						**Semester II**					
DHSS101	Communication in English	3	0	0	6	DHSS271	Communication in English Lab	0	0	2	2
DCH102	Chemistry-I	2	1	0	6	DCSE202	Computer Fundamentals & Programming	2	0	0	4
DCH172	Chemistry-I Lab	0	0	2	2	DCSE272	Computer Fundamentals & Programming Lab	0	0	2	2
DMA103	Mathematics-I	3	0	0	6	DEE203	Fundamentals of Electrical & Electronics Engineering	2	1	0	6
DME104	Engineering Drawing	2	0	0	4	DEE273	Fundamentals of Electrical & Electronics Engineering Lab	0	0	2	2
DME174	Engineering Drawing Lab	0	0	2	2	DMA204	Mathematics-II	3	1	0	8
DPH105	Applied Physics - I	2	1	0	6	DME205	Engineering Mechanics	3	0	0	6
DPH175	Applied Physics - I Lab	0	0	2	2	DPH206	Applied Physics – II	2	1	0	6
DME176	Workshop Practice	0	1	4	6	DPH276	Applied Physics - II Lab	0	0	2	2
Contact Hours: 25		**12**	**3**	**10**	**40**	**Contact Hours: 23**		**12**	**3**	**8**	**38**
Semester III						**Semester IV**					
DCSE301	Computer Architecture and Organization	3	1	0	8	DCSE401	Data Structure using C	3	1	0	8
DCSE302	System Programming	3	0	0	6	DCSE471	Data Structure using C Lab	0	0	3	3
DCSE372	System Programming Lab	0	0	3	3	DCSE402	Computer Communication & Networking	3	0	0	6
DECE303	Digital Electronics	2	1	0	6	DIE403	Microprocessor	3	0	0	6
DECE373	Digital Electronics Lab	0	0	2	2	DIE473	Microprocessor Lab	0	0	3	3
DMA301	Mathematics-III	3	0	0	6	DCSE404	Operating System	3	1	0	8
DHSS302	Engineering Economics and Accountancy	3	1	0	8	DCSE405	Computer Hardware and Networking	1	1	0	4
						DCSE475	Computer Hardware and Networking Lab	0	0	3	3
Contact Hours: 22		**14**	**3**	**5**	**39**	**Total Contact Hours 25**		**13**	**3**	**9**	**41**
Semester V						**Semester VI**					
DCSE501	Database Management Systems	3	0	0	6	DCSE601	Web Technology	3	0	0	6
DCSE571	Database Management Systems Lab	0	0	3	3	DCSE671	Web Technology Lab	0	0	3	3
DCSE502	Software Engineering	3	0	0	6	DCSE691	Major Project	0	2	8	12
DCSE503	Object Oriented Programming with C++	3	0	0	6	DCSE692	Industrial Visit and Seminar	0	0	2	2
DCSE573	Object Oriented Programming with C++ Lab	0	0	3	3	DHSS601	Industrial Management & Entrepreneurship	3	0	0	6
DCSE504	Cryptography & Network Security	3	0	0	6	DCSE61*	Elective 1	-	-	-	6
DCSE574	Cryptography & Network Security Lab	0	0	3	3	DCSE61*	Elective 2	-	-	-	6
DCSE51*	Elective (Any One)	-	-	-	6						
Total Contact Hours 24*		**15**	**0**	**9**	**39**	**Total Contact Hours 25***		**10***	**0**	**15***	**41**
Total Mandatory Credits: 238											

Semester I

Paper Code: DHSS101 **Credit: 6**
Paper Name: Communication in English **L-T-P: 3-0-0**
Total Contact Hours:39

Module 1: Parts of Speech **Contact hours: 3**

1.1 Recognition and review of Nouns, Pronouns, Verbs, Adverbs, Adjectives, Prepositions, Conjunctions, Interjections
1.2 Knowledge of Subject, Object and Compliment of the Verb
1.3 Herbals –Infinitival, Gerund and Preposition.

Module 2: Prepositions of time and place **Contact hours: 5**

2.1 Contextual teaching of prepositions of time - on, in, at, since, for, ago, before, to, past, to, from, till/until, by.
2.2 prepositions of place: in, at, on, by, next to, beside, near, between, behind, in front of, under, below, over, above, across, through, to, into, towards, onto, from.

Module 3: Clause, phrases and Relative Clauses **Contact hours: 2**

3.1 Basic definitions of clauses and phrases
3.2 Focus on Relative Pronouns and their use in sentences as relative clauses.

Module 4: Subject Verb Agreement **Contact hours: 5**

4.1 Rules that guide the agreement of the subject to its verb

Module 5: Sentence types and Transformation of sentences **Contact hours: 5**

5.1 Assertive sentences, Exclamatory sentences, Interrogative sentences, Negative sentences, Compound sentences, complex sentences, simple sentences, Degrees of Comparison.

Module 6: Voice **Contact hours: 3**

6.1 Change from Active Voice to Passive Voice and vice versa

Module 7: Punctuation **Contact hours: 5**

7.1 Use of the comma, semi-colon, colon, apostrophe, exclamation mark, question mark and quotation marks

Module 8: Word formation **Contact hours: 2**

8.1 Change of one part of speech to the other: from Verbs to Nouns, Nouns to Verbs, Adjectives to Nouns, Nouns to Adjectives, Verbs to adverbs, and Adverbs to Verbs

Module 9: Affixation **Contact hours: 2**

9.1 Prefixes and Suffixes and new word formations

Module 10: Nominal Compounds **Contact hours: 2**

10.1 Common nominal compound

Module 11: Paragraph Writing **Contact hours: 5**

11.1 Descriptive Paragraph on various related topics.

Books / References:

1. Essential English Grammar with Answers by Raymond Murphy (Cambridge University Press)
2. English for Polytechnics by Dr Papori Rani Barooah (Eastern Book House Publishers)
3. English Grammar by Annie Brinda (Cambridge University Press)

Paper Code: DCH102 **Credit: 6**
Paper Name: Chemistry-I **L-T-P: 2-1-0**
Total Contact Hours: 40

Module 1: Periodic table, Atomic structure **Contact hours: 4**

1.1 Electrons, protons, neutron
1.2 Atomic mass (A), atomic number (Z)
1.3 Isotopes, isobars, isotone, orbit and orbitals, electronic configuration (upto Z=30)
1.4 Modern periodic table, groups and periods.

Module 2: Electrochemistry **Contact hours: 5**

2.1 Electrolytes, Faraday's law of electrolysis
2.2 Numerical problems, application of electrolysis
2.3 Oxidation and reductions
2.4 Redox reactions.

Module 3: Metallurgy **Contact hours: 5**

3.1 General principles of metallurgy
3.2 Minerals, ore, gangue, slag, flux, roasting, calcination etc.
3.3 Metallurgy of iron and aluminium
3.4 Manufacture of steel by Bessemer process
3.5 Open hearth process and LD process, alloys

Module 4: Building Materials **Contact hours: 3**

4.1 Portland cement
4.2 Types of manufacturing
4.3 Setting and hardening of cement, special cement. Glass, Bricks.

Module 5: Lubricant **Contact hours: 3**

5.1 Definition and classification of lubricants
5.2 Important functions of lubricants.

Module 6:Polymer and Polymerization **Contact hours: 4**

6.1 Types of polymer, thermoplastic and thermosetting plastic
6.2 Preparation and applications of PE, PVC, PP, Perpex, Teflon, Bakelite, nylon
6.3 Natural rubber, Synthetic rubber.

Module 7: Organic Chemistry **Contact hours: 6**

7.1 IUPAC nomenclature, Alkane, alkene, alkyne, alcohol synthesis and applications.

Module 8: Environmental Chemistry **Contact hours: 6**

8.1 Definition, Types of pollution, pollutants, Water quality measurements- D.O, B.O.D, C.O.D, hardness of water, removal of hardness, TDS
8.2 Greenhouse effect, acid rain, Ozone layer depletion.

Module 9: Industrial chemistry **Contact hours: 4**

9.1 Ethanol manufacture from starch by fermentation
9.2 Fuels- Classifications, calorific values, natural gas, water gas, producer gas, LPG, power alcohol
9.3 Petroleum- refining, octane number, cetane number.

Books / References:

1. S. Chawla;A Text Book of Engineering Chemistry, DhanpatRai Publishing Co.
2. Jain and Jain;Engineering Chemistry, DhanpatRai Publishing Co.
3. V.R. Gowariker, N.V. Viswanathan, J. Sreedhar, PolymerScience, New AgeInternational Publisher.
4. S.K. Ghosh Advanced General OrganicChemistry (A Modern Approach) (Set I & Ii) NCBA Publisher, New Delhi, 2009
5. B. Viswanathan, P. S. Raghavan; Practical Physical Chemistry, Viva

6. Dr. S. Rattan; Experiments in Applied Chemistry, S. K. Kataria& Sons.
7. J.C. Kuriacose and J. Rajaram; Chemistry in Engineering, Tata McGraw-Hill Publishing Company Limited, New Delhi
8. Dr. S. Rabindra and Prof. B.K. Mishra; EngineeringChemistry, Kumar and Kumar Publishers (P) Ltd. Bangalore-40
9. SS Kumar; A Text Book of Applied Chemistry-I , Tata McGraw Hill, Delhi
10. Dr. G.H. Hugar; Progressive Applied Chemistry –I and II, Eagle Prakashan
11. M. L. Sharma, P.N. Chaudhury, B. R, Khanal, D.R.Paudel; Engineering Practical Chemistry, Ekta Books Distributors.

Paper Code: DCH172 **Credit: 2**
Paper Name: Chemistry-I Lab **L-T-P: 0-0-2**
Total Contact Hours: NA

Experiment-1: Introduction to chemistry laboratory, precautions, name of common chemicals, apparatus, instruments etc.

Experiment-2: Volumetric analysis and study of apparatus used therein.

Experiment-3: Determine the degree of temporary hardness of water by EDTA titration.

Experiment-4: Determination of solubility of a solid at room temperature.

Experiment-5: To verify the first law of electrolysis (electrolysis of copper sulphate solution using copper electrode).

Experiment-6: Determination of pH of unknown solutions.

Experiment-7: To determine the coefficient of viscosity of the alcohol by using Ostwald‘s viscometer.

Experiment-8: To determine the surface tension of the given liquid with respect to water at room temperature by using Stalagnometer.

Experiment-9: Preparation of standard solution of Na2CO3

Experiment-10: Determination of strength of NaOH by titrating with 0.1 N HCL

Paper Code: DMA103 **Credit: 6**
Paper Name: Mathematics-I **L-T-P: 3-0-0**
Total Contact Hours:35

Module 1: Algebra **Contact hours: 20**

1.1 Vector and Scalar quantities – types of vectors, geometric representation of vectors, addition and subtraction of vectors, magnitude of a vector, product of a vector by a scalar, Module vectors i, j, k.
1.2 Arithmetic and geometric progressions – nth term of A.P. and G.P., Geometric mean between two numbers.
1.3 Complex numbers – origin, general form, polar form, examples. Simple problems.
1.4 Binomial theorem – Factorials, positive integral values, binomial expansion, rules, calculation of appropriate value.
1.5 Logarithm and exponential series.
1.6 Determinants: Definition, operations and Cramer‘s rule for solving simultaneous linear equations.
1.7 Basic concepts of permutation and Combinations..

Module 2: Trigonometry **Contact hours: 15**

2.1 Trigonometric functions and ratios.
2.2 Trigonometric functions of allied angles – half, double, triple, compound angles.
2.3 Addition and subtraction formulae.
2.4 Solution of triangles using properties.
2.5 Simplification of trigonometric expressions using different formulae.
2.6 Basic concept of inverse trigonometric functions and hyperbolic functions.

Books / References:

1. Mathematics for Polytechniques: Vol – I&II, TTTI, Bhopal
2. Mathematics for Polytechniques: S.P. Deshpande
3. Engineering Mathematics: I.B. Prasad
4. Engineering Mathematics: Grewal
5. Plain Trigonometry: Bansilal
6. College Algebra: Shah and Desai
7. Mathematics Textbook for class XI and XII: NCERT

Paper Code: DME104 **Credit: 4**
Paper Name: Engineering Drawing **L-T-P: 2-0-0**
Total Contact Hours: 48

Module 1: Introduction **Contact hours: 5**

1.1 Drawing as a medium of communication
1.2 Use and care of Drawing Instruments Assignments: Such as Drawing of Horizontal and Vertical Lines, Square, Rectangle
Mosaic Pattern, Angular Pattern, Stamping with circular pattern.
1.3 Types of Lines and Dimensioning as per 15696/72

Module 2: Geometrical Constructions **Contact hours: 8**

2.1 Freehand curves, free hand Drawing
2.2 Construction of triangles, Perpendicular and angles of 300, 450, 600, 900
2.3 Construction of Regular Polygons
2.4 Regular Polygons inscribed in circles.
2.5 Regular figures by using T – square and Set – square

Module 3: Lettering, Scales **Contact hours: 5**

3.1 Single Stroke Lettering Straight and Inclined by graph and Free Hand Letters and digits as per 15696/72
3.2 Scale- Representative Fraction, Types or Scales
3.3 Simple problems on Plain and Diagonal Scale

Module 4: Projection of Points **Contact hours: 5**

4.1 Position / location of Points, Horizontal plane, Vertical plane
4.2 Assignments of Simple problems on different quadrants and Find the distance between two points
4.3 Position/ Location of Points

Module 5: Projection of Lines **Contact hours: 5**

5.1 Position / location of Points, Horizontal plane, Vertical plane
5.2 Assignments of Simple problems on different quadrants and Find the distance between two points
5.3 Position/ Location of Lines

Module 6:Orthographic Projection **Contact hours: 5**

6.1 Top View, Front View and Side View of Simple objects, block and machine parts with dimensional scale.
6.2 Sectional Front, Top and Side Views as per IS – 696 for simple parts and blocks.

Module 7: Rivet Heads and Joints **Contact hours: 5**

7.1 Different types of Rivet Heads and Joints.
7.2 Top and Sectional Front views of Lap and Butt Joints with single double cover plates.

Module 8: Isometric Projection **Contact hours: 5**

8.1 Isometric Projection to true scale and isometric scale.

Module 9: Thread/Screwed **Contact hours: 5**

9.1 Thread Profiles (REF IS 2043 IS – 554 ETC.)
9.2 Screwed Fastenings
9.3 Representation of external and internal threaded assembly symbolic.
9.4 Representation of threads.
9.5 Representation of Screws, Bolts, Nuts and Cutter.

Books / References:

1. Elementary Engineering Drawing [Plane and Solid Geometry] By N.D. Bhatt, V.M. Panchal.
2. Geometrical and Machine Drawing by N.D. Bhatt

Paper Code: DME174 **Credit: 2**
Paper Name: Engineering Drawing Lab **L-T-P: 0-0-2**
Total Contact Hours: NA

Hands-on experiments related to the course contents of DME104

Paper Code: DPH105 **Credit: 6**
Paper Name: Applied Physics – I **L-T-P: 2-1-0**
Total Contact Hours: 36

Module 1: Units & Dimension **Contact hours: 2**

1.1 Need of measurement and Unit in Engineering and Science definition of unit, fundamental and derived quantities and their units, different system of units (CGS and SI), Illustrations.

1.2 Explanation of dimensions of physical quantities, dimensional equations of physical quantities and their uses with examples

Module 2: Basic Mechanics **Contact hours: 12**

2.1 Introduction to scalar and vector quantities, representation of vector, addition, subtraction and multiplication of vectors, parallelogram law of vector addition, resolution of vector, dot and scalar product of two vectors (details not required)

2.2 Newton‘s laws of motion: First law, explanation, definition of force, Concept of Inertia, types of inertia (inertia of rest and inertia of motion), Newton‘s second law, momentum, impulse, mass & weight, simple problems, Newton‘s third law, explanation and its examples, Principle of conservation of linear momentum, statement and simple examples (e.g. recoil of a gun), numerical problems

2.3 Circular motion, time period and angular velocity, relation between angular velocity and linear velocity, centripetal and centrifugal force, bending of a cyclist on a curved path, banking of roads and railway track, numerical problems.

2.4 Work, power and energy, its concept, units and dimension, Potential and Kinetic energy, its mathematical relations, Principle of conservation of energy, its proof in case of a free falling body under gravity, numerical problems.

2.5 Simple Harmonic Motion, its geometrical representations and 1derivation of its equations, definition of amplitude, time period, frequency, phase etc., mathematical relations and units, simple pendulum & second‘s pendulum, numerical problems.

Module 3: Gravity and Gravitation **Contact hours: 3**

3.1 Newton‘s law of gravitation, acceleration due to gravity, relation between ‗G‘ and ‗g‘, their units, variation of the value of g with altitude and depth, Centre of gravity and Centre of mass, Numerical problems

Module 4: Elastic Properties of Solid **Contact hours: 3**

4.1 Deforming force, restoring force, Elastic and plastic bodies, explanation of stress and strain with their types, Hook‘s law, elastic limit, Young‘s modulus, Bulk modulus, Rigidity modulus, Poisson‘s ratio, their units and numerical problems.

Module 5: Heat and Thermodynamics **Contact hours: 10**

5.1 Concept of heat and temperature, thermometer, different scales of temperatures and their conversion formulae, numerical problems

5.2 Thermal expansion: expansion of solid, linear, superficial and cubical expansion of solid, their coefficients & their relations; Expansion of liquid: co-efficient of Real and Apparent expansion, their relation, variation of density with temperature, Anomalous expansion of water (experimental determination not necessary). Concept of Absolute scale of temperature.

5.3 Calorimetry: Unit of heat, Joule and calorie, Specific heat, thermal capacity and water equivalent.

5.4 Change of state of a body, melting and freezing point, effect of pressure on melting point, latent heat, Evaporation, difference between vaporisation and evaporation, factors on which rate of evaporation depends.

5.5 Transmission of heat, three modes of heat transfer, conduction, convection and Radiation, good and bad conductor of heat, coefficient of thermal conductivity, its S.I. unit and dimension.

5.6 1st law and 2nd law of thermodynamics, Joule‘s law and Mechanical equivalent of heat.

Module 6 Sound **Contact hours: 6**

6.1 Wave Motion: amplitude, time period, frequency and wavelength, relation between velocity, frequency and wavelength. Transverse and longitudinal waves with examples.
6.2 Propagation of sound wave: Expression of velocity of sound in air, Newton's formula and Laplace's correction, Effect of temperature, and pressure on velocity of sound.
6.3 Audible range, ultrasonic and infrasonic sound, application of ultrasonic sound to calculate the depth of ocean.
6.4 Reflection of sound and its application, Echo and reverberation of sound, acoustic of building
6.5 Doppler's effect with Mathematical expressions.

Books / References:

1. Modern Approach to Physics Part I & II, DilipSarma, N G Chakraborty,and K N Sharma, Kalyani Publisher, New Delhi.
2. Applied Physics Part I & II, Manpreet Singh, Dr. Major Singh, and Mrs. Hitashi Gupta, S K Kataria& Sons- New Delhi.
3. Basic Applied Physics, R K Gaur, Dhanpat Rai Publication- New Delhi.

Paper Code: DPH175 **Credit: 2**
Paper Name: Applied Physics – I Lab **L-T-P: 0-0-2**
Total Contact Hours: 18

Experiment-1: Vernier Callipers: To determine the volume of a metallic/wooden cube.

Experiment-2: Screw Gauge: to determine cross sectional area of a wire/ thickness of a glass piece.

Experiment-3: Spherometer: To determine the radius of curvature of concave and convex mirrors.

Experiment-4: To determine the value of acceleration due to gravity (g) of a place with simple pendulum.

Experiment-5: To measure the velocity of sound in resonance tube.

Experiment-6: To determine the frequency of a tuning fork using Sonometer.

Experiment-7: Measurement of Specific gravity of solid, liquid, using Nicolson hydrometer, Hare's apparatus and specific gravity bottles.

Experiment-8: To determine the atmospheric pressure by using Boyle's law apparatus.

Experiment-9: To determine water equivalent of a calorimeter by method of mixture.

Paper Code: DME176 **Credit: 6**

Paper Name: Workshop Practice **L-T-P: 0-1-4**
Total Contact Hours: 60

Module 1: Carpentry Shop **Contact hours: 12**

1.1 Introduction with the shop
1.2 Various structure of wood and types of wood
1.3 Different types of tools, machine and accessories used in Carpentry shop
1.4 Safety Precautions in workshop
Details of Practical Contents (3+3 hrs)
Demo of different wood working tools and machines
Demo of different wood working processes
Simple joints like T joints etc.
One simple utility job

Module 2: Fitting Shop **Contact hours: 12**

2.1 Introduction with the fitting shop
2.2 Various marking, measuring, cutting, holding and striking tools
2.3 Different Operations like chipping, filing, marking drilling etc.
2.4 Working principle of drilling machine, lapping dies etc.
Details of Practical Contents (3+3 hrs)
Demo of different fitting tools and machines and power tools
Demo of different processes in fitting shop
Squaring of a rectangular metal piece
One simple utility job.

Module 3: Welding Shop **Contact hours: 12**

3.1 Introduction
3.2 Types of Welding, Arc Welding, Gas Welding, Gas Cutting
3.3 Welding of dissimilar materials, selection of welding rod material, size of rod and work piece
3.4 Different types of flames
3.5 Elementary symbolic Representation
3.6 Safety and precautions
Details of Practical Contents (3+3 hrs)
Demo of different welding tools and machines
Demo of Arc Welding, Gas Welding, Gas Cutter and rebuilding of broken parts with welding
Any one Composite job involving lap joint welding process.

Module 4: Machine Shop **Contact hours: 12**

4.1 Introduction
4.2 Study of Different types of Lathe machine, shaping machine, Drilling machine
4.3 Study of Different types of hand tools and machine tools and parts
4.4 Safety & precautions
Details of Practical Contents (3+3 hrs)
Demo of different machines and their operations
Preferably prepare a simple job.

Module 5: Turning Shop **Contact hours: 6**

5.1 Demo of lathe machine, drilling machine
5.2 One job related to plane and taper turning , threading and knurling
5.3 One job related to drilling and tapping

Module 6:Electrical Shop **Contact hours: 6**

6.1 Demo of simple house wiring and use of tools
6.2 One job related to simple house wiring
6.3 Fittings of cut outs, fuses and other simple fittings etc.
6.4 Difference between Single phase wiring and three phase wiring

Books / References:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., —Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Kalpakjian S. And Steven S. Schmid, —Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
3. Gowri P. Hariharan and A. Suresh Babu," Manufacturing Technology – I" Pearson Education, 2008.
4. Roy A. Lindberg, —Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998
5. Rao P.N., —Manufacturing Technology", Vol. I and Vol. II, Tata McGraw Hill House, 2017

Semester II

Paper Code: DHSS271 **Credit: 2**
Paper Name: Communication in English Lab **L-T-P: 0-0-2**
Total Contact Hours: 39

Module 1: Speaking and Listening practices **Contact hours: 16**

1.1 Practices of sounds of English
1.2 Proper Body language while speaking
1.3 Presentation and public speaking practices
1.4 Practicing to enhance listening skills
1.5 Different types of listening
1.6 Good listening practices
1.7 Overcoming barriers to effective listening

Module 2: Business Writing **Contact hours: 3**

2.1 Letter Writing Formal letter formats.
2.2 Practice of letter writing in different situations: Order letter, Complaint letter, Letter of Adjustment, Quotation letter, Letter to the Editor, Application for leave of absence.
2.3 Job Application and Cover Letter, format of a job application.
2.4 Resume, Curriculum Vitae, bio data.

Module 3: Paragraph Writing and Summary Writing **Contact hours: 5**

3.1Definition, Cohesion and Linkage using Transition words on everyday topics.
3.2 Practicing how to compose coherent passages.
3.3 Definition, Use of Transition words, important points to remember while summarizing.
3.4 Explain and practicing how to arrive at a summary of a paragraph / text.

Module 4: Email Writing **Contact hours: 5**

4.1 Writing the perfect e-mail,
4.2 Steps to the perfect e-mail, formal and informal greetings, requests through an e-mail, writing an apology, complaint and seeking help and information in an e-mail.
4.3 Informing about a file attached in in an email, writing the formal ending of an e-mail.
4.4 Explaining and practicing how to write formal and informal emails.

Module 5: Report writing **Contact hours: 2**

5.1 Definition, types of reports with a focus on annual report, non-profit annual report, technical and academic report.
5.2 Necessity and purpose of writing a report, qualities of a good report.
5.3 Language used in a report.
5.4 Different formats of reports and sample reports.

Module 6: Facing an interview **Contact hours: 5**

6.1 How to approach, what to speak, how to speak in an interview and answer interview questions, the business etiquettes to maintain
6.2 Body language, negative body language, handling an awkward situation in an interview, the dress code
6.3 Successful job interview practices
6.4 Perfect handshake, points to remember while applying for a job

Module 7: British English and American English **Contact hours: 3**

7.1 Difference between American and British English words – vocabulary and spelling
7.2 Pronunciation and accents

Books / References:

1. Student‘s handbook of Written English and Phonetics by Dr Papori Rani Barooah (Eastern Book House Publishers)
2. Strengthening your writing -V.R. Nayaranswami (Orient Longman)

Paper Code: DCSE202 **Credit: 4**
Paper Name: Computer Fundamentals and Programming **L-T-P: 2-0-0**

Total Contact Hours:35

Module 1: Computer Fundamentals **Contact hours: 10**

1.1 Brief history.
1.2 Block diagram and different components.
1.3 Memory & it‘s different types.
1.4 I/O devices.
1.5 Introduction to Operating System, Types and Role of OS.
1.6 Computer languages, translator software, editor.
1.7 Data, different types of data, information and its characteristics.
1.8 Introduction to computer network and the Internet.

Module 2: Number System and codes **Contact hours: 10**

2.1 Different number systems - decimal, binary, octal, hexadecimal number system.
2.2 Number Conversions.
2.3 1‘s and 2‘s Complement, subtraction using complements.
2.4 Different codes- ASCII, BCD, Ex-3, Gray.
2.5 Conversion from Gray to binary and vice-versa.
2.6 BCD Addition.

Module 3: Introduction to C programming **Contact hours: 15**

3.1 Fundamentals of Programming-Algorithm & Flowchart.
3.2 Source code and object code.
3.3 Basic structure of C programs.
3.4 Executing a C program.
3.5 C Tokens, Keywords and Identifier, Constants, Variables, Storage Class and Data types.
3.6 Operators and expression.
3.7 Input Output functions like printf, scanf, getchar, putchar, gets, puts
3.8 Decision making and branching using IF..Else, Switch.
3.9 Looping using for, while, and do-while.
3.10 Array.

Books / References:

1. Computer Fundamentals Paperback by Priti Sinha Pradeep K.Sinha (Author), BPB Publication
2. Byron Gottfried, ―Programming with C", Tata McGraw Hill.
3. Herbert Schildt, ―The complete Reference C", TMH
4. Balagurusamy, E. (2019). *Programming in ANSI C, 8/e*. McGraw-Hill Education.
5. YashwantKanetkar, ―Let us C", BPB Publication
6. Henrry Mulish, Herbert L. Cooper, ―The Spirit of C: An Introduction to Modern Programming", Jaico Books.
7. Briain W. Kenigham and Dennis Ritchie, ―C Programming language", Prentice Hall of India.

Paper Code: DCSE272 **Credit: 2**
Paper Name: Computer Fundamentals and Programming Lab **L-T-P: 0-0-2**

Total Contact Hours:32

Module 1: Basic Commands for Computer System **Contact hours: 2**

Module 2: Preparation of Documents **Contact hours: 6**

2.1 Introduction to Word processing: Opening a document, preparing documents, inserting diagrams and tables.

2.2 Editing document- (a) Character, word and line editing, (b) Margin Setting, Paragraph alignment, (c) Block Operations, (d) Spell Checker, (e) Saving a document, (f) Mail merge.

Module 3: Information Presentation through Spreadsheet **Contact hours: 8**

3.1 Application of Spreadsheet.
3.2 Structure of spreadsheets.
3.3 Preparing table for simple data and numeric operations.
3.4 Using formulae and functions in excel operations, Creation of graphs, Pie charts, bar charts.

Module 4: Preparation of presentation **Contact hours: 6**

4.1 Creation of electronic slides on any topic
4.2 Practice of animation effect
4.3 Presentation of slides

Module 6: Programming in C **Contact hours: 10**

5.1 Editing a C program.
5.2 Defining variables and assigning values to variables.
5.3 Arithmetic and relational operators, arithmetic expressions and their evaluation.
5.4 Practice on input/output functions like getchar, putchar, gets, puts, scanf, printf etc.
5.5 Programming exercise on simple if statement, If..else statement, switch statement.
5.6 Programming exercise on looping with do-while, while, for loop.
5.7 Programming exercise on array.

Books / References:

1. Foundations of Information Technology Coursebook 9: Windows 7 and MS Office 2007 (With MS Office 2010 Updates)-SangeetaPanchal,Alka Sabharwal
2. Microsoft Office 2016 Step by Step by Joan Lambert and Curtis Frye
3. Herbert Schildt, "The complete Reference C", TMH
4. YashwantKanetkar, "Let us C", BPB Publication
5. Balagurusamy, E. (2019). Programming in ANSI C, 8/e. McGraw-Hill Education.
6. Henrry Mulish, Herbert L. Cooper, "The Spirit of C: An Introduction to Modern Programming", Jaico Books.
7. Briain W. Kenigham and Dennis Ritchie, "C Programming language", Prentice Hall of India.

Paper Code: DEE203 **Credit: 6**
Paper Name: Fundamentals of Electrical & Electronics Engineering **L-T-P: 2-1-0**

Total Contact Hours: 34

Module 1: Introduction **Contact hours: 2**

1.1 Sources of energy; General structure of electrical power systems, Power transmission and distribution via overhead lines and underground cables.

Module 2: DC circuits **Contact hours: 8**

2.1 Definitions of active, passive, linear, non-linear circuits elements and networks, Kirchoff's laws, Nodal and mesh analysis, voltage and current sources, network theorems, superposition. Thevenin's, Norton's, maximum power transfer, Millman's, and reciprocity theorems, analysis of simple circuits with DC excitation.

Module 3: Single phase AC circuits **Contact hours: 10**

3.1 Generation of single phase sinusoidal EMF, instantaneous, average and effective value, form and peak factor, examples of other alternating waveforms and average and effective value calculations, concept of phasor and phasor diagrams, lagging and leading of phasors, pure resistive, inductive and capacitive circuits, power factor, complex power, R-L, R-C and R-L-C series circuits, parallel AC circuits, series and parallel resonance.

Module 4: Semiconductor Devices: **Contact hours: 4**

4.1 Review of atomic structure, Intrinsic and Extrinsic semiconductors, current carriers in semiconductors, P-type and N-type materials, P-N junction, biasing, characteristic curve, load line, Zener diode. Special semiconductor devices (Qualitative only) – tunnel diode, backward diode, varactor and PIN diode, their construction, operation and applications.

Module 5: Bipolar transistor (Qualitative only) **Contact hours: 3**

5.1 Construction and schematic representation of PNP and NPN transistors, formation of PNP / NPN junctions, energy band diagram; transistor mechanism and principle of transistors.

Module 6: Bipolar transistor (Qualitative only) **Contact hours: 2**

6.1 Different types of biasing system, bias stabilisation, analysis of CE, CB & CC configuration, their I/P & O/P characteristics, transistor rating and specifications.

Module 7: Rectifier Circuits **Contact hours: 3**

7.1 Half wave and full wave rectifier (Qualitative only): ripple factor, rectification efficiency, Peak Inverse Voltage. Filtering (passive) and voltage regulation (Qualitative only): Capacitor filter, Inductor filter, 'T' filter, 'π' filter. Zener as voltage regulator.

Module 8: Cathode Ray Oscilloscope **Contact hours: 2**

8.1 Construction features of cathode ray tube, concept of dual beam CRO; application of CRO for different electrical measurements: amplitude frequency and phase of sine wave, Lissajous figure.

Books / References:

1. D.P. Kothari & I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. B.L. Thereja, A.K. Thereja, "A Textbook of Electrical Technology", S.Chand
4. Jacob Millman, "Electronics Devices & Circuits", McGraw Hill Education; 4 editions (2015).
5. Boyestad&Nashelsky, "Electronics Devices and circuit theory", Pearson Education India; 11th edition (2015).
6. S. Salivahanan& N. Suresh Kumar, "Electronic Devices and Circuits", McGraw Hill Education; Fourth edition (2017).
7. Albert Malvino& David Bates, "Electronic Principles", Tata McGraw Hill Publication, 2010.
8. A.K. Maini, "Analog Circuits", Khanna Publishing House, Ed. 2018.

Paper Code: DEE273 **Credit: 2**

Experiment-1: Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, rheostat and wattmeter.

Experiment-2: Make a measured resistance from a given rheostat.

Experiment-3: Verification of Kirchhoff‘s laws.

Experiment-4: Verification of Superposition theorem.

Experiment-5: Verification of Thevenin‘s theorem.

Experiment-6: P-N Junction.

Experiment-7: Half-wave rectifier circuit.

Experiment-8: Full-wave rectifier circuit.

Experiment-9:V- I characteristics of transistors.

Experiment-10: Wiring.

Paper Code: DMA204 **Credit: 8**
Paper Name: Mathematics-II **L-T-P: 3-1-0**
Total Contact Hours:40

Module 1: Calculus-I **Contact hours: 16**

a. Differential Calculus

1.1 Sets: Definition, types and operation on Sets.
1.2 Relation: Definition, domain and range, equivalence relation.
1.3 Functions: definition, types of functions.
1.4 Limits: Concept and evaluation of limits, indeterminate forms, L'Hospital's Rule.
1.5 Differentiation: Differentiation by first principle. Differentiation of sum, product and quotient, function of function, Chain rule. Differentiation of trigonometric, inverse trigonometric, hyperbolic, logarithmic and parametric functions, applications.
1.6 Basic concepts of partial differentiation.

b. Integral Calculus

1.7 Integration: Definition and fundamental properties.
1.8 Methods of integration – integration by substitution, by parts, partial fractions
1.9 Applications

Module 2: Statistics **Contact hours: 10**

2.1 Measures of Central Tendency: Mean,Median and Mode and empirical relationship between them and related problems.
2.2 Measures of Dispersion: Range, Mean Deviation, Standard Deviation, Quartile deviation.
2.3 Correlation

Module 3: Co-ordinate Geometry **Contact hours: 14**

3.1 Co-ordinate Systems, Cartesian and polar co-ordinates, distance between two points, section formula, area of triangle, collinearly and co-planarity.
3.2 Straight Line: Definition, general and standard form of equations, intersection of straight lines: angle between them, bisector of angle between them.
3.3 Change of co-ordinate axes, shifting of origin and rotation of axes.
3.4 Circle: Standard equations and simple problems, tangent and normal.
3.5 Basic idea of parabola, ellipse and hyperbola, their standard equations and basic properties.

Books / References:

1. Mathematics for Polytechniques, TTTI, Bhopal, Latest Edition.
2. Mathematics for Polytechniques, S. P. Deshpande, Latest Edition.
3. Engineering Mathematics, I.B. Prasad, Latest Edition.
4. A text Book Matrices, Shanti Narayan, S. Chand & Co. New Delhi, 1998
5. Introduction to Statistics, L. Choudhury, KitapGhar, Guwahati.Latest Edition.
6. Fundamental of Statistics, Kapoor & Gupta, Latest Edition.
7. Mathematics Textbook for class XI and XII, NCERT, Latest Edition.

Paper Code: DME205 **Credit: 6**
Paper Name: Engineering Mechanics **L-T-P: 3-0-0**
Total Contact Hours:41

Module 1: Forces and Moments **Contact hours: 12**

1.1 Force, Moment and Couple, Resultant of forces, Forces in space.
1.2 Equilibrium, FBD, General equations of equilibrium

Module 2: Friction **Contact hours: 8**

2.1 Introduction to dry friction. Laws of friction, friction of simple machines- inclined planes, Screw jacks.

Module 3: Center of gravity and moment of inertia **Contact hours: 8**

3.1 Center of gravity of axes, volume and composite bodies: Area moment of inertia and mass moment of inertia for plane figures and bodies.

Module 4: Center of gravity and moment of inertia **Contact hours: 5**

4.1 Linear and circular motion, Linear and angular velocities and acceleration,
4.2 Units relation in between centrifugal force, Its uses in Engineering problems.
4.3 Angle of banking super elevation problems. Bodies moving on a level circular path, skidding, overturning.

Module 5: Work, Power and Energy **Contact hours: 3**

5.1 Work, power and Energy definition and application
5.2 Potential and kinetic energy-definition and Units and their Engineering problems.

Module 6: Simple Lifting Machines **Contact hours: 5**

6.1 Definition and importance of Simple Machines.
6.2 Law of Machine, problems. Simple lifting Machines –simple Wheel and axle, differential wheel and axle and screw jack(simple) problems.
6.3 Definition M.A, V.R and efficiency and their relationship. Simple problems

Books / References:

1. Engineering Mechanics: S Timoshenko & D H Young. McGrow Hill Int.
2. Engineering Mechanics: R S Khurmi. S Chand & Co.
3. Engineering Mechanics: R K Bansal. Laxmi Publication (P) Ltd
4. Engineering Mechanics: K L Kumar. McGrow Hill Publishing Co.
5. Irving H. Shames (2006), Engineering Mechanics, 4th Edition, Prentice Hall
6. F. P. Beer and E. R. Johnston (2011), Vector Mechanics for Engineers, Vol I –Statics, Vol II, – Dynamics, 9th Ed, Tata McGraw Hill
7. R.C. Hibbler (2006), Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press

Paper Code: DPH206 **Credit: 6**
Paper Name: Applied Physics – II **L-T-P: 2-1-0**
Total Contact Hours:36

Module 1: Light **Contact hours: 5**

1.1 Reflection, Reflection on spherical mirror, idea of real and virtual image, mirror formula, sign conventions (mirror formula to be assumed), nature size and position of images of different positions of objects, numerical problems.
1.2 Refraction, refractive index, critical angle, total internal reflection, between critical angle and refractive index, Prism, refraction through prism, minimum deviation, numerical problems. Lens, refraction through lens (lens formula to be assumed of a lens), numerical problems.

Module 2: Electrostatics **Contact hours: 3**

2.1 Concept of Electric charge according to modern electron theory, unit of charge, Inverse square law, electric field, Electric line of force, electric intensity
2.2 Potential at a point due to a point charge, relation between intensity and potential with deduction of the formula
2.3 Capacity of a condenser, series and parallel combination, different type of condenser, numerical problems.

Module 3: Current Electricity **Contact hours: 11**

3.1 Potential difference and electric current with their units.
3.2 Difference between emf. and potential difference; internal resistance of cell. Voltaic cell; defects of cell: local action and polarization and their removal.
3.3 Difference between primary and secondary cells with examples, grouping of cells, series, parallel and mixed combinations of cells.
3.4 Basic D.C. Circuits: Ohm‘s Law and its verification, mathematical expression, Kirchoff”s Law, numerical problems.
3.5 Definition of resistance, conductance, effects of temperature on resistance, Series and parallel combination of resistance, resistance per unit length, numerical problems.
3.6 Heating Effect of Current: Joule‘s law, electricity energy and power, numerical problems
3.7 Thermoelectric effect: Thermocouple, Seebeck effect, Peltier effect and Thomson effect.
3.8 Chemical effect of current: electrolysis, Faradays‘s laws of electrolysis

Module 4: Magnetism **Contact hours: 5**

4.1 Nature and artificial magnets theories, different types of magnets, induced magnetism, nature of polarities.
4.2 Inverse square law, magnetic intensity at end – on and broad – side on position, uniform and non – uniform field, magnetic moment, couple on a magnet in a uniform field, Tangent law.
4.3 Elements of terrestrial magnetism

Module 5: Electromagnetism **Contact hours: 4**

5.1 Magnetic effect of current, nature of magnetic field due to straight and circular conductor, due to solenoid, Fleming‘s left and right hand rules, effect of current following through two parallel conductors.
5.2 Electro Magnetic induction: e. m. f. induced in a coil due to magnet, Faraday‘ s laws of electro – magnetic induction, Lenz Law, self and mutual induction.

Module 6: Modern Physics **Contact hours: 4**

6.1 Photo Electric Emission: explanation and demonstration of photo electric current, photo electric equation with its physical signification.
6.2 Nuclear Energy: Atomic mass unit, mass energy equivalence, mass defect
6.3 X- rays: Properties and its application in industry (Production apparatus not necessary)

6.4 Radio – activity: Natural and artificial radioactivity, emission of alpha, beta and gamma radiation, their properties and uses.

Module 7: Electronics **Contact hours: 2**

7.1 Thermionic emission: vacuum tube, diode and triode, their working principle, concept of rectifier and amplifier, use of diode as rectifier.

Module 8: Semi-conductor Physics **Contact hours: 2**

8.1 Concept of semiconductors, properties and basic principle, intrinsic and extrinsic semiconductor, p-type and n-type semiconductor.

Books / References:

1. Modern Approach to Physics Part I & II, DilipSarma, N G Chakraborty,and K N Sharma, Kalyani Publisher, New Delhi.
2. Applied Physics Part I & II, Manpreet Singh, Dr. Major Singh, and Mrs. Hitashi Gupta, S K Kataria& Sons- New Delhi.
3. Basic Applied Physics, R K Gaur, Dhanpat Rai Publication- New Delhi

Paper Code: DPH276 **Credit: 2**
Paper Name: Applied Physics – II Lab **L-T-P: 0-0-2**
Total Contact Hours:20

Experiment-1 To verify the laws of reflection using a plane mirror and to study the characteristics of image formed.

Experiment-2: To determine the refractive index of the material of the glass slab by pin method.

Experiment-3: To determine the focal length of a convex lens by U-V method.

Experiment-4: To determine the focal length of a convex lens by plane mirror method.

Experiment-5: To draw I-D curve and to determine the refractive index of the material of a prism.

Experiment-6: To locate the poles of a bar magnet and to measure the magnetic length.

Experiment-7: To plot magnetic lines of force of a bar magnet with north pole pointing north and to locate the neutral point/to plot magnetic lines of force of a bar magnet with south pole pointing north and to locate the neutral point.

Experiment-8: To verify Ohm‘s law by Ammeter-voltmeter method.

Experiment-9: To find equivalent resistance using voltmeter with I. Three resistances connected in series II. Three resistances connected in parallel.

Experiment-10: To measure the unknown resistance of the material of a wire by meter bridge using Wheatstone bridge principle.

Semester III

Paper Code: DCSE301 **Credit: 8**
Paper Name: Computer Architecture and Organization **L-T-P: 3-1-0**
Total Contact Hours:42

Module 1: Introduction to Computer Architecture **Contact hours: 6**

1.1 Stored program concept — Von Neumann architecture (definition only)
1.2 Functional units, Bus structure
1.3 Brief introduction to logic gates, flip-flop, encoder/decoder, multiplexer, half adder/full adder

Module 2: Number Representation **Contact hours: 6**

2.1 Signed numbers
2.2 Fixed point and floating point representation
2.3 Complements, various Arithmetic operation (with signed magnitude & floating point numbers)
2.4 Booth's algorithm

Module 3: Basic Computer Organisation and Design **Contact hours: 7**

3.2 Instruction codes, Computer registers
3.3 Computer instructions, Timing and Control, Instruction cycle
3.4 Memory-Reference Instructions
3.5 Input-output and interrupt
3.6 Complete computer description
3.7 Design of Basic computer, design of Accumulator Unit

Module 4: Central Processing Unit **Contact hours: 9**

4.1 Component of ALU (in block diagram only)
4.2 General Register organisation
4.3 Stack organisation, Instruction format
4.4 Different types of Instructions, addressing modes
4.5 Hardware control unit- its different functions
4.6 Microprogrammed control unit – control memory, micro program example, design of control unit.

Module 5: Memory Organisation **Contact hours: 7**

5.1 Concept of bits, bytes and words
5.2 Storage of numbers and characters
5.3 Memory hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, Virtual memory

Module 6:Input-Output Organisation **Contact hours: 7**

6.1 Various I/O devices
6.2 Input-output interface
6.3 Asynchronous Data Transfer
6.4 Mode of Transfer, Priority interrupt
6.5 DMA, Input output processor

Books / References:

1. Computer System Architecture – by Mano, PHI

2. Computer Organisation& Architecture – by Stallings, PHI
3. Computer Organisation – by Carl Hamacher, ZvonkoVranesic and SafwatZaky, MGH

Paper Code: DCSE302 **Credit: 6**
Paper Name: System Programming **L-T-P: 3-0-0**
Total Contact Hours: 40

Module 1: Assembly Language **Contact hours: 6**
1.1Introduction to Assembly Language
1.2Description of functional Characteristics, addressing modes
1.3Data types and instruction structure
1.4Registers
1.5Indexing
1.6Instruction set description

Module 2: Macros **Contact hours: 4**
2.1 Recursive macros
2.2 Sub routines
2.3 Stacks, procedures, exception handling

Module 3: Assemblers **Contact hours: 8**
3.1 Overview of assembly, assembly processes
3.2 Processing of imperative, declarative and assembler directive statements
3.3 Relocation, linking and loading concepts
3.4 One and Two Pass assembler
3.5 Symbol table organization, program sections, output forms

Module 4: Macro Assembler **Contact hours: 6**
4.1 Macro definitions and parameters
4.2 Macro call Expansion
4.3 Macro definition and macro call within a macro
4.4 Conditional assembly macro processor

Module 5: Loaders **Contact hours: 6**
5.1 Review of loading, linking and relocation
5.2 Absolute, dynamic and direct loading schemes
5.3 Program linking schemes and relocation of external references
5.4 Optional features in loaders and linking editors
5.5 Overlay structures and dynamic loading

Module 6:Compiler Construction **Contact hours: 10**
6.1 Introduction to Compiler
6.2 Phases and passes, Bootstrapping
6.3 Lexical Analysis
6.4 Syntax analysis
6.5 Bottom Up and Top Down parsers
6.6 Translation
6.7 Code Optimization
6.8 Code Generation

Books / References:

1. Systems Programming by DmDhamdhere, Tata McGraw-Hill Education.
2. Systems Programming by Donovan, Tata McGraw-Hill Education.

Paper Code: DCSE372 **Credit: 3**
Paper Name: System Programming Lab **L-T-P: 0-0-3**
Total Contact Hours: 30

Basics of Unix: Introduction, Unix Architecture, Files and Directories Management, Environment, Basic Utilities, Pipes and Filters, Processes, Text Editors, Shell and Basics of Shell Scripting.

NASM Assembler: Introduction, Installation and Environmental Setup

Assembly Language: Basic Syntax, Memory Segments, Registers, System Calls, Addressing Modes, Variable, Constants, Arithmetic Instructions, Logical Instructions, Conditions, Loops, Numbers, String, Arrays, Procedure, Recursion, Macros, File & Memory Management

Assembly Language programs that demonstrate all the above

Lex and Yacc: Writing basic compiler using Lex and yacc

Books / References:

1. Das, S. (2000). UNIX, Concepts and Applications. Tata McGraw-Hill.
2. Das, S. (2012). Your UNIX/Linux: The Ultimate Guide. McGraw-Hill
3. Duntemann, J. (2000). Assembly language step-by-step: programming with DOS and Linux. John Wiley & Sons.

Paper Code: DECE303 **Credit: 6**
Paper Name: Digital Electronics **L-T-P: 3-0-0**
Total Contact Hours: 30

Module 1: Number Systems & Boolean Algebra **Contact hours: 4**

1.1 Introduction to different number systems – Binary, Octal, Decimal, Hexadecimal
1.2 Conversion from one number system to another
1.3 Boolean variables – Rules and laws of Boolean Algebra De-Morgan's Theorem
1.4 Karnaugh Maps and their use for simplification of Boolean expressions

Module 2: Logic Gates **Contact hours: 6**

2.1 Logic Gates – AND, OR, NOT, NAND, NOR, XOR, XNOR: Symbolic representation and truth table
2.2 Implementation of Boolean expressions and Logic Functions using gates. Simplification of expressions

Module 3: Combinational Logic Circuits **Contact hours: 6**

3.1 Arithmetic Circuits – Addition, Subtraction 1's 2's Complement, Half Adder, Full Adder, Half Subtractor, Full Subtractor, Parallel and Series Adders, Encoder, Decoder
3.2 Multiplexer – 2 to 1 MUX, 4 to 1 MUX, 8 to 1 MUX.
3.3 Applications Demultiplexer – 1 to 2 DEMUX, 1- 4 DEMUX, 1- 8 DEMUX problems

Module 4: Sequential Logic Circuits **Contact hours: 6**

4.1 Flip Flops – SR, JK, T, D, FF, JK-MS, Triggering
4.2 Counters – 4 bit Up – Down Counters, Asynchronous/ Ripple Counter, Decade Counter- Mod 3, Mod 7 Counter, Johnson Counter, Ring Counter
4.3 Registers – 4bit Shift Register: Serial In Serial Out, Serial in Parallel Out, Parallel In Serial Out, Parallel In Parallel Out

Module 5: Memory Devices **Contact hours: 8**

5.1 Classification of Memories – RAM Organization, Address Lines and Memory Size, Static RAM, Bipolar RAM, cell Dynamic RAM, D RAM, DDR RAM
5.2 Read Only memory – ROM organization, Expanding memory, PROM, EPROM, EEPROM, Flash memory
5.3 Data Converters – Digital to Analog converters, Analog to Digital Converters

Books / References:

1. Digital principles & Applications: Albert Paul Malvino& Donald P. Leach McGraw Hill Education; Eighth edition (ISBN: 978-9339203405)
2. Digital Electronics: Roger L. Tokheim&Macmillian McGraw-Hill Education (ISE Editions); International 2 Revised ed edition (ISBN: 978-0071167963)
3. Digital Electronics – an introduction to theory and practice: William H. Gothmann Prentice Hall India Learning Private Limited; 2 edition (ISBN: 978-8120303485)
4. Fundamentals of Logic Design: Charles H. Roth Jr. Jaico Publishing House; First edition (ISBN: 978-8172247744)
5. Digital Electronics: R. Anand Khanna Publications, New Delhi (Edition 2018) ISBN: 978-93-82609445

Paper Code: DECE373 **Credit: 2**

Paper Name: Digital Electronics Lab **L-T-P: 0-0-2**
Total Contact Hours: 2 Hours/Week

Hands-on experiments related to the course contents of DECE303

Paper Code: DMA301 **Credit: 6**
Paper Name: Mathematics-III **L-T-P: 3-0-0**
Total Contact Hours: 40

Module 1: Matrices **Contact hours: 8**

1.1 Definition, Operation of matrices.
1.2 Special Matrices – Square, diagonal, row, column, zero or null, unit matrix, upper and lower triangular, symmetric and skew – symmetric matrices.
1.3 Adjoint of a matrix, inverse of a matrix, finding inverse using adjoints and elementary transformations.
1.4 Rank of a matrix.
1.5 Solution of simultaneous linear equations.

Module 2: Ordinary differential equations (ODE) **Contact hours: 20**

First Order ODE
2.1 Formation of differential equations.
2.2 Separable equations.
2.3 Equations reducible to separable form.
2.4 Exact equations.
2.5 Integrating factors
2.6 Linear first order equations; Bernoulli equation.
2.7 Orthogonal Trajectories.
Second Order ODE
2.8 Homogenous linear equations of arbitrary order with constant coefficients.
2.9 Non homogenous linear equations with constant coefficients.
2.10 Euler‘s and Cauchy‘s equations.
2.11 Method of variation of parameters.
2.12 System of linear differential equations.

Module 3: Vector Calculus **Contact hours: 12**

3.1Introduction to vector Calculus.
3.2 Scalar field and victor field.
3.3 Derivative and integration of vector functions.
3.4 Partial derivative of vectors.
3.5 Directional derivatives.
3.6 Tangent plane and normal to a level surface.
3.7 Gradient, divergence and curl.

Books / References:

1. S.S. Sastry, Prestice Hall of India, New Delhi Ed. 1994, Engineering Mathematics Vol-I
2. Thomas &Finnery, Narosa Publishing Co. New Delhi, Ed. 1999, Calculus and Analytical Geometry
3. B.S. Grewal, Krishna Publishers, New Delhi, Ed. 1999, Higher Engineering Mathematics
4. Murray R. Spiegel and Seymour Lipschutz, Mcgraw Hill, (Schaum‘s Outlines Series), 2nd edition 2009, Vector Analysis
5. Bhu Dev Sharma, KedarNath Ram Nath, Latest Ed., Differential Equations
6. Dr. M. D. Raisinghania, S. Chand, 19th Edition, Ordinary and partial Differential Equations
7. Shepley L. Ross, Wiley, Third Edition (Wiley Student Edition), Differential Equations

Paper Code: DHSS302 **Credit: 8**
Paper Name: Engineering Economics and Accountancy **L-T-P: 3-1-0**
Total Contact Hours: 52

Part-A Engineering Economics

Module 1: Introduction to Economics **Contact hours: 4**

1.1 Definition of Economics, Its utility and scope of the Study.
1.2 Definition of Engineering Economics
1.3 Meaning and concepts of Utility, Consumption, value, price, Goods and National income, Inflation.
1.4 Wants, Definition and Characteristics
1.5 Wealth and Welfare – Definition, meaning and types.

Module 2: Demand and Supply **Contact hours: 6**

2.1 Meaning and types of Demand
2.2 The law of Demand, its limitations
2.3 Preparation of Demand Schedule
2.4 Meaning of Supply
2.5 The law of supply, its limitations
2.6 Preparation of supply schedule

Module 3: Production **Contact hours: 4**

3.1 Meaning and factors of Production
3.2 Factors determining efficiency of labour
3.3 Saving, investment and capital formation
3.4 Meaning of Production Function

Module 4: Money **Contact hours: 3**

4.1 Meaning of Money
4.2 Types of Money
4.3 Functions of Money

Module 5: Banking Organisation **Contact hours: 3**

5.1 Central Bank – its functions
5.2 Commercial Banks – its functions

Module 6: Pricing **Contact hours: 4**

6.1 Objective of Pricing Policy
6.2 Price determinants
6.3 Price discrimination

Part-BAccountancy

Module 7: Introduction to Book Keeping and Accountancy **Contact hours: 5**

7.1 Definition and objectives of Book Keeping
7.2 Need and Advantages of Book Keeping
7.3 Definition of Accounting
7.4 Difference between book keeping and accounting
7.5 Double Entry Systems – main features

7.6 Advantage and dis advantages of Double Entry System

Module 8: Introduction to Computerised Accounting System **Contact hours: 3**

8.1 Components of Computerised Accounting Software
8.2 Need for Computerised Accounting
8.3 Difference between computerised Accounting and Manual Accounting

Module 9: Transaction **Contact hours: 3**

9.1 Definition
9.2 Meaning of Account
9.3 Classification of Accounts: Traditional Approach and Modern Approach
9.4 Meaning of Debit and Credit
9.5 Rules of Debit and Credit

Module 10: Journal and Ledger **Contact hours: 5**

10.1 Meaning of Journal
10.2 Recording of Transaction in Journal
10.3 Meaning of Ledger
10.4 Objective and Utility of Ledger
10.5 Posting and Balancing of Ledger
10.6 Distinction between Journal and Ledger
10.7 Names of Different Books of Accounts

Module 11: Cash Book **Contact hours: 5**

11.1 Meaning and Importance of Cash Book
11.2 Characteristics and Advantages of Cash Book
11.3 Discount – Trade Discount and Cash Discount
11.4 Different Types of Cash Book: Single column cash book, Double column Cash Book and Triple column Cash book
11.5 Bank Reconciliation Statement – Basic Idea

Module 12: Trial Balance and Error in Accounting **Contact hours: 3**

12.1 Meaning and Objects of Trial Balance
12.2 Main features and Advantage of Trial Balance
12.3 Preparation of Trial Balance
12.4 Types of Error in Accounting

Module 13: Components of Final Accounts **Contact hours: 4**

13.1 Meaning and objectives of Trading Account
13.2 Contents of Trading Account
13.3 Meaning and objectives of Profit and Loss Account
13.4 Contents of Profit and Loss Account
13.5 Meaning of Depreciation, revenue expenditure and capital expenditure
13.6 Contents of Balance Sheet

Books / References:

1. Introductory Micro Economics- Sandeep Garg- Dhanpat Rai Publication Pvt. Ltd. New Delhi.
2. Introductory Macro Economics- Sandeep Garg- Dhanpat Rai Publication Pvt. Ltd. New Delhi.
3. Theory and Practice of Accountancy-B.B. Dam, R.A. Sarda, R. Barman, B. Kalita-Capital Publishing Company, Guwahati-5.
4. Book-Keeping & Accountancy- Juneja. Chawla &Saksena- Kalyani Publisher, New Delhi-110002.
5. Tally. ERP 9 for Beginners- Tally Solutions Pvt. Ltd.- Sahaj Enterprises, Bangalore.

Central Institute of Technology Kokrajhar

Deemed to be University, MHRD, Govt. of India

Kokrajhar, BTR, Assam

DIPLOMA SYLLABUS OF

ANIMATION & MUTIMEDIA TECHNOLOGY (AMT)

(To be applicable from August 2021 for batches to start from 2021-22 academic session)

Department of Multimedia Communication and Design

Module: Diploma	**Branch: AMT**	**Year: 1st Year**	**Semester: 1st Sem**
Course Code	**Name of Course**	**L-T-P**	**Credit**
DHSS101	Communication Skills-I	3-0-0	6
DCH101	Chemistry-I (Theory)	2-1-0	6
DPH101	Applied Physics-I (Theory)	2-1-0	6
DMA101	Mathematics-I	3-1-0	8
DAMT101	Fundamentals of Computer Application(Theory)	2-0-0	4
DAMT102	Foundation of Animation(Theory)	1-1-0	4
DCH171	Chemistry-I (Practical)	0-0-2	2
DPH171	Applied Physics-I (Practical)	0-0-2	2
DAMT171	Fundamentals of Computer Application(Practical)	0-0-2	2
DAMT172	Foundation of Animation(Practical)	0 0-6	6
		Contact Hours 29	**46**

Module: Diploma	**Branch: AMT**	**Year: 1st Year**	**Semester: 2nd Sem**
Course Code	**Name of Course**	**L-T-P**	**Credit**
DHSS201	Communication Skills-II	3-0-0	6
DCSE202	Computer Fundamentals and Programming (Theory)	2-0-0	4
DAMT201	Story boarding & Script writing(Theory)	1-0-0	2
DAMT202	Elements of Multimedia(Theory)	2-0-0	4
DAMT203	2D Animation Techniques(Theory)	1-0-0	2
DCSE272	Computer Fundamentals and Programming (Theory)	0-0-2	2
DAMT271	Story boarding & Script writing(Practical)	0-0-4	4
DAMT272	Elements of Multimedia (Practical)	0-0-2	2
DAMT273	2D Animation Techniques(Practical)	0-0-6	6
		Contact Hours 23	**32**

Module: Diploma	**Branch: AMT**	**Year: 2nd Year**	**Semester: 3rd Sem**
Course Code	**Name of Course**	**L-T-P**	**Credit**
DAMT301	Introduction to Digital Modeling (Theory)	1-0-0	2
DAMT302	Basic Concept of Texturing Techniques (Theory)	1-0-0	2
DAMT303	Web Designing (Theory)	1-0-0	2
DAMT304	Digital Photography and Film Making (Theory)	1-0-0	2
DAMT371	Introduction to Digital Modeling (Practical)	0-0-6	6
DAMT372	Basic Concept of Texturing Techniques (Practical)	0-0-6	6
DAMT373	Web Designing (Practical)	0-0-4	4
DAMT374	Digital Photography and Film Making (Practical)	0-0-6	6
DAMT375	Concept Art (Practical)	0-0-6	6
		Contact Hours 32	**36**

Module: Diploma	Branch: AMT	Year: 3rd Year	Semester: 4th Sem
Course Code	**Name of Course**	**L-T-P**	**Credit**
DAMT401	3D Animation (Theory)	1-0-0	2
DAMT402	Concept of Rigging(Theory)	1-0-0	2
DAMT403	Introduction to Multimedia Design(Theory)	2-0-0	4
DAMT404	Art Fundamentals and Graphics Design(Theory)	2-0-0	4
DAMT471	3D Animation (Practical)	0-0-6	6
DAMT472	Concept of Rigging(Practical)	0-0-6	6
DAMT473	Introduction to Multimedia Design(Practical)	0-0-6	6
DAMT474	Art Fundamentals and Graphics Design(Practical)	0-0-6	6
		Contact Hours 30	**36**

Module: Diploma	Branch: AMT	Year: 3rd Year	Semester: 5th Sem
Course Code	**Name of Course**	**L-T-P**	**Credit**
DAMT501	Lighting in Animation (Theory)	1-0-0	2
DAMT502	Compositing & Visual Effects(Theory)	1-0-0	2
DAMT503	Introduction to Gaming Theory (Theory)	2-1-0	6
DAMT504	Concept of New Media (Theory)	2-0-0	4
DAMT571	Lighting in Animation (Practical)	0-0-6	6
DAMT572	Compositing & Visual Effects(Practical)	0-0-6	6
DAMT595	Minor Project	0-0-10	10
		Contact Hours 29	**36**
Module: Diploma	**Branch: AMT**	**Year: 3rd Year**	**Semester: 6th Sem**
Course Code	**Name of Course**	**L-T-P**	**Credit**
DHSS601	Industrial Management and Entrepreneurship	3-1-0	8
DAMT601	Audio Video Editing (Theory)	1-1-0	4
DAMT671	Audio Video Editing (Practical)	0-0-6	6
DAMT695	Major Project	0-0-12	12
		Contact Hours 24	**30**
		Total Credits	**216**

***Students will present/exhibit a Compilation of all their work done at the end of each semester.**

Consolidated statement of total credits in each semester

Semester	L	T	P/S	Credit
1	13	4	12	46
2	9	0	14	32
3	4	0	28	36
4	6	0	24	36
5	6	1	22	36
6	4	2	18	30
Total	42	7	118	216

As per CIT Academic Ordinance:

1 h Lecture (L) per week	2 credit
1 h Tutorial (T) per week	2 credit
1 h Studio Project	2 credit
1 h Practical (P) per week	1 credit
1 h Project Work	1 credit
1 h Seminar / Training / Industrial Training	1 credit

SEMESTER - 1

1. Course Title: COMMUNICATION IN ENGLISH-I

2. Course Code: DHSS101 (L-3, T-0, P-0, C-6)

3. Aim of the course:

The general aim of a course in English language and communication is aimed at the three domains of learning: knowledge, skills and attitudes. In keeping up with this aim, it is attempted to develop all the four skills of language learning in the learner – listening, speaking, reading and writing and also to enable the students to use the grammar of the English language correctly. Since, all these four skills are interrelated to each other, this course is aimed at achieving language proficiency in all the four skills so that at the end of the course the student is a confident user of the General Indian English (GIE), with the added knowledge of the other variants as British English and American English. This, it is attempted to achieve, by building a carefree, tension free classroom atmosphere in which the language classes incorporate activities related to these four skills. It is aimed that at the end of the course, the student can relate to the English language as a language of communication and conduct of everyday affairs.

4. Course outcome:

On completion of the course on Communication in English-I, student will be able to

- CO1 = Comprehend basic sentences in English.
- CO2 = Construct grammatically correct sentences in English.
- CO3 = Use grammatically correct English sentences in everyday situations.
- CO4 = Use varied English vocabulary in everyday situations confidently.
- CO5 = Conduct themselves orally using simple English.

Chapter no.	Chapter Title	Content / area of focus	Intended Learning Outcome	Duration in hours
1.	Parts of Speech	1.1 Recognition and review of Nouns, Pronouns, Verbs, Adverbs, Adjectives, Prepositions, Conjunctions, Interjections 1.2 Knowledge of Subject, Object and Compliment of the Verb 1.3 Verbals –Infinitival, Gerund and Preposition	1. Explain the different parts of speech. 2. Describe the various parts of sentence.	3
2.	Prepositions of time and place	2.1 Contextual teaching of prepositions of time - on, in , at, since, for, ago, before, to, past, to, from, till/until, by	1. Explain prepositions of time and place.	5

		2.2 prepositions of place: in, at, on, by, next to, beside, near, between, behind, in front of, under, below, over, above, across, through, to, into, towards, onto, from		
3.	Clause, phrases and Relative Clauses	3.1 Basic definitions of clauses and phrases 3.2 Focus on Relative Pronouns and their use in sentences as relative clauses	1. Describe the various types of clauses and phrases with special reference to relative clauses.	2
4.	Subject Verb Agreement	4.1 Rules that guide the agreement of the subject to its verb	1. Explain subject verb agreement.	5
5.	Sentence types and Transformation of sentences	5.1 Assertive sentences, Exclamatory sentences, Interrogative sentences, Negative sentences, Compound sentences, complex sentences, simple sentences, Degrees of Comparison	1. Describe the various types of sentences and their transformations.	5
6.	Voice	6.1 Change from Active Voice to Passive Voice and vice versa	1. Describe Voice.	3
7.	Punctuation	7.1 Use of the comma, semi-colon, colon, apostrophe, exclamation mark, question mark and quotation marks	1. Explain punctuation in different situations and sentences.	5
8.	Word formation	8.1 Change of one part of speech to the other: from Verbs to Nouns, Nouns to Verbs, Adjectives to Nouns, Nouns to Adjectives, Verbs to adverbs, and Adverbs to Verbs	1. Explain the conversion of one part of speech to the other.	2
9.	Affixation	9.1 Prefixes and Suffixes and new word formations	1. Explain the use of various Affixes and the change of meaning with it.	2
10.	Nominal Compounds	10.1 Common nominal compound	1. Describe how different nouns can come together to form a new word.	2
11	Paragraph Writing	11.1 Descriptive Paragraph on various related topics.	1. Describe how to write coherent paragraphs in related words.	5

BOOKS RECOMMENDED:

1. ***Essential English Grammar with Answers*** by Raymond Murphy (Cambridge University Press)
2. ***English for Polytechnics*** **by Dr Papori Rani Barooah (Eastern Book House Publishers)**
3. ***English Grammar*** **by Annie Brinda (Cambridge University Press)**

Course Name: MATHEMATICS – I **L- T – P: Cr**
Course Code: DMA101 **3 – 1 – 0: 08**

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1. ALGEBRA (18 HOURS)

- Vector and Scalar quantities – types of vectors, geometric representation of vectors, addition and subtraction of vectors, magnitude of a vector, product of a vector by a scalar, unit vectors i, j, k.
- Arithmetic and geometric progressions – nth term of A.P. and G.P., Geometric mean between two numbers.
- Complex numbers – origin, general form, polar form, examples
- Binomial theorem – Factorials, positive integral values, binomial expansion, rules, calculation of appropriate value.
  Logarithm and exponential series.
- Determinants: Definition, operations and Cramer's rule for solving simultaneous linear equations.
- Basic concepts of permutation and Combinations.

2. TRIGONOMETRY (10 HOURS)

- Trigonometric functions and ratios.
- Trigonometric functions of allied angles – half, double, triple, compound angles.
- Addition and subtraction formulae.
- Solution of triangles using properties.
- Simplification of trigonometric expressions using different formulae.
- Basic concept of inverse trigonometric functions and hyperbolic functions.

3. CO-ORDINATE GEOMETRY (12 HOURS)

- Co-ordinate Systems, Cartesian and polar co-ordinates, distance between two points, section formula, area of triangle, collinearly and co-planarity.
- Straight Line: Definition, general and standard form of equations, intersection of straight lines: angle between them, bisector of angle between them.
- Change of co-ordinate axes, shifting of origin and rotation of axes.
- Circle: Standard equations and simple problems, tangent and normal.
- Basic idea of parabola, ellipse and hyperbola, their standard equations and basic properties.

Reference Books:

Sl No	Title	Author/ Publisher
1	Mathematics for Polytechniques: Vol – I&II	TTTI, Bhopal
2	Mathematics for Polytechniques	S.P. Deshpande
3	Engineering Mathematics	I.B. Prasad
4	Engineering Mathematics	Grewal
5	Plain Trigonometry	Bansilal
6	College Algebra	Shah and Desai
7	Mathematics Textbook for class XI and XII	NCERT

Course Name: Chemistry-1 (THEORY) **L- T – P: Cr**

Course Code: DCH101 **2 – 1 – 0: 06**

Unit I:Kinetic theory of gases (6L)
Postulates of kinetic theory, Pressure volume correlations, Numerical problems, Liquefaction of gases – Thomson effect, Claude's Method and Linde's Method.
Unit II: Electrochemistry (6L)
Electrolytes, Faraday's law of electrolysis, Numerical problems, application of electrolysis, oxidation and reductions, Redox reactions.
Unit III: States of Matter(6L)
Solid, liquid, gas. Boyle's law, Charles's Law, Avogadro's law, Ideal gas equations, numerical problems.
Unit IV: Periodic table, Atomic structure(6L)
Electrons, protons, neutron, Atomic mass (A), atomic number (Z) isotopes, isobars, isotone, orbit and orbitals, electronic configuration (upto Z=40), Modern periodic table, groups and periods.
Unit V: Organic chemistry-I (6L)
IUPAC nomenclature, Alkane, alkene, alkyne, alcohol synthesis and applications.
Unit VI: Biochemistry(4L)
Carbohydrates, lipids, amino acids, proteins, Nucleic acid--- DNA and RNA, Vitamins and hormones --- sources and application.
Unit VII: Environmental Chemistry (6L)
Defination, Types of pollution, pollutants, Water quality measurements- D.O, B.O.D, C.O.D, hardness, TDS, Green house effect, acid rain, Ozone layer depletion.

Course Title: Chemistry-1 (PRACTICAL) **L T P : Cr**
Course code: DCH171 **0 - 0 - 2 : 2**

Experiment-1: Aim of the experiment: Introduction to chemistry laboratory, precautions, name of common chemicals, apparatus, instruments etc.
Experiment-2: Aim of the experiment: Volumetric analysis and study of apparatus used therein.
Experiment-3: Aim of the experiment: Determine the degree of temporary hardness of water by EDTA titration.
Experiment-4: Aim of the experiment: Determination of solubility of a solid at room temperature.
Experiment-5: Aim of the experiment: To verify the first law of electrolysis (electrolysis of copper sulphate solution using copper electrode).

Experiment-6: Aim of the experiment: Determination of pH of unknown solutions.

Text/Reference Books:
1. Chemistry in Engineering by J.C. Kuriacose and J. Rajaram; Tata McGraw-Hill Publishing Company Limited, New Delhi
2. Engineering Chemistry by Dr. S. Rabindra and Prof. B.K. Mishra ; Kumar and Kumar Publishers (P) Ltd. Bangalore-40
3. A Text Book of Applied Chemistry-I by SS Kumar; Tata McGraw Hill, Delhi
4. Progressive Applied Chemistry –I and II by Dr. G.H. Hugar; Eagle Prakashan.

Course Title: Applied Physics I (Theory) **L T P: Cr**
Course code: DPH101 **2 – 1- 0 : 6**

Category: Basic Science Course

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1. UNITS & DIMENSION (2 L)
1.1. Need of measurement and Unit in Engineering and Science, definition of unit, fundamental and derived quantities and their units, different system of units (CGS and SI), Illustrations.
1.2 Explanation of dimensions of physical quantities, dimensional equations of physical quantities and their uses with examples.
2 BASIC MECHANICS (12 L)
2.1 Introduction to scalar and vector quantities, representation of vector, addition, subtraction and multiplication of vectors, parallelogram law of vector addition,

resolution of vector, dot and scalar product of two vectors (details not required).

2.2 Newton's laws of motion: First law, explanation, definition of force, Concept of Inertia, types of inertia (inertia of rest and inertia of motion), Newton's second law,

momentum, impulse, mass & weight, simple problems, Third law, explanation and its examples, Principle of conservation of linear momentum, statement and simple examples.(e.g. recoil of a gun), numerical problems.
2.3 Circular motion, time period and angular velocity, relation between angular velocity and linear velocity, centripetal and centrifugal force, bending of a cyclist on a curved path, banking of roads and railway track , numerical problems.

2.4 Work, power and energy, its concept, units and dimension, Potential and Kinetic energy, its mathematical relations, Principle of conservation of energy, its proof in case of a free falling body under gravity, numerical problems.

2.5 Simple Harmonic Motion, its geometrical representations and 1derivation of its equations, definition of amplitude, time period, frequency, phase etc., mathematical relations and units, simple pendulum & second's pendulum, numerical problems.

3. GRAVITY AND GRAVITATION (3 L)

3.1 Newton's law of gravitation, acceleration due to gravity, relation between 'G' and 'g', their units, variation of the value of g with altitude and depth, Centre of gravity and Centre of mass, Numerical problems

4 ELASTIC PROPERTIES OF SOLID (3 L)

4.1 Deforming force, restoring force, Elastic and plastic bodies , explanation of stress and strain with their types, Hook's law, elastic limit , Young's modulus, Bulk modulus, Rigidity modulus, Poisson's ratio, their units and numerical problems.

5 HEAT & THERMODYNAMICS (10 L)

5.1 Concept of heat and temperature, thermometer, different scales of temperatures and their conversion formulae, numerical problems.

5.2 Thermal expansion: expansion of Solid, linear, superficial and cubical expansion of solid, their coefficients & their relations; Expansion of liquid: co-efficient of Real and Apparent expansion, their relation, variation of density with temperature, Anomalous expansion of water (experimental determination not necessary). Concept of Absolute scale of temperature.

5.3 Calorimetry: Unit of heat, Joule and calorie, Specific heat, thermal capacity and water equivalent.

5.4 Change of state of a body, melting and freezing point, effect of pressure on melting

point, latent heat, Evaporation, difference between vaporisation and evaporation, factors on which rate of evaporation depends.

5.5 Transmission of heat, three modes of heat transfer, conduction, convection and Radiation, good and bad conductor of heat, coefficient of thermal conductivity, its S.I. unit and dimension.

5.6 1st law and 2nd law of thermodynamics, Joule's law and Mechanical equivalent of heat.

6 SOUND (6 L)

6.1 Wave Motion: amplitude, time period, frequency and wavelength, relation between velocity, frequency and wavelength. Transverse and longitudinal waves with examples.

6.2 Propagation of sound wave: Expression of velocity of sound in air, Newton's formula and Laplace's correction, Effect of temperature, and pressure on velocity of sound.

6.3 Audible range, ultrasonic and infrasonic sound, application of ultrasonic sound to calculate the depth of ocean.

6.4 Reflection of sound and its application, Echo and reverberation of sound, acoustic of building

6.5 Doppler's effect with Mathematical expression .

Suggested Reference books.

1. Modern Approach to Physics Part I & II, Dilip Sarma, N G Chakraborty,and K N Sharma, Kalyani Publisher, New Delhi.

2. Applied Physics Part I & II, Manpreet Singh, Dr. Major Singh, and Mrs. Hitashi Gupta, S K Kataria & Sons- New Delhi.

3. Basic Applied Physics, R K Gaur, Dhanpat Rai Publication- New Delhi.

Course Title: Applied Physics I (Practical) **L T P: Cr**
Course code: DPH171 **0 - 0 -2 : 2**

Category: Basic Science Course

1. Vernier Calipers: To determine the volume of a metallic/wooden cube.
2. Screw Gauge : to determine cross sectional area of a wire/ thickness of a glass piece.
3. Spherometer: To determine the radius of curvature of concave and convex mirrors.
4. To determine the value of acceleration due to gravity (g) of a place with simple pendulum.
5. To measure the velocity of sound in resonance tube.
6. To determine the frequency of a tuning fork using a Sonometer.
7. Measurement of Specific gravity of solid, liquid, using Nicolson hydrometer, Hare's apparatus and specific gravity bottles.
8. To determine the atmospheric pressure by using Boyle's law apparatus.
9. To determine water equivalent of a calorimeter by method of mixture.

Course Name: Fundamentals of Computer Application (Theory) **L- T – P: Cr**

Course Code: DAMT101 **2 – 0 – 0: 04**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Computer Fundamentals -
Brief history – Babbage machine, Von Neumann. Architecture – Block diagrams, Role of Operating Systems, concept of language and language translators, editors. Memory – different types, functions, concept of I/O devices.
Number System-
Number system and codes: Decimal, binary, octal, hexadecimal number systems and conversion from one system to another, arithmetic operations using these numbers. Representation of a negative number in the different number systems. Complement and complement subtraction. Different codes: ASCII, 8421, Ex-3, 2421, gray, Alpha-numeric, BCD, Seven segment codes etc. and code conversion.
Introduction to Operating System-
Concept of resource management, single user and multi user OS, Various popular OS (DOS, Windows, Unix/ Linux), elementary commands.
Introduction to Internet-
Fundamentals of networking – need of network topology, concept of LAN, WAN, MAN, network devices – NIC, hub, bridge, switch, repeaters, gateway, modem, transmission media. Internet services, concept of global net, different browsers, search engine.
MS – Office- Various products, their introduction and uses.

Course Name: Fundamentals of Computer Application (Practical) **L- T – P: Cr**

Course Code: DAMT171 **0 – 0 – 2: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books:

1. DOS quick reference: RajibMathur
2. Learning Word for Windows : RajibMathur
3. Learning Windows step by step: RajibMathur
4. Microsoft office unleashed: Techmedia
5. ABC of Office: Han
6. Mastering Excel: Chester
7. Excel 97 Bible: John Walkenbach
8. Teach yourself MS Access in 24 hours: Eddy and Buchanan
9. Microsoft Access 2000 fast and easy: Primatech BBP
10. Unix: S. Das

Course Name: Foundation of Animation (Theory) **L- T – P: Cr**

Course Code: DAMT102 **1 – 1 – 0: 04**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Different Types of Animation, Introduction to Pre-Production, Scripting, Storyboarding, Layout, Character Designing, Props Designing, Background Designing, Camera Angles, Frame Lengths, Voice recording, Introduction to 2D Animation. Introduction to Production, Introduction to 3D animation, Modeling, Texturing, Rigging, Animation. Lighting, Dynamics, VFX, Introduction to Post-Production, Compositing, Rendering, Tools of the trade. Scope of Animation, Various positions in the Animation Industry,

Rapid sketching, Drawings with the help of basic shapes, Animal study, Human anatomy, Shading techniques, Live model study, Head study, hand and feets, full figure study. Gesture drawing.

Posing for Animation.Shapes and forms, About 2d and 3d drawings, Caricaturing – fundamentals, Exaggeration, Attitude, Silhouettes, Boundary- breaking exercises and warm ups, gesture drawing, Line drawing and quick sketches, Drawing from observation, memory and imagination.12 animation principles.

Course Name: Foundation of Animation (Practical) **L- T – P: Cr**

Course Code: DAMT172 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "Beginner's Guide to Animation" – by Mark Murphy; Watson-Guptill Publication

- "Producing Animation" – by Catherine Winder & Zahra Dowlatabadi; Focal Press
- "Drawn to Life: 20 Golden Years of Disney Master Classes: Volume 1" – by Walt Stanchfield;
- Focal Press
- "Successful drawing " by Andrew Loomis
- "Constructive Anatomy" by George Bridgman

SEMESTER - 2

Course Name: Communication Skill-II **L- T – P: Cr**

Course Code: DHSS201 **3 – 0 – 0: 06**

Aim of the course:

The general aim of a course in English language and communication is aimed at the three domains of learning: knowledge, skills and attitudes. In keeping up with this aim, it is attempted to develop all the four skills of language learning in the learner – listening, speaking, reading and writing and also to enable the students to use the grammar of the English language correctly. Since, all these four skills are interrelated to each other, this course is aimed at achieving language proficiency in all the four skills so that at the end of the course the student is a confident user of the General Indian English (GIE), with the added knowledge of the other variants as British English and American English. This, it is attempted to achieve, by building a carefree, tension free classroom atmosphere in which the language classes incorporate activities related to these four skills. It is aimed that at the end of the course, the student can relate to the English language as a language of communication and conduct of everyday affairs.

Course outcome:

On completion of the course on Communication in English-II, student will be able to

- CO1 = Comprehend meaning of a passage in English.
- CO2 = Arrive at the gist of a passage and also write the gist in one's own words.
- CO3 = Understand the differences between general English and official English.
- CO4 = Face an interview with confidence and fluency and a positive attitude.

Chapter no.	**Chapter Title**	**Content / area of focus**	**Intended Learning Outcome**	**Duration in hours**
1.	Letter Writing	1.1 Formal letter formats, greetings, salutation, body of the letter,	1. Explain how to write different types of formal letters	5

		practice of letter writing in different situations: Order letter, Complaint letter, Letter of Adjustment, Quotation letter , Letter to the Editor, Application for leave of absence		
2.	Job Application and Cover Letter, Resume, Curriculum Vitae, bio data	2.1 Format of a job application, Cover Letter, formats of Resume and CV for a fresher and for someone with experience, Differences between Resume, CV, Bio-data, and choice of referees	1. Explain how to write Job Applications, Cover Letter, Resume, Curriculum Vitae, bio data	5
3.	Paragraph Writing	3.1 Definition, Cohesion and Linkage using Transition words on everyday topics	1. Describe how to compose coherent passages.	3
4.	Summary writing	4.1 Definition, Use of Transition words, important points to remember while summarizing	1. Explain how to arrive at a summary of a paragraph / text.	2

5.	Reading Comprehension	5.1 Developing the comprehension skill of the students and the ability to reproduce grammatically and semantically correct English sentences	1. Describe how to comprehend passages for understanding.	2
6.	Memo Writing	6.1 Definition and format	1. Explain how to write a formal Memo.	2
7.	Amplification	7.1 Definition and format	1. Explain how to write a formal memo	2
8.	Report writing	8.1 Definition, types of reports with a focus on annual report, non-profit annual report, technical and academic report, necessity and purpose of writing a report, qualities of a good report, language used in a report, different formats of reports and sample reports	8.1 Definition, types of reports with a focus on annual report, non-profit annual report, technical and academic report, necessity and purpose of writing a report, qualities of a good report, language used in a report, different formats of reports and sample reports	2
9.	E- mail writing	9.1 writing the perfect e-mail, steps to the perfect e-mail, formal and informal	1. Explain how to write formal and informal emails.	2

		greetings, requests through an e-mail, writing an apology, complaint and seeking help and information in an e-mail, informing about a file attached in in an email, writing the formal ending of an e-mail		
10.	Facing an interview and dress code	10.1 How to approach, what to speak, how to speak in an interview and answer interview questions, the business etiquettes to maintain, body language , negative body language, handling an awkward situation in an interview, the perfect handshake, points to remember while applying for a job	1. Discuss how to face an interview for success.	3
11.	British English and American English	10.1 Difference between American and British English words – vocabulary and spelling	1. Distinguish between British English and American English.	2

BOOKS RECOMMENDED:
1. ***Student's handbook of Written English and Phonetics*** by Dr Papori Rani Barooah (Eastern Book House Publishers) 2. ***Strengthening your writing*** -V.R. Nayaranswami (Orient Longman)

Course Name: Computer Fundamentals and Programming (Theory) **L–T–P: Cr**

Course Code: DCSE202 **2–0–0: 04**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Module 1: Computer Fundamentals **Contact hours: 10**

1.1 Brief history
1.2 Block diagram and different components
1.3 Memory & its different types
1.4 I/O devices
1.5 Introduction to Operating System, Types and Role of OS
1.6 Computer languages, translator software, editor.
1.7 Data, different types of data, information and its characteristics
1.8 Introduction to computer network and the Internet

Module 2: Number System and codes **Contact hours: 10**

2.1 Different number systems - decimal, binary, octal, hexadecimal number system
2.2 Number Conversions
2.3 1's and 2's Complement, subtraction using complements.
2.4 Different codes- ASCII, BCD, Ex-3, Gray
2.5 Conversion from Gray to binary and vice-versa
2.6 BCD Addition.

Module 3: Introduction to C programming **Contact hours: 15**

3.1 Fundamentals of programming-Algorithm & Flowchart
3.2 Source code and object code
3.3 Basic structure of C programs
3.4 Executing a C program
3.5 C Tokens, Keywords and Identifier, Constants, Variables, Storage Class and Data types.
3.6 Operators and expression
3.7 Input Output function like printf, scanf, getchar, putchar, gets, puts
3.8 Decision making and branching using IF..Else, Switch
3.9 Looping using for, while, and do-while
3.10 Array

Books / References:

1. Computer Fundamentals Paperback by Priti Sinha Pradeep K.Sinha (Author), BPB Publication
2. Byron Gottfried, "Programming with C", Tata McGraw Hill.
3. Herbert Schildt, "The complete Reference C", TMH
4. Balagurusamy, E. (2019). Programming in ANSI C, 8/e. McGraw-Hill Education.
5. YashwantKanetkar, "Let us C", BPB Publication

6. Henrry Mulish, Herbert L. Cooper, “The Spirit of C: An Introduction to Modern Programming”, Jaico Books.
7. Briain W. Kenigham and Dennis Ritchie, “C Programming language”, Prentice Hall of India.

Course Name: Computer Fundamentals and Programming (Practical) **L–T–P: Cr**

Course Code: DCSE272 **0–0–4: 04**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Module 1: Basic Commands for Computer System **Contact hours: 2**

Module 2: Preparation of Documents **Contact hours: 6**

2.1 Introduction to Word processing: Opening a document, preparing documents, inserting diagrams and tables

2.2 Editing document- (a) Character, word and line editing, (b) Margin Setting, Paragraph alignment, (c) Block Operations, (d) Spell Checker, (e) Saving a document, (f) Mailmerge.

Module 3: Information Presentation through SpreadSheet **Contact hours: 8**

3.1 Application of SpreadSheet

3.2 Structure of spreadsheets

3.3 Preparing table for simple data and numeric operations

3.4 Using formulae and functions in excel operations, Creation of graphs, Pie charts, bar charts.

Module 4: Preparation of presentation **Contact hours: 6**

4.1 Creation of electronic slides on any topic

4.2 Practice of animation effect

4.3 Presentation of slides

Module 5: Programming in C **Contact hours: 10**

5.1 Editing a C program

5.2 Defining variables and assigning values to variables

5.3 Arithmetic and relational operators, arithmetic expressions and their evaluation

5.4 Practice on input/output functions like getchar, putchar, gets, puts, scanf, printf etc.

5.5 Programming exercise on simple if statement, If..else statement, switch statement

5.6 Programming exercise on looping with do-while, while, for loop and array.

Books / References:

1. Foundations of Information Technology Coursebook 9: Windows 7 and MS Office 2007 (With MS Office 2010 Updates)-Sangeeta Panchal, Alka Sabharwal
2. Microsoft Office 2016 Step by Step by Joan Lambert and Curtis Frye
3. Herbert Schildt, “The complete Reference C”, TMH
4. YashwantKanetkar, “Let us C”, BPB Publication
5. Balagurusamy, E. (2019). Programming in ANSI C, 8/e. McGraw-Hill Education.
6. Henrry Mulish, Herbert L. Cooper, “The Spirit of C: An Introduction to Modern Programming”, Jaico Books.
7. Briain W. Kenigham and Dennis Ritchie, “C Programming language”, Prentice Hall of India.

Course Name: Story boarding & Script writing (Theory) **L- T – P: Cr**

Course Code: DAMT201 **1 – 0 – 0: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Story development process, idea and motivation, plot and premise, story structure, formats and genre, synopsis, outline and treatment, scene and sequence, screenplay elements and format, drafting and final script.

Introduction to storyboard, compositing and framing concept,foreground,middle ground and background, basics of cinematography, camera shots and angles, camera movement.

Thumbnails planning and layouts, character model sheet and action chart, expression chart, beat sheet and beat board, scene and shot breakdown, screen direction, flow of action,continuity,language of film,transistion,montage, intercut, hook up, pitching and pacing, storyboard and sound design for animatics,voice track ,final storyboard and animatics.

Course Name: Storyboarding & Scriptwriting (Practical) **L- T – P: Cr**

Course Code: DAMT271 **0 – 0 – 4: 04**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "Writing the Short Film" by Patricia Cooper and Ken Dancyger
- "The Art of layout and storyboarding" by Mark T Bryne
- "Screenplay" by Syed Field

Course Name: Elements of Multimedia (Theory) **L- T – P: Cr**

Course Code: DAMT202 **2 – 0 – 0: 04**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Unit-I: Introduction to Multimedia

Multimedia definition, Multimedia Application, Multimedia System, Characteristics of Multimedia Systems, Components of Multimedia, Multimedia Data. Static and Continuous media, Analog and Digital Signals, Analog to Digital and Digital to Analog Conversion, Data Compression, Compression Algorithms.

Unit-II: Elements of Multimedia

Text, Images, Graphics, Animation, Audio and Video.

Text: Typefaces, Fonts, Cases, Symbols and Icons, Buttons, Text Printing Orientation, HTML, ASCII, Unicode, Hypermedia and Hypertext.

Unit-III: Animation

2D and 3D Animation, Animation in Multimedia, Advantages and Disadvantages of Animation, Interactive Animation, Concept Development and Storyboarding, 2D and 3D Animation Tools, Animation File Formats.

Unit-IV: Images and Graphics

Definition, Colour Perception, Vector and Raster Graphics, Image Depth, Alpha Channel, Basic Colour Theory, Colour Wheel, Colour Characteristics, Dithering, Anti-Aliasing, Resolution, Colour Models, Image and Graphics File Formats, Basic Image Processing, Layers, Filters, Image Manipulation, Colour Printers, Digital Still Cameras.

Unit-V: Audio

Definition of Sound, Basics of Acoustics, Psychoacoustics, Limits of Sound Perception, Types of Audible Sounds, Characteristics of Musical Sound, MIDI, MIDI Files, Synthesis of MIDI Sounds, Digital Audio, Common Audio Editing Tools, Audio File Formats, Microphone, Amplifiers.

Unit-VI: Video

Definition, Video Frames, Frame Rate, Scan Line, Fields, Interlacing and Progressive Videos, Aspect Ratio, TV Broadcast Standards, Vertical and Horizontal Resolution, Types of Video Cameras, Component and Composite Video, Stereoscopic Video, Digitization Basics, Spatial Resolution, Bandwidth, Sampling, Nyquist Theorem, Video Formats. Video Editing Tools.

Unit-VII: Overview of Internet and Virtual Reality

Browsers, Internet Services- URL, Dial-ups, ISDN, E-mail, Chat, Cross-Platform Features, Audio & Video streaming, Internet applications – Audio & Video Conferencing, Internet Telephony, World Wide Web, Computer Networks, Virtual Reality.

Reference Books:

"Multimedia, Making IT Work" – by Tay Vaughan; 9th Edition, Osborne McGraw Hill.
"Multimedia Demystified" – by Jennifer Coleman, Dowling; McGraw Hill.

Course Name: Elements of Multimedia (Practical) **L- T – P: Cr**

Course Code: DAMT272 **0 – 0 – 2: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Book

- Multimedia Systems" – by Buford; Addison Wesley
- "Multimedia Systems" – by Agrawal & Tiwari; Excel

Course Name: 2D Animation Techniques (Theory) **L- T – P: Cr**

Course Code: DAMT203 **1 – 0 – 0: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Introduction to animation history, different mediums and pioneers, early optical illusions concept devices, full and limited style, the 12 principles of Disney, traditional process, bouncing ball animation, adding squash and stretch, pendulum exercise, prop design and bg design. Tools and interface, tween animation, masking, text, bone tool, preset motion, character design, turnaround, line of action and posing, expression chart, character rigging and walk cycle animation. Progressive walk. Run and jump, making a short clip.

Course Name: 2D Animation Techniques (Practical) **L- T – P: Cr**

Course Code: DAMT273 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "The illusion of life" by Frank Thomas and Ollie Johnston
- "Animator Survival Kit" by Richard William
- "Adobe Flash professional CS6 Classroom in a Book" by Adobe Creative Team

SEMESTER - 3

Course Name: Introduction to Digital Modelling (Theory) **L- T – P: Cr**

Course Code: DAMT301 **1 – 0 – 0: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Maya Interface, Control the display of attributes in the Channel Box, Introduction to Polygon Modeling, Concept of NURBS, Combine and Separate, Extract, Fill Hole, Loft Option, Mirror Geometry, Polygons Menu, Normals, Soft Selection, Smooth Mesh, Models for Games and Production, Boolean Operation, Editing NURBS, Creating NURBS curves. Importing and Exporting files, Use Curves in 3D Modeling, Concepts of Sculpting, The Outliner, High Poly Character Model, Low Poly Model, Gaming Models, Inorganic Modeling, Organic Modeling.

Course Name: Introduction to Digital Modelling (Practical) **L- T – P: Cr**

Course Code: DAMT371 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "Getting Started in 3D with Maya: Create a Project from Start to Finish: Model, Texture, Rig, Animate, and Render in Maya" by Adam Watkins
- "Thinking Animation: Bridging the Gap Between 2D and CG" by Angie Jones, Jamie Oliff

Course Name: Basic Concept of Texture Techniques (Theory) **L- T – P: Cr**

Course Code: DMCD302 **1 – 0 – 0: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Adobe Photoshop, Photoshop tool Knowledge, RGB Colour, basic Image Manipulation: Bit map Images, Vector Images, Image size and resolution Settings, Creating Images, Color Concepts, Paint Tools Concept, Layer Basics, Masking, Definition of Textures, Introduction to UV Mapping, , Planar Mapping, Spherical Mapping, Cylindrical Mapping, Automatic Mapping, Matte Painting, Digital Painting, Ramp Shader, Displacement Map, 3D Motion Blur, Still Photography, Paint Effect.

Course Name: Basic Concept of Texture Techniques (Practical) **L- T – P: Cr**

Course Code: DAMT372 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "Getting Started in 3D with Maya: Create a Project from Start to Finish: Model, Texture, Rig, Animate, and Render in Maya" by Adam Watkins
- "Thinking Animation: Bridging the Gap Between 2D and CG" by Angie Jones, Jamie Oliff
- "Advanced Maya Texturing and Lighting" by Lee Lanier

Course Name: Web Designing (Theory) **L- T – P: Cr**

Course Code: DAMT303 **1 – 0 – 0: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

The Internet – concept, types, connections – structure and features of internet – Internet and Intranet, Protocols, Browsers, Search engines, Web structure, Web structure, Web blogs. Internet services—URL, Dial—ups, ISDN, e-mail, chat, cross platform features, audio & video streaming, Internet applications—Audio & video conferencing, Internet telephony, virtual reality, artificial intelligence. Fundamentals of web designing – tools – design techniques – Web site organization – file structure, naming conventions, pages, folders, navigation, hyperlinks and adding sound. Websites – features – portals – content- corporate sites – commercial cites—functions. Content planning – Analysis – Objectives—Content strategies – developing content tactics – defining content matter. Web authoring tools – Adobe Photoshop, Front Page, Dream weaver, Flash, using peripherals for website enhancements. Adobe Dreamweaver—features – tools. Microsoft front page – features – tools

Course Name: Web Designing (Practical) **L- T – P: Cr**

Course Code: DAMT373 **0 – 0 – 4: 04**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "Internet for everyone, Leno et al., Lone Techworld, Chennai 1998"
- "Building a website, Tim Worsley, Orling Kindersely, New Delhi, 2000

Course Name: Digital Photography and Film Making (Theory) **L- T – P: Cr**

Course Code: DAMT304 **1 – 0 – 0: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Introduction to Photography, History of camera, Types of camera, Principles of photography, Rule of Third, Golden Ratio, Aperture, shutter speed, lens, filters and flash, Camera films, What is lighting? Importance of lighting in photography, Lighting equipment and control, Lighting techniques and problems. Origin of Colour, Colour Temperature, White Balance: Process and Need.

History of Cinema, Research-Development of Classical Indian & Hollywood Cinema, Overview of writing for different mediums like, TV, radio, newspaper and other performing art format, Development of Story: Basic elements,

Principles and tools of script writing, Role of language, Introduction of subject, theme, plot, Definition and explanation of story writing, Theory of projection of conflict, presentation of plot, Characterization-case studies with successful writers, Direction: The thought process of director. Film Grammar for Scriptwriting-Interpretation of story, scripts and storyboard to develop an overall vision of production, Working with a script/screenplay,

Production models: Preproduction & post production activities, Directing and analysing a film, Animation film Techniques, An introduction to screen grammar: What is a shot? The various elements of shot-taking: Image Size, Camera Angles, Movements, Lenses, Lighting, Camera Speed, Stocks, Graphics, Colour. The Rule of Thirds & the Golden Points. Depth of Field and Selective Focus. Concept of Sound.

Course Name: Digital Photography and Film Making (Practical) **L- T – P: Cr**

Course Code: DAMT374 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "Film Directing shot by shot: Visualizing from Concept to Screen."bySteve Katz.
- "Cinematography for Directors: A guide for Creative Collaboration" by Jacqueline B Frost
- "Teaching Analysis of Film Language" by David Wharton and Jeremy Grant

Course Name: Concept Art (Practical) **L- T – P: Cr**

Course Code: DAMT375 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Prop Designing,Layout and Planning,Perspective drawings,Background Design-Interior and Exterior,Character Design,Model sheet- turnaround,Expression and Posing,Anthropomorphic character design,Building background story and Concept Art.

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- Character Mentor by Tom Bancroft
- Mastering Fantasy Art: Drawing Dynamic Characters by John Stanko
- The Art of Perspective by PHIL METZGER
- Dream Worlds:Production Design for Animation by Hans P Bacher

SEMESTER - 4

Course Name: 3D Animation (Theory) **L- T – P: Cr**

Course Code: DAMT401 **1 – 0 – 0: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Animation Techniques-Types of Animation Techniques and Principles of Animation. Posing-Pose, Primary function of pose, Line of action, reversing the line of action, Uses of vertical line of action, Flow lines, Proper weight in posing and staging, Silhouette.Keyframe- Keys, Extremes, Breakdowns, in-betweens, Blocking, Graph editor, Cleanup and In-between, Understanding key frames, Non-Linear Animation – Motion Path Animation –Deformers, Motion trail, Turntable

Course Name: 3D Animation (Practical) **L- T – P: Cr**

Course Code: DAMT471 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "Animation Survival Kit" by by Richard Williams
- "Understanding 3D Animation using Maya." by John Edgar Park
- "Tony White's Animator's Notebook" by Tony White
- "Acting for Animators" by Ed Hook

Course Name: Concept of Rigging (Theory) **L- T – P: Cr**

Course Code: DAMT402 **1 – 0 – 0: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Introduction to Rigging-What is rigging and why it is needed, Character rigging in a 3D production.Basic concepts needed for Rigging: pivot, Parenting v/s Grouping, Constraints, types of constraints. Maya Skeletons-Understanding joints, Bone set-up, importing character in Maya, Setting up bones for biped character, managing hierarchies. Kinematics: introduction and overview of IK and FK.

Character set-up-Anatomy study: Study of human skeleton, Starting to rig a character (biped): Setting up the skeleton, rigging the leg and the feet using reverse foot, rigging the hand in IK and FK (IK/FK switch), Deformers.

Course Name: Concept of Rigging (Practical) **L- T – P: Cr**

Course Code: DAMT472 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "Understanding 3D Animation using Maya"by John Edgar Park
- "An Essential Introduction to Maya Character Rigging" by Cheryl Cabrera

Course Name: Introduction to Multimedia Design (Theory) **L- T – P: Cr**

Course Code: DAMT403 **2 – 0 – 0: 04**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Multimedia presentation and authoring, professional development tools, the Stages of a Multimedia Project, Requirements of a Multimedia Project, Building up a Team, Duties of a Project Manager, Multimedia Designer, Interface Designer, Content Writer, Video and Audio Specialist, Multimedia Programmer, Implementing Multimedia with the World Wide Web.

Course Name: Introduction to Multimedia Design (Practical) **L- T – P: Cr**

Course Code: DAMT473 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "Multimedia, Making IT Work" – by Tay Vaughan; Osborne McGraw Hill

Course Name: Art Fundamentals and Graphics design (Theory) **L- T – P: Cr**

Course Code: DAMT404 **2 – 0 – 0: 04**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

The Elements of Art and the Principles of Art.Introduction to elements of graphic design - Text and image, grids and layout, composition, form and function, figure and ground phenomenon.Gestalts laws,

Typographic fonts and their characters. Typographic parameters: x-height, ascenders, descenders, kerning, tracking and leading. Variations of body text, headlines and display text.Hands on practice using application of fundamentals of Graphic Design.

Introduction to Printing Technology. Introduction to Digital Media Technology.

Course Name: Art Fundamentals and Graphics design (Practical) **L- T – P: Cr**

Course Code: DAMT474 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text: A History of Western Art 5th Edition by Laurie Schneider Adams

SEMESTER - 5

Course Name: Lighting in Animation (Theory) **L- T – P: Cr**

Course Code: DAMT501 **1 – 0 – 0: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Basics of Lighting, Color theory, Direct and Indirect Light, Types of Lights in Maya, 3-point Lighting, Light attributes, Shadows, Shadow Maps

Working with Layers, Rendering in Layers, Rendering in passes, Lighting Passes, Depth of Field, Cameras

Basics of Caustics, Mental Ray, Photons, Global Illumination, Raytracing, Final Gather

Basic Lighting Techniques, Indoor and Outdoor lighting Techniques, Special Lighting Techniques, Materials and Rendering Algorithms.

Course Name: Lighting in Animation (Practical) **L- T – P: Cr**

Course Code: DAMT571 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- Digital Lighting and Rendering I, II - by Jeremy Birn.
- Essential CG Lighting Techniques - by Darren Brooker
- Advanced Lighting and Materials with Shaders - by Kelly Dempski and Emmanuel Viale.

Course Name: Compositing & Visual Effects (Theory) **L- T – P: Cr**

Course Code: DAMT502 **1 – 0 – 0: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Introduction to Visual Effects-Understanding Visual Effects, Categories, Types. Exploring Particles-Particle Simulation, Particle Emitters, Particle Rendering.Fluid Mechanics-Understanding Fluids, Building Simulation.Compositing-Understanding Compositing, Physical Compositing, Mattes and Compositing, Digital Matting Methods and tools, Compositing Techniques, Digitally Processing Image and Footages.Green and Blue Screens-Understanding Green/Blue Screen and Composting, Rotoscoping Techniques.

Course Name: Compositing & Visual Effects (Practical) **L- T – P: Cr**

Course Code: DAMT572 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- “The Green Screen Handbook” by Jeff Foster
- “Maya Studio Projects Dynamics” by Toddo Palamar
- “The Visual Effects Arsenal” by Bill Byrne
- “Creative After Effects” by Angie Taylo

Course Name: Introduction to Gaming Theory **L- T – P: Cr**

Course Code: DAMT503 **2 – 1 – 0: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Introduction to Video Games, History of Video Games, Definition of Play, Games as digital media, brainstorming game ideas, introduction to key concepts.Narratology and Ludology, The Classification of games, Game Types, Game Genres, MMOGs, Player Perspectives, Designer Perspectives, Games and Learning.Introduction to Game Analysis, Cheating, Rules and fiction,

Beyond the Rules of the game, Playing with the Rules, Interface and Immersion, Player Experience, Types of players, Hardcore Vs Casual Players, Identity.Gaming platforms, Gaming Hardware, Building a Gaming rig, Fictional Worlds, Games as Simulations, Gaming in Virtual Reality.Game Aesthetics, Criticism and Journalism, Game Culture: Communities, Violence, Nature and Significance of Play as a Cultural Phenomenon, Play and Work.

Text/Reference Books

- "Understanding Video Games: The Essential Introduction – By Jonas Heide Smith, Simon Egenfeldt-Nielsen and Susana Pajares Tosca.
- "The Ultimate History of Video Games" – by Steven Kent
- "The Art of Video Games: From Pac-Man to Mass Effect."
- "The Art of the Video Game" – by Josh Jenisch.

Course Name: CONCEPT OF NEW MEDIA (Theory) **L - T – P: Cr**

Course Code: DAMT504 **2 – 0 – 0: 04**

Full Marks: 100 **Theory: 28/70** **Sessional: 15/30**

DESCRIPTION: To match with today's digital world, this course is introduced to students to give them the knowledge and understanding of how New Media evolved with the evolution of technology. Students will learn about the fundamental principles, history and various applications of New Media in this course.

OBJECTIVE: The objective of this course is to teach students the theoretical part of New Media including history to understand the subject, as well as studio exercise on application of New Media through –

- Installation art – by using different forms of new media
- Digital media exploration
- TV, cinema as modern era communication media etc.

Course Content:

UNIT 1: Introduction to New Media

- Evolution of New Media - History to modern era
- Technology in New Media
- New Media culture – conventions and technique of old media

UNIT 2: Principles of New Media

- Discrete representation
- Numerical representation
- Automation
- Variability

UNIT 3: Concept of New Media

- Changing relationship of representation.
- Database as genre of new media.
- Logic of remediation.

- Concept of digital dialectic.
- Digital Cinema and the history of moving Image.
- The new language of cinema.

UNIT 4: Forms of New Media

- Installations - Sound art, Net art.
- Free software movement and open source.
- New media art installation and cross-media practice.
- Interactivity and interface: Models of interactive systems.

STUDIO EXERCISE

Students will be taught to understand the basic concept of New Media and how it is being used in different areas. Also students will have to perform small projects using New Media forms and different types of installations.

Text books / Reference books:

1. R. Grusin and J. D. Bolter, *Remediation: Understanding New Media,* MIT Press, 2000.
2. L. Manovich, *The Language of New Media*, MIT Press, 2001.
3. P. Lunenfeld (ed.), *The Digital Dialectic: New Essays on New Media*, MIT Press, 1999.
4. N. Wardrip-Fruin and N. Montfort (eds.), *The New Media Reader,* MIT Press, 2003.

Course Name: Minor Project		**L – T – P:Cr**
Course Code: DAMT595		**0 – 0 – 10: 10**
Full Marks: 100	**Practical: 25/50**	**Sessional: 25/50**

Students will be given a small project which may be a short movie, animated or live, graphic design based project, other technical skill based project. etc. in proper pipeline, which will be executed under specific guide/mentor. The final output should reflect all production stages in details .The final output along with proper documentation and presentation should be submitted in complete form.

SUBMISSION:

- Project Report Documents
- Video of Documentary/Short Movie
- Final presentation

SEMESTER - 6

Course Name: **Industrial Management and Entrepreneurship** **L- T – P: Cr**

Course Code: DHSS601 **3 – 1 – 0: 08**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Meaning and concept of Management, Principles and functions of Management, Labour turnover, Payment of wages – factors determining the wage, Methods of payment of wages.Leadership and Decision Making, qualities and styles of Leadership, decision making process.

Elements of costs, Analysis and classification of expenditure for cost accounts, preparation of cost sheet, Marginal costing and Break Even Analysis.

Factories Act -1948, Definitions, Main Provisions regarding Health, Safety and welfare of workers.

Industrial Dispute Act – 1947, Definitions, Preventive measure, Machinery for settlement of Industrial Dispute in India.

Trade Union Act - Meaning and function of Trade Union.

Meaning and function of Entrepreneurship

Forms of Business organization: Sole Trader, Main features, merits and demerits, Partnership – main features, merits and demerits. Joint stock company – main features, difference between private and public limited companies. Introduction to co-operative and public undertaking.

Small scale industries: Definitions, scope with reference to self-employment, procedure to start small scale industries, Sources of finance - Bank, Government and Financial institutions etc. Selection of site for factories, Industrial Estate, Growth Centre, Ancillary Industries.

System of Distribution – Wholesale and Retail Trade.

References:

- General Principle and Practice of Management – L M Prasad
- Management Concepts and Practice – Kanchan Bhatia and Shweta Mittal
- Micro Economics – Sandeep Garg
- Self-Employment through Entrepreneurship – J.C. Kalita
- Entrepreneurship Development & Small Business Management – Dr. BhawnaBhatnagar and AnkurBudhiraja.
- Labour and Industrial Law of India – S.K. Misra
- Industrial Safety and Health for Administrative Services---Charles D. Reese

Course Name: Audio Video Editing (Theory) **L- T – P: Cr**

Course Code: DAMT601 **1 – 1 – 0: 04**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Introduction to Audio Editing, MIDI, Digital Audio, Firewire -Types of Wires and the peripherals, Voice-over recording, , Filters, Codecs.Introduction to Digital Video and Video Editing, Principles of editing, Introduction to Video Editing Tool; Adobe Premier, Final Cut Pro.Linear and Non-linear Editing, on-line and off-line editing, In-Camera Editing,Timeline, Three Point Edit, Transitions, Video Formats and Broadcast systems, Continuity, Cut in, Cut away, Jump cut, time remap, Rule of 180 Degree, Rule of 30 Degree.Framing effective shots--Field of View, Headroom, Noseroom and Lead room, Types of Camera, Lens, Camera angles, shots, movements, Image Formats - sizes, Single and Multi-camera shoots.

Course Name: Audio Video Editing (Practical) **L- T – P: Cr**

Course Code: DAMT671 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- Audio Production Work text; *Concept, Technique and Equipment 6th Edition By David E. Rose, Lynne S. Gross, Brain Bross*
- Grammar of the Edit, *Author; Roy Thompson, Christopher J. Bowen*
- Grammar of the Shot, *Author;Roy Thompson, Christopher J. Bowen*

Course Name: Major Project **L- T – P: Cr**

Course Code: DAMT695 **0 – 0 –12: 12**

Full Marks: 200 **Practical: 40/100** **Sessional: 40/100**

Students will have to do a major project with a guide who has specialized in the area the students have chosen to pursue. The major project would serve as their Show Reel or Demo Reel, which in turn would enable the student to apply for a position in any Animation/Multimedia industry after they have passed out.

SUBMISSION:

- Project Report Documentation with Final Presentation
- Video Show Reel/Demo Reel (1-3 min duration)

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Central Institute of Technology Kokrajhar

Deemed to be University, MHRD, Govt. of India

Kokrajhar, BTR, Assam

DIPLOMA SYLLABUS OF

ANIMATION & MUTIMEDIA TECHNOLOGY (AMT)

(To be applicable for the batches of 2019 and 2020 till July 2021)

Department of Multimedia Communication and Design

Module: Diploma	**Branch: AMT**	**Year: 1st Year**	**Semester: 1st Sem**
Course Code	**Name of Course**	**L-T-P**	**Credit**
DHSS101	Communication Skills-I	3-0-0	6
DCH101	Chemistry-I (Theory)	2-1-0	6
DPH101	Applied Physics-I (Theory)	2-1-0	6
DMA101	Mathematics-I	3-1-0	8
DAMT101	Fundamentals of Computer Application (Theory)	2-0-0	4
DAMT102	Foundation of Animation (Theory)	1-1-0	4
DCH171	Chemistry-I (Practical)	0-0-2	2
DPH171	Applied Physics-I (Practical)	0-0-2	2
DAMT171	Fundamentals of Computer Application(Practical)	0-0-2	2
DAMT172	Foundation of Animation(Practical)	0 0-6	6
		Contact Hours 29	**46**
Module: Diploma	**Branch: AMT**	**Year: 1st Year**	**Semester: 2nd Sem**
Course Code	**Name of Course**	**L-T-P**	**Credit**
DHSS201	Communication Skills-II	3-0-0	6
DAMT201	Story boarding & Script writing(Theory)	1-0-0	2
DAMT202	Elements of Multimedia(Theory)	2-0-0	4
DAMT203	2D Animation Techniques(Theory)	1-0-0	2
DAMT204	Art Fundamentals and Graphics Design(Theory)	2-0-0	4
DAMT271	Story boarding & Script writing(Practical)	0-0-4	4
DAMT272	Elements of Multimedia (Practical)	0-0-2	2
DAMT273	2D Animation Techniques(Practical)	0-0-6	6
DAMT274	Art Fundamentals and Graphics Design(Theory)	0-0-6	6
		Contact Hours 23	**36**
Module: Diploma	**Branch: AMT**	**Year: 2nd Year**	**Semester: 3rd Sem**
Course Code	**Name of Course**	**L-T-P**	**Credit**
DAMT301	Introduction to Digital Modeling (Theory)	1-0-0	2
DAMT302	Basic Concept of Texturing Techniques (Theory)	1-0-0	2
DAMT303	Web Designing (Theory)	1-0-0	2
DAMT304	Digital Photography and Film Making (Theory)	1-0-0	2
DAMT371	Introduction to Digital Modeling (Practical)	0-0-6	6
DAMT372	Basic Concept of Texturing Techniques (Practical)	0-0-6	6
DAMT373	Web Designing (Practical)	0-0-4	4
DAMT374	Digital Photography and Film Making (Practical)	0-0-6	6
DAMT375	Concept Art (Practical)	0-0-6	6
		Contact Hours 32	**36**
Module: Diploma	**Branch: AMT**	**Year: 3rd Year**	**Semester: 4th Sem**

Course Code	Name of Course	L-T-P	Credit
DAMT401	3D Animation (Theory)	1-0-0	2
DAMT402	Concept of Rigging(Theory)	1-0-0	2
DAMT403	Introduction to Multimedia Design(Theory)	2-0-0	4
DAI406	Computer Programming with C/C++	3-0-0	6
DAMT471	3D Animation (Practical)	0-0-6	6
DAMT472	Concept of Rigging(Practical)	0-0-6	6
DAMT473	Introduction to Multimedia Design(Practical)	0-0-6	6
DAI476	Computer Programming with C/C++	0-0-4	4
		Contact Hours 30	**36**

Module: Diploma	**Branch: AMT**	**Year: 3rd Year**	**Semester: 5th Sem**
Course Code	**Name of Course**	**L-T-P**	**Credit**
DAMT501	Lighting in Animation (Theory)	1-0-0	2
DAMT502	Compositing & Visual Effects(Theory)	1-0-0	2
DAMT503	Introduction to Gaming Theory (Theory)	2-1-0	6
DAMT504	Concept of New Media (Theory)	2-0-0	4
DAMT571	Lighting in Animation (Practical)	0-0-6	6
DAMT572	Compositing & Visual Effects(Practical)	0-0-6	6
DAMT595	Minor Project	0-0-10	10
		Contact Hours 29	**36**
Module: Diploma	**Branch: AMT**	**Year: 3rd Year**	**Semester: 6th Sem**
Course Code	**Name of Course**	**L-T-P**	**Credit**
DHSS601	Industrial Management and Entrepreneurship	3-1-0	8
DAMT601	Audio Video Editing (Theory)	1-1-0	4
DAMT671	Audio Video Editing (Practical)	0-0-6	6
DAMT695	Major Project	0-0-12	12
		Contact Hours 24	**30**
		Total Credits	**220**

***Students will present/exhibit a Compilation of all their work done at the end of each semester.**

Consolidated statement of total credits in each semester

Semester	L	T	P/S	Credit
1	13	4	12	46
2	9	0	18	36
3	4	0	28	36
4	7	0	22	36
5	6	1	22	36
6	4	2	18	30
Total	42	7	118	220

As per CIT Academic Ordinance:

1 h Lecture (L) per week	2 credit
1 h Tutorial (T) per week	2 credit
1 h Studio Project	2 credit
1 h Practical (P) per week	1 credit
1 h Project Work	1 credit
1 h Seminar / Training / Industrial Training	1 credit

SEMESTER - 1

1. Course Title: COMMUNICATION IN ENGLISH-I

2. Course Code: DHSS101 (L-3, T-0, P-0, C-6)

3. Aim of the course:

The general aim of a course in English language and communication is aimed at the three domains of learning: knowledge, skills and attitudes. In keeping up with this aim, it is attempted to develop all the four skills of language learning in the learner – listening, speaking, reading and writing and also to enable the students to use the grammar of the English language correctly. Since, all these four skills are interrelated to each other, this course is aimed at achieving language proficiency in all the four skills so that at the end of the course the student is a confident user of the General Indian English (GIE), with the added knowledge of the other variants as British English and American English. This, it is attempted to achieve, by building a carefree, tension free classroom atmosphere in which the language classes incorporate activities related to these four skills. It is aimed that at the end of the course, the student can relate to the English language as a language of communication and conduct of everyday affairs.

4. Course outcome:

On completion of the course on Communication in English-I, student will be able to

- CO1 = Comprehend basic sentences in English.
- CO2 = Construct grammatically correct sentences in English.
- CO3 = Use grammatically correct English sentences in everyday situations.
- CO4 = Use varied English vocabulary in everyday situations confidently.
- CO5 = Conduct themselves orally using simple English.

Chapter no.	Chapter Title	Content / area of focus	Intended Learning Outcome	Duration in hours
1.	Parts of Speech	1.1 Recognition and review of Nouns, Pronouns, Verbs, Adverbs, Adjectives, Prepositions, Conjunctions, Interjections 1.2 Knowledge of Subject, Object and Compliment of the Verb 1.3 Verbals –Infinitival, Gerund and Preposition	1. Explain the different parts of speech. 2. Describe the various parts of sentence.	3
2.	Prepositions of time and place	2.1 Contextual teaching of prepositions of time - on, in , at, since, for, ago, before, to, past, to, from, till/until, by	1. Explain prepositions of time and place.	5

		2.2 prepositions of place: in, at, on, by, next to, beside, near, between, behind, in front of, under, below, over, above, across, through, to, into, towards, onto, from		
3.	Clause, phrases and Relative Clauses	3.1 Basic definitions of clauses and phrases 3.2 Focus on Relative Pronouns and their use in sentences as relative clauses	1. Describe the various types of clauses and phrases with special reference to relative clauses.	2
4.	Subject Verb Agreement	4.1 Rules that guide the agreement of the subject to its verb	1. Explain subject verb agreement.	5
5.	Sentence types and Transformation of sentences	5.1 Assertive sentences, Exclamatory sentences, Interrogative sentences, Negative sentences, Compound sentences, complex sentences, simple sentences, Degrees of Comparison	1. Describe the various types of sentences and their transformations.	5
6.	Voice	6.1 Change from Active Voice to Passive Voice and vice versa	1. Describe Voice.	3
7.	Punctuation	7.1 Use of the comma, semi-colon, colon, apostrophe, exclamation mark, question mark and quotation marks	1. Explain punctuation in different situations and sentences.	5
8.	Word formation	8.1 Change of one part of speech to the other: from Verbs to Nouns, Nouns to Verbs, Adjectives to Nouns, Nouns to Adjectives, Verbs to adverbs, and Adverbs to Verbs	1. Explain the conversion of one part of speech to the other.	2
9.	Affixation	9.1 Prefixes and Suffixes and new word formations	1. Explain the use of various Affixes and the change of meaning with it.	2
10.	Nominal Compounds	10.1 Common nominal compound	1. Describe how different nouns can come together to form a new word.	2
11	Paragraph Writing	11.1 Descriptive Paragraph on various related topics.	1. Describe how to write coherent paragraphs in related words.	5

BOOKS RECOMMENDED:

1. ***Essential English Grammar with Answers*** by Raymond Murphy (Cambridge University Press)
2. ***English for Polytechnics*** **by Dr Papori Rani Barooah (Eastern Book House Publishers)**
3. ***English Grammar*** **by Annie Brinda (Cambridge University Press)**

Course Name: MATHEMATICS – I **L- T – P: Cr**
Course Code: DMA101 **3 – 1 – 0: 08**

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1. ALGEBRA (18 HOURS)

- Vector and Scalar quantities – types of vectors, geometric representation of vectors, addition and subtraction of vectors, magnitude of a vector, product of a vector by a scalar, unit vectors i, j, k.
- Arithmetic and geometric progressions – nth term of A.P. and G.P., Geometric mean between two numbers.
- Complex numbers – origin, general form, polar form, examples
- Binomial theorem – Factorials, positive integral values, binomial expansion, rules, calculation of appropriate value.
  Logarithm and exponential series.
- Determinants: Definition, operations and Cramer's rule for solving simultaneous linear equations.
- Basic concepts of permutation and Combinations.

2. TRIGONOMETRY (10 HOURS)

- Trigonometric functions and ratios.
- Trigonometric functions of allied angles – half, double, triple, compound angles.
- Addition and subtraction formulae.
- Solution of triangles using properties.
- Simplification of trigonometric expressions using different formulae.
- Basic concept of inverse trigonometric functions and hyperbolic functions.

3. CO-ORDINATE GEOMETRY (12 HOURS)

- Co-ordinate Systems, Cartesian and polar co-ordinates, distance between two points, section formula, area of triangle, collinearly and co-planarity.
- Straight Line: Definition, general and standard form of equations, intersection of straight lines: angle between them, bisector of angle between them.
- Change of co-ordinate axes, shifting of origin and rotation of axes.
- Circle: Standard equations and simple problems, tangent and normal.
- Basic idea of parabola, ellipse and hyperbola, their standard equations and basic properties.

Reference Books:

Sl No	Title	Author/ Publisher
1	Mathematics for Polytechniques: Vol – I&II	TTTI, Bhopal
2	Mathematics for Polytechniques	S.P. Deshpande
3	Engineering Mathematics	I.B. Prasad
4	Engineering Mathematics	Grewal
5	Plain Trigonometry	Bansilal
6	College Algebra	Shah and Desai
7	Mathematics Textbook for class XI and XII	NCERT

Course Name: Chemistry-1 (THEORY) **L- T – P: Cr**

Course Code: DCH101 **2 – 1 – 0: 06**

Unit I:Kinetic theory of gases (6L)
Postulates of kinetic theory, Pressure volume correlations, Numerical problems, Liquefaction of gases – Thomson effect, Claude's Method and Linde's Method.
Unit II: Electrochemistry (6L)
Electrolytes, Faraday's law of electrolysis, Numerical problems, application of electrolysis, oxidation and reductions, Redox reactions.
Unit III: States of Matter(6L)
Solid, liquid, gas. Boyle's law, Charles's Law, Avogadro's law, Ideal gas equations, numerical problems.
Unit IV: Periodic table, Atomic structure(6L)
Electrons, protons, neutron, Atomic mass (A), atomic number (Z) isotopes, isobars, isotone, orbit and orbitals, electronic configuration (upto Z=40), Modern periodic table, groups and periods.
Unit V: Organic chemistry-I (6L)
IUPAC nomenclature, Alkane, alkene, alkyne, alcohol synthesis and applications.
Unit VI: Biochemistry(4L)
Carbohydrates, lipids, amino acids, proteins, Nucleic acid--- DNA and RNA, Vitamins and hormones --- sources and application.
Unit VII: Environmental Chemistry (6L)
Defination, Types of pollution, pollutants, Water quality measurements- D.O, B.O.D, C.O.D, hardness, TDS, Green house effect, acid rain, Ozone layer depletion.

Course Title: Chemistry-1 (PRACTICAL) **L T P : Cr**
Course code: DCH171 **0 - 0 - 2 : 2**

Experiment-1: Aim of the experiment: Introduction to chemistry laboratory, precautions, name of common chemicals, apparatus, instruments etc.
Experiment-2: Aim of the experiment: Volumetric analysis and study of apparatus used therein.
Experiment-3: Aim of the experiment: Determine the degree of temporary hardness of water by EDTA titration.
Experiment-4: Aim of the experiment: Determination of solubility of a solid at room temperature.
Experiment-5: Aim of the experiment: To verify the first law of electrolysis (electrolysis of copper sulphate solution using copper electrode).

Experiment-6: Aim of the experiment: Determination of pH of unknown solutions.

Text/Reference Books:
1. Chemistry in Engineering by J.C. Kuriacose and J. Rajaram; Tata McGraw-Hill Publishing Company Limited, New Delhi
2. Engineering Chemistry by Dr. S. Rabindra and Prof. B.K. Mishra ; Kumar and Kumar Publishers (P) Ltd. Bangalore-40
3. A Text Book of Applied Chemistry-I by SS Kumar; Tata McGraw Hill, Delhi
4. Progressive Applied Chemistry –I and II by Dr. G.H. Hugar; Eagle Prakashan.

Course Title: Applied Physics I (Theory) **L T P: Cr**
Course code: DPH101 **2 – 1- 0 : 6**

Category: Basic Science Course

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1. UNITS & DIMENSION (2 L)
1.1. Need of measurement and Unit in Engineering and Science, definition of unit, fundamental and derived quantities and their units, different system of units (CGS and SI), Illustrations.
1.2 Explanation of dimensions of physical quantities, dimensional equations of physical quantities and their uses with examples.
2 BASIC MECHANICS (12 L)
2.1 Introduction to scalar and vector quantities, representation of vector, addition, subtraction and multiplication of vectors, parallelogram law of vector addition,

resolution of vector, dot and scalar product of two vectors (details not required).

2.2 Newton's laws of motion: First law, explanation, definition of force, Concept of Inertia, types of inertia (inertia of rest and inertia of motion), Newton's second law,

momentum, impulse, mass & weight, simple problems, Third law, explanation and its examples, Principle of conservation of linear momentum, statement and simple examples.(e.g. recoil of a gun), numerical problems.
2.3 Circular motion, time period and angular velocity, relation between angular velocity and linear velocity, centripetal and centrifugal force, bending of a cyclist on a curved path, banking of roads and railway track , numerical problems.

2.4 Work, power and energy, its concept, units and dimension, Potential and Kinetic energy, its mathematical relations, Principle of conservation of energy, its proof in case of a free falling body under gravity, numerical problems.

2.5 Simple Harmonic Motion, its geometrical representations and 1derivation of its equations, definition of amplitude, time period, frequency, phase etc., mathematical relations and units, simple pendulum & second's pendulum, numerical problems.

3. GRAVITY AND GRAVITATION (3 L)

3.1 Newton's law of gravitation, acceleration due to gravity, relation between 'G' and 'g', their units, variation of the value of g with altitude and depth, Centre of gravity and Centre of mass, Numerical problems

4 ELASTIC PROPERTIES OF SOLID (3 L)

4.1 Deforming force, restoring force, Elastic and plastic bodies , explanation of stress and strain with their types, Hook's law, elastic limit , Young's modulus, Bulk modulus, Rigidity modulus, Poisson's ratio, their units and numerical problems.

5 HEAT & THERMODYNAMICS (10 L)

5.1 Concept of heat and temperature, thermometer, different scales of temperatures and their conversion formulae, numerical problems.

5.2 Thermal expansion: expansion of Solid, linear, superficial and cubical expansion of solid, their coefficients & their relations; Expansion of liquid: co-efficient of Real and Apparent expansion, their relation, variation of density with temperature, Anomalous expansion of water (experimental determination not necessary). Concept of Absolute scale of temperature.

5.3 Calorimetry: Unit of heat, Joule and calorie, Specific heat, thermal capacity and water equivalent.

5.4 Change of state of a body, melting and freezing point, effect of pressure on melting

point, latent heat, Evaporation, difference between vaporisation and evaporation, factors on which rate of evaporation depends.

5.5 Transmission of heat, three modes of heat transfer, conduction, convection and Radiation, good and bad conductor of heat, coefficient of thermal conductivity, its S.I. unit and dimension.

5.6 1st law and 2nd law of thermodynamics, Joule's law and Mechanical equivalent of heat.

6 SOUND (6 L)

6.1 Wave Motion: amplitude, time period, frequency and wavelength, relation between velocity, frequency and wavelength. Transverse and longitudinal waves with examples.

6.2 Propagation of sound wave: Expression of velocity of sound in air, Newton's formula and Laplace's correction, Effect of temperature, and pressure on velocity of sound.

6.3 Audible range, ultrasonic and infrasonic sound, application of ultrasonic sound to calculate the depth of ocean.

6.4 Reflection of sound and its application, Echo and reverberation of sound, acoustic of building

6.5 Doppler's effect with Mathematical expression .

Suggested Reference books.

1. Modern Approach to Physics Part I & II, Dilip Sarma, N G Chakraborty,and K N Sharma, Kalyani Publisher, New Delhi.

2. Applied Physics Part I & II, Manpreet Singh, Dr. Major Singh, and Mrs. Hitashi Gupta, S K Kataria & Sons- New Delhi.

3. Basic Applied Physics, R K Gaur, Dhanpat Rai Publication- New Delhi.

Course Title: Applied Physics I (Practical) **L T P: Cr**
Course code: DPH171 **0 - 0 -2 : 2**

Category: Basic Science Course

1. Vernier Calipers: To determine the volume of a metallic/wooden cube.
2. Screw Gauge : to determine cross sectional area of a wire/ thickness of a glass piece.
3. Spherometer: To determine the radius of curvature of concave and convex mirrors.
4. To determine the value of acceleration due to gravity (g) of a place with simple pendulum.
5. To measure the velocity of sound in resonance tube.
6. To determine the frequency of a tuning fork using a Sonometer.
7. Measurement of Specific gravity of solid, liquid, using Nicolson hydrometer, Hare's apparatus and specific gravity bottles.
8. To determine the atmospheric pressure by using Boyle's law apparatus.
9. To determine water equivalent of a calorimeter by method of mixture.

Course Name: Fundamentals of Computer Application (Theory) **L- T – P: Cr**

Course Code: DAMT101 **2 – 0 – 0: 04**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Computer Fundamentals -
Brief history – Babbage machine, Von Neumann. Architecture – Block diagrams, Role of Operating Systems, concept of language and language translators, editors. Memory – different types, functions, concept of I/O devices.
Number System-
Number system and codes: Decimal, binary, octal, hexadecimal number systems and conversion from one system to another, arithmetic operations using these numbers. Representation of a negative number in the different number systems. Complement and complement subtraction. Different codes: ASCII, 8421, Ex-3, 2421, gray, Alpha-numeric, BCD, Seven segment codes etc. and code conversion.
Introduction to Operating System-
Concept of resource management, single user and multi user OS, Various popular OS (DOS, Windows, Unix/ Linux), elementary commands.
Introduction to Internet-
Fundamentals of networking – need of network topology, concept of LAN, WAN, MAN, network devices – NIC, hub, bridge, switch, repeaters, gateway, modem, transmission media. Internet services, concept of global net, different browsers, search engine.
MS – Office- Various products, their introduction and uses.

Course Name: Fundamentals of Computer Application (Practical) **L- T – P: Cr**

Course Code: DAMT171 **0 – 0 – 2: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books:

1. DOS quick reference: RajibMathur
2. Learning Word for Windows : RajibMathur
3. Learning Windows step by step: RajibMathur
4. Microsoft office unleashed: Techmedia
5. ABC of Office: Han
6. Mastering Excel: Chester
7. Excel 97 Bible: John Walkenbach
8. Teach yourself MS Access in 24 hours: Eddy and Buchanan
9. Microsoft Access 2000 fast and easy: Primatech BBP
10. Unix: S. Das

Course Name: Foundation of Animation (Theory) **L- T – P: Cr**

Course Code: DAMT102 **1 – 1 – 0: 04**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Different Types of Animation, Introduction to Pre-Production, Scripting, Storyboarding, Layout, Character Designing, Props Designing, Background Designing, Camera Angles, Frame Lengths, Voice recording, Introduction to 2D Animation. Introduction to Production, Introduction to 3D animation, Modeling, Texturing, Rigging, Animation. Lighting, Dynamics, VFX, Introduction to Post-Production, Compositing, Rendering, Tools of the trade. Scope of Animation, Various positions in the Animation Industry,

Rapid sketching, Drawings with the help of basic shapes, Animal study, Human anatomy, Shading techniques, Live model study, Head study, hand and feets, full figure study. Gesture drawing.

Posing for Animation.Shapes and forms, About 2d and 3d drawings, Caricaturing – fundamentals, Exaggeration, Attitude, Silhouettes, Boundary- breaking exercises and warm ups, gesture drawing, Line drawing and quick sketches, Drawing from observation, memory and imagination.12 animation principles.

Course Name: Foundation of Animation (Practical) **L- T – P: Cr**

Course Code: DAMT172 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "Beginner's Guide to Animation" – by Mark Murphy; Watson-Guptill Publication

- "Producing Animation" – by Catherine Winder & Zahra Dowlatabadi; Focal Press
- "Drawn to Life: 20 Golden Years of Disney Master Classes: Volume 1" – by Walt Stanchfield;
- Focal Press
- "Successful drawing " by Andrew Loomis
- "Constructive Anatomy" by George Bridgman

SEMESTER - 2

Course Name: Communication Skill-II **L- T – P: Cr**

Course Code: DHSS201 **3 – 0 – 0: 06**

Aim of the course:

The general aim of a course in English language and communication is aimed at the three domains of learning: knowledge, skills and attitudes. In keeping up with this aim, it is attempted to develop all the four skills of language learning in the learner – listening, speaking, reading and writing and also to enable the students to use the grammar of the English language correctly. Since, all these four skills are interrelated to each other, this course is aimed at achieving language proficiency in all the four skills so that at the end of the course the student is a confident user of the General Indian English (GIE), with the added knowledge of the other variants as British English and American English. This, it is attempted to achieve, by building a carefree, tension free classroom atmosphere in which the language classes incorporate activities related to these four skills. It is aimed that at the end of the course, the student can relate to the English language as a language of communication and conduct of everyday affairs.

Course outcome:

On completion of the course on Communication in English-II, student will be able to

- CO1 = Comprehend meaning of a passage in English.
- CO2 = Arrive at the gist of a passage and also write the gist in one's own words.
- CO3 = Understand the differences between general English and official English.
- CO4 = Face an interview with confidence and fluency and a positive attitude.

Chapter no.	**Chapter Title**	**Content / area of focus**	**Intended Learning Outcome**	**Duration in hours**
1.	Letter Writing	1.1 Formal letter formats, greetings, salutation, body of the letter,	1. Explain how to write different types of formal letters	5

		practice of letter writing in different situations: Order letter, Complaint letter, Letter of Adjustment, Quotation letter , Letter to the Editor, Application for leave of absence		
2.	Job Application and Cover Letter, Resume, Curriculum Vitae, bio data	2.1 Format of a job application, Cover Letter, formats of Resume and CV for a fresher and for someone with experience, Differences between Resume, CV, Bio-data, and choice of referees	1. Explain how to write Job Applications, Cover Letter, Resume, Curriculum Vitae, bio data	5
3.	Paragraph Writing	3.1 Definition, Cohesion and Linkage using Transition words on everyday topics	1. Describe how to compose coherent passages.	3
4.	Summary writing	4.1 Definition, Use of Transition words, important points to remember while summarizing	1. Explain how to arrive at a summary of a paragraph / text.	2

5.	Reading Comprehension	5.1 Developing the comprehension skill of the students and the ability to reproduce grammatically and semantically correct English sentences	1. Describe how to comprehend passages for understanding.	2
6.	Memo Writing	6.1 Definition and format	1. Explain how to write a formal Memo.	2
7.	Amplification	7.1 Definition and format	1. Explain how to write a formal memo	2
8.	Report writing	8.1 Definition, types of reports with a focus on annual report, non-profit annual report, technical and academic report, necessity and purpose of writing a report, qualities of a good report, language used in a report, different formats of reports and sample reports	8.1 Definition, types of reports with a focus on annual report, non-profit annual report, technical and academic report, necessity and purpose of writing a report, qualities of a good report, language used in a report, different formats of reports and sample reports	2
9.	E- mail writing	9.1 writing the perfect e-mail, steps to the perfect e-mail, formal and informal	1. Explain how to write formal and informal emails.	2

		greetings, requests through an e-mail, writing an apology, complaint and seeking help and information in an e-mail, informing about a file attached in in an email, writing the formal ending of an e-mail		
10.	Facing an interview and dress code	10.1 How to approach, what to speak, how to speak in an interview and answer interview questions, the business etiquettes to maintain, body language , negative body language, handling an awkward situation in an interview, the perfect handshake, points to remember while applying for a job	1. Discuss how to face an interview for success.	3
11.	British English and American English	10.1 Difference between American and British English words – vocabulary and spelling	1. Distinguish between British English and American English.	2

BOOKS RECOMMENDED:
1. ***Student's handbook of Written English and Phonetics*** by Dr Papori Rani Barooah (Eastern Book House Publishers) 2. ***Strengthening your writing*** -V.R. Nayaranswami (Orient Longman)

Course Name: Computer Fundamentals and Programming (Theory) **L–T–P: Cr**

Course Code: DCSE202 **2–0–0: 04**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Module 1: Computer Fundamentals **Contact hours: 10**

1.1 Brief history
1.2 Block diagram and different components
1.3 Memory & its different types
1.4 I/O devices
1.5 Introduction to Operating System, Types and Role of OS
1.6 Computer languages, translator software, editor.
1.7 Data, different types of data, information and its characteristics
1.8 Introduction to computer network and the Internet

Module 2: Number System and codes **Contact hours: 10**

2.1 Different number systems - decimal, binary, octal, hexadecimal number system
2.2 Number Conversions
2.3 1's and 2's Complement, subtraction using complements.
2.4 Different codes- ASCII, BCD, Ex-3, Gray
2.5 Conversion from Gray to binary and vice-versa
2.6 BCD Addition.

Module 3: Introduction to C programming **Contact hours: 15**

3.1 Fundamentals of programming-Algorithm & Flowchart
3.2 Source code and object code
3.3 Basic structure of C programs
3.4 Executing a C program
3.5 C Tokens, Keywords and Identifier, Constants, Variables, Storage Class and Data types.
3.6 Operators and expression
3.7 Input Output function like printf, scanf, getchar, putchar, gets, puts
3.8 Decision making and branching using IF..Else, Switch
3.9 Looping using for, while, and do-while
3.10 Array

Books / References:

1. Computer Fundamentals Paperback by Priti Sinha Pradeep K.Sinha (Author), BPB Publication
2. Byron Gottfried, "Programming with C", Tata McGraw Hill.
3. Herbert Schildt, "The complete Reference C", TMH
4. Balagurusamy, E. (2019). Programming in ANSI C, 8/e. McGraw-Hill Education.
5. YashwantKanetkar, "Let us C", BPB Publication

6. Henrry Mulish, Herbert L. Cooper, “The Spirit of C: An Introduction to Modern Programming”, Jaico Books.
7. Briain W. Kenigham and Dennis Ritchie, “C Programming language”, Prentice Hall of India.

Course Name: Computer Fundamentals and Programming (Practical) **L–T–P: Cr**

Course Code: DCSE272 **0–0–4: 04**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Module 1: Basic Commands for Computer System **Contact hours: 2**

Module 2: Preparation of Documents **Contact hours: 6**

2.1 Introduction to Word processing: Opening a document, preparing documents, inserting diagrams and tables

2.2 Editing document- (a) Character, word and line editing, (b) Margin Setting, Paragraph alignment, (c) Block Operations, (d) Spell Checker, (e) Saving a document, (f) Mailmerge.

Module 3: Information Presentation through SpreadSheet **Contact hours: 8**

3.1 Application of SpreadSheet

3.2 Structure of spreadsheets

3.3 Preparing table for simple data and numeric operations

3.4 Using formulae and functions in excel operations, Creation of graphs, Pie charts, bar charts.

Module 4: Preparation of presentation **Contact hours: 6**

4.1 Creation of electronic slides on any topic

4.2 Practice of animation effect

4.3 Presentation of slides

Module 5: Programming in C **Contact hours: 10**

5.1 Editing a C program

5.2 Defining variables and assigning values to variables

5.3 Arithmetic and relational operators, arithmetic expressions and their evaluation

5.4 Practice on input/output functions like getchar, putchar, gets, puts, scanf, printf etc.

5.5 Programming exercise on simple if statement, If..else statement, switch statement

5.6 Programming exercise on looping with do-while, while, for loop and array.

Books / References:

1. Foundations of Information Technology Coursebook 9: Windows 7 and MS Office 2007 (With MS Office 2010 Updates)-Sangeeta Panchal, Alka Sabharwal
2. Microsoft Office 2016 Step by Step by Joan Lambert and Curtis Frye
3. Herbert Schildt, “The complete Reference C”, TMH
4. YashwantKanetkar, “Let us C”, BPB Publication
5. Balagurusamy, E. (2019). Programming in ANSI C, 8/e. McGraw-Hill Education.
6. Henrry Mulish, Herbert L. Cooper, “The Spirit of C: An Introduction to Modern Programming”, Jaico Books.
7. Briain W. Kenigham and Dennis Ritchie, “C Programming language”, Prentice Hall of India.

Course Name: Story boarding & Script writing (Theory) **L- T – P: Cr**

Course Code: DAMT201 **1 – 0 – 0: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Story development process, idea and motivation, plot and premise, story structure, formats and genre, synopsis, outline and treatment, scene and sequence, screenplay elements and format, drafting and final script.

Introduction to storyboard, compositing and framing concept,foreground,middle ground and background, basics of cinematography, camera shots and angles, camera movement.

Thumbnails planning and layouts, character model sheet and action chart, expression chart, beat sheet and beat board, scene and shot breakdown, screen direction, flow of action,continuity,language of film,transistion,montage, intercut, hook up, pitching and pacing, storyboard and sound design for animatics,voice track ,final storyboard and animatics.

Course Name: Storyboarding & Scriptwriting (Practical) **L- T – P: Cr**

Course Code: DAMT271 **0 – 0 – 4: 04**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "Writing the Short Film" by Patricia Cooper and Ken Dancyger
- "The Art of layout and storyboarding" by Mark T Bryne
- "Screenplay" by Syed Field

Course Name: Elements of Multimedia (Theory) **L- T – P: Cr**

Course Code: DAMT202 **2 – 0 – 0: 04**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Unit-I: Introduction to Multimedia

Multimedia definition, Multimedia Application, Multimedia System, Characteristics of Multimedia Systems, Components of Multimedia, Multimedia Data. Static and Continuous media, Analog and Digital Signals, Analog to Digital and Digital to Analog Conversion, Data Compression, Compression Algorithms.

Unit-II: Elements of Multimedia

Text, Images, Graphics, Animation, Audio and Video.

Text: Typefaces, Fonts, Cases, Symbols and Icons, Buttons, Text Printing Orientation, HTML, ASCII, Unicode, Hypermedia and Hypertext.

Unit-III: Animation

2D and 3D Animation, Animation in Multimedia, Advantages and Disadvantages of Animation, Interactive Animation, Concept Development and Storyboarding, 2D and 3D Animation Tools, Animation File Formats.

Unit-IV: Images and Graphics

Definition, Colour Perception, Vector and Raster Graphics, Image Depth, Alpha Channel, Basic Colour Theory, Colour Wheel, Colour Characteristics, Dithering, Anti-Aliasing, Resolution, Colour Models, Image and Graphics File Formats, Basic Image Processing, Layers, Filters, Image Manipulation, Colour Printers, Digital Still Cameras.

Unit-V: Audio

Definition of Sound, Basics of Acoustics, Psychoacoustics, Limits of Sound Perception, Types of Audible Sounds, Characteristics of Musical Sound, MIDI, MIDI Files, Synthesis of MIDI Sounds, Digital Audio, Common Audio Editing Tools, Audio File Formats, Microphone, Amplifiers.

Unit-VI: Video

Definition, Video Frames, Frame Rate, Scan Line, Fields, Interlacing and Progressive Videos, Aspect Ratio, TV Broadcast Standards, Vertical and Horizontal Resolution, Types of Video Cameras, Component and Composite Video, Stereoscopic Video, Digitization Basics, Spatial Resolution, Bandwidth, Sampling, Nyquist Theorem, Video Formats. Video Editing Tools.

Unit-VII: Overview of Internet and Virtual Reality

Browsers, Internet Services- URL, Dial-ups, ISDN, E-mail, Chat, Cross-Platform Features, Audio & Video streaming, Internet applications – Audio & Video Conferencing, Internet Telephony, World Wide Web, Computer Networks, Virtual Reality.

Reference Books:

"Multimedia, Making IT Work" – by Tay Vaughan; 9th Edition, Osborne McGraw Hill.
"Multimedia Demystified" – by Jennifer Coleman, Dowling; McGraw Hill.

Course Name: Elements of Multimedia (Practical) **L- T – P: Cr**

Course Code: DAMT272 **0 – 0 – 2: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Book

- Multimedia Systems" – by Buford; Addison Wesley
- "Multimedia Systems" – by Agrawal & Tiwari; Excel

Course Name: 2D Animation Techniques (Theory) **L- T – P: Cr**

Course Code: DAMT203 **1 – 0 – 0: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Introduction to animation history, different mediums and pioneers, early optical illusions concept devices, full and limited style, the 12 principles of Disney, traditional process, bouncing ball animation, adding squash and stretch, pendulum exercise, prop design and bg design. Tools and interface, tween animation, masking, text, bone tool, preset motion, character design, turnaround, line of action and posing, expression chart, character rigging and walk cycle animation. Progressive walk. Run and jump, making a short clip.

Course Name: 2D Animation Techniques (Practical) **L- T – P: Cr**

Course Code: DAMT273 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "The illusion of life" by Frank Thomas and Ollie Johnston
- "Animator Survival Kit" by Richard William
- "Adobe Flash professional CS6 Classroom in a Book" by Adobe Creative Team

SEMESTER - 3

Course Name: Introduction to Digital Modelling (Theory) **L- T – P: Cr**

Course Code: DAMT301 **1 – 0 – 0: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Maya Interface, Control the display of attributes in the Channel Box, Introduction to Polygon Modeling, Concept of NURBS, Combine and Separate, Extract, Fill Hole, Loft Option, Mirror Geometry, Polygons Menu, Normals, Soft Selection, Smooth Mesh, Models for Games and Production, Boolean Operation, Editing NURBS, Creating NURBS curves. Importing and Exporting files, Use Curves in 3D Modeling, Concepts of Sculpting, The Outliner, High Poly Character Model, Low Poly Model, Gaming Models, Inorganic Modeling, Organic Modeling.

Course Name: Introduction to Digital Modelling (Practical) **L- T – P: Cr**

Course Code: DAMT371 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "Getting Started in 3D with Maya: Create a Project from Start to Finish: Model, Texture, Rig, Animate, and Render in Maya" by Adam Watkins
- "Thinking Animation: Bridging the Gap Between 2D and CG" by Angie Jones, Jamie Oliff

Course Name: Basic Concept of Texture Techniques (Theory) **L- T – P: Cr**

Course Code: DMCD302 **1 – 0 – 0: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Adobe Photoshop, Photoshop tool Knowledge, RGB Colour, basic Image Manipulation: Bit map Images, Vector Images, Image size and resolution Settings, Creating Images, Color Concepts, Paint Tools Concept, Layer Basics, Masking, Definition of Textures, Introduction to UV Mapping, , Planar Mapping, Spherical Mapping, Cylindrical Mapping, Automatic Mapping, Matte Painting, Digital Painting, Ramp Shader, Displacement Map, 3D Motion Blur, Still Photography, Paint Effect.

Course Name: Basic Concept of Texture Techniques (Practical) **L- T – P: Cr**

Course Code: DAMT372 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "Getting Started in 3D with Maya: Create a Project from Start to Finish: Model, Texture, Rig, Animate, and Render in Maya" by Adam Watkins
- "Thinking Animation: Bridging the Gap Between 2D and CG" by Angie Jones, Jamie Oliff
- "Advanced Maya Texturing and Lighting" by Lee Lanier

Course Name: Web Designing (Theory) **L- T – P: Cr**

Course Code: DAMT303 **1 – 0 – 0: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

The Internet – concept, types, connections – structure and features of internet – Internet and Intranet, Protocols, Browsers, Search engines, Web structure, Web structure, Web blogs. Internet services—URL, Dial—ups, ISDN, e-mail, chat, cross platform features, audio & video streaming, Internet applications—Audio & video conferencing, Internet telephony, virtual reality, artificial intelligence. Fundamentals of web designing – tools – design techniques – Web site organization – file structure, naming conventions, pages, folders, navigation, hyperlinks and adding sound. Websites – features – portals – content- corporate sites – commercial cites—functions. Content planning – Analysis – Objectives—Content strategies – developing content tactics – defining content matter. Web authoring tools – Adobe Photoshop, Front Page, Dream weaver, Flash, using peripherals for website enhancements. Adobe Dreamweaver—features – tools. Microsoft front page – features – tools

Course Name: Web Designing (Practical) **L- T – P: Cr**

Course Code: DAMT373 **0 – 0 – 4: 04**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "Internet for everyone, Leno et al., Lone Techworld, Chennai 1998"
- "Building a website, Tim Worsley, Orling Kindersely, New Delhi, 2000

Course Name: Digital Photography and Film Making (Theory) **L- T – P: Cr**

Course Code: DAMT304 **1 – 0 – 0: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Introduction to Photography, History of camera, Types of camera, Principles of photography, Rule of Third, Golden Ratio, Aperture, shutter speed, lens, filters and flash, Camera films, What is lighting? Importance of lighting in photography, Lighting equipment and control, Lighting techniques and problems. Origin of Colour, Colour Temperature, White Balance: Process and Need.

History of Cinema, Research-Development of Classical Indian & Hollywood Cinema, Overview of writing for different mediums like, TV, radio, newspaper and other performing art format, Development of Story: Basic elements,

Principles and tools of script writing, Role of language, Introduction of subject, theme, plot, Definition and explanation of story writing, Theory of projection of conflict, presentation of plot, Characterization-case studies with successful writers, Direction: The thought process of director. Film Grammar for Scriptwriting-Interpretation of story, scripts and storyboard to develop an overall vision of production, Working with a script/screenplay,

Production models: Preproduction & post production activities, Directing and analysing a film, Animation film Techniques, An introduction to screen grammar: What is a shot? The various elements of shot-taking: Image Size, Camera Angles, Movements, Lenses, Lighting, Camera Speed, Stocks, Graphics, Colour. The Rule of Thirds & the Golden Points. Depth of Field and Selective Focus. Concept of Sound.

Course Name: Digital Photography and Film Making (Practical) **L- T – P: Cr**

Course Code: DAMT374 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "Film Directing shot by shot: Visualizing from Concept to Screen."bySteve Katz.
- "Cinematography for Directors: A guide for Creative Collaboration" by Jacqueline B Frost
- "Teaching Analysis of Film Language" by David Wharton and Jeremy Grant

Course Name: Concept Art (Practical) **L- T – P: Cr**

Course Code: DAMT375 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Prop Designing,Layout and Planning,Perspective drawings,Background Design-Interior and Exterior,Character Design,Model sheet- turnaround,Expression and Posing,Anthropomorphic character design,Building background story and Concept Art.

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- Character Mentor by Tom Bancroft
- Mastering Fantasy Art: Drawing Dynamic Characters by John Stanko
- The Art of Perspective by PHIL METZGER
- Dream Worlds:Production Design for Animation by Hans P Bacher

SEMESTER - 4

Course Name: 3D Animation (Theory) **L- T – P: Cr**

Course Code: DAMT401 **1 – 0 – 0: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Animation Techniques-Types of Animation Techniques and Principles of Animation. Posing-Pose, Primary function of pose, Line of action, reversing the line of action, Uses of vertical line of action, Flow lines, Proper weight in posing and staging, Silhouette.Keyframe- Keys, Extremes, Breakdowns, in-betweens, Blocking, Graph editor, Cleanup and In-between, Understanding key frames, Non-Linear Animation – Motion Path Animation –Deformers, Motion trail, Turntable

Course Name: 3D Animation (Practical) **L- T – P: Cr**

Course Code: DAMT471 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "Animation Survival Kit" by by Richard Williams
- "Understanding 3D Animation using Maya." by John Edgar Park
- "Tony White's Animator's Notebook" by Tony White
- "Acting for Animators" by Ed Hook

Course Name: Concept of Rigging (Theory) **L- T – P: Cr**

Course Code: DAMT402 **1 – 0 – 0: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Introduction to Rigging-What is rigging and why it is needed, Character rigging in a 3D production.Basic concepts needed for Rigging: pivot, Parenting v/s Grouping, Constraints, types of constraints. Maya Skeletons-Understanding joints, Bone set-up, importing character in Maya, Setting up bones for biped character, managing hierarchies. Kinematics: introduction and overview of IK and FK.

Character set-up-Anatomy study: Study of human skeleton, Starting to rig a character (biped): Setting up the skeleton, rigging the leg and the feet using reverse foot, rigging the hand in IK and FK (IK/FK switch), Deformers.

Course Name: Concept of Rigging (Practical) **L- T – P: Cr**

Course Code: DAMT472 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "Understanding 3D Animation using Maya"by John Edgar Park
- "An Essential Introduction to Maya Character Rigging" by Cheryl Cabrera

Course Name: Introduction to Multimedia Design (Theory) **L- T – P: Cr**

Course Code: DAMT403 **2 – 0 – 0: 04**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Multimedia presentation and authoring, professional development tools, the Stages of a Multimedia Project, Requirements of a Multimedia Project, Building up a Team, Duties of a Project Manager, Multimedia Designer, Interface Designer, Content Writer, Video and Audio Specialist, Multimedia Programmer, Implementing Multimedia with the World Wide Web.

Course Name: Introduction to Multimedia Design (Practical) **L- T – P: Cr**

Course Code: DAMT473 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "Multimedia, Making IT Work" – by Tay Vaughan; Osborne McGraw Hill

Course Name: Art Fundamentals and Graphics design (Theory) **L- T – P: Cr**

Course Code: DAMT404 **2 – 0 – 0: 04**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

The Elements of Art and the Principles of Art.Introduction to elements of graphic design - Text and image, grids and layout, composition, form and function, figure and ground phenomenon.Gestalts laws,

Typographic fonts and their characters. Typographic parameters: x-height, ascenders, descenders, kerning, tracking and leading. Variations of body text, headlines and display text.Hands on practice using application of fundamentals of Graphic Design.

Introduction to Printing Technology. Introduction to Digital Media Technology.

Course Name: Art Fundamentals and Graphics design (Practical) **L- T – P: Cr**

Course Code: DAMT474 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text: A History of Western Art 5th Edition by Laurie Schneider Adams

SEMESTER - 5

Course Name: Lighting in Animation (Theory) **L- T – P: Cr**

Course Code: DAMT501 **1 – 0 – 0: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Basics of Lighting, Color theory, Direct and Indirect Light, Types of Lights in Maya, 3-point Lighting, Light attributes, Shadows, Shadow Maps

Working with Layers, Rendering in Layers, Rendering in passes, Lighting Passes, Depth of Field, Cameras

Basics of Caustics, Mental Ray, Photons, Global Illumination, Raytracing, Final Gather

Basic Lighting Techniques, Indoor and Outdoor lighting Techniques, Special Lighting Techniques, Materials and Rendering Algorithms.

Course Name: Lighting in Animation (Practical) **L- T – P: Cr**

Course Code: DAMT571 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- Digital Lighting and Rendering I, II - by Jeremy Birn.
- Essential CG Lighting Techniques - by Darren Brooker
- Advanced Lighting and Materials with Shaders - by Kelly Dempski and Emmanuel Viale.

Course Name: Compositing & Visual Effects (Theory) **L- T – P: Cr**

Course Code: DAMT502 **1 – 0 – 0: 02**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Introduction to Visual Effects-Understanding Visual Effects, Categories, Types. Exploring Particles-Particle Simulation, Particle Emitters, Particle Rendering.Fluid Mechanics-Understanding Fluids, Building Simulation.Compositing-Understanding Compositing, Physical Compositing, Mattes and Compositing, Digital Matting Methods and tools, Compositing Techniques, Digitally Processing Image and Footages.Green and Blue Screens-Understanding Green/Blue Screen and Composting, Rotoscoping Techniques.

Course Name: Compositing & Visual Effects (Practical) **L- T – P: Cr**

Course Code: DAMT572 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- "The Green Screen Handbook" by Jeff Foster
- "Maya Studio Projects Dynamics" by Toddo Palamar
- "The Visual Effects Arsenal" by Bill Byrne
- "Creative After Effects" by Angie Taylo

Course Name: Introduction to Gaming Theory **L- T – P: Cr**

Course Code: DAMT503 **2 – 1 – 0: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Introduction to Video Games, History of Video Games, Definition of Play, Games as digital media, brainstorming game ideas, introduction to key concepts.Narratology and Ludology, The Classification of games, Game Types, Game Genres, MMOGs, Player Perspectives, Designer Perspectives, Games and Learning.Introduction to Game Analysis, Cheating, Rules and fiction,

Beyond the Rules of the game, Playing with the Rules, Interface and Immersion, Player Experience, Types of players, Hardcore Vs Casual Players, Identity.Gaming platforms, Gaming Hardware, Building a Gaming rig, Fictional Worlds, Games as Simulations, Gaming in Virtual Reality.Game Aesthetics, Criticism and Journalism, Game Culture: Communities, Violence, Nature and Significance of Play as a Cultural Phenomenon, Play and Work.

Text/Reference Books

- "Understanding Video Games: The Essential Introduction – By Jonas Heide Smith, Simon Egenfeldt-Nielsen and Susana Pajares Tosca.
- "The Ultimate History of Video Games" – by Steven Kent
- "The Art of Video Games: From Pac-Man to Mass Effect."
- "The Art of the Video Game" – by Josh Jenisch.

Course Name: CONCEPT OF NEW MEDIA (Theory) **L - T – P: Cr**

Course Code: DAMT504 **2 – 0 – 0: 04**

Full Marks: 100 **Theory: 28/70** **Sessional: 15/30**

DESCRIPTION: To match with today's digital world, this course is introduced to students to give them the knowledge and understanding of how New Media evolved with the evolution of technology. Students will learn about the fundamental principles, history and various applications of New Media in this course.

OBJECTIVE: The objective of this course is to teach students the theoretical part of New Media including history to understand the subject, as well as studio exercise on application of New Media through –

- Installation art – by using different forms of new media
- Digital media exploration
- TV, cinema as modern era communication media etc.

Course Content:

UNIT 1: Introduction to New Media

- Evolution of New Media - History to modern era
- Technology in New Media
- New Media culture – conventions and technique of old media

UNIT 2: Principles of New Media

- Discrete representation
- Numerical representation
- Automation
- Variability

UNIT 3: Concept of New Media

- Changing relationship of representation.
- Database as genre of new media.
- Logic of remediation.

- Concept of digital dialectic.
- Digital Cinema and the history of moving Image.
- The new language of cinema.

UNIT 4: Forms of New Media

- Installations - Sound art, Net art.
- Free software movement and open source.
- New media art installation and cross-media practice.
- Interactivity and interface: Models of interactive systems.

STUDIO EXERCISE

Students will be taught to understand the basic concept of New Media and how it is being used in different areas. Also students will have to perform small projects using New Media forms and different types of installations.

Text books / Reference books:

1. R. Grusin and J. D. Bolter, *Remediation: Understanding New Media,* MIT Press, 2000.
2. L. Manovich, *The Language of New Media*, MIT Press, 2001.
3. P. Lunenfeld (ed.), *The Digital Dialectic: New Essays on New Media*, MIT Press, 1999.
4. N. Wardrip-Fruin and N. Montfort (eds.), *The New Media Reader,* MIT Press, 2003.

Course Name: Minor Project		**L – T – P:Cr**
Course Code: DAMT595		**0 – 0 – 10: 10**
Full Marks: 100	**Practical: 25/50**	**Sessional: 25/50**

Students will be given a small project which may be a short movie, animated or live, graphic design based project, other technical skill based project. etc. in proper pipeline, which will be executed under specific guide/mentor. The final output should reflect all production stages in details .The final output along with proper documentation and presentation should be submitted in complete form.

SUBMISSION:

- Project Report Documents
- Video of Documentary/Short Movie
- Final presentation

SEMESTER - 6

Course Name: **Industrial Management and Entrepreneurship** **L- T – P: Cr**

Course Code: DHSS601 **3 – 1 – 0: 08**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Meaning and concept of Management, Principles and functions of Management, Labour turnover, Payment of wages – factors determining the wage, Methods of payment of wages.Leadership and Decision Making, qualities and styles of Leadership, decision making process.

Elements of costs, Analysis and classification of expenditure for cost accounts, preparation of cost sheet, Marginal costing and Break Even Analysis.

Factories Act -1948, Definitions, Main Provisions regarding Health, Safety and welfare of workers.

Industrial Dispute Act – 1947, Definitions, Preventive measure, Machinery for settlement of Industrial Dispute in India.

Trade Union Act - Meaning and function of Trade Union.

Meaning and function of Entrepreneurship

Forms of Business organization: Sole Trader, Main features, merits and demerits, Partnership – main features, merits and demerits. Joint stock company – main features, difference between private and public limited companies. Introduction to co-operative and public undertaking.

Small scale industries: Definitions, scope with reference to self-employment, procedure to start small scale industries, Sources of finance - Bank, Government and Financial institutions etc. Selection of site for factories, Industrial Estate, Growth Centre, Ancillary Industries.

System of Distribution – Wholesale and Retail Trade.

References:

- General Principle and Practice of Management – L M Prasad
- Management Concepts and Practice – Kanchan Bhatia and Shweta Mittal
- Micro Economics – Sandeep Garg
- Self-Employment through Entrepreneurship – J.C. Kalita
- Entrepreneurship Development & Small Business Management – Dr. BhawnaBhatnagar and AnkurBudhiraja.
- Labour and Industrial Law of India – S.K. Misra
- Industrial Safety and Health for Administrative Services---Charles D. Reese

Course Name: Audio Video Editing (Theory) **L- T – P: Cr**

Course Code: DAMT601 **1 – 1 – 0: 04**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Introduction to Audio Editing, MIDI, Digital Audio, Firewire -Types of Wires and the peripherals, Voice-over recording, , Filters, Codecs.Introduction to Digital Video and Video Editing, Principles of editing, Introduction to Video Editing Tool; Adobe Premier, Final Cut Pro.Linear and Non-linear Editing, on-line and off-line editing, In-Camera Editing,Timeline, Three Point Edit, Transitions, Video Formats and Broadcast systems, Continuity, Cut in, Cut away, Jump cut, time remap, Rule of 180 Degree, Rule of 30 Degree.Framing effective shots--Field of View, Headroom, Noseroom and Lead room, Types of Camera, Lens, Camera angles, shots, movements, Image Formats - sizes, Single and Multi-camera shoots.

Course Name: Audio Video Editing (Practical) **L- T – P: Cr**

Course Code: DAMT671 **0 – 0 – 6: 06**

Total Marks: 100 **Theory: 28/70** **Sessional: 15/30**

Practical practices based on the theory part demonstrated and guided by the Course Instructor as per requirement of the course.

Text/Reference Books

- Audio Production Work text; *Concept, Technique and Equipment 6th Edition By David E. Rose, Lynne S. Gross, Brain Bross*
- Grammar of the Edit, *Author; Roy Thompson, Christopher J. Bowen*
- Grammar of the Shot, *Author;Roy Thompson, Christopher J. Bowen*

Course Name: Major Project **L- T – P: Cr**

Course Code: DAMT695 **0 – 0 –12: 12**

Full Marks: 200 **Practical: 40/100** **Sessional: 40/100**

Students will have to do a major project with a guide who has specialized in the area the students have chosen to pursue. The major project would serve as their Show Reel or Demo Reel, which in turn would enable the student to apply for a position in any Animation/Multimedia industry after they have passed out.

SUBMISSION:

- Project Report Documentation with Final Presentation
- Video Show Reel/Demo Reel (1-3 min duration)

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B. Tech (5th sem) in Instrumentation Engineering Syllabus Details (July 2020 onwards)

Paper code:UCSE519Paper name: Data Structure and Algorithms **Credit: 6**
Total contact hours: 40 **L-T-P: 3-0-0**

Module 1: Introduction **Contact hours: 4**

Basic Terminology, Elementary Data Organization, Data Structure Operations, Abstract Data Types (ADT), Algorithms, Complexity, Time-space Trade off, Asymptotic Notations.

Module 2: Concept of Arrays, Records and Pointers **Contact Hours: 6**

Introduction to Array, Memory representation of arrays, Basic Array Operations-Traversal, Insertion, Deletion, Sorting and Searching, Multidimensional Array, Pointer to Array, Record and Its Structure, Representation of Records in Memory, Matrices, Spares Matrices

Module 3: Linked List **Contact Hours: 5**

Introduction, Memory Representation, Traversing a linked list, searching a linked list, Memory Allocation, Garbage Collection, Insertion into a linked list, Deletion from a linked list, Header Linked list, Circular Linked List, Two-Ways Lists.

Module 4: Stack **Contact Hours: 5**

Introduction to Stack, Array and Linked representation of Stack, Primitive Stack operations: Push & Pop, Arithmetic Expression, Polish and Reverse Polish Notation, Application of stacks, Recursion, Tower of Hanoi problem.

Module 5: Queue **Contact Hours: 5**

Basic concept, Memory representation of Queues,Operations on Queues: Enqueue and Dequeue, Circular Queues, Priority Queues, Application of Queues.

Module 6: Trees and Graphs **Contact Hours: 9**

Basic tree terminologies, Binary Tree, Representation of Binary Tree in memory, Tree Traversal algorithms: Inorder, Preorder and Postorder, Binary Search Tree, Operations on Binary Search Trees: Insertion, Deletion and Searching, Balanced Binary Trees, AVL Trees, Introduction to Graphs, Graph Theory fundamentals, Representation of graphs in memory: Adjacency matrix and Adjacency list, Graph traversal techniques: BFS and DFS, Spanning Trees

Module 7: Searching and Sorting Techniques **Contact Hours: 3**

Searching: Linear Search and Binary Search, Sorting: Insertion sort, Selection sort, Bubble sort, Quick sort, Merge sort, Heap Sort

Module 8: Hashing **Contact Hours: 3**

Introduction to Hashing, Hash Functions, Collision Resolution Strategies

Books/ References:

1. Data Structures and Algorithms by A. V. Aho, J. E. Hoppcroft and J. E. Ullman - Pearson
2.Data Structures using C by A.M. Tenenbaum - PHI
3. Data Structure with C by Seymour Lipschutz–McGraw Hill.
4. Fundamentals of Computer Algorithms by E. Horowitz&S. Sahani - Galgotia

B. Tech (5thsem) in Instrumentation Engineering Syllabus Details (July 2020 onwards)

Paper code: UIE501Paper name: Microprocessor & Microcontroller **Credit: 8**
Total contact hours: 45 **L-T-P: 3-1-0**

Module 1: Introduction to computer architecture and organization **Contact Hours: 12**

Introduction to computer architecture and organization: Architecture of 8-bit and 16 bit microprocessors, bus configurations, CPU module, introduction to assembly language and machine language programming, instruction set of a typical 8-bit and 16 bit microprocessor, subroutines and stacks, programming exercises.

Module 2: Memory technology **Contact Hours: 14**

Timing diagrams, Memory families, memory interfacing, programmable peripheral interface chips, interfacing of input-output ports, programmable interval timer.

Module 3: Data transfer schemes **Contact Hours: 10**

Serial and parallel data transfer schemes, interrupts and interrupt service procedure. Programmable interrupt controller. Programmed and interrupt driven data transfer. Programmable DMA controller.

Module 4: Architectures of 8051 Microcontroller **Contact Hours: 9**

Bus configuration, instruction sets, programming exercises. Embedded System software and hardware design, development and troubleshooting tools.

Text Books:

1. Ramesh Goankar, "*Microprocessor Architecture, Programming and applications, with the 8085/8080A*", 3rd Edition, Penram International Publishing house, 2002.

2. Kenneth J.Ayala, "*The 8051 Micro controller*", Penram Interfacing Publishing, 1996.

3. Douglas V.Hall, "*Microprocessors and Interfacing – Programming and Hardware*", 2nd Edition, McGraw Hill, 1992.

4. Dr.K.V.K.K.Prasad, *"Embedded/Real-Time Systems: Concepts, Design & Programming"* Dreamtech Press, 2005.

Reference Books:

1. B.Ram, "*Fundamentals of Microprocessors and Microcontrollers*", 4th Edition, Dhanpatrai and sons, 1994.

2. MykePredko, "*Programming and Customizing the 8051 micro controller*", Tata-McGraw Hill, 3rd reprint 2002.

3. Frank Vahid/Tony Givargis, *"Embedded System Design – A Unified Hardware/Software Introduction",* John Wiley & Sons, Inc, 2005 ISBN 9971-51-405-2

4. Mazidi and Majidi "The 8051 Microcontroller And Embedded Systems Using Assembly And C"-Pearson Education,

B. Tech (5thsem) in Instrumentation Engineering Syllabus Details (July 2020 onwards)

Paper code:UIE502Paper name: Control System **Credit: 6**
Total contact hours: 36 **L-T-P: 3-0-0**

Module I: Introduction and overview:

Define the Control problem with examples. Meaning of reference input, Control input, disturbance input and controlled output.

Module II: Modeling:

Define Linear Time variant system. Modeling problem for linear timeinvariant system. Impulse response and convolution integral for LTIsystem.Transfer function modeling of systems: Input output relation inLaplace domain and Transfer function; Block Diagram reduction,signal flow graph, Mason's Gain theorem. Representation of systemand reduction to their transfer function.Modeling of some physical system--- Electrical circuit, Mechanicalmotors, thermal (room temperature), pneumatic etc.Concepts of States, State space modeling, Solution of state equations,State space to transfer function, transfer function to state space(realization problem). Examples of state space modeling---- Coupledtank system, inverted pendulum, biological system etc.

Module III: Characterization of Plant:

Definition of stability. Criteria for stability of a system. Pole-zeroconcept, Routh-Hurwitz Criterion, Eigen value. Equivalence of poleand Eigen value.Time domain: Standard test signals. Time response of first andsecond order systems for standard test inputs. Application of initialand final value theorem. Design specifications for second-ordersystems based on the time-response.Frequency-domain: Meaning of frequency response, Analyticalevaluation of Frequency response of given transfer function.Polar plots, Bode plots and Nyquist plot for representation offrequency response.Gain cross over frequency, phase cross over frequency. Role off rate.DC gain, corner frequency.

Module IV: Characterization of feedback loop:

Advantages of feedback.Loop Stability: Bode and Nyquist plot criteria. Bode stability criteria, Nyquist stability criteria, loop robustness, gain margin, phase margin,delay margin.Loop performance: Frequency domain parameter sensitivity,tracking, disturbance rejection.Loop performance in time domain: Transient response: Root locus,Steady state response: Steady state error.

Module V: Controller Design problem:

PID Control.Frequency domain Loop shaping approach: Lead, Lag, Lag-leadcompensator.Model matching approach: Two degree of freedom controller.State feedback approach: Controllability, Observability, Poleplacement, State Observer.

Module VI: Introduction to Optimal Control and Nonlinear Control:

Nonlinear Control:Linearization about operating points.Optical Control:Performance Indices and their optimization. LQR problem.

Text/References:

1. Automatic Control System: Basic analysis and design by William A. Wolovich, TheOxford Series in Electrical and Computer Engineering.

2. B. C. Kuo, "Automatic Control System", 10th McGraw Hill.

3. K. Ogata, "Modern Control Engineering", Prentice Hall, 5th edition.

4. I. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International,2009

5. Control Systems Engineering, 6th edition, ISV (WSE), by Norman Nise, Wiley

6. Control Systems, Ambikapathy, Khanna Publishing House, 2018.

7. Control Systems, N K Sinha, New Age International Pvt, 2013.

B. Tech (5thsem) in Instrumentation Engineering Syllabus Details (July 2020 onwards)

Paper code: UIE503Paper name: Industrial Instrumentation **Credit: 6**
Total contact hours: 36 **L-T-P: 3-0-0**

Module 1: **Contact hours: 8**

Temperature Measurement: Temperature scale, ITS 90, fixed points and interpolation equations Filled in systems: liquid, gas and vapour, ranges, media, errors, construction details and comparison, classification Bimetal elements, Thermostats RTD: review of materials, construction, types; measuring circuits, ranges, errors and minimization of errors Thermocouples including MI thermocouples: types, thermoelectric power, circuits, ranges, errors, cold junction compensation, compensating cables Radiation Thermometer sensors used, spectral and other characteristics, Optical Pyrometers

Module 2: **Contact hours: 8**

Measurement of Pressure: Manometers – U tube, Inclined Tube and Well type Manometers Elastic Pressure Sensor Instruments – Bourdon Tube Pressure Gauge, Capsule Gauge, Differential Pressure Gauge, Pressure Switch Electronic Pr / DP transmitters: capacitive.
Mcleod Gauge, thermal conductivity gauge, ionization gauge

Module 3: **Contact hours: 8**

Flow rate Measurement: General concepts - Laminar flow, Reynolds's number, Effect of temperature and pressure on flow rate measurement, Calibration of flow meters. Head type flow measurement – analysis and calculation, and head producing devices - orifice, venture, pitot tube, Glass and metal tube rotameters
Electromagnetic type, Ultrasonic type, Vortex type, Positive displacement type Mass flow meters :Coriolis, Thermal, open channel flow measurement

Module 4: **Contact hours: 6**

Level Measurement: Gauge glass, Bi-Colour, Magnetic and Reflex Level Gauge Float and displacers type instruments – Gauge and Switch D/P type sensors and their installation arrangements Capacitive type level instrument Ultrasonic and Microwave type level instruments

Module 5: **Contact hours: 6**

Pneumatic Instrumentation Flapper nozzle system - pneumatic force balance and motion balance system Pneumatic Transmitter

Digital Data Acquisition systems & control: Use of signal conditioners, scanners, signal converters, recorders, display devices, A/D & D/A circuits in digital data acquisition.

Books / References:

1. D. Patranabis, Principles of industrial Instrumentation, TMH, New Delhi, 2nd Ed.
2. B. G. Liptak, Instrument Engineers Handbook, vol-I and vol-II, Chilton Book Co. Philadelphia
3. D. M. Considine and G. D. Considine (Eds.) Process Instruments and controls Handbook, McGraw Hill, New York
4. Ernest O. Doeblin, Measurement Systems – Application and Design, Tata-McGraw Hill
5. A. Barua, Fundamentals of Industrial Instrumentation, Wiley India
6. M.M.S. Anand, Electronic Instruments and Instrumentation Technology, PHI, Delhi
7. C. R. Alavala, Principles of Industrial Instrumentation and Control Systems, Cengage Learning

B. Tech (5thsem) in Instrumentation Engineering Syllabus Details (July 2020 onwards)

Paper code: UIE511Paper name: Digital Signal Processing **Credit: 6**
Total contact hours:36 **L-T-P: 3-0-0**

Module 1: **Contact hours: 4**

Introduction: Introduction to Digital Signal Processing: Discrete time signals & sequences, linear shift invariant systems, stability, and causality. Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems.

Module 2: **Contact hours: 10**

Discrete Fourier Series: Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT.

Fast Fourier Transforms: Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency, FFT Algorithms, Inverse FFT, FFT with General Radix.

Module 3: **Contact hours:8**

Realization of Digital Filters: Applications of z-transforms, solution of difference equations of digital filters. System function, stability criterion, frequency response of stable systems. Realization of digital filters – direct, canonic, cascade and parallel forms, Lattice structures.

Module 4: **Contact hours: 10**

IIR Digital Filters: Analog filter approximations – Butter worth and Chebshev, Design of IIR Digital filters from analog filters, Bilinear transformation method, step and impulse invariance techniques, Spectral transformations.

FIR Digital Filters: Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques, Frequency Sampling technique, Comparison of IIR & FIR filters.

Module 5: **Contact hours:4**

Introduction To DSP Processors: Introduction to programmable DSPs: Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access schemes in DSPs Multiple access memory, Multiport memory, VLSI Architecture, Pipelining, Special addressing modes, On-Chip Peripherals.

Books / References:

1. Digital Signal Processing : Principals, Algorithms and Applications - Proakis, J.Gard and D.G.Manolakis, 3rd Edn.,,PHI, 1996.
2. Fundamentals of Digital Signal Processing – Robert J. Schilling & Sandra L. Harris, Thomson, 2005.
3. Discrete Time Signal Processing – A.V. Oppenheim and R.W. Schaffer, PHI, 1989.
4. Fundamentals of Digital Signal Processing – LoneyLuderman.
5. Digital Signal Processing – S. Salivahanan et al., TMH, 2000. Digital Signal Processing – Thomas J. Cavicchi, WSE, John Wiley, 2004.
6. Digital Signal Processors, Architecture, Programming & Applications, - B. VenkataRamani, M. Bhaskar, TMH, 4th reprint, 2004.

B. Tech (5thsem) in Instrumentation Engineering Syllabus Details
(July 2020 onwards)

Paper code: UIE571Paper name: Microprocessor & Microcontroller Lab **Credit: 2**
Total contact hours: 2hours per week **L-T-P: 0-0-2**

LIST OF EXPERIMENTS:

Under construction

B. Tech (5thsem) in Instrumentation Engineering Syllabus Details
(July 2020 onwards)

Paper code: UIE572Paper name: Control System Lab **Credit: 2**
Total contact hours: 2 hours per week **L-T-P: 0-0-2**

LIST OF EXPERIMENTS:

Under construction

B. Tech (5thsem) in Instrumentation Engineering Syllabus Details
(July 2020 onwards)

Paper code: UIE573Paper name: Industrial Instrumentation Lab **Credit: 2**
Total contact hours: 2 hours per week **L-T-P: 0-0-2**

LIST OF EXPERIMENTS:

Under construction

B. Tech (5thsem) in Instrumentation Engineering Syllabus Details
(July 2020 onwards)

Paper code: UIE574Paper name: Digital Signal Processing Lab **Credit: 2**
Total contact hours: 2 hours per week **L-T-P: 0-0-2**

LIST OF EXPERIMENTS:

Under construction

केन्द्रीय प्रौद्योगि
CENTRAL INSTITUTE O
DEEMED TO BE UNIVERSITY, MHRD, GOVT. OF INDIA
KOKRAJHAR, ASSAM-783370
Website: www.cit.ac.in

Department of Food Engineering&Technology

5TH SEMESTER

A. Theory							
	Code	Subjects	Contacts (per week)				Credit Points
			L	T	P	Total	
1.	UHSS501	Industrial Management and Entrepreneurship	3	0	0	3	6
2.	UFET501	Food Product Technology-III (Milk and Milk Products)	3	0	0	3	6
3.	UFET502	Food Process Engineering	3	0	0	3	6
4.	UFET503	Food Process Equipment Design	3	0	0	3	6
5.	UFET504	Fundamentals of Heat and Mass Transfer	3	0	0	3	6
6.	UFET505	Food Industry Waste Management	3	0	0	3	6
Total of Theory							36

B. Practical							
	Code	Subjects	Contacts (periods per week)				Credit points
			L	T	P	Total	
1.	UFET571	Product Technology-III Lab	0	0	2	2	2
2.	UFET572	Food Engineering Lab	0	0	2	2	2
3.	UFET573	Process Equipment Drawing	0	1	3	4	4
4.	UFET574	Transfer Process Engineering Lab	0	0	2	2	2
Total of practical							10

Total of 5th Semester: 46

Subject Code: UHSS501
Subject Name:INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP
Total Contact Hours:50
Credits: 06

L-T-P: 3-0-0

Module IContact hours: 10
Meaning and Concept of Management, Principles and function of Management, Concept of Organizational Behavior, Function of a Manager—Planning, Organizing, Coordinating and Controlling. Motivation—implication of Managers and application. Leadership and Decision Making: Qualities and Styles of Leadership, Decision making process.

Module IIContact hours: 10
Individual Process in Organizations-Perception, attitude and personality, Factors that affect them, How they influence people. Group Process in Organizations, Group formation, Group effectiveness, Group Conflict.

Module IIIContact hours: 10
Evolution, Role and Status of Human Resource Management in India. Recruitment and Selection Process in Organization, Job Analysis, Job Specification, Selection Process-Test and Interview. Trade Union and Collective Bargaining

Module IVContact hours: 10
Entrepreneurship-Meaning, Types of entrepreneur, Qualities of an entrepreneur, Role of Entrepreneur, Factors affecting entrepreneurial growth. Entrepreneurship Development Programme-Concept, Objective and Importance, Engineer Entrepreneurship Training Programme Scheme

Module VContact hours: 10
Small Scale Industry-Definition, Types of Small Scale Industry, How to Set up Small Scale Industry, Role and Problem of Small Scale Industry. Concept of Joint Stock Company, Private and Public Limited Company. Source of Finance for Entrepreneur-Bank, Government and Financial Institutions etc.

Suggested Readings:

1. *S.S. Khanka-OrganisationalBehaviour.*
2. *S.S. Sarkar, R.K.Sharma and S.K.Gupta – Business Organisation and Entrepreneurship Development.*
3. *Cynthia L. Greene – Entrepreneurship.*

Subject Code: UFET501
Subject Name:FOOD PRODUCT TECHNOLOGY-III (MILK & MILK PRODUCTS)
Total Contact Hours:40

Credits: 06
L-T-P: 3-0-0

Module IContact hours: 10
Introduction: Present status of milk & milk products in India and Abroad; Chemical composition, microbiological quality, and nutritional importance of milk and milk product in PFA Act, Rules, 1955 as amended to date.

Module IIContact hours: 10
Fluid Milks: Physicochemical characteristics and factors affecting them. Production, collection, testing quality, cooling, storage, and transportation of liquid milks. Receiving and quality assessing of liquid milk in dairy industry for detection of adulteration, decision for acceptance/rejection. Different milk types.

Module IIIContact hours: 10
Development in chemical preservation of milk-LP system- mechanismH_2O_2 Vs LP system-defects of LP system, pasteurization, sterilization and UHT processing, Soy milk manufacturing; Use of carbonation in extending the shelf life of dairy product; techno- economic considerations; storage, packaging and distribution of liquid milks. Cleaning and sanitization of dairy equipments and plant as a whole.

Module IVContact hours: 10
Milk Products: Definition, composition, methods of preparation/production, quality and/or grading parameters, packaging, storage characteristics, uses and shelf-life of cream, butter and ghee; evaporated and condensed milks, skimmed, whole and instants milk powders. Ice-Creams, fermented milks (Curd, yogurt etc.) and milk-products (cheeses, butter milk, lassi etc.); other milk products (khoa, casein, whey proteins, lactose etc.)

Suggested Readings:

1. Outlines of Dairy Technology by Sukumar De,Oxford University Press.
2. Principles of Dairy Processing by James N.Warner, Wiley Eastern Ltd.
3. Milk and Milk Products by Eckles,Combs; and Macy,Tata McGraw Hill.
4. Technology of Indian Milk Products by Aneja et al. A Dairy India Publication.
5. PFA Act 1954 & Rules 1955 as amended to date.
6.Robinson RK; 1996; Modern Dairy Technology, Vol 1 & 2; Elsevier Applied Science Pub.
7. Milk & Milk Processing; Herrington BL; 1948, McGraw-Hill Book Company.
8. Modern Dairy Products, Lampert LH; 1970, Chemical Publishing Company.
9. Developments in Dairy Chemistry – Vol 1 & 2; Fox PF; Applied Science Pub Ltd.

Subject Code: UFET502

Subject Name:FOOD PROCESS ENGINEERING
Total Contact Hours:45

Credits: 06
L-T-P: 3-0-0

Module IContact hours: 10
Geometrical, physical, functional and growth property of foods. Cleaning, sorting and grading of foods. Size Reduction: Principles and types of size reduction equipment, disintegration of fibrous materials, screening, types of screen and mechanical separations.Mixing: Mixing of liquids and solids (powder), mixing equipments. Agitation, types of agitators.

Module IIContact hours: 9
Filtration: Principle of filtration, types of filtration equipments, settling classifiers,flotation and centrifugation, types of centrifuge.

Module IIIContact hours: 9
Drying: Principle of drying and dehydration, rate of drying and drying equipments.Crystallization: equipments, crystal growth, crystallization process.

Module IVContact hours: 8
Humidification: General theory, psychometric chart, fundamental concept ofhumidification and dehumidification, cooling tower.

Module VContact hours: 9
New separation Techniques: Introduction to membrane based separation techniques,reverse osmosis, ultra filtration, micro filtration, evaporation, dialysis. Foam separation,micellar separation and supercritical fluid extraction.

Suggested Readings:

1. Food Engineering Operation - Brennan, Butters, Cowell and Lilly.
2. Food Process Engineering - Heldman, D. R. and Singh, R. P.
3. Fundamental of Food Process Engineering - Romeo T. Toledo
4. Unit Operation of Chemical Engineering - Mc Cabe, Smith & Harriot
5. Mass Transfer Operation - Treybal, R. E.
6. Chemical Engineering (Vol. I & II) - Coulson, J. M. & Richardson, J. F.Butterworth-Heinemann, Oxford, UK.
7. Kenneth J. Valentas, Enrique Rotstein and R. Paul Singh. 1997. Handbook of Food Engineering Practice. CRC Press, Boca Raton, FL, USA.

Subject Code: UFET503
Subject Name:FOOD PROCESS EQUIPMENT DESIGN

Total Contact Hours:50

Credits: 06
L-T-P: 3-0-0

Module IContact hours: 8
Material of construction: Introduction to material selection; Material properties; Environmental effects on material selection; Mechanical properties & strength of materials.

Module IIContact hours: 9
Design of thin walled process vessels: Cylindrical & spherical vessels under internal and external pressure; Design of attachments and closures; Compensation for openings; Design of flange connections & threaded fasteners; Design of supports.

Module IIIContact hours: 8
Design of thick-walled high-pressure vessels: Design of piping; Methods of fabrication offerrous & non-ferrous metals; concrete, wood and other non-metallic construction.

Module IVContact hours: 8
Design of material handling equipment: Belt conveyor, bucket elevator, screw conveyor, cyclone conveyor, chain conveyor, pneumatic conveyor.

Module VContact hours: 8
Design of heat exchangers: Shell and tube, plate and scraped surface heat exchanger (Design will include functional & structural design).

Module VIContact hours: 9
Design of evaporators and crystallizers: Design of single effect and multiple effect evaporators and its components; Design of rising film and falling film evaporators and feeding arrangements for evaporators; Design of crystallizer and entrainment separator

Suggested Readings:
1. Process Plant Design - Beckhurst, J. K. and Harber, J. H.
2. Process Equipment Design - Brownell, L. E. and Young, E. H.
3. Process Equipment Design - Joshi, M. V.
4. Chemical Engineering Handbook - Perry, R. H. and Chitton, C. H.
5. Mechanical Design and Fabrication of Process Equipment; B. C. Bhattacharya;Khanna Publishers, Delhi
6. Introduction to Chemical Equipment Design – Mechanical Aspects; Bhattacharyya BC; CBS Publis
7. R. Paul Singh and Dennis R. Heldman. 2014. Introduction to Food Engineering, 5th Ed. Elsevier, Amsterdam, The Netherlands.

8. Albert Ibarz and Gustavo V. Barbosa-Cánovas. 2003. Unit Operations in Food Engineering. CRC Press, Boca Raton, FL, USA.
9. R. K. Sinnott. 1999. Chemical Engineering, Vol. 6, Chemical Engineering Design, 3rd Ed.
12. Selection of Material and Fabrication for Chemical Process Equipment; B. C. Bhattacharya; Chem. Engg. Education Dev. Centre; I.I.T Madras..
10. James R. Couper, W. Roy Penney, James R. Fair and Stanley M. Walas 2012 Chemical Process Equipment: Selection and Design. Elsevier Inc
11. Mahajani, V. V. and Umarji, S. B., Process equipment design, Macmillan.
12Computer Aided Design of Chemical Process Equipment; B. C. Bhattacharya; and C. M. Narayanan; New Central Book Agency, Kolkata.
13. Process Equipment Design; H. C. Hesse and J. H. Rushton; Van Nostrand, East West Press

Subject Code: UFET504
Subject Name:FUNDAMENTALS OF HEAT AND MASS TRANSFER
Total Contact Hours:40

Credits: 06
L-T-P: 3-0-0

Module IContact hours: 10

Importance of heat transfer in Chemical Engineering operations - Modes of heattransfer - Fourier's law of heat conduction - one dimensional steady state heatconduction equation for flat plate, hollow cylinder, - Heat conduction through aseries of resistances - Thermal conductivity measurement; effect of temperatureon thermal conductivity; Heat transfer in extended surfaces.

Module IIContact hours: 10

Concepts of heat transfer by convection - Natural and forced convection,analogies between transfer of momentum and heat - Reynold's analogy, Prandtland Colburn analogy. Dimensional analysis in heat transfer, heat transfercoefficient for flow through a pipe, flow past flat plate, flow through packed beds, Log Mean temperature differences, Radiation heat transfer, Black body radiation, Emissivity, Stefan - Boltzmann law, Plank's law, radiationbetween surfaces.

Module IIIContact hours:10

Introduction to mass transfer operations,theories of mass transfer, Molecular diffusion in gases, liquids and solids; diffusivity measurement and prediction; multi-component diffusion, Eddy diffusion,

Module IVContact hours:10

Concept of mass transfer coefficients, different transport analogies, application of correlations for mass transfer coefficients, inter phase mass transfer, relationship between individual and overall mass transfer coefficients. NTU and NTP concepts, Stage-wise and differential contractors.

Suggested Readings:

1. *Holman, J. P., 'Heat Transfer ', 8th Edn., McGraw Hill, 1997.*
2. *Ozisik, M. N., Heat Transfer: A Basic Approach, McGraw-Hill, 1984*
3. *Kern, D.Q., "Process Heat Transfer ", McGraw-Hill, 1999.*
4. *Treybal, R.E. "Mass-Transfer Operations" 3rd Edition, McGraw-Hill, 1981.*
5. *Dutta, Binay, K. "Principles of Mass Transfer and Separation Process", PHI, 2007.*
6. *Nag, P.M. "Heat and Mass Transfer", 2nd Edition, Tata McGraw-Hill, 2007.*
7. *Geankoplis, C.J. "Transport Processes and Separation Process Principles (Includes unit Operations) 4th Edition, PHI, 2003.*
8. *McCabe, W.L., Smith, J.C., and Harriot, P., "Unit Operations in Chemical Engineering", 7th Edn., McGraw-Hill, 2005.*
9. *Coulson, J.M. and Richardson, J.F., "Chemical Engineering" Vol. I and II,*

10. 4th Edition,Asian Books Pvt. Ltd., India, 1998.
11. J.D. Seader and E.J. Henley, "Separation Process Principles", 2nd Ed., John Wiley, 2006.
12. BinayK.Dutta,"Principles of Mass Transfer and SeperationProcesses",PHI Learning Ltd,2013.

Subject Code: UFET505
Subject Name:FOOD INDUSTRY WASTE MANAGEMENT
Total Contact Hours:50

Credits: 06
L-T-P: 3-0-0

Module IContact hours: 10
Classification and characterization of food industries effluents, utilization of byproducts from cereals, pulses, oilseeds, fruits, vegetables, dairy, eggs, meat, fishand poultry processing industries. Standards for discharge of environmental pollutants from food processing industries covered under EPA Act 1986.

Module IIContact hours: 10
Treatment of food industry effluents:Primary treatment-screening, sedimentation, floatation etc. types of physical treatment, chemical treatment e.g. coagulation and flocculation, neutralization and biological treatment- objectives, organisms, reactions, oxygen requirements, aeration devices.

Module IIIContact hours: 10

Treatment methods for liquid wastes from food process industries: lagoons, trickling filters, activated sludge process, oxidation ditches, rotating biological contactors, UASB.

Module IVContact hours: 10

Treatment methods of solid wastes: Biological composting, drying, gasification, pyrolysis and incineration; design of solid waste management system, Landfill digester, Aerobic and anaerobic composting, Vermicomposting.

Module VContact hours: 10

Advanced wastewater treatment systems: Physical, physicochemical and chemical treatments. Ion exchange treatment of waste water, disinfection, handling and disposal of sludge and treated effluents conforming to EPA provisions Recovery of useful materials fromeffluents by different methods.

Suggested Readings:

1. Water technology by N.F.Gray.
2. Environmental pollution by K.C.Agrawal.
3. Industrial microbiology by L.E.Casida Jr
4. Environmental pollution control engireering by C.S. Rao.
5. Food processing waste management by green and Kramer (AVI)

6. By- products from food industries: utilization and disposal by AFSI (I)
7. Environment (protection) act, 1986.
8. Handbook of advanced wastewater treatment by Culp and Wisner.
9. Environmental Biotechnology; Bhattacharyya B C & Banerjee R; Oxford University Press.

Subject Code: UFET571 **Credit: 02**
Subject Name: Product Technology- III Lab **L-T-P: 0-0-2**
Total Contact Hours :20
List of Experiments:

1. Proximate analysis of milk by Milk analyzer Contact Hours:2
2. Quality control test- Alcohol test, COB test and acidity test Contact Hours:2
3. Determination of specific gravity of milk by lactometer and pycnometer Contact Hours:2
4. Detection of adulteration of milk and milk products Contact Hours:2
5. Microbial Analysis of milk- Methylene Blue Reductase test and Resazurin Reductase test Contact Hours:2
6. Preparation of Paneer Contact Hours:2
7. Preparation of Rasgulla Contact Hours:2
8. Preparation of burfi Contact Hours:2
9. Preparation of sweetened condensed milk Contact Hours:2
10. Preparation of Yogurt Contact Hours:2

Subject Code: UFET572 **Credit: 02**
Subject Name: Food Engineering Lab **L-T-P: 0-0-2**
Total Contact Hours :22
List of Experiments:

1. To study the following using Psychometric chart
   i. Determination of various properties of air-water-vapor from any two given parameters (RH, WBT, DBT, DPT)
   ii. Determination of various properties of air-water-vapor mixture obtaining after mixing of two different air stream's having different properties.

   Contact Hours:2
2. To study the water activity of a given sample. Contact Hours:2
3. To determine equilibrium moisture content (EMC) of the given food materials using static equilibrium method. Contact Hours:2
4. To study the dehydration characteristic of fruits & vegetables by obtaining
   i. Moisture content vs. time curve
   ii. Drying rate vs. time curve Contact Hours:2
5. Determination of the rate of drying for given food products/samples using tray dryer and vacuum dryer. Contact Hours:2
6. To determine the rate of drying for rotary dryer for different air flow rates & different air inlet temperatures. Contact Hours:2
7. To Study the operation of freeze drying process. Contact Hours:2
8. To concentrate the sodium carbonates using Calandria Evaporator. Contact Hours:2
9. To concentrate the sodium chloride using Rotary Vacuum Evaporator. Contact Hours:2
10. To Study the operation of Plate and Frame Filter Press. Contact Hours:2
11. To Study the performance of a rotary drum filter under vacuum. Contact Hours:2

Subject Code: UFET573 **Credit: 02**
Subject Name: Process Equipment Drawing **L-T-P: 0-0-2**
Total Contact Hours :20
List of Experiments:

1. Experiment: Draw the design of shell and tube heat exchanger with 13 no. of tubes given tube diameter 5mm, length of the tube as 30 cm and distance between the tube is 4 mm. Contact Hours:2
2. Experiment: Draw the design of a typical reaction vessel with diameter of 14 cm and length 30 cm. Contact Hours:2
3. Experiment: Draw the design and tube layout of short tube vertical evaporator with a central down comer and 16 no. of tubes. The diameter of the tubes should be 4 mm, height of the tube 10 cm and the length of the evaporator is 30 cm. Contact Hours:2
4. Experiment: Draw the design of long tube vertical evaporator with 10 no. of tubes, distance between the tubes is 3mm with diameter 5 mm and length 30 cm. Contact Hours:2
5. Experiment: Draw the design of steam jacketed kettle with diameter 25 cm. Contact Hours:2
6. Experiment: Draw the design of vertical autoclave with diameter of 16 cm and length 30 cm. Contact Hours:2
7. Experiment: Draw the design of rotary dryer giving diameter of the drying chamber as 13 cm and length as 35 cm. Contact Hours:2
8. Experiment: Draw the design of boiler with 5 no. of water tubes (L=18 cm, B= 1 cm), steam chamber (diameter = 7 cm). Contact Hours:2
9. Experiment: Draw the design of spray dryer with drying chamber diameter (11 cm), cyclone separator diameter (4 cm). Contact Hours:2
10. Draw the design of Gate valve. Contact Hours:2

Subject Code: UFET574 **Credit: 02**
Subject Name: Transfer Process Engineering Lab **L-T-P: 0-0-2**
Total Contact Hours :20
List of Experiments:

1. To verify Bernoullis equation experimentally. Contact hours:2
2. To determine the Reynolds number. Contact hours:2
3. To determine the co-efficient of discharge for venturimeter. Contact hours:2
4. Study of centrifugal pump characteristics.Contact hours:2
5. To study about the shell and tube, tubular and plate type heat exchanger.Contact hours:2
6. To calculate the overall heat transfer co-efficient of tubular heat exchanger. Contact hours:2
7. To calculate the overall heat transfer co-efficient of shell and tube heat exchanger Contact hours:2
8. To study the process of distillation experimentally.Contact hours:2
9. Determine the efficiency of rotary vacuum evaporator.Contact hours:2
10. Determine the viscosity of different type of fluid. Contact hours:2

Central Institute of Technology Kokrajhar

Dept. of Computer Science and Engineering

B. Tech Syllabus (5th Semester)

Subject Code	Subject Name	Type	L	T	P	C
UCSE501	Computer Network	Compulsory	3	0	0	6
UCSE502	Operating System	Compulsory	3	0	0	6
UCSE503	Formal Language and Automata Theory	Compulsory	3	0	0	6
UCSE511	Information Theory and Coding	Professional Elective	3	0	0	6
UCSE512	Advance Computer Architecture	Professional Elective	3	0	0	6
UCSE513	Artificial Intelligence	Professional Elective	3	0	0	6
UCSE514	Web and Internet Technology	Professional Elective	3	0	0	6
UHSS501	Industrial Management and Entrepreneurship	Compulsory	3	0	0	6
UCSE571	Computer Network Lab	Compulsory	0	0	3	3
UCSE572	Operating System Lab	Compulsory	0	0	3	3
UCSE573	Hardware Lab	Compulsory	0	1	3	5
Total Contact Hours			15	1	9	41

[Note: Only one of the professional electives mentioned above can be selected]

Detailed Syllabus:

Computer Network (UCSE501)

L-T-P: 3-0-0
Credits: 6

Prerequisites:Programming for Problem Solving (UCSE201)

Module 1: Introduction [4L]
History of networking, OSI, TCP/IP and other networks models, Examples of Networks:Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

Module 2: Physical Layer [6L]
Design issues, physical media introduction, transmission media, types of media, guided media,unguided media, copper, twisted pair, coaxial cables, UTP, STP, fiber-optic cables, workingprinciple of fiber optic cables, wireless, microwave, satellite, switching and encodingasynchronous communications; Narrow band, broadband, ISDN and ATM.

Module 3: Data link layer [6L]
Design issues, framing, error detection and correction, CRC, Elementary Protocol stop and wait,Sliding Window, Slip, Data link layer in HDLC, Internet, ATM. Data Link sublayers, ALOHA,MAC, LLC, MAC addresses, CSMA, CSMA/CD. IEEE 802.X Standard Ethernet, wirelessLANS. Bridges.

Module 4: Network Layer [8L]
Design issues, packet structure, IP addressing, different versions of IP address, classes of IP,concept of private/public IP, subnetting, CIDR, virtual circuit and datagram subnets-Routing,routing algorithm, routing protocols, distance vector routing protocol, link state routing protocol,routing information protocol and its versions, shortest path routing, flooding, hierarchicalrouting, broadcast, multicast, anycast, dynamic routing. Congestion, Congestion ControlAlgorithms – General Principles – of Congestion prevention policies. Internetworking: TheNetwork layer in the internet and in the ATM Networks.

Module 5: Transport Layer [6L]
Design issues, Transport Services, Connection management, three-way handshaking protocols,TCP and UDP protocols; ATM AAL Layer Protocol, socket, port, client/server communication.

Module 6: Application Layer [5L]
HTTP, SMTP, POP, IMAP, DHCP, DNS, FTP, Telnet, Network Security, TLS, SSL, WWW.

TEXT BOOKS:
1. Computer Networks — Andrew S Tanenbaum,4th Edition. PearsonEducation/PHI
2. Data Communications and Networking – Behrouz A. Forouzan.Third EditionTMH.

REFERENCES:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, PearsonEducation
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

Operating System (UCSE502)

L-T-P: 3-0-0
Credits: 6

Module 1: Introduction [3L]
Introduction: Objectives and functions of OS, Evolution of Operating Systems,

Module 2: Process [4L]
Structuraloverview Process description and control: Process states, Process description, Processcontrol, Process and threads, Examples of process description

Module 3: CPU Scheduling [6L]
Uniprocessorscheduling: Types of CPU scheduling, CPU Scheduling algorithms.

Module 4: Process Synchronization [6L]
Concurrency: Principles of concurrency, mutual exclusion, Software and Hardwareapproaches, Semaphores, Monitors, Message passing, readers/writers problem, Dining philosopher's problem.

Module 5: Deadlock [4L]
Principles of deadlock, Deadlock prevention, Detection and avoidance,

Module 6: Memory Management [7L]
Memory management requirements, Loading program into mainmemory, Virtual memory, Hardware and control structures, OS software, Examples ofmemory management.

Module 7:I/O and Disk[7L]
I/O management and disk scheduling

Module 8: File Management [5L]
File management and security: Overview of filemanagement, File organization and access, File directories, File sharing, Record blocking,Secondary storage management, Case study: Unix file system, inodes, inode assignment to anew file, super block.

Text Books:
1. A. Silbershatz, P.B. Galvin and Gagne, "Operating System Concepts", Addison- Wesley,2005.
2. Maurice J. Bach "The design of the UNIX operating system", Eastern Economy Edition,Prentice Hall of India Pvt. Ltd., New Delhi, 2004.

Reference Books:
1. A. S. Tanenbaum "Operating System Design and Implementation", 3rd Ed., Practice Hallof India, 2004.
2. W. Stalling, "Operating Systems: Internals and Design Principles", 5th Ed., Prentice Hallof India, 2007.

3. H. N. Dietel “An Introduction to Operating Systems”, Addison Wesley, 1990.

Formal Language and Automata Theory (UCSE503)

L-T-P: 3-0-0

Credits: 6

Prerequisite:
UMA302 – Discrete Mathematics

Module 1: Introduction [2L]
Finite Sets, Power Set, Cardinality of finite sets, Cartesian Product, Set operations, Properties of Sets, Functionsand Relations, Countability, Graph, Tree, Transition system, Transition diagram.

Module 2: Finite State Machine [4L]
Definition, Alphabet, String, Language, Formal language, Natural language, Concepts of DFA and NFA withexamples, Regular language, Conversion of NFA to DFA, minimization of FSM, Mealy and Moore Machine.

Module 3: Regular Language [4L]
Regular set, expression, Arden’s theorem, Finite Automata construction from a regular expression, Conversion ofFinite Automata to Regular expressions. Non regular language, Pumping lemma of regular language, closureproperties of regular language.

Module 4: Introduction to Grammar [5L]
Definition, regular grammar, right and left linear grammar, equivalence between regular linear grammar and FA,inter conversion, Context free grammar, derivation trees, sentential forms, right most and leftmost derivation ofstrings, left recursion, left factoring.

Module 5: Context Free Grammars [5L]
Ambiguity in context free grammars. Minimization of Context Free Grammars. Chomsky normal form, Greibacknormal form, Pumping Lemma for Context Free Languages. Enumeration of properties of CFL (proofs omitted).

Module 6: Push Down Automata [5L]
Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by emptystate and its equivalence. Equivalence of CFL and PDA, interconversion. (Proofs not required). Deterministic andNondeterministic PDA.

Module 7: Turing Machine [4L]
Turing Machine, definition, model, design of TM, Computable functions, recursive, recursively enumerablelanguages. Church’s hypothesis, counter machine, types of Turing machines (proofs not required), Turingmachine as a transducer.

Module 8: Computability Theory [6L]
Chomsky hierarchy of languages, linear bounded automata and context sensitive language, LR(0) grammar,decidability of, problems, Universal Turing Machine, undecidability of posts. Correspondence problem, Turingreducibility, Definition of P and NP problems, NP complete and NP hard problems.

Text Books:
1. An Introduction to Formal Languages and Automata - Peter Linz, Sixth Edition.
2. Introduction to Automata Theory Languages and Computation, Hopcroft H.E. and Ullman J. D. PearsonEducation

References:
1. Theory of Computer Science – Automata languages and computation -Mishra and Chandrashekaran, 2nd edition, PHI
2. Introduction to languages and the Theory of Computation,John C Martin, TMH
3. Elements of Theory of Computation, Lewis H.P. & Papadimition C.H. Pearson /PHI
4. Introduction to Theory of Computation –Sipser 2nd edition Thomson

Information Theory and Coding (UCSE511)

L-T-P: 3-0-0

Credits: 6

Prerequisites:
UCSE302 Discrete Mathematics
UCSE403 Design and Analysis of Algorithms

Module 1:Information Theory [12L]
Entropy, its characterization and related properties, Huffman codes, Shannon-Fano coding,robustness of coding techniques, Information measure-noiseless coding, discrete memorylesschannel – channel capacity, fundamental theorem of information theory.

Module 2: Coding Theory [12L]
Error correcting codes: minimum distance principles, Hamming bound, general binary code,group code, linear group code, Convolution encoding: algebraic structure, Gilbert bound, Threshold decoding: threshold decoding for block codes, Cyclic binary codes: BCH codes, generalized BCH code and decoding, optimum codes,concepts of non-cyclic codes.

Module 3: Combinatorial Designs [10L]
Definitions of BIBD, Hadamard Designs, Latin Squares, Mutually Orthogonal Latin Squares,Orthogonal Arrays.Constructions of codes using designs: Example: Hadamard codes.

Module 4: Network Coding [11L]
Fundamentals of Network Coding: Butterfly networks, graphs and networks, The max-flow min-cut theorem, the multi-source multicast problem, deterministic codedesign for network coding, randomized network coding application of network coding

Texts / References:
1. J. A. Thomas and T. M. Cover: Elements of information theory, Wiley, 2006.
2. J. H. van Lint: Introduction to Coding Theory, Third Edition, Springer, 1998.
3. F. J. MacWilliams and N.J. Sloane: Theory of Error Correcting Codes, Parts I and II,North-Holland, Amsterdam, 1977.
4. D. Stinson: Combinatorial Designs: Constructions and Analysis, Springer, 2003
5. P. J. Cameron and J. H. van Lint: Designs, Graphs, Codes and their Links, CambridgeUniversity Press, 2010.
6. C. Fragouli and E. Soljanin: Network Coding Fundamentals, Now Publisher, 2007.
7. M. Medard and A. Sprintson, (editors): Network Coding – Fundamentals andApplications, Acadamic Press, 2012.
8. C. Fragouli, J. Le Boudec, J. Widmer: Network coding: An instant primer
9. W. Ryan and S. Lin, Channel Codes: Classical and Modern, Cambridge UniversityPress, 2009.
10. R. B. Ash, Information Theory, Dover Publications, 1990.
11. D. J. Mackay, Information Theory, Inference and Learning Algorithms, CambridgeUniversity Press, 2003.

Advance Computer Architecture (UCSE512)

L - T - P: 3 - 0 - 0

Total Credits: 6

Prerequisites:
1. UCSE401 - Computer Organization and Architecture
2. UECE306 - Digital Electronics and Logic Design

Module 1: Introduction[4L]
Fundamentals of computer Design, Technology trends, Cost performance analysis.

Module2:**Parallel Architecture [3L]**
Parallel processing architectures, Flynn's classification, PRAM model.

Module3: **Pipelined Architecture [8L]**
RISC philosophy and overview of pipelined architecture. Performance evaluation of pipelined architecture. Limitations of scalar pipelines, Pipeline Hazards and Analysis, Branch Prediction, MIPS Pipeline for Multi-Cycle Operations.

Module4:ILP[7L]

Instruction level parallelism, Limitations.

Module5: Multiprocessor based Architecture [8L]
Multiprocessor and Thread Level Parallelism,

Module6: superscalar architecture [6L]
Dynamic pipelines, superscalar techniques, performance evaluation of superscalar architectures, VLIW architecture, data-level parallelism.

Module7: Memory system design [5L]
Introduction, Optimization of cache, Virtual memory and Virtual machines, Fallacies and pitfalls.

Module8: Storage system design [4L]
Introduction, Faults and failures, I/O performance.

Books:
Computer Architecture - A Quantitative Approach,5th edition, John L. Hennessy, David A. Patterson.
Computer Architecture and Parallel Processing- Kai Hwang and A. .Brigggs International Edition, McGraw Hill
Advanced Computer Architecture: D. Sima, T. fountain, P. Kacsuk, Pearson
Parallel Computer Architecture: D. Culler, J.P.Singh, A.Gupta, Elsevier

Artificial Intelligence (UCSE513)

L - T - P: 3 - 0 - 0

Total Credits: 6

Prerequisites:
UCSE302 Discrete Mathematics
UCSE403 Design and Analysis of Algorithms

Module 1: Introduction [3L]
AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept ofrationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

Module 2: Searching [8L]
Searching for solutions, uninformed search strategies – Breadth first search, depth first search, Depth limitedsearch, Iterative deepening depth first search bi-direction search - comparison. Search with partial information(Heuristic search) Greedy best first search, A* search, Memory bounded heuristic search, Heuristic functions.Local search Algorithms, Hill climbing, simulated, annealing search, local beam search, genetic algorithms.

Module 3: Game Playing [5L]

Adversarial search, Games, minimax, algorithm, optimal decisions in multiplayer games, Alpha-Beta pruning,Evaluation functions, cutting of search.

Module 4: Knowledge Representation & Reasons logical Agents [9L]
Knowledge – Based Agents, the Wumpus world, logic, propositional logic, Resolution patterns in propositionallogic, Resolution, Forward & Backward Chaining.First order logic. Inference in first order logic, propositional vs. first order inference, unification & lifts, forwardchaining, Backward chaining, Resolution

Module 5: Planning [5L]
Classical planning problem, Language of planning problems, Expressiveness and extension, planning with state–space search, Forward states spare search, Backward states space search, Heuristics for state space search.Planning search, planning with state space search, partial order planning Graphs.

Module 6: Learning [4L]
Forms of learning, Induction learning, Learning Decision Tree, Statistical learning methods, learning withcomplex data, learning with Hidden variables – The EM Algorithm, Instance Based learning, Neural Networks.

Text Book:
1. Artificial Intelligence – A Modern Approach. Second Edition, Stuart Russel, Peter Norvig, PHI/PearsonEducation.
2. Artificial Intelligence, 3rd Edition, Patrick Henry Winston., Pearson Edition.

Web and Internet Technology (UCSE514)

L - T - P: 3 - 0 - 0

Total Credits: 6

Module1: Web Basics and Overview[6L]
Introduction to Internet, World Wide Web, Web browser,Web server, Internet services, Web services, URL, DNS.Internet communication protocols such as HTTP and its different versions, FTP,SMTP, POP, MIME, Email Privacy such as Pretty Good Privacy (PGP), and PrivacyEnhanced Email (PEM).

Module2: Client/Server Computing[6L]
What is C/S Computing, Fat client VS Fat Servers, N-tieredSoftware Architecture, Middleware, Distributed Object Models such Common ObjectRequests Broker Architecture (CORBA), Distributed Component Object Model(DCOM), Java Remote Method Invocation (JRMI) and Enterprise Java Bean (EJB).

Module3: Markup Languages and their Grammars[5L]

SGML, HTML, XHTML, XML, XSL, CSS, Document type definition, Object Models, Presenting XML, Using XML Processors:DOM and SAX.

Module4:Client-Side programming[12L]
HTML, CSS, JavaScript, AJAX, jQuery, Server-Side programming: PHP, JSP, ASP, CGI, Web Database Connectivity, Overview of Java, JAVA Applet, JAVA Servlets.Overview of Bootstrap, BS Grids

Module5: **Web Browser[6L]**
Browser Architecture, Document Object Model (DOM), DOM Tree,Render Tree, Rendering Engine and its use on various browsers, case study onbrowser architectures of Mozilla Firefox, Google Chrome, and IE.Web Server Apache Architecture: Web Server Architecture, Server Features,Configuration of Apache and IIS.

Module 6: Web Security[5L]
Web security threats, Firewalls, Proxy Servers, Cryptography, DigitalSignature, Digital Certificates, Secure Socket Layer (SSL), S-HTTP, SecureElectronic Transaction (SET), 3D Secure Protocol.

Text Books:
1. Web Technologies: A Computer Science Perspective by Jaffrey C. Jackson, Prentice Hall,2007
2. Web Technologies: TCP/IP to Internet Application Architecture by Achyut S. Godbole andAtul Kahate, Tata McGraw-Hill Education, 2003, 5th Reprint 2006
3. Robert W Sebesta, “Programming the World Wide Web”, Pearson Education, 2013

Reference Books:
1. Dynamic Web Publishing Unleashed, Shelly Powers et al., 2nd Edition, Sams, 1997
2. Java 1.2 Unleashed, Jamie Jaworski, 4th Edition, Sams, 1998
3. CGI by Example, Jeffry Dwight et.al., Que, 1996.
4. Using Active Server Pages, Scot Johnson et.al., Que, 1997
5. Chris Bates, “Web Programming, building internet applications”, 2nd edition, John Wiley& Sons, 2002.

Industrial Management and Entrepreneurship (UHSS501)

L - T - P: 3 - 0 - 0

Total Credits: 6

Unit:1
Meaning and Concept of Management, Principles and function of Management, Concept of Organizational Behaviour, Function of a Manager—Planning, Organizing, Coordinating and Controlling, Motivation—implication of Managers and application. Leadership, Qualities and Styles of Leadership, Decision making process.

Unit:2

Individual Process in Organizations-Perception, attitude and personality, Factors that affect them, How they influence people. Group Process in Organizations, Group formation, Group effectiveness, Group Conflict.

Unit:3

Evolution, Role and Status of Human Resource Management in India. Recruitment and Selection Process in Organization- Job Analysis-Job Specification-Selection Process-Test and Interview. Trade Union and Collective Bargaining.

Unit:4

Entrepreneurship-Meaning, Types of entrepreneur, Qualities of an entrepreneur, Role of Entrepreneur,Factors affecting entrepreneurial growth. Entrepreneurship Development Programme-Concept, Objective and Importance, Engineer Entrepreneurship Training Programme Scheme, Modern Marketing, Tools for Entrepreneurs, Concept of Start –up and Process for generating start up.

Unit: 5

Small Scale Industry-Definition, Types of Small Scale Industry, How to Set up Small Scale Industry, Role and Problem of Small Scale Industry, Meaning of IPR , Concept of Joint Stock Company, Private and Public Limited Company, Source of Finance for Entrepreneur-Bank, Government and Financial Institutions etc.

Reference Books :

I) S.S. khanka-OrganisationalBehaviour ,S.Chand& Company , New Delhi
II) S.S.Sarkar, R.K.Sharma and S.K.Gupta – Business Organisation and Entrepreneurship Development, Kalyani Publishers , New Delhi
III) Arbinda Debnath – Principles of Management , BLG Publication , Guwahati
IV) L.M. Pradad - Principles and Practice of Management ,S.Chand& Company, New delhi
V) S.S. Khanka – Entrepreneurial Development ,S.Chand& Company , New-Delhi
VI) M.B. Shukla –Entrepreneurship and Small Business Management ,Kitab Mahal, Guwahati
VII) Kanchan Bhatia and Shweta Mittal – Management Concept and Practice ,Variety Books Publishers & Distributors
VIII) Arabinda Debnath – Industrial Management and Entrepreneurship , Kalyani Publishers

Computer Network Lab (UCSE571)

L-T-P: 0-0-3
Credits: 3

Unit 1: Introduction to Networks

Lab 1: Identify the different types of networks LAN, MAN, WAN in the campus and make areport
Lab 2: Identify and list out all the important devices of networking. Explore how the devices getconnected to each other and able to communicate with each other and make a report.
Lab 3: Setup a packet tracer in your lab/home computer and make a layout of network usingdifferent components

Unit 2: Physical Layer

Lab 4: Setup a LAN that can communicate among the virtual devices inside the packet tracer
Lab 5: Extend the LAN that is set up in Lab 4 for so that it works in the real world. Setup aphysical LAN network using UTP cables, RJ45, Crimpers, switch/hub and machines connectedusing this setup should communicate with each other.
Lab 6: Explore possibility of setting up fiber optic connection physically. Identify variouscomponents required for setting up a fiber optic connection.

Unit 3: Data link layer
Lab 7: Using packet tracer/wireshark identify the data link layer frame structure
Lab 8: Perform some lab work that demonstrates MAC, ARP etc.

Unit 4: Network Layer
Lab 9: Create a network and multiple subnetworks in the packet tracer and make them able tocommunicate with each other.
Lab 10: Lab that demonstrate routing in the packet tracer
Lab 11: Configure routing with various protocols like RIP, BGP, EGP etc

Unit 5: Transport Layer
Lab 12: Write a C/C++/Java program to demonstrate socket programming
Lab 13: Write a program to demonstrate client/server communication protocol

Unit 6: Application
Lab 14: Configure an SMTP/IMAP/POP to send/receive email, DHCP server to allocate IPaddresses, HTTP server to serve html documents, ftp to access files, ssh to access remote server.

References:
Software: CISCO Packet tracer, Boson NetSim
OS: Linux/Windows having specialised software installed for the specific purpose.
Application Softwares: DHCP Server, FTP Server: filezilla server, openftp, opensmtpd, HTTP-Apache, nginx, SSH-OpenSSH, termius,sshd,putty

Operating System Lab (UCSE572)

L-T-P: 0-0-3

Credits: 3

List of Programs:
1. Simple Unix-C (at least two) programs using system calls to read and write strings onstandard I/O devices and files.
2. Implementation of starting a new process, replacing a process image, duplicating aprocess image, waiting for a process, zombie process.
3. Implementation of the Dining Philosopher problem using shared memory and semaphore.

4. Implementation of a bounded-buffer problem using shared memory and semaphore.
5. Implementation of FCFS process scheduling techniques.
6. Implementation Shortest Job First (both preemptive and non-preemptive version)process scheduling techniques.
7. Implementation Round Robin process scheduling techniques.
8. Implementation for simulating page replacement algorithms like FIFO, Optimal andLRU.
9. Implementation of threads using POSIX or using thread class in Java.
10. Implementation of (at least one) deadlock avoidance techniques.

Text Books:

1. Stevens, “UNIX programming”, Pearson Education, Pearson Education, 2004.

Hardware Lab (UCSE573)

L-T-P: 0-1-3

Credits: 5

HDL: Verilog/VHDL

List of experiments:

1. Realization of basic digital circuits: Half adder, Full Adder, Ripple Carry Adder, Adder/Subtractor, Multiplexer/Demultiplexer.
2. Complex Arithmetic Units:Carry Lookahead Adder, Unsigned Multiplication, Signed Multiplication, Systolic Array Multiplication, Division
3. Realization of Logic Units: 16 bits greater than, 16 bits less than, 16 bit equals to
4. Development of a 16-bit ALU

Books:

The Verilog® Hardware Description Language 5th Edition by Donald E. Thomas , Philip R. Moorby

B. Tech Electronics & Communication Engineering Syllabus Structure and Details (July 2020 onwards)

Course No.	Course Name	L	T	P	C	Course No.	Course Name	L	T	P	C
Semester I						**Semester II**					
UPH101	Engineering Physics	3	1	0	8	UCH201	Engineering Chemistry	3	1	0	8
UMA101	Engineering Mathematics-I	3	1	0	8	UMA201	Engineering Mathematics-II	3	1	0	8
UEE101	Basic Electrical Engineering	3	1	0	8	UCSE201	Programming for Problem Solving	4	1	0	10
UHSS101	English Communication	2	0	0	4	UCE201	Engineering Drawing and Computer Graphics	1	0	0	2
UME101	Engineering Workshop	1	0	0	2	UHSS201	Professional Ethics and Human Value	2	0	0	4
UPH171	Engineering Physics Lab	0	0	3	3	UCH271	Engineering Chemistry Lab	0	0	2	2
UEE171	Basic Electrical Engineering Lab	0	0	2	2	UCSE271	Programming for Problem Solving Lab	0	0	3	3
UHSS171	English Communication Practice	0	0	2	2	UCE271	Engineering Drawing and Computer Graphics Lab	0	0	4	4
UME171	Workshop Practice	0	0	4	4						
Contact Hours: 26		**12**	**3**	**11**	**41**	**Contact Hours: 25**		**13**	**3**	**9**	**41**
Semester III						**Semester IV**					
UECE301	Electronic Devices	3	0	0	6	UECE401	Analog and Digital Communication	3	0	0	6
UECE371	Devices & Network Lab	0	0	2	2	UECE471	Analog and Digital Communication Lab	0	0	2	2
UECE302	Digital System Design	3	0	0	6	UECE402	Analog Circuits	3	0	0	6
UECE372	Digital System Design Lab	0	0	2	2	UECE472	Analog Circuits Lab	0	0	2	2
UECE303	Signals and Systems	3	0	0	6	UECE403	Microcontrollers	3	0	0	6
UECE304	Network Theory	3	0	0	6	UECE473	Microcontrollers Lab	0	0	2	2
UCSE306	Data Structure using C	3	0	0	6	UMA401	Numerical Methods and Computer Programming	3	0	0	6
UCSE376	Data Structure using C lab	0	0	2	2	UMA471	Numerical Methods and Computer Programming Lab	0	0	2	2
UHSS371	Group Discussion	0	0	2	2	UCSE401	Data Base Management System	2	0	0	4
UECE305 *	Slot for MC ****										
Total Contact Hours: 23		**15**	**0**	**8**	**38**	**Total Contact Hours: 23**		**15**	**0**	**8**	**38**
Semester V						**Semester VI**					
UECE501	Electromagnetic Waves	3	0	0	6	UECE601	VLSI Design	3	0	0	6
UECE571	Electromagnetic Waves Lab	0	0	2	2	UECE602	Computer Network	3	0	0	6
UECE502	Control Systems	3	0	0	6	UECE672	Computer Network Lab	0	0	3	3
UECE503	Digital Communication Systems and Stochastic Process	3	0	0	6	UECE673	VLSI Design lab	0	0	3	3
UECE504	Digital Signal Processing	3	0	0	6	UECE694	Mini Project/ Electronic Design workshop	0	0	4	4
UECE574	Digital Signal Processing Lab	0	0	2	2	UECE615	A. Antennas and Propagation B. Speech and Audio Processing	3	0	0	6
UECE515	A. Nano Electronics B. System Design using HDL C. Linear IC and Systems	3	0	0	6	UECE616 (OE-2)	A. Digital Image Processing B. Power Electronics C. Automotive Electronics	3	0	0	6
UECE516 (OE-1)	A. Bio-Medical Electronics B. Introduction to MEMS C. Optimization Theory	3	0	0	6	UHSS601	Engineering Economics	3	0	0	6
Total Contact Hours: 22		**18**	**0**	**4**	**40**	**Total Contact Hours: 25**		**15**	**0**	**10**	**40**
Semester VII						**Semester VIII**					
UECE711	A. Microwave Theory and Techniques B.	3	0	0	6	UECE811	A. Optical Communication B. Spread Spectrum Communication	3	0	0	6
UECE712	A. Wireless & Mobile Communication B. Wireless Sensor Networks	3	0	0	6	UECE812	A. Information Theory and Coding B. Error correcting codes C. Signal Detection and Estimation Theory	3	0	0	6
UECE713 (OE-3)	A. Adaptive Signal Processing B. Satellite Communication C. Cryptography and Network Security	3	0	0	6	UECE813 (OE-5)	A. Computer Vision B. RADAR and Electronic Navigation Systems	3	0	0	6
UECE714 (OE-4)	A. Embedded systems B. Wavelets C. Machine Learning	3	0	0	6	UECE814 (OE-6)	A. Mixed Signal Design B. High Speed Electronics C. Analog IC Design	3	0	0	6

							D. RFIC				
ECE795	Project Stage-I	0	0	8	8	UECE895	Project Stage-II	0	0	8	8
ECE796	Industrial Training	0	0	2	2	UECE896	Seminar	0	0	4	4
UHSS701	Industrial Management	3	0	0	6	UECE897	Grand Viva	0	0	4	4
Contact Hours: 25		**15**	**0**	**10**	**40**	**Contact Hours: 28**		**12**	**0**	**16**	**40**
Total Mandatory Credits: 318											

Semester V

ECE501	Electromagnetic Waves	3L: 0T: 0P	6 credits

Introduction **(1L)**

Module: 1 - Basics of Vector Analysis – orthogonal Coordinate Systems, Transformations of coordinate systems; Del operator; Gradient, Divergence, Curl – their physical interpretations; Laplacian operator. **(5L)**

Module: 2 - Coulomb's law, electric field intensity, charge distribution. Gauss' law, flux density and electric field intensity. Divergence theorem. Current Densities, Conductors, Poisson's & Laplace's equations, Uniqueness theorem, Biot-Savart law, Ampere's law, Relation between J & H, Vector magnetic Potential, Stokes' theorem. **(8L)**

Module: 3 - Faraday's law & Lenz's law, Displacement Current, $J_C - J_D$ relation, Maxwell's equations, Time-harmonic fields, Wave Equation, Boundary Conditions between media interface; Uniform Plane wave; Wave Propagation in Lossy Dielectric, Loss-less Dielectric, Free space. Poynting Theorem, Power flow, Poynting vector, Skin Depth, Surface Resistance, Reflection and Transmission of wave for normal incidence **(12L)**

Module: 4 - Transmission Lines: Concept of Lump parameters and Distributed parameters, Line Parameters, Transmission line equations and solutions, Physical significance of the solutions. Propagation constant, Characteristic Impedance; Wavelength; Velocity of Propagation; Distortion-less Line Reflection and Transmission coefficients; Standing Waves, VSWR, Input Impedance, Smith Chart Applications; Load Matching Techniques. **(12L)**

Module: 5 - Types of transmission lines (open 2-wire, coaxial, microstrip), applications and limitations. **(2L)**

Total: 40L

Text/Reference Books:

1. Electromagnetic Waves & Radiating Systems, 2nd Edition – E. C. Jordan and K.G. Balmain, Pearson Education
2. Elements of Electromagnetics, 4th Edition – Matthew N O Sadiku Oxford University Press
3. Engineering Electromagnetics, 2ed Edition - Nathan Ida Springer India
4. R.K. Shevgaonkar, Electromagnetic Waves, Tata McGraw Hill India, 2005
5. E.C. Jordan & K.G. Balmain, Electromagnetic waves & Radiating Systems, Prentice Hall, India
6. Narayana Rao, N: Engineering Electromagnetics, 3rd ed., Prentice Hall, 1997.
7. David Cheng: Electromagnetics, Prentice Hall

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Understand characteristics and wave propagation on high frequency transmission lines
2. Carryout impedance transformation on TL
3. Use sections of transmission line sections for realizing circuit elements
4. Characterize uniform plane wave
5. Calculate reflection and transmission of waves at media interface

UECE571: Electromagnetic Waves Lab [0L: 0T: 2P] (02 credits)
Total contact hours: 02/Week
Hands-on experiments related to the course contents **UECE501**

UECE502	Control Systems	3L: 0T: 0P	6 credits

Module: 1 - Introduction to control problem- Industrial Control examples. Transfer function. System with dead-time. System response. Control hardware and their models: potentiometers, synchros, LVDT, dc and ac servomotors, tacho-generators, electro hydraulic valves, hydraulic servomotors, electro pneumatic valves, pneumatic actuators. Closed-loop systems. Block diagram and signal flow graph analysis. **(8L)**

Module: 2 - Time response of first, second and higher order systems to impulse, step and ramp inputs, Time response specifications, types of systems, steady state error and error constants. Basic control action and automatic controllers, Effect of P, I, D, PI, PD and PID controllers on system performance, Sensitivity of system**.** **(6L)**

Module: 3 - Concept of stability, necessary condition for stability, absolute and relative stability, Routh Hurwitz criterion, Construction of Root loci and its application, Stability analysis of electrical systems. **(8L)**

Module: 4 - Polar plots, Bode plot, stability in frequency domain, Nyquist plots. Nyquist stability criterion. Performance specifications in frequency-domain. Frequency domain methods of design, Compensation & their realization in time & frequency domain. Lead and Lag compensation. **(10L)**

Module: 5 - Concepts of state, state variable, state model, state models for linear continuous time functions, diagonalization of transfer function, solution of state equations, concept of controllability & observability. **(8L)**

Total: 40L

Text/Reference Books:

1. Modern control system – Ogata
2. Automatic control system – B.C. Kuo
3. Modern control system – Nagrath & Gopal
4. Control system design – Graham C. Goodwin
5. Linear control system - B. S. Manke

Course Outcomes

At the end of this course students will demonstrate the ability to

1. learn about closed loop control sytems
2. know time domain response analysis of control systems
3. analyze the stability of control systems
4. understand state variable analysis, controllability and observability.

UECE503	Digital Communication Systems and Stochastic Process	3L: 0T: 0P	6 credits

Module: 1 - Review of probability and random process. Pulse modulation: Sampling process. Pulse Amplitude and Pulse code modulation (PCM), Differential pulse code modulation. Delta modulation, Noise considerations in PCM, Time Division multiplexing, Line coding: PSD of various line codes. Pulse shaping, Nyquist criterion for zero ISI. **(10L)**

Module: 2 – Optimum detection of signals in noise, Coherent communication with waveforms- Probability of Error evaluations. Baseband Pulse Transmission- Inter symbol Interference and Nyquist criterion. Pass band Digital Modulation schemes- Phase Shift Keying, Frequency Shift Keying, Quadrature Amplitude Modulation. The optimum filter, matched filter, probability of error using matched filter, coherent reception, non-coherent detection of FSK, calculation of error probability of ASK, BPSK, BFSK, QPSK. **(10L)**

Module: 3 – Specification of a random process, Autocorrelation function of a random process, Power Spectral Density of a random process, Transmission of random process through linear systems. Bandpass random process: Bandpass White Gaussian Random Process, Sinusoidal in Noise. Optimum filtering: Wiener-Hopf filter. **(8L)**

Module: 4 – Stochastic Processes: Stationary Processes, Cumulative Distribution Function and Probability Distribution function, First order stationary processes, Second order stationary processes. Correlation functions: The auto-correlation function, Wide-sense stationary processes and Ergodic processes, Linear filtering of stochastic processes: Basics of LTI filtering, Time domain description of filtering of stochastic processes: Mean value of the filter output, Autocorrelation functions of the output, Cross-correlation of the input and the output. Spectra of filter output. Spectrum of a random data signal. Probability density function of the envelope and phase of bandpass noise. **(12L)**

Total: 40L

Text/Reference Books:

1. H. Stark and J. Woods, ``Probability and Random Processes with Applications to Signal Processing," Third Edition, Pearson Education
2. A. Papoulis and S. Unnikrishnan Pillai, “Probability, Random Variables and Stochastic Processes,”' Fourth Edition, McGraw Hill.
3. Proakis J.G., “Digital Communications”, 4th Edition, McGraw Hill, 2000
4. Wozencraft J. M. and Jacobs I. M., “Principles of Communication Engineering", John Wiley, 1965.
5. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Investigate pulsed modulation system and analyze their system performance
2. Analyze different digital modulation schemes and can compute the bit error performance
3. Make use of theorems related to random signals and stochastic processes
4. To understand propagation of random signals in LTI systems.

UECE504	Digital Signal Processing	3L: 0T: 0P	6 credits

Module: 1 - Discrete time signals: Sequences; representation of signals on orthogonal basis; Sampling and reconstruction of signals; Discrete systems attributes, Z-Transform, Analysis of LTI systems, frequency Analysis, Inverse Systems, Discrete Fourier Transform (DFT). **(10L)**

Module: 2 - Fast Fourier Transform Algorithm, Implementation of Discrete Time Systems. **(5L)**

Module: 3 - Design of FIR Digital filters: Window method, Park-McClellan's method / Frequency-sampling method. Design of IIR Digital Filters: Butterworth, Chebyshev and Elliptic Approximations; Low pass, Band pass, Band stop and High pass filters. **(10L)**

Module: 4 - Parametric and non-parametric spectral estimation. **(5L)**

Module: 5 - Effect of finite register length in filter design (IIR or FIR - any one of the two). **(5L)**

Module: 6 - Introduction to multirate signal processing. **(5L)**

Total: 40L

Text/Reference Books:

1. S.K.Mitra, Digital Signal Processing: A computer based approach.TMH
2. A.V. Oppenheim and Schafer, Discrete Time Signal Processing, Prentice Hall, 1989.
3. John G. Proakis and D.G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, Prentice Hall, 1997.
4. L.R. Rabiner and B. Gold, Theory and Application of Digital Signal Processing, Prentice Hall, 1992.
5. J.R. Johnson, Introduction to Digital Signal Processing, Prentice Hall, 1992.
6. D.J. De Fatta, J. G. Lucas and W.S. Hodgkiss, Digital Signal Processing, John Wiley & Sons, 1988.

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Represent signals mathematically in continuous and discrete time and frequency domain
2. Get the response of an LSI system to different signals
3. Design of different types of digital filters for various applications

UECE574: Digital Signal Processing Laboratory [0L: 0T: 2P] (02 credits)
Total contact hours: 02/Week
Hands-on experiments related to the course contents **UECE504**

UECE515	A. Nano Electronics	3L: 0T: 0P	6 credits

Module: 1 - Introduction to nanotechnology, meso-structures, Basics of quantum mechanics: Schrodinger equation, Density of states. **(7L)**

Module: 2 - Particle in a box Concepts, Degeneracy. Band theory of solids. Kronig-Penny model. Brillouin zones. **(8L)**

Module: 3 - Shrink-down approaches: Introduction, CMOS Scaling, The nanoscale MOSFET, Finfets, Vertical MOSFETs, limits to scaling, system integration limits (interconnect issues etc.), Resonant Tunneling Diode, Coulomb dots, Quantum blockade. **(12L)**

Module: 4 - Single electron transistors, Carbon nano-tube electronics, Band-structure and transport, devices, applications, 2D semiconductors and electronic devices. **(10L)**

Module: 5 - Graphene, atomistic simulation. **(3L)**

Total: 40L

Text/ Reference Books:

1. G.W. Hanson, Fundamentals of Nanoelectronics, Pearson, 2009.
2. W. Ranier, Nanoelectronics and Information Technology (Advanced Electronic Material and Novel Devices), Wiley-VCH, 2003.
3. K.E. Drexler, Nanosystems, Wiley, 1992.
4. J.H. Davies, The Physics of Low-Dimensional Semiconductors, Cambridge University Press, 1998.
5. C.P. Poole, F. J. Owens, Introduction to Nanotechnology, Wiley, 2003.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand various aspects of nano-technology and the processes involved in making nano components and material.
2. Leverage advantages of the nano-materials and appropriate use in solving practical problems.
3. Understand various aspects of nano-technology and the processes involved in making nano components and material.
4. Leverage advantages of the nano-materials and appropriate use in solving practical problems.

UECE515	B. System Design using HDL	3L: 0T: 0P	6 credits

Module: 1 – Introduction: Introduction to Reconfigurable Computing Systems: Objectives, Expectations, Logistics, characterization of Reconfigurable Computing & Reconfigurable Hardware, Reconfigurable Software **(8L)**

Module: 2 – Verilog: Lexical conventions - comments, identifiers, numbers, strings. Data types: nets, registers, vectors, arrays. Parameter types. Operators. Operator types, precedence.
Behavioral modeling blocks: always block, event-based timing control, branch statements, case, casex, casez. Procedural assignments: blocking and non-blocking. Data flow modeling. Assign statements. Delays. Implicit net declaration. Regular, implicit continuous assignment and net declaration delay. Logic statement implementation. The conditional operator.
Gate level modeling. Gate types: and/or, buf/not gates, bufif/notif gates. Gate truth tables. Gate delays. Specify block. UDP. Ports. Port connection rules: by order and name.
Switch level modeling. Primitives. Use of trireg. Testbench creation. Initial block. Delay-based timing control. **(15L)**

Module: 3 – System Verilog: Overview and history of Verilog and System Verilog, System Verilog Syntax and Semantics, Programming Statements and Operators, Modeling RAMs and ROMs **(7L)**

Module: 4 - Verilog-A: Language Tokens, Verilog-A Keywords , Analog Operator Keywords , System Tasks and Functions**,** Built-In Mathematical Functions, Analog Operators, Signals, Analog Behavior. **(6L)**

Module: 5 - System design methodology: Finite-State Machine, RTL Design, RTL Implementation Options, A Case Study: Liquid-Crystal Displays. **(4L)**

Total: 40L

Text/ Reference Books:

1. Jha, N. K.; Gupta, S. Testing of Digital Systems; Cambridge University Press: Cambridge, UK, 2003
2. Ghosh, S. K. Hardware Description Languages: Concepts and Principles; Wiley-IEEE Press: Hoboken, NJ, USA, 1999
3. M. Ciletti, Advanced Digital Design with the Verilog(TM) HDL. (Prentice Hall, Upper Saddle River, NJ, 2002).
4. M. Morris R. Mano, Michael D. Ciletti, Digital Design: With an Introduction to the Verilog HDL, VHDL, and SystemVerilog, 6th Edition, 2018
5. Ronald W. Mehler, Digital Integrated Circuit Design Using Verilog and Systemverilog, Newnes, 2014
6. Dan Fitz Patrick, "Analog Behavioral Modelling with the Verilog-A Language", Kluwer Academic Publishers
7. V. Pedroni. Finite State Machines in Hardware: Theory and Design (with VHDL and SystemVerilog). The MIT Press; 2013
8. Ming-Bo Lin, Digital System Designs and Practices: Using Verilog HDL and FPGAs, ISBN: 978-0-470-82323-1, 2008

Course Outcomes:

At the end of the course, students will demonstrate the ability to:
1. understand a reconfigurable computing systems.
2. understand Verilog and System Verilog.
3. understand system design methodology using Finite-State Machine and RTL design.

UECE515	C. Linear IC and Systems	3L: 0T: 0P	6 credits

Module: 1 - Introduction to Electronic system Design:
Design flow of Electronic systems, methodologies, Specifications, Electronic Products Classification: Consumer, Industrial and Military, Linear/Non linear, Analog signal conditioning, Choice of Op-Amps in signal conditioning applications.
Op-amp, In-Amps: Specifications, types of op-amps, Comparison different topologies, μA741 IC Internal schematics & discussions. (**12L**)

Module: 2 - Applications of Op-Amps:
Linear Applications: VCVS, VCCS, CCVS,CCCS implementation using Op-Amp, Differentiator , Integrator, Non Linear Applications: Clippers and Clampers, Precision rectifier, Log and Antilog amplifiers, Comparators, PWM signal generation using comparator, Series/Shunt Regulator using OP-AMP. Discussions on: LM 317, 78XX, 79XX. (**10L**)

Module: 3 - Data Acquisition & Conversion Systems:
Data Acquisition system and basics, Data Converters, Specifications, Types of D/A converters Current driven DAC, Types of A/D converters Flash, Single slope, Dual slope, Successive Approximation Register- Delta Sigma Modulation. (**8L**)

Module: 4 - Signal Generation using Op-Amps:
Types of Signal generators, Specifications of Oscillators, Relaxation Oscillators, sine wave oscillators. Circuits and explanations, PLL: case study (**10L**)

Total: 40L

TEXTBOOKS:

1. Lienig, Jens, Bruemmer, Hans. *Fundamentals of Electronic Systems Design,* Springer, 2007
2. Sergio Franco, Design With Operational Amplifiers and Analog Integrated Circuits, 4th edition, Mc-graw Hill
3. Bruce Carter Ron Mancini, Op Amps for Everyone, 5th Edition, Newnes, 2017
4. William D. Stanley, Operational Amplifiers With Linear Integrated Circuits, pearson , 2004
5. Behzad Razavi, Principles of Data Conversion System Design, Wiley-IEEE Press, 1995
6. Carusone, Johns, and Martin, Analog Integrated Circuit Design, 2nd edition, John Wiley, 2012

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. understand linear/non linear analog signal conditioning.
2. express the different applications of Op-Amp.
3. understand data acquisition & conversion systems.
4. understand signal generation using Op-Amps.

UECE516	A. Bio-Medical Electronics (OE-1)	3L: 0T: 0P	6 credits

Module: 1 - Brief introduction to human physiology. Biomedical transducers: displacement, velocity, force, acceleration, flow, temperature, potential, dissolved ions and gases. **(12L)**

Module: 2 - Bio-electrodes and bio-potential amplifiers for ECG, EMG, EEG, etc. **(8L)**

Module: 3 - Measurement of blood temperature, pressure and flow. Impedance plethysmography. Ultrasonic, X-ray and nuclear imaging. **(10L)**

Module: 4 - Prostheses and aids: pacemakers, defibrillators, heart-lung machine, artificial kidney, aids for the handicapped. Safety aspects. **(10L)**

Total: 40L

Text/Reference Books:

1. W.F. Ganong, Review of Medical Physiology, 8th Asian Ed, Medical Publishers, 1977.
2. J.G. Websster, ed., Medical Instrumentation, Houghton Mifflin, 1978.
3. A.M. Cook and J.G. Webster, eds., Therapeutic Medical Devices, Prentice-Hall, 1982.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand the application of the electronic systems in biological and medical applications.
2. Understand the practical limitations on the electronic components while handling bio-substances.
3. Understand and analyze the biological processes like other electronic processes.

UECE516	B. Introduction to MEMS (OE-1)	3L: 0T: 0P	6 credits

Module: 1 - Introduction and historical background, scaling effects. Micro/Nano Sensors, Actuators and Systems overview: Case studies. (**10L**)

Module: 2 - Review of Basic MEMS fabrication modules: Oxidation, Deposition Techniques, Lithography (LIGA) and Etching. Micromachining: Surface Micromachining, sacrificial layer processes, Stiction; Bulk Micromachining, Isotropic Etching and Anisotropic Etching, Wafer Bonding. (**10L**)

Module: 3 - Mechanics of solids in MEMS/NEMS: Stresses, Strain, Hookes's law, Poisson effect, Linear Thermal Expansion, Bending; Energy methods. (**10L**)

Module: 4 - Overview of Finite Element Method, Modelling of Coupled Electromechanical Systems. (**10L**)

Total: 40L

Text/Reference Book:

1. G. K. Ananthasuresh, K. J. Vinoy, S. Gopalkrishnan K. N. Bhat, V. K. Aatre, Micro and Smart Systems, Wiley India, 2012.
2. S. E.Lyshevski, Nano-and Micro-Electromechanical systems: Fundamentals of Nano-and Microengineering (Vol. 8). CRC press, (2005).
3. S. D. Senturia, Microsystem Design, Kluwer Academic Publishers, 2001.
4. M. Madou, Fundamentals of Microfabrication, CRC Press, 1997.
5. G. Kovacs, Micromachined Transducers Sourcebook, McGraw-Hill, Boston, 1998.
6. M.H. Bao, Micromechanical Transducers: Pressure sensors, accelerometers, and Gyroscopes, Elsevier, New York, 2000.

Course Outcomes:

At the end of the course the students will be able to

1. Appreciate the underlying working principles of MEMS and NEMS devices.
2. Design and model MEM devices.

UECE516	C. Optimization Theory (OE-1)	3L: 0T: 0P	6 credits

Module-I: Introduction to optimization, Constraints, Objective function, Variable bounds, Exhaustive search, Region Elimination method, Gradient based methods: Steepest descent, Newton-Raphson, Linear programming. **(10L)**

Module-II: Optimality criteria, Powel's conjugate direction method, Gradient based methods: gradient descent, Newton's method, Quasi-Newton's method, Conjugate gradient, Levenbarg-Marquardt algorithm. **(10L)**

Module-III: Constrained Optimization, Kuhn-Tucker Condition, Penalty function method, Direct search for constrained minimization, Linearized search techniques, Linear programming. **(10L)**

Module-IV: Non-traditional optimization algorithms, Golden section search, Simulated annealing, Genetic algorithm, Particle swarm optimization. **(10L)**

Total: 40L

Text/Reference Book:

1. Singiresu S Rao **,** Engineering Optimization Theory and Practice, Fifth Edition, 2019
2. Kalyanmoy Deb, Optimization for Engineering Design, Second edition, 2012
3. Edwin K.P. Chong and Stainslaw H. Jak, "An introduction to Optimization", 3rd edition.

Learning Objectives:

- Introduction to optimization techniques using both linear and non-linear programming. The focus of the course is to know about the classical optimization techniques and their implementation in practical problems. After completion of the classical optimization algorithm, students will learn about some non-traditional optimization methods like Simulated Annealing, Genetic algorithm, Particle swarm optimization etc.
- By the end of the course, students should be able to:
  - Cast engineering minima/maxima problems into optimization framework.
  - Learn efficient computational procedures to solve optimization problems.
  - MATLAB/Python implementation to optimization methods.

Knowledge Prerequisite:

- Introductory knowledge in linear algebra and probability theory
- Elementary knowledge in Vector Calculus

Central Institute of Technology Kokrajhar

Deemed to be University, MHRD, Govt. of India

Kokrajhar, BTR, Assam

SYLLABUS FOR BACHELOR OF DESIGN (B. Des.) IN MULTIMEDIA COMMUNICATION AND DSESIGN

(Updated in August 2021)

Department of Multimedia Communication and Design

COURSE LAYOUT OF BACHELOR OF DESIGN

SEMESTER I

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P/S*	C
THEORY/TUTORIAL/STUDIO						
1.	UHSS 101	Communication Skills	2	0	0	4
2.	UMCD 101	Introduction to Design	1	0	0	2
3.	UMCD 102	Fundamentals and Principles of Art	1	0	0	2
4.	UMCD 103	Computer Fundamentals and Operation	2	0	0	4
5.	UHSS 171	Communication Skills (Lab)	0	0	2	2
6.	UMCD 171	Introduction to Design (Lab)	0	0	2	2
7.	UMCD 172	Fundamentals and Principles of Art (Lab)	0	0	3	3
8.	UMCD 173	Computer Fundamentals and Operation (Lab)	0	0	2	2
9.	UMCD 174	Drawing and Illustration Technique	0	0	5	5
10.	UMCD 191	Design Studio – I (Digital Drawing Technique)	0	0	5	10
TOTAL			**6**	**0**	**19**	**36**
Total Contact Hours: 25						
Total Credit: 36						

SEMESTER II

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P/S*	C
THEORY/TUTORIAL/STUDIO						
1.	UHSS 201	Professional Ethics & Human Value	2	0	0	4
2.	UMCD 201	History of Art and Appreciation	2	0	0	4
3.	UMCD 202	Introduction to Multimedia Communications	2	0	0	4
3.	UMCD 203	Fundamentals of Animation Design	2	0	0	4
5.	UMCD 204	Introduction to Graphic Design	1	0	0	2
6.	UMCD 272	Introduction to Multimedia Communications (Lab)	0	0	2	2
7.	UMCD 273	Fundamentals of Animation Design (Lab)	0	0	2	2
8.	UMCD 274	Introduction to Graphic Design (Lab)	0	0	2	2
9.	UMCD 291	Design Studio – II (Graphic Design)	0	0	5	10
TOTAL			**9**	**0**	**11**	**34**
Total Contact Hours: 20						
Total Credit : 34						

SEMESTER III

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P/S*	C
THEORY/TUTORIAL/STUDIO						
1.	UMCD 301	Multimedia Design Fundamentals	2	0	0	4
3.	UMCD 302	Concept of Storyboarding & Script Writing	1	0	0	2
5.	UMCD 303	2D Animation Techniques	1	0	0	2
2.	UMCD 304	Introduction to Photography and Videography	1	0	0	2
5.	UMCD 371	Multimedia Design Fundamentals (Lab)	0	0	2	2
6.	UMCD 372	Concept of Storyboarding & Script Writing (Lab)	0	0	4	4
7.	UMCD 373	2D Animation Techniques (Lab)	0	0	2	2
8.	UMCD 374	Introduction to Photography and Videography (Lab)	0	0	2	2
9.	UMCD 375	Clay Modeling	0	0	4	4
10.	UMCD 391	Design Studio – III (2D Animation)	0	0	5	10
TOTAL			**5**	**0**	**19**	**34**
Total Contact Hours: 24						
Total Credit: 34						

SEMESTER IV

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P/S*	C
THEORY/TUTORIAL/STUDIO						
1.	UMCD 401	3D Modeling and Texturing	1	0	0	2
2.	UMCD 402	Rigging for 3D Animation	1	0	0	2
2.	UMCD 403	Web Design Technology	1	0	0	2
3.	UMCD 404	Concept of Film Making	1	0	0	2
4.	UMCD 471	3D Modeling and Texturing (Lab)	0	0	2	2
5.	UMCD 472	Rigging for 3D Animation (Lab)	0	0	4	4
6.	UMCD 473	Web Design Technology (Lab)	0	0	4	4
7.	UMCD 474	Concept of Film Making (Lab)	0	0	2	2
8.	UMCD 41*	Elective - I	0	0	4	8
9.	UMCD 491	Design Studio – IV (Modeling & Texturing)	0	0	5	10
TOTAL			**4**	**0**	**21**	**38**
Total Contact Hours: 25						
Total Credit: 38						

****Industrial Training Phase – I**
(During summer break tentatively in the month of JUNE – JULY)

* Elective – I : Subjects		
Sl. No.	**Subject code**	**Subjects**
1.	UMCD 411	Graphic Design for Communication
2.	UMCD 412	Effective Mass Communication
3.	UMCD 413	Art of Acting and Voiceover For Animation
3.	UMCD 41*	Any other subject offered from time to time with the approval of the university.

SEMESTER V

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P/S*	C
THEORY/TUTORIAL/STUDIO						
1.	UHSS 501	Industrial Management and Entrepreneurship	3	0	0	6
2	UCSE 509	Introduction to Programming	2	0	0	4
2.	UMCD 501	3D Animation Technique	1	0	0	2
4.	UMCD 502	Audio Video Editing	1	0	0	2
6.	UCSE 579	Introduction to Programming (Lab)	0	0	4	4
5.	UMCD 571	3D Animation Technique (Lab)	0	0	2	2
7.	UMCD 572	Audio Video Editing (Lab)	0	0	4	4
8.	UMCD 591	Design Studio – V (3D Animation)	0	0	5	10
9.	UMCD 51*	Elective - II (project based)	0	0	4	8
TOTAL			**7**	**0**	**19**	**42**
Total Contact Hours: 26						
Total Credit: 42						

* Elective – II : Subjects		
Sl. No.	**Subject code**	**Subjects**
1.	UMCD 511	Instructional Design and Multimedia
2.	UMCD 512	Digital Sculpting
3.	UMCD 513	Advanced Texturing Techniques
3.	UMCD 51*	Any other subject offered from time to time with the approval of the university.

SEMESTER VI

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P/S*	C
THEORY/TUTORIAL/STUDIO						
1.	UMCD 601	Creative Thinking Process and Methods	1	0	0	2
2.	UMCD 602	Computer Generated Lighting and Rendering	1	0	0	2
3.	UMCD 603	Visual Effects & Digital Compositing	1	0	0	2
4.	UMCD 604	Introduction to Game Design	1	0	0	2

5.	UMCD 672	Computer Generated Lighting and Rendering (Lab)	0	0	4	4
6.	UMCD 673	Visual Effects & Digital Compositing (Lab)	0	0	2	2
7.	UMCD 674	Introduction to Game Design (Lab)	0	0	4	4
8.	UMCD 691	Design Studio – VI (Visual Effects)	0	0	5	10
9.	UMCD 61*	Elective - III (project based)	0	0	4	8
TOTAL			**4**	**0**	**19**	**36**
Total Contact Hours: 23						
Total Credit: 36						

****Industrial Training Phase – II**
(During summer break tentatively in the month of JUNE – JULY)

*** Elective – III : Subjects**		
Sl. No.	**Subject code**	**Subjects**
1.	UMCD 611	New Media and Interaction
2.	UMCD 612	Video Production and Editing
3	UMCD 613	Digital Design and Animation
4.	UMCD 61*	Any other subject offered from time to time with the approval of the university.

SEMESTER VII

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P/S*	C
THEORY/TUTORIAL/STUDIO						
1.	UMCD 701	Animation Production Design	1	0	0	2
2.	UMCD 771	Animation Production Design (Lab)	0	0	6	6
3.	UMCD 791	Minor Project	0	0	8	16
4.	UMCD 792	Design Management and Professional Practice (Industrial Presentation)	0	0	4	4
5.	UMCD 71*	Elective - IV (project based)	0	0	4	8
TOTAL			**1**	**0**	**22**	**36**
Total Contact Hours: 23						
Total Credit: 36						

*** Elective – IV : Subjects**		
Sl. No.	**Subject code**	**Subjects**
1.	UMCD 711	Game Design and Production Process
2.	UMCD 712	Lighting with Arnold/Mental Ray
3.	UMCD 713	Editing and Compositing Techniques
3.	UMCD 71*	Any other subject offered from time to time with the approval of the university.

SEMESTER VIII

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P/S*	C
THEORY/TUTORIAL/STUDIO						
1.	UMCD 891	Major Project (Thesis Project)	0	0	8	16
2.	UMCD 892	Multimedia Design Research Seminar	0	0	4	4
3.	UMCD 81*	Elective - V	0	0	4	8
TOTAL			**0**	**0**	**16**	**28**
Total Contact Hours: 16						
Total Credit: 28						

*** Elective – V : Subjects**		
Sl. No.	**Subject code**	**Subjects**
1.	UMCD 811	Tangible User Interface
2.	UMCD 812	Communication Design
3.	UMCD 81*	Any other subject offered from time to time with the approval of the university.

Consolidated statement of total credits in each semester

Semester	L	T	P/S	Credit
1	6	0	19	36
2	9	0	11	34
3	5	0	19	34
4	4	0	21	38
5	7	0	19	42
6	4	0	19	36
7	1	0	22	36
8	0	0	16	28
Total	36	0	146	284

As per CIT Academic Ordinance:

1 h Lecture (L) per week	2 credit
1 h Tutorial (T) per week	2 credit
1 h Studio Project	2 credit
1 h Practical (P) per week	1 credit
1 h Project Work	1 credit
1 h Seminar / Training / Industrial Training	1 credit

COURSE CONTENTS

SEMESTER – 1

Course Title: COMMUNICATION SKILLS **L-T-P-C:** 2-0-0-4

Course Code: UHSS 101 / 171

MODULE	TOPIC	COURSE CONTENT
1	**Grammar**	Correction of sentence, Vocabulary / word formation, Single word for a group of words, Fill in the blank, transformation of sentences, Structure of sentences – Active / Passive Voice – Direct / Indirect.
2	**Narration**	Essay – Descriptive – Comparative – Argumentative – Thesis statement- Structure of opening / concluding paragraphs – Body of the essay.
3	**Reading Comprehension**	Global – Contextual – Inferential – Select Passages from recommended text.
4	**Business Correspondence**	Letter Writing – Formal. Drafting. Bio-data-Resume - Curriculum Vitae.
5	**Report Writing**	Structure, Types of report – Practice Writing.
6	**Communication and Public Speaking Skill**	Communication Process-meaning, principles of effective communication (barriers and solutions), Introduction to the sounds of English, Features of effective speech, verbal-nonverbal.
7	**Group Discussion**	Principle – practice.

TEXTBOOKS / REFERENCES:

1. S R Inthira & V Saraswathi " *Enrich your English – a) Communication skills b) Academic skills* " Publisher CIEFL & OUP
2. R.C. Sharma and K.Mohan , "*Business Correspondence and Report Writing*", Tata McGraw Hill , New Delhi, 1994
3. L.Gartside , "*Model Business Letters*" , Pitman , London , 1992
4. Longman, "*Longman Dictionary of Contemporary English*" (or '*Oxford Advanced Learner's Dictionary of Current English*', OUP, 1998.
5. Maxwell Nurnberg and Rosenblum Morris , "*All About Words*" , General Book Depot, New Delhi , 1995
6. *Written Communication in English* by Sara-Freeman – Orient Longman

Course Title: INTODUCTION TO DESIGN **L-T-P-C:** 1-0-2-4

Course Code: UMCD 101 / 171

MODULE	TOPIC	COURSE CONTENT
1	**UNIT – 1 Introduction**	Introduction of Design. Arts and Social Sciences. Design as a creative professional career. Interrelationship of Design to Engineering. Inter-relationship of 2D & 3D forms.
2	**UNIT – 2 History**	Brief history of developments in Design and Technology. Aesthetics, Ergonomic, Scientific and Engineering considerations in Design.

3	**UNIT – 3** **Understanding Design**	Case studies in Product, Communication, and Environment Designs. Stages in the design processes. Design and indigenous technology.
4	**UNIT – 4** **Role of Design**	Role of Design in creating the future. Status of Design profession in India and worldwide.

TEXTBOOKS / REFERENCES:

1. D. Norman, *Design of Everyday Things,* Currency Books, New York, 1990.
2. R. Hollis, *Concise History of Graphic Design,* Thames and Hudson, 1994.
3. P. Sparke, *Introduction to Design and Culture in the 20th Century,* Routledge, 1986.
4. J. Guy, *20th Century Design*, Thames and Hudson, 1993.
5. M.A. Muser and D.Macleon, *Art and Visual Environment,* MIT Press, 1996.
6. Visual Intelligence, Donald D. Hoffman, 2000
7. M.N. Horenstein, *Design Concepts for Engineers,* Prentice Hall UK, 2002.
8. J.H. Earle, *Engineering Design Graphics,* Addition Wesley, 2003.

Course Title: Fundamentals & Principles of Art **L-T-P-C:** 1-0-3-5
Course Code: UMCD 102 / 172

MODULE	TOPIC	COURSE CONTENT
1	**Elements of Art**	Shape, Form, Texture, Space
2	**Principles of Art**	Balance, Movement, Emphasis, Variety, Unity, Pattern, Art Media and Techniques, Drawing and Painting-Sculpture, Architecture, Pottery, Weaving, body painting/printing and adornments *(clothing, tattoo and jewellery)*, Printmaking and Photography, Crafts, Graphic Design and Computer Art. The styles and forms of Art *(paintings, sculpture and applied art).*
3	**Two-Dimensional Art**	Influences of Western Art such as Impressionism, Expressionism, Cubism, Surrealism, Abstract Expressionism, Realism, Popular (Pop) Art, Optical (Op) Art, Minimalism, Photo-realism, Conceptual Art.
4	**Three-Dimensional Art**	Sculptures, statues, installations, kinetic art and performance art.
5	**Aesthetic theories**	Realism, emotionalism, formalism, feminism, and constructivism.

TEXTBOOKS / REFERENCES:

1. *Art Fundamentals: Theory and Practice* by Otto G. Ocvirk, Robert Stinson, Philip R. Wigg, Robert O. Bone, David L. Cayton
2. *The Elements of Art and Composition* by Brenda Ellis. Publisher: Artistic Pursuits Inc. Comb-binding, 92 pages, 68 lessons, 186 illustrations. ISBN: 978-1-939394-08-8, January 1, 2013, 3rd Edition
3. Fred, S. Kleiner, "*Gardener's Art through Ages*", Harcourt College Publishers, 2001.
4. Bernard S. Myers, *Understanding the Arts*, Holt, Rinehart and Winston Inc, 1964
5. Edith Thomory, "*A History of Fine Arts in India and the West"*, Orient Longman

Publisher's Pvt.Ltd, 1982
6. H.H. Arnason, "*History of Modern Art*", Thames and Hudson, 1977.

Course Title: Computer Fundamentals & Operation **L-T-P-C:** 2-0-2-6

Course Code: UMCD 103 / 173

MODULE	TOPIC	COURSE CONTENT
1	**Definition and History of computer**	Definition of Electronic Computer, History, Generations, Characteristic and Application of Computers, Classification of Computers, Computer Languages, Generation of Languages, Algorithm, Flow charts.
2	**Components of computer system**	Components of Computer system, Memory– different types, functions, concept of I/O devices. Types of software, Role of Operating System
3	**Number system**	Number system -Decimal, binary, octal, hexadecimal number systems and conversion from one system to another, Coding System -ASCII, EBCDIC
4	**Fundamentals of networking**	Fundamentals of networking – network topology, concept of LAN, WAN, MAN, network devices – NIC, hub, bridge, switch, repeaters, gateway, modem, transmission media
5	**Basics of Internet and Web technology**	Internet and World Wide Web: Hypertext Markup Language, DHTML,WWW, Gopher, FTP, Telnet, Web Browsers, Net Surfing, Search Engines, Email, Benefits and impact of e-commerce,
6	**Introduction to MS Office**	Basic feature of MS Office, Office Tools, MS Excel, MS PowerPoint.

TEXTBOOKS / REFERENCES:

1. *Computer Fundamentals*, Pradeep K Sinha, Priti Sinha
2. Rajaraman, *Introduction to Computers*, PHI
3. *Learning Word for Windows*: Rajib Mathur
4. *ABC of Office*: Han

Course Title: Drawing and Illustration Technique **L-T-P-C:** 0-0-5-5

Course Code: UMCD 174

MODULE	TOPIC	COURSE CONTENT
1	**Drawing Man-Made Objects**	Drawing from cubes, cones, cylindrical object, casts, drapery, and still life groups etc.
2	**Nature drawing**	Nature drawing to develop the sense of structure. Study from any kind of forms in nature-pods, shells, butterflies, flowers, plants, insects, minerals bones etc. To understand how these forms achieve their structural unity through adherence to principles with physical nature of the material being observed and studied through various rendering media and techniques in various light conditions.

3	**Nature drawing from human figures**	Nature drawing from human figures – mainly based on general form and gesture – Head study. Drawing from Memory – To develop the sense of observation and the capacity to retain and recall images and their co-ordinations**.**
4	**Introduction to Elements of Perspective**	Study of basic solids, plan and elevation main aspects of parallel and 2 angular perspective.
5	**Calligraphy**	Basic discipline of beautiful handwriting, sense of letter form – Simultaneous judgment of the composition of the letters – spacing – organization – intuitive and logical planning of writing – development of style. A Co-ordinate series of assignments of script writing with different types of traditional and modern tools. Students be exposed to Calligraphic examples of various traditional scripts.
6	**Outdoor sketching**	Rapid sketching from any objects from places like – streets, market, stations etc. and also from Museums and Zoo etc. Students should be exposed to such drawing made by master artists of different times.

TEXTBOOKS / REFERENCES:

1) *Drawing* By Daniel Marcus Mendelowitz
2) *Dynamic Figure Drawing* Watson-Guptill Publications, 1996
3) *Keys to drawing* By Bert Dodson
4) *Drawing: Space, Form, and Expression* Wayne Enstice, Melody Peters
5) *Drawing distinctions: the varieties of graphic expression* By Patrick Maynard
6) *Basic figure drawing techniques* By Greg Albert
7) *Secrets to Drawing Realistic Children* By Carrie Stuart Parks, Rick Parks

Course Title: Design Studio – I (Digital Drawing Technique) **L-T-P-C:** 0-0-5-10

Course Code: UMCD 191

MODULE	TOPIC	COURSE CONTENT
1	**Project 1**	**Project based on following contents:** Implementation of design or art elements & principle on drawing.
2	**Project 2**	**Project based on following contents:** Graphic Design and Computer Art. The styles and forms of Art *(paintings, sculpture and applied art).* Basic Typo design, Basic concept of Photography, Natural Study Perspective knowledge, Outdoor study, Calligraphy Life drawing etc.
3	**Project 3**	**Project based on following contents:** Basic type of Animation movie concept, Doodle Design, Handmade drawing or Sketches implement on digital print making techniques etc.
4	**Project 4**	**Final design based project report**

COURSE CONTENTS

SEMESTER – 2

Course Title: Professional Ethics & Human Value **L-T-P-C:** 2-0-0-4

Course Code: UHSS 201

MODULE	TOPIC	COURSE CONTENT
1	**Engineering Ethics**	Senses of 'engineering ethics' – variety of moral issues – types of inquiry – moral dilemmas – moral autonomy – Kohlberg's theory – Gilligan's theory – consensus and controversy –professions and professionalism – professional ideals and virtues – theories about right action – self- interest – customs and religion – uses of ethical theories
2	**Engineering as Social Experimentation**	Engineering as experimentation – engineers as responsible experimenters – codes of ethics – a balanced outlook on law – the challenger case study
3	**Responsibility for Safety**	Safety and risk – assessment of safety and risk – risk benefit analysis – reducing risk.
4	**Responsibilities and Rights**	Collegiality and loyalty – respect for authority – collective bargaining – confidentiality –conflicts of interest – occupational crime – professional rights – employee rights – intellectual property rights – discrimination
5	**Global Issues**	Multinational corporations – environmental ethics – computer ethics – weapons development –engineers as managers – consulting engineers – engineers as expert witnesses and advisors – moral leadership – sample code of conduct

TEXTBOOKS / REFERENCES:

1. Mike Martin and Roland Schinzinger, "*Ethics in Engineering*", McGraw Hill, New York, 1996.
2. Charles D Fleddermann, "*Engineering Ethics*", prentice Hall, New Mexico, 1999.
3. Laura Schlesinger, "*How Could You Do That: The Abdication of Character, Courage, and Conscience*", Harper Collins, New York, 1996.
4. Stephen Carter, "*Integrity*", Basic Books, New York, 1996.

Course Title: HISTORY OF ART AND APPRECIATION **L-T-P-C**: 2-0-0-4

Course Code: UMCD 201

MODULE	TOPIC	COURSE CONTENT
1	**Introduction to Art history**	Importance of "Art History" as a discipline while studying Visual Arts,

2	**Pre & Proto Historic Period**	Prehistoric Cave paintings from Bhopal, Harappa & Mohenjedaro Civilization (town planning, sculpture-Beard man, dancing girl, seals and script), Rock cut architecture, Architecture- Ajanta, Brahminical cave, Architecture - Ellora,
3	**Indian Artist & Works**	Gagendranath Tagore, Jamini Roy, Rabindranath Tagore, Amrita Sher Gill, Ramkinker Vaij etc.
4	**Western artists & Works:**	Michelangelo, Leonardo da Vinci, Vincent van Gogh, Paul Gauguin, Georges Seurat, Salvador Dali, Pablo Picasso etc.

TEXTBOOKS / REFERENCES:

1. *Typology* - G.M. Rege, Bombay..
2. *Kalatmak Lykhai*, published by D.A.V.P.
3. *Figure Painting in Water Colour*, Charles Reid Watson, Guptill Publication.

Course Title: Introduction to Multimedia Communications **L-T-P-C**: 2-0-2-6

Course Code: UMCD 202/272

MODULE	TOPIC	COURSE CONTENT
1	**Introduction**	Introduction to Multimedia; Definition, History and Applications of Multimedia; Characteristics of Multimedia; Components of Multimedia System; Static and Continuous Media
2	**Analog and Digital Signals**	Analog and Digital Signals; Analog to Digital and Digital to Analog Conversion.
3	**Data Compression**	Types of Data Compression; Introduction to Various Compression Techniques– Shannon Fano, Huffman Coding, LZW Coding, Run-Length Encoding, JPEG, MPEG.
4	**Elements of Multimedia**	Understanding the Elements of Multimedia– Text, Still Images, Graphics, Audio, Video and Animation.
5	**The WWW**	Overview of the Internet; Web Browsers, Internet Services-URL, Dial-ups, ISDN, E- mail, Chat, Cross-Platform Features, Audio & Video Streaming; Internet Applications – Audio & Video conferencing, Internet telephony, World Wide Web, Computer Networks.
6	**Virtual Reality**	Introduction to Virtual Reality; VR- Systems; VR Tools.

TEXTBOOKS / REFERENCES:

1. Tay Vaughan, *Multimedia: Making It Work*, Ninth Edition, Tata Mc-Graw Hill Education, 2014.
2. Jennifer Coleman Dowling, *Multimedia Demystified*, First Edition, Mc-Graw Hill, 2012.
3. Ze-Nian Li and Mark S. Drew, *Fundamentals of Multimedia*, First Edition, Eastern Economy Edition, PHI Learning Pvt. Ltd.
4. Patrick Buckley, Frederic Lardinois and DODOcase, *Virtual Reality Beginner's Guide + Google Cardboard Inspired VR Viewer*, Regan Arts, 2014, ISBN-10: 1941393101, ISBN-13: 978-1941393109.

Course Title: Fundamentals of Animation Design **L-T-P-C**: 2-0-2-6

Course Code: UMCD 203/273

MODULE	TOPIC	COURSE CONTENT
1	**Introduction**	Introduction to Animation, Animation History, Animation techniques: Traditional animation practices and their importance and relation to contemporary animation techniques. Introduction to specialized areas: Cel-animation, character animation, clay animation and puppet animation, Principles of Animation, Production Pipeline.
2	**Pre-Production**	Introduction to Pre-Production, Scripting, Storyboarding, Layout, Character Designing, Props Designing, Background Designing, Camera Angles, Frame Length.
3	**Visual Culture**	Importance of visual culture in the study of animation. Applying visual technology for animation.
4	**Production**	Animation production: techniques for production and analyzing 2D and 3D animation. 3D Modeling, Texturing, Rigging, 3D Animation, CG Lighting, Visual Effects
5	**Post-Production**	Post Production processes, Importance of post-production, Compositing, and Rendering.

TEXTBOOKS / REFERENCES:

1. K. Laybourne, *The animation book: a complete guide to animated filmmaking, from filp-books to sound cartoons*, Revised Edition, Three Rivers Press, 1998.
2. S. Roberts, *Character Animation in 3D: Use of traditional drawing techniques to produce stunning CGI animation*, Focal Press, 2004.
3. *Beginner's Guide to Animation* – by Mark Murphy; Watson-Guptill Publication.
4. O. Johnston, and F. Thomas, *The Illusion of Life: Disney Animation*, Walter Foster Publishing.
5. W. T. Foster, *Cartooning: Animation Basics*, Revised Edition, Walter Foster Publishing.
6. M. Nicholas, *Introduction to Visual Culture*, Routledge, London.

Course Title: Introduction to Graphic Design **L-T-P-C**: 1-0-2-4

Course Code: UMCD 204

MODULE	TOPIC	COURSE CONTENT
1	**UNIT - 1**	Introduction to elements of graphic design – Text and image, grids and layout, composition, form and function, figure and ground phenomenon. Typographic fonts and their characters.
2	**UNIT - 2**	Gestalt Laws
3	**UNIT - 3**	Typographic parameters: x-height, ascenders, descenders, kerning, tracking and leading. Variations of body text, headlines and display text. Grid in graphic design.
4	**UNIT - 4**	Hands on practice in applications of fundamentals of Graphic Design.
5	**UNIT - 5**	Introduction to Printing Technology. Introduction to Digital Media Technology. Case studies

TEXTBOOKS / REFERENCES:

1. Swan, *The new Graphic Design School*, VNR, 1997.
2. R. Carter and P. B. Meggs, *Typographic Design: Form and Communication*, John Wiley & Sons, 2000.

3. A. Darley, *Visual Degital Culture*, Routledge, 2000.
4. M. A. Muser and D. Macleon, *Art and Visual Environments*, MIT Press, 1996.
5. R. Hollis, *Concise History of Graphic Design*, Thames & Hudson, 1994.
6. P. B. Meggs, *Type and Image: the language of graphic Design*, VNR, 1992.
7. A. White, *Type of use: effective typography for electronic publishing*, New York Design Press, 1992.

Course Title: Design Studio – II (Graphic Design) **L-T-P-C**: 0-0-5-10

Course Code: UMCD 291

MODULE	TOPIC	COURSE CONTENT
1	**Project 1**	**Project based on following contents:** Application of Elements of graphic design - Text and image, grids and layout, composition, form and function, figure and ground phenomenon. Typographic fonts and their characters.
2	**Project 2**	**Project based on following contents:** Gestalt Laws and its practical application.
3	**Project 3**	**Project based on following contents:** Applications of Typography in hypothetical and real projects.
4	**Project 4**	**Project based on following contents:** Application of Printing Technology and Digital Media Technology.

COURSE CONTENTS

SEMESTER – 3

Course Title: Multimedia Design Fundamentals **L-T-P-C**: 2-0-2-6

Course Code: UMCD 301/371

MODULE	TOPIC	COURSE CONTENT
1	**UNIT - 1**	Need for Multimedia, Present and Future Market Potential.
2	**UNIT - 2**	Dimensions of Multimedia – Functionality, Aesthetics, Content and Usability.
3	**UNIT - 3**	Multimedia Product Possibilities.
4	**UNIT - 4**	Understanding Authoring Tools – Types of Authoring Tools, Important Features.

5	**UNIT - 5**	Multimedia Skills, Building an Efficient Team, Role of Multimedia Producer, Writer, Interface Designers, Audio and Video Specialist, Multimedia Programmer.
6	**UNIT - 6**	Stages of creating a Multimedia Project – Planning and Costing, Designing and Producing, Design Aesthetics - Interface Design, Graphical User Interface, Target Audience, Social Media, Designing for the World Wide Web, Testing, Delivery.

TEXTBOOKS / REFERENCES:

1. Vic Costello with Susan A. Youngblood and Norman E. Youngblood, *Multimedia Foundations: Core Concepts for Digital Design*, Focal Press, 2013.
2. Tay Vaughan, *Multimedia: Making It Work*, Ninth Edition, Mc-Graw Hill Education, 2014.
3. Jennifer Coleman Dowling, *Multimedia Demystified*, First Edition, Mc-Graw Hill, 2012.
4. Gary Olsen, *Getting Started in Multimedia Design*, First Edition, North Light Books, 1997.

Course Title: Concept of Storyboarding & Script Writing **L-T-P-C**: 1-0-4-6

Course Code: UMCD 302/372

MODULE	TOPIC	COURSE CONTENT
1	**Layout of the story**	Character design, Situation, Background Building of the story, Insurmountable problems, Gradual or sudden crumbling, Types of screenplay- Proposal script, shooting script, post-production script,
2	**Story Content for a Screenplay**	High concept, Originality and familiarity, Subplots, Character growth, Theme, Identification & Motivation, Obstacle & Courage, Familiarity of setting, Film category & Cost,
3	**Developing a Screenplay**	Developing a Hero & other characters, Creating sympathy or hatred for the character, Make the character likeable.
4	**Structure of Screenplay**	Three act - Individual scene
5	**Terminology**	Fade in and Fade out, Cut to.
6	**Introduction to Storyboard**	Parts of storyboard - Advantages of storyboarding - Interactive Storyboarding - Designing of Storyboard exercise

TEXTBOOKS / REFERENCES:

1. Chawdhary, Nirmal Kumar, *How to write film screenplay*, Kanishka publishers, distributers, New Delhi- 110002, 2009, ISBN 978-81-8457-112-7.
2. Rubenstein, Paul Max, Martin Jo Maloney, *Writing For the Media, Film Television, Video And Radio*, Prentive Hall, Englewood Clifts, New Jersey 07632, 1988, ISBN: 0-13-971508-7-01.
3. Whitaker, Harold, John Halas, Updated by Tom Sito, *Timing for Animation*, Focal Press Elsevier, New York & Singapore, 2009 ISBN: 978-0-240-52160-2.

Course Title: 2D Animation Techniques **L-T-P-C**: 1-0-2-4

Course Code: UMCD 303/373

MODULE	TOPIC	COURSE CONTENT
1	**Introduction to Animation**	Origin and development of Animation, Early Animation-Victorian, Zoetrope, The magic lantern, Thaumatrope, Flip Book, Praxinoscope, Traditional Animation, Feature Length Film, Stop motion, Computer Animation.
2	**Future of Animation**	Animated Humans, Cell Shaded Animation, Principle of Animation.
3	**Process of Animation**	Synopsis writing, Budgeting, Developing a crew.
4	**Pre-production**	Story Writing, Script /dialogue Writing, Screenplay, Model sheet-Character designs, Storyboard.
5	**Production**	Sound mixing, Special Effects, Color Corrections, Rendering, Exercise on Story, Storyboard and Screenplay Writing.
6	**Group Discussion**	Principle – practice.

TEXTBOOKS / REFERENCES:

1. *History of Animation*- Wikipedia, the free encyclopaedia 6-2-2010 p 1-15.
2. Thomas, Frank and Ollie Johnston, *The Illusion of life Disney Animation*, Walt Disney production, New York, NY 10011, Revised Edition of Disney Animation, Popular Edition 1984 ISBN 0-7868-6070-70.
3. "*Principle of Traditional Animation applied to 3D computer Animation*" pixer son Rofael California In ACM Computer Graphics (21) 4th July 1987Rubenstein, Paul Max, Writing for Media, Prentice Hall, Englewood Cliffs, New Jersey 07632, 1988. ISBN 0- 13-971508-8.

Course Title: Introduction to Photography and Videography **L-T-P-C**: 1-0-2-4

Course Code: UMCD 304/374

MODULE	TOPIC	COURSE CONTENT
1	**Basics of Photography**	Introduction to Photography, History of camera, Types of camera, Principles of photography, Rule of Third, Golden Ratio.
2	**Parts of Still Camera**	Aperture, shutter speed, lens, filters and flash, Camera films.
3	**Basics of Videography**	Basic components of video camera, Basic shots and shot composition, Camera angles and movements, Camera mountings, camera control unit, Focus & Defocus.
4	**Lighting for Photography and Videography**	What is lighting? Importance of lighting in photography & Videography, Lighting equipment and control, Lighting techniques and problems.
5	**Theory of Colours**	Origin of Colour, Colour Temperature, White Balance: Process and Need.

TEXTBOOKS / REFERENCES:

1. Wells, Liz, *Photography*, ISBN 978-0-415-46087-3.
2. Kobre, Kenneth, *Photo journalism*, Focal Press, IBSN 978-0-7506-8593-1
3. Millerson Gerold, *Television Production*, Focal Press.

4. Zettl, Herbert, *Handbook of Television Production*, Cengage Learning India Private Limited, Alps Building Ist Floor, 56-Janpath, New Delhi-110001, Reprint 2008 ISBN: 13 : 978-81-315-0508-3.
5. Belavady Vasuky, *Video Production*, Oxford Publication.

Course Title: Clay Modeling **L-T-P-C**: 0-0-4-4

Course Code: UMCD 375

MODULE	TOPIC	COURSE CONTENT
1	**Study of two dimensional space**	Carved, Modelled, Perforated, Mobile.
2	**Dimensional organizational possibilities**	Various methods of joining such as interlocking, pasting etc.
3	**Knowledge of 3D**	Paper, Card board, Wood block.
4	**Clay Preparation with Various materials**	Wire, Clay, Plasticise, Plaster of Parries, Metal sheets, Plastic, Foam, Thermocol, String, Gums and adhesives, Wax, Found objects, etc.
5	**Design Prototype**	A Co-ordinated series and basic design problems with analytical approach
6	**Colour treatment**	Colour should be introduced at various stages of experiments.

TEXTBOOKS / REFERENCES:

1. *Clay: the history and evolution of humankind's relationship with Earth's most primal element*, Suzanne Staubach.
2. *Clay: a studio handbook*, Vince Pitelka.
3. *The Figure in Clay: Contemporary Sculpting Techniques by Master Artists,* By Suzanne J. E. Tourtillott.
4. *Clay Tobacco Pipes*, By Eric G. Ayto.

Course Title: Design Studio – III (2D ANIMATION) **L-T-P-C**: 0-0-5-10

Course Code: UMCD 391

MODULE	TOPIC	COURSE CONTENT
1	**Project 1**	**Project based on following contents:** Line of action, Poses making, Story contents develop, Acting & posing.
2	**Project 2**	**Project based on following contents:** Traditional Animation, Stop motion, Clay Animation, Paper cut animation.
3	**Project 3**	**Project based on following contents:** 2D Character and background design, 2D digital animation concept.
4	**Project 4**	**Final design based project report.**

COURSE CONTENTS

SEMESTER – 4

Course Title: 3D Modeling and Texturing **L-T-P-C**: 1-0-2-4

Course Code: UMCD 401/471

MODULE	TOPIC	COURSE CONTENT
1	**Introduction to the Maya Interface**	Basic 3D transforms (translation, rotation, scaling).
2	**Modeling a Simple Character with Subdivision Surfaces**	Concepts of Modeling with Subdivision Surfaces, Modeling and a Character with Polygon & NURBS: NURBS Topology, Tools & Methods, Modeling with Profile Curves, Designing and Modeling a Character with Polygon & NURBS.
3	**Modeling a Simple Character with Polygons**	Modeling with Polygon Tools, Using Image Planes, Block Modeling, Sculpting the Character, Groups and Hierarchies.
4	**Designing a Humanoid and Modeling the Head**	Human Anatomy for Modelers, Using Distortions for Artistic Purposes, Methods and Tools.
5	**Knowledge of Texturing**	Shading textures, Colour, texture and surface styles. Hyper shade, UV Knowledge, Create UVs, UVs layout tools, Projection UVs map, Utilizes the UV texture, adding texture mapping on any objecting and character.

TEXTBOOKS / REFERENCES:

1. Murdock, Kelly C., *3ds Max 7 Bible*, Wiley Dreamtech India Pvt. Ltd. New Delhi, 2005, ISBN: 81-265-0597-4.
2. Kulagin, Boris, Dmitry Morozou, *3Ds Max & Animation with Character Studio 4 and Plug-Ins*, Firewall Media, New Delhi, 2006, ISBN: 81-7008-820-8.
3. Kulagin, Boris, *3ds Max 8, From Modeling to Animation*, BPB Publications, B-14, Connaught Place, New Delhi-110001, 2007, ISBN: 81-8333-201-3.

Course Title: Rigging for 3D Animation **L-T-P-C**: 1-0-4-6

Course Code: UMCD 402/472

MODULE	TOPIC	COURSE CONTENT
1	**Rigging Basics**	Introduction to 3D animation basics, Key Frame Animation, Animation Techniques: Non –Linear and Character Animation, Path Animation, Exercises and warm ups.
2	**Character Rigging**	Character Rigging: Anatomy study, Understanding Skeletons and Joints, Use of Deformers, Creating bones for Character.
3	**Kinematics**	Kinematics: Inverse kinematics (IK) & forward kinematics (FK)
4	**Character set-up**	Character set-up for a wide range of complex body movement, with controls that are intuitive and flexible.

5	**Skinning methods**	Binding & Weight for character, direct and indirect skinning methods

TEXTBOOKS / REFERENCES:

1. *Inspired 3D Advanced Rigging and Deformations* by Brad Clark, John Hood & Joe Harkins; Course Technology PTR; 1 edition (March 25, 2005), ISBN-10: 1592001165.

Course Title: Web Design Technology **L-T-P-C**: 1-0-4-6

Course Code: UMCD 403/473

MODULE	TOPIC	COURSE CONTENT
1	**UNIT - 1**	History of Web and its background
2	**UNIT - 2**	Web design tools and techniques – Photoshop, Dreamweaver, Flash, FrontPage and other important tools and software, Web authoring.
3	**UNIT - 3**	Web design technology – Introduction to HTML, CSS, Java, PHP.
4	**UNIT - 4**	Word Press tools, SEO technology, Search engine technology.
5	**UNIT - 5**	Assignments and Discussions

TEXTBOOKS / REFERENCES:

1. *Using the internet* (4th Ed.), Prentice Hall, New Delhi, 2000.
2. *Building a website*, Tim Worsley, Orling Kindersely, New Delhi, 2000.
3. *Web Designing Fundamentals*, Daniel Gray, Dreamtech Press, New Delhi, 2000.
4. *How the Internet works*, Millennium Edition by Preston Gralla.
5. *Adaptive Web Design*, 2nd Edition By Aaron Gustafson, New Riders, December 2015.

Course Title: Concept of Film Making **L-T-P-C**: 1-0-2-4

Course Code: UMCD 404/474

MODULE	TOPIC	COURSE CONTENT
1	**Introduction**	Definition of Film, Concept and idea generation, Scope of Documentary/Film, Story development - treatment - scriptment -plot points – structure, Writing the screenplay, Re-writing the screenplay, Scenic design and props, Concept of virtual studio, Financing the movie.
2	**Pre-production**	Casting Locations, Shot list, Script, Tech scout, Film Production design.
3	**Production**	Principle of photography / videography – setting up, Rehearsal Setting up shots, Single and multi-camera shooting, Checking the take.
4	**Post-production**	Editing, Sound mixing, Music, Test screenings, Movie distribution.

TEXTBOOKS / REFERENCES:

1. Renee Dunlop, *Production Pipeline Fundamentals for Film and Games*, Focal Press.
2. Eve Light Honthaner, *The Complete Film Production Handbook*, Focal Press.

Course Title: Design Studio – IV (Modeling & Texturing) **L-T-P-C**: 0-0-5-10

Course Code: UMCD 491

MODULE	TOPIC	COURSE CONTENT
1	**Project 1**	**Project based on following contents:** Designing and Modeling a character with Polygons or NURBS/ Designing 3D environment set
2	**Project 2**	**Project based on following contents:** Sculpting the Character/ Environment set, Projection UVs map /Utilizes the UV texture etc.
3	**Project 3**	**Project based on following contents:** Adding texture mapping on objects/ character.
4	**Project 4**	**Final design based project report.**

Course Title: ELECTIVE – 1 **L-T-P-C**: 0-0-4-8

Course Code: UMCD 41*

Elective subject – 1 (Code: UMCD 411): Graphic Design for Communication

Communicating ideas and concepts using various means of drawing and illustration techniques, Creation of artworks for reproduction using tools of new media. Traditional vs. Digital printing, Lithography, Gravure, Letter press, Screen printing, Digital printing. Dot gain and choice of papers for different quality of printing. Desk Top Publication production, color separation, positives and plate making, exposure to pre-press activities in off-set printing. Paper sizes and their formats. Basic visual compositions using text and image for both page and screen. Assignments in design of stationary (visiting cards, letter heads, etc.), booklets or label designs for small products.

Texts/Referencebooks:

1. B. Gordon and M. Gordon, *Complete Guide to Digital Graphic Design*, Thames & Hudson, 2002
2. A. Pipes, *Production for Graphic Designers*, Laurence King Publication, 1997
3. T. Porter and S. Goodman, *Manual of Graphic Techniques, Vols. 1, 3, 4*, Architectural Press, 1999
4. A. Glossman, *Printing Fundamentals*, Tappi Press, 1985
5. T. Porter, *Design Drawing techniques for architects, graphic designers and artists*, Architectural Press, Oxford, 1991.

Elective subject – 2 (Code: UMCD 412): Effective Mass Communication

Communication; Nature and Scope of Communication – Sociological and Psychological aspects of Communication – Levels of Communication; Intra-personal, Inter-personal, Group and Mass Communication, Verbal and Non-verbal Communication. Diffusion process; One step; Two step, Multi step flow of Information; Mass Media and Society – Mass Culture. Communication models; Diffusion of Innovation Model. Communication Theories; Cognitive Dissonance, Normative Theories, Perception and Retention, Uses and Gratification Approach, Cultivation Approach, Marxist and Neo-Marxist Approaches. Characteristics and functions of mass communication. Importance of mass

communication. Mass media – press, radio, TV, web and traditional media. Communicating with the masses – Public speaking as communication – audience, structure and formality. Group dynamics- Motivation, Persuasion and leadership traits. Using forms of mass communication- Creative and technical presentations in various areas like graphite, photography, PowerPoint presentations, debates and street plays.

Text / Reference books:

1. Kumar, Kewal J Mass Communication in India, Jaico Books, New Delhi,
2. J.S. Yadava & Pradeep Mathur Issues in Mass Communication: The Basic Concepts, Kanishka Publishers, Delhi, 2008.
3. Shymali Bhattacharjee., Media and Mass Communication: An Introduction, Kanishka Publishers, Delhi, 2005.
4. Burgoon, Michael, Frank G Hansaker, Edwin J Dawson (1994), 'Human Communications' (3rd ed), Sage, New Delhi.
5. Denis McQuail and S. Ven Windall, Longman, Singapore Publications, 1981, 'Communication models for the study of Mass Communication'. 5
6. Melvin L Defluer and Sandra J Ball, Longman Publications, 'Theories of Mass Communication'.
7. De Fleur, Melvin and Dennis, Everette; 'Understanding Mass Communication'; (1988); 3rd edition; Houghton Mifflin Co.
8. Narula, Uma; 'Mass Communication theory and practice'; (1994).
9. Verderber, Rudolph F.(1997). 'The Challenge of Effective Speaking'. (10th ed) Wadsworth, Singapore.

Elective subject – 3 (Code: UMCD 413): Art of acting and voice over for animation

As this is a project based course, hence the contents of the course will be decided by the concerned course instructor as and when the course float.

COURSE CONTENTS

SEMESTER – 5

Course Title: Industrial Management and Entrepreneurship **L-T-P-C**: 2-0-0-4

Course Code: UHSS 501

MODULE	TOPIC	COURSE CONTENT
1	**UNIT - I**	Meaning and Concept of Management, Principles and function of Management, Concept of Organizational Behaviour, Function of a Manager—Planning, Organizing, Coordinating and Controlling. Motivation—implication of Managers and application
2	**UNIT - II**	Leadership and Decision Making: Qualities and Styles of Leadership, Decision making process. Individual Process in Organizations-Perception, attitude and personality, Factors that affect them, How they influence people.

3	**UNIT - III**	Group Process in Organizations, Group formation, Group effectiveness, Group Conflict.
4	**UNIT - IV**	Evolution, Role and Status of Human Resource Management in India. Recruitment and Selection Process in Organization, Job Analysis, Job Specification, Selection Process-Test and Interview.
5	**UNIT - V**	Trade Union and Collective Bargaining, Entrepreneurship - Meaning, Types of entrepreneur, Qualities of an entrepreneur, Role of Entrepreneur, Factors affecting entrepreneurial growth. Entrepreneurship Development Programme - Concept, Objective and Importance, Engineer Entrepreneurship Training Programme Scheme.
6	**UNIT - VI**	Small Scale Industry-Definition, Types of Small Scale Industry, How to Set up Small Scale Industry, Role and Problem of Small Scale Industry. Concept of Joint Stock Company, Private and Public Limited Company. Source of Finance for Entrepreneur-Bank, Government and Financial Institutions etc.

TEXTBOOKS / REFERENCES:

1. S.S. Khanka - *Organisational Behaviour*, S. Chand Publishing, 4th Revised Edition, 2010.
2. S.S. Sarkar, R. K. Sharma and S. K. Gupta – *Business Organisation and Entrepreneurship Development*, Kalyani Publishers, 2014
3. Cynthia L. Greene – *Entrepreneurship: Ideas in Action*, 6th Edition, South-Western Cengage Learning, 2017.

Course Title: Introduction to Programming **L-T-P-C**: 2-0-4-8

Course Code: UCSE 509/579

MODULE	TOPIC	COURSE CONTENT
1	**Fundamentals of Computer**	History of Computer, Generation of Computer, Classification of Computers, Basic Anatomy of Computer System, Primary & Secondary Memory, Processing Unit, Input & Output devices. Binary & Allied number systems representation of signed and unsigned numbers, BCD, ASCII, Binary. Arithmetic & logic gates. Assembly language, High level language, compiler and assembler (basic concepts) Basic concepts of operating systems like MS DOS, MS WINDOW, UNIX, Algorithm & flow chart.
2	**C Fundamentals**	The C character set, identifiers and keywords, data type & sizes, variable names, declaration, statements
3	**Operators and Expressions**	Arithmetic operators, relational and logical operators, type conversion, increment and decrement operators, bitwise operators, assignment operators and expressions, precedence and order of evaluation. Input and Output: Standard input and output, formatted output – printf, formatted input scanf.

4	**Flow of Control**	Statement and blocks, if-else, switch, loops – while, for, do while, break and continue, goto and labels.
5	**Fundamentals and Program Structures**	Basic of functions, function types, functions returning values, functions not returning values, auto, external, static and register variables, scope rules, recursion, function prototypes, C preprocessor, command line arguments
6	**Arrays and Pointers**	One dimensional arrays, pointers and functions, multidimensional arrays.
7	**Structures, Unions and Files**	Basic of structure, structures and functions, arrays of structures, bit fields, formatted and unformatted files.

TEXTBOOKS / REFERENCES:

1. Kerninghan, B.W. *The Elements of Programming Style*.
2. Yourdon, E. *Techniques of Program Structures and Design*.
3. Schied F.S. *Theory and Problems of Computers and Programming*.
4. Gottfried. *Programming with C*. Schaum.
5. Kerninghan B.W. & Ritchie D.M. *The C Programming Language*
6. Rajaraman V. *Fundamental of Computers*.
7. Balaguruswamy. *Programming in C.*
8. Kanetkar Y. *Let us C.*

Course Title: 3D Animation Technique **L-T-P-C**: 1-0-2-4

Course Code: UMCD 501/571

MODULE	TOPIC	COURSE CONTENT
1	**Animation Basics**	Introduction to 3D animation basics, Key Frame Animation, Animation Techniques: Non –Linear animation, Character Animation, Path Animation, Exercises and warm ups.
2	**Motion Studies**	Motion Studies: Laws of Physics, Quick Studies from real life: Path of action, Line of action, Posing 3D characters.
3	**3D Animation Process**	The Animation Process: Planning, creating thumbnails, Blocking Poses, Setting proper timing, refining the animation.
4	**Acting and Animation**	Drama and psychological effect- Laban movement theory, Study of Body language: posture, gesture.
5	**Lip sync Basics**	Facial expression and lip sync

TEXTBOOKS / REFERENCES:

1. *The Animator's Survival Kit* - by Richard Williams; Faber Publications; Main - Revised edition (5 November 2009), ISBN-10: 9780571238347.
2. *Mastering 3D Animation*, by Peter Ratner; Allworth Press (September 1, 2000), ISBN-10: 1581150687.
3. *Acting in Animation: A Look at 12 Films* by Ed Hooks; Heinemann Drama (February 9, 2005), ISBN-10: 0325007055.
4. *Digital Character Animation 3* - by George Maestri; New Riders Press (April 22, 2006), ISBN-10: 9780321376008.

5. *Timing for Animation* - by Harold Whitaker and John Halas; Focal Press; 2nd edition (September 3, 2009), ISBN-10: 9780240521602.

Course Title: Audio Video Editing **L-T-P-C**: 1-0-4-6
Course Code: UMCD 502/572

MODULE	TOPIC	COURSE CONTENT
1	**Basics of Audio - Visual production**	Basic shots and their composition, Various camera movements and angles, Planning and production of programs in studio, Single and multi-camera shooting, Shooting an interview.
2	**Basics of Audio Editing**	Creating time line - cut, fade and mix, Introduction to editing tools, Applying effects to sound, Working with audio editing software.
3	**Basics of Video Editing**	Making edit decisions, Creating a time line, Main tools of editing, Basics transitions: cut, dissolve, wipe and fade, Working on non-linear editing software.
4	**Advanced Editing Techniques**	Audio mixing with visuals, Special audio-video effects, Video titling and graphics, Rendering and authoring, Editing montage and promos.
5	**Introduction of Sound**	Properties of sound- Bass, Timber, Treble, Pitch, Tempo. Sound Aesthetics. Noise-Echo, Reverb and Distortion Sound Effect- Music & Special effects, Basics of Sound Recording Types of Sound- Mono, Stereo, Surround Concept of Dolby Surround Sound.

TEXTBOOKS / REFERENCES:

1. Talbot, Michael -Smith, Sound engineering explained, Focal Press, 2011.
2. Nisbett, Alec, The sound studio: audio techniques for radio, television, film and recording, Focal Press, 2003.
3. Mott, Robert L., Sound effects: radio, TV, and film, Focal Press, 1990.
4. Sonnenschein, David, Sound design: the expressive power of music, voice, and sound effects in cinema, Michael Wiese Productions, 2001.
5. Viers, Ric, The Sound Effects Bible: How to Create and Record Hollywood Style Sound Effects, Michael Wiese Productions, 2008.
6. Sergi, Gianluca, The Dolby era: film sound in contemporary Hollywood, Manchester University Press, 2004 - Altman, Rick, Sound theory, sound practice, Routledge, 1992.
7. Alburger, James, The Art of Voice Acting, Focal Press, 2010, ISBN: 9780240812113.
8. Rumsey, Francis and TIM MCCORMICK, Sound and Recording, Focal Press 2009, ISBN: 978024052163.

Course Title: Design Studio – V (3D Animation) **L-T-P-C**: 0-0-5-10

Course Code: UMCD 591

MODULE	TOPIC	COURSE CONTENT
1	**Project 1**	**Project based on following contents:** 3D Animatic / Stillomatic: Line of action, Character blocking with poses, Story contents development and background design.

2	**Project 2**	**Group Project based on following contents:** Animated short film on a select topic/story: Implementing the 12 principles of animation with an overview of the whole animation process, Character animation, Acting and lip-syncing & post-production.
4	**Project 3**	**Final design based project report.**

Course Title: ELECTIVE – 2 **L-T-P-C**: 0-0-4-8

Course Code: UMCD 51*

Elective subject – 1 (Code: UMCD 511): Instructional Design and Multimedia

Overview of interface and Instructional considerations in interactive design. Case studies presentations of good websites and multimedia. Concepts of information architecture and user study, identification of information paths and how to integrate features and content for effective information navigation. Storyboarding and identification of information hierarchies in information design systems. The use of metaphor in information design. Development of an interface depending on the domains of learning as well as levels of learning, Creating design strategy documents for small learning modules. Understanding interactivity in multimedia. Developing a CD for educational purposes or for a social cause.

References:

1. P. Mijksenaar and P. Wetendrop, *Open Here– The art of Instructional Design*, Thames and Hudson, 1999
2. J. Villamil and L. Molina, *Multimedia: production planning and delivery*, Prentice Hall, 1998
3. P. Mijksenaar, *Visual Information–Introduction to Information Design*, Princeton Architectural Press, 1998
4. M. Woolman, *Type in motion, Innovation in Digital Information Graphics*, Thames & Hudson, 2002

Elective subject – 2 (Code: UMCD 512): Digital Sculpting

As this is a project based course, hence the contents of the course will be decided by the concerned course instructor as and when the course float.

Elective subject – 3 (Code: UMCD 513): Advanced Texturing Technique

As this is a project based course, hence the contents of the course will be decided by the concerned course instructor as and when the course float.

COURSE CONTENTS

SEMESTER – 6

Course Title: Creative Thinking Process and Methods **L-T-P-C**: 1-0-0-2

Course Code: UMCD 601

MODULE	TOPIC	COURSE CONTENT
1	**UNIT - 1**	Cognitive issues in creative thinking; Neurobiological studies of human brain lateralization with respect to creative thinking phenomena.
2	**UNIT - 2**	Introduction to knowledge engineering and management.
3	**UNIT - 3**	Modelling of Design Thinking and Tacit knowledge representation; Fuzzy thinking, vertical thinking, lateral thinking.
4	**UNIT - 4**	Management issues in creativity and innovation; group versus individual creativity.
5	**UNIT - 5**	Creativity techniques and tools; Brain storming, Hypnologic imaginary, TRIZ method, Morphological analysis of ideas. Role of creativity in Innovation and Invention; Comparative studies of creativity in the Arts, Sciences, Engineering and Design.
6	**UNIT - 6**	Future casting; Case Studies; Issues in Intellectual Property Rights.

TEXTBOOKS / REFERENCES:

1. M. Runio and S. Pritzker (eds.), *Encyclopedia of Creativity,* Academic Press, 1999.
2. G. Schreiber, H. Akkermans, A. Anjewierden, R. de Hoog, N. Shadbolt, W. Van de Velde and B. Wielinga, *Knowledge Engineering and Management*, MIT Universities Press India Ltd, 2000.
3. E. De Bono, *Serious Creativity*, INDUS Harper Collins Publishers India, 1992.
4. D. Morey, M. Maybury and B. Thuraisingham, *Knowledge Management*, Universities Press MIT, 2000.
5. T. Proctor, *The essence of Management Creativity*, PHI, New Delhi, 2002.
6. H. Petroski, *Invention by Design*, Universities Press (India) Ltd., 2000.
7. M. French, *Invention and Evolution – Design in Nature and Engineering*, Cambridge University Press, 1994.
8. N. Cross, *Engineering Design Methods – Strategies for Product Design*, John Wiley & Sons, England, 1995.
9. E. Kroll, S. Condoor and D. G. Janson, *Innovative Conceptual Design*, Cambridge University Press, 2001.

Course Title: Computer Generated Lighting and Rendering **L-T-P-C**: 1-0-4-6

Course Code: UMCD 602/672

MODULE	TOPIC	COURSE CONTENT
1	**UNIT - 1**	Understanding natural lighting and shadow formations; Colour Theory; Properties of Light.
2	**UNIT - 2**	Fundamentals of Lighting Design; Direct and Indirect Illumination; 3-point Lighting; Types of Lights and their attributes in a 3D software.
3	**UNIT - 3**	Indoor and Outdoor Lighting Techniques; Depth Map and Raytrace Shadows.
4	**UNIT - 4**	Basic Rendering Techniques; Rendering in Layers; Lighting Passes; Rendering in Passes; Virtual Cameras and Depth of Field; Pre-compositing.
5	**UNIT - 5**	Recreating Light effects such as Caustics, Global Illumination and Final Gather using Mental Ray; Key inputs for lighting a 3D scene as per industrial standards.

TEXTBOOKS / REFERENCES:

1. Jeremy Birn, *Digital Lighting & Rendering*, Third Edition, New Riders, 2014.
2. Darren Brooker, *Essential CG Lighting Techniques with 3DS Max*, Third Edition, Focal Press, 2008.
3. Lee Lanier, *Advanced Maya Texturing and Lighting*, Third Edition, Autodesk Maya Press, Wiley Publishing Inc., 2015.
4. Chuck Gloman and Tom Letourneau, *Placing Shadows – Lighting Techniques for Video Production*, Third Edition, Focal Press, 2013.
5. Gerald Milerson, *Lighting for Television & Film*, Third Edition, Focal Press, 2013.

Course Title: Visual Effects & Digital Compositing **L-T-P-C**: 1-0-2-4

Course Code: UMCD 603/673

MODULE	TOPIC	COURSE CONTENT
1	**UNIT - 1**	Understanding Visual Effects (VFX), Categories, Types of Visual Effects, Use of VFX, Importance of VFX, Feature of VFX and Special Effects.
2	**UNIT - 2**	Stabilizing footage, Keying matte - blue and green screen, color correction, wire removal, rotoscopy, lights and camera, Tracking (Motion tracking with one point and multiple point tracking of a live footage).
3	**UNIT - 3**	Digital Compositing; Understanding Compositing, Passes Compiling, Mattes and compositing, Digital Matting Methods and tools, Compositing Techniques, Digitally Processing Image and Footages. Green and Blue Screens; Understanding Chroma Keying and Composting.

4	**UNIT - 4**	Understanding Fluids, Building Simulation, Particle Simulation, Particle Emitters, Particle Rendering, Paint Effects.

TEXTBOOKS / REFERENCES:

1. *The Green Screen Handbook: Real-World Production Techniques*. Author: Jeff Foster; Sybex; 1st edition (March 15, 2010), ISBN-10: 0470521074.
2. *Maya Studio Projects Dynamics*. Author: Todd Palamar; Sybex; 1st edition (November 2, 2009), ISBN-10: 0470487763.
3. *The Visual Effects Arsenal*, Author: Bill Byrne; Focal Press; 1st edition (April 17, 2009), ISBN-10: 9780240811352.

Course Title: Introduction to Game Design **L-T-P-C**: 1-0-4-6

Course Code: UMCD 604/674

MODULE	TOPIC	COURSE CONTENT
1	**UNIT - 1**	Understanding Video Games - Principles of Simple Games, Workability of simple games, Reason of playing games, Elements that define games and the gaming experience, Similarity and dissimilarity of games from each other; History of Gaming; Evolution of Gaming.
2	**UNIT - 2**	Classification of Games - Game Genre; Game Types; PvP and PvE, NPC; Player's Perspective; Designer's Perspective;
3	**UNIT - 3**	Gaming Platforms; Types of Gaming – PC Gaming, Console Gaming, Mobile Gaming; Gaming Hardware - Building a Gaming Rig; Gaming Peripherals; Gaming in Virtual Reality
4	**UNIT - 4**	The Gaming Industry; Pros and Cons of Gaming
5	**UNIT - 5**	End Users – Players learning the mechanics of your game, Rules that define gameplay, Rules communicated to your players, Rules bent and broken by player, Importance of a story in games (Narrative);
6	**UNIT - 6**	Types of Gamers; Professional Gamers; Identity; Job Prospects.

TEXTBOOKS / REFERENCES:

1. Steven Kent, *The Ultimate History of Video Games*, First Edition, Three Rivers Press, 2001.
2. Simon Egenfeldt-Nielsen, Jonas Heide Smith and Susana Pajares Tosca, *Understanding Video Games: The Essential Introduction*, Third Edition, Routledge, 2016.
3. Jane McGonigal, *Reality is Broken: Why Games Make Us Better and How They Can Change The World*, Penguin Press, 2011.
4. Chris Melissinos, Patrick O'Rourke, Mike Mika and Elizabeth Broun, *The Art of Video Games: From Pac-Man to Mass Effect*, First Edition, Welcome Books, 2012.
5. Chris Kohler, *Power Up: How Japanese Video Games Gave the World an Extra Life*, Second Edition, Dover Publications, 2015.

Course Title: Design Studio – VI (Visual Effects) **L-T-P-C**: 0-0-5-10

Course Code: UMCD 691

MODULE	TOPIC	COURSE CONTENT
1	**Project 1**	**Project based on following contents:** Color correction, Rotoscopy, Tracking (Motion tracking with one point and multiple point tracking of a live footage).
2	**Project 2**	**Group Project based on following contents:** Digitally Processing Image and Footages**;** Implementing the Green or Blue Screens in a composition/Chroma Keying and Composting.
4	**Project 3**	**Final design based project report.**

Course Title: ELECTIVE – 3 **L-T-P-C**: 0-0-4-8

Course Code: UMCD 61*

Elective subject – 1 (Code: UMCD 611): New Media and Interaction

Introduction to New Media : Evolution of New Media - History to modern era**;** Technology in New Media **;** New Media culture – conventions and technique of old media **; Principles of New Media :** Discrete representation **;** Numerical representation **;** Automation **;** Variability **; Concept of New Media :** Changing relationship of representation. **;** Database as genre of new media. **;** Logic of remediation**;** Concept of digital dialectic. **;** Digital Cinema and the history of moving Image. **;** The new language of cinema. **; Forms of New Media:** Installations - Sound art, Net art. **;** Free software movement and open source. **;** New media art installation and cross-media practice. **;** Interactivity and interface: Models of interactive systems.

Interaction: Basic concepts in Interaction Design. Interaction Models – issues in man- machine interface, ergonomic considerations, dialog. Paradigms for interaction – time sharing, video display units, Programming toolkits, Sensor based context aware interaction, Multi-modal displays etc. Interaction Design Process: User focus; Scenarios; Navigation Design; Screen Design and Layout; Iteration and Prototyping. Design: Principles; Standards; Guidelines; Rules and Heuristics Principles. Design Techniques: Scenario building; Personas, Brain Storming, Story Boarding, Wire framing etc. Evaluation Techniques: Expert Analysis; Heuristic Evaluation; Evaluation through User Participation. Case examples in Human computer interaction.

Texts/References:

Interaction design books -

1. B. Shneiderman, Designining the User Interface: Strategies for Effective Human-Computer Interaction, 3rd Ed., Addison Wesley, 2000.
2. J. Preece, Y. Rogers and H. Sharp, Interaction Design: Beyond Human –Computer Interaction, John Wiley & Sons, Delhi, 2003.
3. A. Dix, J. Finlay, G.D Abowd and R. Beale, Human Computer Interaction , 3rd Ed., Pearson Education Ltd., 2004.

4. W.O. Galitz, The Essential Guide to User Interface Design of Interaction Design, John Wiley & Sons, 2002.

New Media books -

5. R. Grusin and J. D. Bolter, Remediation: Understanding New Media, MIT Press, 2000.
6. L. Manovich, The Language of New Media, MIT Press, 2001.
7. P. Lunenfeld (ed.), The Digital Dialectic: New Essays on New Media, MIT Press, 1999.
8. N. Wardrip-Fruin and N. Montfort (eds.), The New Media Reader, MIT Press, 2003.
9. M. Hansen, New Philosophy for New Media, MIT Press, 2004.
10. J. Thackara, In the Bubble – Designing in a complex World, Prentice Hall India, 2005.

Elective subject – 2 (Code: UMCD 612): Video Production and Editing

As this is a project based course, hence the contents of the course will be decided by the concerned course instructor as and when the course float.

Elective subject – 3 (Code: UMCD 611): Digital Design and Animation

As this is a project based course, hence the contents of the course will be decided by the concerned course instructor as and when the course float.

COURSE CONTENTS

SEMESTER – 7

Course Title: Animation Production Design **L-T-P-C**: 1-0-6-8

Course Code: UMCD 701/771

MODULE	TOPIC	COURSE CONTENT
1	**Definition of Computer-based Animation**	Basic Types of Animation: Real Time, Non-real-time, Definition of Modelling, Creation of 3D objects. Exploring the MAYA Interface, Controlling & Configuring the Viewports, Customizing the Max Interface & Setting Preferences, Working with Files, Duplicating Objects, Pivoting, Understanding 2D Splines & shape, Extrude & Bevel 2D object to 3D, Understanding Nurbs, Understanding Polygon, Boolean.
2	**Pre-production Knowledge of Pipeline**	Define Concept or Idea, Story & Script develop, Understanding Storyboard design, Making Animatic design, Concept of Layout Design.
3	**Production Knowledge of Pipeline**	Explain of Modelling Design, Concept of Texturing, Understanding of Rigging/Setup, Implement of Principle of Animation Techniques, Concept of Lighting and Camera, Understand of basic Rendering.

4	**Post Production Knowledge or Pipeline**	VFX and Compositing, Understanding of Motion graphics, Concept of colour correction, implement of Audio Video Editing, Final output.

TEXTBOOKS / REFERENCES:

1. Chawdhary, Nirmal Kumar, *How to write film screenplay*, Kanishka publishers, distributers, New Delhi- 110002, 2009,ISBN 978-81-8457-112-7.
2. Whitaker, Harold, John Halas, Updated by Tom Sito, *Timing for Animation*, Focal Press Elsevier, New York & Singapore, 2009 ISBN: 978-0-240-52160-2.
3. Eve Light Honthaner, *The Complete Film Production Handbook*, Focal Press.
4. Tay Vaughan, *Multimedia: Making It Work*, Ninth Edition, Mc-Graw Hill Education, 2014.
5. Vic Costello with Susan A. Youngblood and Norman E. Youngblood, *Multimedia Foundations: Core Concepts for Digital Design*, Focal Press, 2013.
6. "*Principle of Traditional Animation applied to 3D computer Animation*" pixer son Rofael California In ACM Computer Graphics (21) 4th July 1987Rubenstein, Paul Max, Writing for Media, Prentice Hall, Englewood Cliffs, New Jersey 07632, 1988. ISBN 0- 13-971508-8.
7. Viers, Ric, *The Sound Effects Bible: How to Create and Record Hollywood Style Sound Effects*, Michael Wiese Productions, 2008.
8. Rumsey, Francis and Tim McCormick, *Sound and Recording*, Focal Press 2009, ISBN: 978024052163.
9. Darren Brooker, *Essential CG Lighting Techniques with 3DS Max*, Third Edition, Focal Press, 2008.
10. Lee Lanier, *Advanced Maya Texturing and Lighting*, Third Edition, Autodesk Maya Press, Wiley.
11. *Timing for Animation* - by Harold Whitaker and John Halas.
12. *Inspired 3D Advanced Rigging and Deformations* by Brad Clark, John Hood & Joe Harkins.

Course Title: Minor Project **L-T-P-C**: 0-0-8-16

Course Code: UMCD 791

MODULE	TOPIC	COURSE CONTENT
1	**Project**	Project based on hypothetical concepts related to multimedia communication and animation design.
Minor Project will be done throughout the semester.		

***** A Project Report has to be submitted at the end of the Semester by the concerned students to the Department with approval from the Project Supervisor and Committee Members.***

Course Title: Design Management and Professional Practice (Industrial Presentation) **L-T-P-C**: 0-0-4-4

Course Code: UMCD 792

MODULE	TOPIC	COURSE CONTENT
1	**Project – 1**	Performing design projects considering creativity, innovation and management. IPR and Copyright issues and management

2	**Project – 2**	Managing design project, Workforce management, Team handling, Client consultation, Business development techniques.

(A management based design project and execution practice for future professional career.)

Course Title: ELECTIVE – 4 **L-T-P-C**: 0-0-4-8

Course Code: UMCD 71*

Elective subject – 1 (Code: UMCD 711): Game Design and Production Process

Game Design Origins – Understanding Games, Game Rules, Cheats, Cheat-Codes, Easter Eggs; Gameplay Styles and Strategies; Core Game Design Concepts; Introduction to Artificial Intelligence; Visual Design; Detailed Development of Visuals; Navigation and Interfaces; Designing Levels and the Game Design Document; Sound; Job Descriptions, Game Tracking and Legal Issues; Distribution and Marketing.

Texts/References:

1. Briar Lee Mitchell, *Game Design Essentials*, First Edition, John Wiley & Sons, Sybex, 2012.
2. Keith Burgun, *Game Design Theory: A New Philosophy for Understanding Games*, First Edition, CRC Press, 2013.
3. Richard Rouse III, Game Design: Theory and Practice, Second Revised Edition, Wordware Publishing, 2005.
4. Scott Rogers, *Level Up!: The Guide to Great Video Game Design*, Second Edition, John Wiley & Sons, 2014.

Elective subject – 2 (Code: UMCD 712): Lighting with Arnold / Mental Ray

As this is a project based course, hence the contents of the course will be decided by the concerned course instructor as and when the course float.

Elective subject – 3 (Code: UMCD 713): Editing and Compositing Techniques

As this is a project based course, hence the contents of the course will be decided by the concerned course instructor as and when the course float.

COURSE CONTENTS

SEMESTER – 8

Course Title: Major Project (Thesis Project) **L-T-P-C**: 0-0-8-16

Course Code: UMCD 891

MODULE	TOPIC	COURSE CONTENT
1	**Project**	This project would be based on design research and implementation.

Major Project will be done throughout the semester.

(Project may be Industry-sponsored Project or a continuation of the Major Project to implement in a practical basis.)

***** A Project Report has to be submitted at the end of the Semester by the concerned students to the Department with approval from the Project Supervisor and Committee Members.***

Course Title: Multimedia Design Research Seminar **L-T-P-C**: 0-0-4-4

Course Code: UMCD 892

MODULE	TOPIC	COURSE CONTENT
1	**Seminar**	A Seminar Presentation by students based on current Industry trend and future innovations.

(Student will have to do their research or design based study on latest industry trends and present their study as a seminar.)

Course Title: ELECTIVE – 5 **L-T-P-C**: 0-0-4-8

Course Code: UMCD 81*

Elective subject – 1 (Code: UMCD 811): Tangible User Interface

An overview of tangible user interface; comparative study of different interaction modalities including gestures, tangible products, screen based interface and embedded computing objects; Tangible interfaces and product affordance; Principles and guidelines in design of tangible user interfaces; introduction to tools and technologies necessary for designing and building tangible user interfaces.

Texts/References:

1. K. Ryokai, R. Aipperspach and D. Nguyen, *Theories and practices of tangible user interfaces,* School of Information, University of California, Barkeley, 2007.
2. T. Igoe, *Making things talk – practical methods for connecting physical objects,* O'Reilly Media, 2007.
3. O. Shear and E. Hornecker*, Tangible User Interface*, Now Publishers Inc., 2010
4. D. Saffer, *Designing gestural Interfaces: touch screens and interactive devices*, O'Reilly Media, 2007.

Elective subject – 2 (Code: UMCD 812): Communication Design

- Understanding design as applied to solving communication problems within the context of our society.
- Structuring information in terms of classifications, hierarchy, order, sequence, etc.
- Design of magazine, textbook, picture books, Children's books, exhibition, website, e-book, etc.

References:

1. Meggs, Phillip B.; Type and Image: the language of graphic Design, VNR, 1992
2. R. Carter, D. B. Meg Phillip, Typographic Design: Form and Communication, John Wiley & Sons, 2000

3. Kimberly Elam , Grid Systems: Principles of Organizing Type (Design Briefs), Prince ton Architectural Press, 2004
4. Erik Spiekermann, E.M Ginger; Stop Stealing Sheep & Find Out How Type Works, Second Edition, Adobe Press; 2 edition, 2002

Note:

1. **L**: Lecture period, **T:** Tutorial Period, **P/S*:** Practical period/Studio Session, **C:** Credits. **(P/S*-** In Design Curriculum, instead of Practical Classes, Studio Classes are conducted for better understanding of the subjects through hands-on experience, live projects and discussions).

2. ****Industrial Training**
Industrial Training Phase – I (in IV Semester) and Phase – II (in VI Semester) are expected to be attended by the students during summer break either in the Industry sector of their choice or in the Department under the guidance of any of the faculty members. Students have to give a presentation on the training during the next semester session. There will be no credit given here.

Credits

1 h Lecture (L) per week	2 credit
1 h Studio Project	2 credit
1 h Practical (P) per week	1 credit
1 h Seminar / Training / Industrial Training	1 credit

Consolidated statement of Total Credits in each Semester

Semester	L	T	P/S	Credit
1	6	0	19	36
2	9	0	11	34
3	5	0	19	34
4	4	0	21	38
5	7	0	19	42
6	4	0	19	36
7	1	0	22	36
8	0	0	16	28
Total	36	0	146	284

END OF SYLLABUS

DiplomaInstrumentationEngineeringSyllabus Details
5th semester

Course Name: Generation Transmission & Distribution of Power
Course Code: DEE511 **Credit: 06**
Total contact hours:35 **L-T-P: 2-1-0**

Module1: Introduction (4 hours)

Energy scenario in India, Total installed capacity, Generation of electrical energy, Non-conventional power generation – solar thermal energy, solar PV, wind energy, biomass, fuel cells (introduction only)

Module2: Thermal power plant (6 hours)

Brief introduction of a thermal power station, Mechanism of power generation and energy conversion, Site selection, Major equipment in steam power plant, Water treatment, Steam condensers, Cooling towers, Simple numerical.

Module3: Hydroelectric power plant (6 hours)

Introduction, Mechanism of power generation and energy conversion, Advantages and disadvantages of hydroelectric power plants, Site selection, Hydrology (only introduction), Essential elements of hydro plant-catchment area, reservoir, dam and intake house, inlet waterway, power house, outlet waterway etc, Classification of hydro plants, Hydro turbine- classifications only, impulse turbine and reaction turbine examples, simple numerical.

Module4:Nuclear power plant (6 hours)

Introduction, Mechanism of power generation and energy conversion, Advantages and disadvantages of nuclear power plants, Site selection, Nuclear physics- atom and atomic number, concept of atomic mass unit (amu), radioactive decay and half-life period, concept of α, β and γ-rays, Einstein's mass-energy relationship, mass defect and binding energy, nuclear reactions—difference with chemical reactions, nuclear fission and fusion reactions with examples, chain reaction of U-235 isotope, Nuclear reactors – introduction of main parts - core, moderator, control rods, reflector, coolant, radiation shielding, Simple numerical on binding energy, fission of U-235 etc.

Module5:Diesel engine power plants (3 hours)

Introduction, Advantages, disadvantages and applications, Essential components – diesel engine, air intake system, exhaust system, fuel system, cooling system, lubricating system, engine starting system etc, Simple numerical.

Module6:Gas Turbine Power Plant- GTPP (2 hours)

Introduction,Open cycle and closed cycle GTPP, Advantages and disadvantages of GTPP, examples of GTPP.

Module7:Transmission (3 hours)

Introduction,Open cycle and closed cycle GTPP, Advantages and disadvantages of GTPP, examples of GTPP.

Module8:Distribution (5 hours)

General distribution systems – AC and DC distribution, overhead versus underground systems, Connection schemes of distribution systems- radial, ring main and interconnected system, Requirements of distribution systems.

Reference books --

1. Principles of power systems by- V.K. Mehta and Rohit Mehta
2. A Textbook of Power System Engineering by- A. Chakrabarti, M.L. Soni, P.V. Gupta, U.S. Bhatnagar
3. Electric power engineering handbook, second edition by- Leonard Grigsby

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Course Name: Process Control
Course Code: DIE501 **Credit: 06**
Total contact hours: 35 **L-T-P: 2-1-0**

Module 1:Introduction and basic control concepts **(6 Hours)**

An Introduction to Process Control, Control history, Manual Control, Advantages of Process Control, Introductory Concepts, Process Control and Process Management

P&ID symbols, SAMA representation of Control loops.

Functional Structure of Feedback Control, Sensors and Transmission Systems, Time Constant, Accuracy, Precision, Sensitivity, Repeatability, Turndown Transportation delay, Digital field bus, Smart Sensors.

Module 2: Process feedback controllers **(8 Hours)**

Controllers, Two position controller , Proportional Controller, Integral Control action, Derivative Control action, PID Controller, Reverse acting and forward acting controller, Electronic PID controller.

Module 3:Final control element **(4 Hours)**

Control valves, Actuators and Positioners, Linear Stem valves, Flow Characteristics, Rotary valves, Control valve sizing and Selection, Control valve Dynamic Performance, Power fail safe actions.

Module 4:Process Dynamics and Control **(6 Hours)**

First order lags, interacting and non-interacting Stages, Close loop and Open loop response. Tuning Control Systems, The Process reaction method, Open loop method.

Module 5:Special Purpose Concepts in Control **(6 Hours)**

Cascade, Ratio and Dead time control, Feed forward and Multivariable Control., Override control, Selective control, Split Range control, Industrial applications - Drum Level Control, Dahlin Algorithm. Statistical Quality control. Hazardous and Intrinsic Safety.

Module 6: Modern Control system Architecture **(5 Hours)**

Computers in Process Control, Digital Control, Data logger(DAS), DCS, SCADA.

Books / References:

1) Fundamentals of Process Control Theory, 3rd edition ; Paul Murrill, Ph.D; ISA
2) Process Control Principles and Application, SurekhaBhanot; Oxford University Press
3) Process Control , K. Krishnaswamy
4) Process Control Instrumentation Technology , Curtis Johnson
5) Instrumentation for Process Measurement and Control, 3rd Edition, Norman A Anderson
6) Chemical Process Control: An Introduction to Theory and Practice , George Stephanopoulos
7) Process Automation Handbook , Springer publication, Jonathan Love

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Course Title: Process Control Lab
Course Code: DIE571 **Credit: 02**
Total contact hours: 2/week **L-T-P: 0-0-2**

List of experiments to be performed by the students for Process Control Lab

1. To study and Plot the Resistance-Temperature characteristics of RTD.
2. To study and Plot the Resistance-Temperature characteristics of Thermistors.
3. To study and Plot the Temperature-e.m.f Curves for Thermocouples.
4. To study the Input and Output Characteristics of LVDT.Determine the Sensitivity of LVDT.Also Measure the phase difference between two windings of LVDT.
5. To study the Strain Measurement using Strain Gauge and Cantilever Beam.
6. To calibrate the pH Meter using Buffer Solution and determine the PH Value of the given unknown solution.
7. Light Dependent resistor (LDR) characteristics.
8. To study the different controller characteristics.
9. To Control temperature,pressure,flow,level using PC with the help of different control modes.
10. To verify the operation of Control valves.
11. To Study the characteristics of a flapper nozzle Amplifier.
12. To verify the operation of I/P and P/I converters.

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Course Title: Industrial Instrumentation-I
Course Code: DIE502 **Credit: 06**
Total contact hours:35 **L-T-P: 2-1-0**

Module 1: Introduction **(2Hours)**

Introduction to different process variables in industry, Construction and working of elastic elements: spring, bellow, diaphragm, bourdon tube, cantilever

Module 2:Measurement of Force and Torque **(5 Hours)**

Force: Definition and unit, Load cell and its types: strain gauge, hydraulic, pneumatic, magnetoelastic and piezoelectric load cells

Torque: Definition and its unit, Torque meters and its types: mechanical, electrical and strain gauge torque meters

Module 3: Measurement of Speed, Acceleration and Vibration **(8 Hours)**

Speed/Velocity: Definition and unit, Linear velocity measurement: electromagnetic transducers, Angular velocity measurement: tachometers: photoelectric, capacitive, inductive, drag cup type, stroboscope, D.C. and A.C tachogenerators.

Acceleration: Definition and its unit, Accelerometer and its types: potentiometric, LVDT, piezoelectric, strain gauge and capacitive accelerometers, mechanical type vibration instruments, seismic instruments as accelerometer, vibration sensor, calibration of vibration pickups.

Module 4: Measurement of Pressure **(9 Hours)**

Pressure: Definition and its unit, classification of pressure measuring instruments with respect to pressure range.

High pressure measurement: Bridgman gauge and pressure gauges or pressure transducers with bourdon tube and diaphragm.

Medium pressure measurement: pressure gauges or pressure transducers with different elastic elements.

Low pressure measurement: Direct methods: pressure gauges or pressure transducers with bourdon tube and diaphragms, manometers; Indirect methods: McLeod gauge, Thermal conductivity gauge, Ionization gauge; Calibration of pressure gauges: Dead weight tester.

Module 5: Measurement of Temperature **(9 Hours)**

Temperature: Definition and its unit, Classification of thermometers: mechanical, electrical and optical thermometers.

Mechanical thermometer: bimetallic thermometer, fluid filled in system thermometers: liquid filled, gas filled and vapour pressure; source of error and its compensation in liquid filled system.

Electrical thermometers: RTD-3 lead and 4 lead RTDs, Thermistor, Thermocouple and fabrication of industrial thermocouples.

Optical thermometers: Radiation methods of temperature measurement, Total radiation pyrometer, optical pyrometer and fiber optic sensor for temperature measurement.

Module 6: Measurement of pH **(2 Hours)**

pH: Definition, reference and glass electrodes, pH meter

Books / References:

1. Doebellin, E.O.and Manik D.N.,Measurement systems Application and Design, Special Indian Edition, Tata McGraw Hill Education Pvt.Ltd,2007
2. Jones.B.E, Instrument Technology, Vol.2, Butterworth-Heinemann, International Edition, 2003.
3. Liptak, B.G., Instrumentation Engineers Handbook (Measurement), CRC Press, 2005.
4. Patranabis,D., Principles of Industrial Instrumentation, 3rd Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2010.
5. Eckman D.P., Industrial Instrumentation, Wiley Eastern Limited, 1990.
6. Rangan C. S., Sarma G. R. And Mani V. S. V., Instrumentation Devices and Systems, McGraw Hill Education Pvt.Ltd, 1997.

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Course Title: Industrial Instrumentation-ILab
Course Code: DIE572 **Credit: 02**
Total contact hours: 2/week **L-T-P: 0-0-2**

List of experiments to be performed by the students for Industrial Instrumentation-ILab

1) Measurement of speed,torque and vibration.
2) Calibration of pressure gauge using dead weight tester.
3) Measurement of temperature using IR thermometer and IC sensors.
4) Standardization and measurement of pH values of different solutions.
5) Measurement ofangular velocity using tachometers.
6) Measurement of weight using load cell or strain gauges.
7) Measurement and calibration of temperature using RTD,Thermistor and thermocouple.
8) Measurement of Pressure using bellows,Bourdon tube and Manometer.

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Course Title: Electrical and Electronic Measurements
Course Code: DIE503 **Credit: 06**
Total contact hours: 35 **L-T-P: 2-1-0**

Module 1: Measurement of Voltage and Current (10 Hours)
Introduction to Electrical Instruments: Operating forces, constructional details, types of support, control systems and damping systems.
Galvanometers: Construction, basic principle of working, errors, advantages and disadvantages of D'Arsonval type galvanometer.
Voltmeters and Ammeters: Construction, basic principle of working, errors, advantages and disadvantages of moving coil, moving iron, dynamometer type and electrostatic type instruments

Module 2: Measurement of Power and Energy (4 Hours)
Electrodynamometer type wattmeter: Basic principle of working, construction, errors, advantages and disadvantages.
Single Phase Induction type energy meter: Basic principle of working, construction, errors, advantages and disadvantages.

Module 3: Measurement of Resistance (7 Hours)
Measurement of low and medium resistance: Ammeter-voltmeter method, Wheatstone bridge method, Kelvin's Bridge method and Kelvin's double bridge method
Measurement of high resistance: Direct deflection methods, Loss of charge method and Megger.

Module 5: Measurement of Impedance (6 Hours)
Measurement of inductance: Maxwell's bridge and Hay's Bridge.
Masurement of capacitance: De Sauty's and Schering Bridge.
Measurement of mutual inductance: Heaviside Mutual Inductance Bridge
Measurement of frequency: Wein's Bridge

Module 5: Electronic Instruments (8 Hours)
Analog and Digital Electronic Ammeters, Voltmeters and Function generator.
Cathode Ray Oscilloscope: study of oscilloscope subsystems and measurements, DSO.

Books / References:
1. A.K. Sawhney, 'Electrical & Electronic Measurements and Instrumentation', DhanpathRai&Co (P) Ltd.
2. J.B.Gupta, 'A Course in Electronic and Electrical Measurements and Instrumentation', S.K.Kataria& Sons, Delhi.
3. David A Bell, ' Electronic Measurements and Instrumentation', Prentice-Hall of India Private Limited.

****

Course Title: Electrical & Electronic Measurements Lab
Course Code: DIE573 **Credit: 02**
Total contact hours: 2/week **L-T-P: 0-0-2**

List of experiments to be performed by the students for Electrical & Electronic Measurements Lab

1. To study the working of PMMC and MI instruments.
2. Measurement of unknown resistance using Whetstone's Bridge.
3. Measurement of unknown inductance using Maxwell's Bridge.
4. Measurement of unknown capacitance using De Sauty's and Schering Bridge.
5. Measurement of frequency using Wein's Bridge.
6. Measurement of power using electrodynamometer type wattmeter.
7. Measurement of amplitude and frequency of voltage waveform using DSO.
8. Study of frequency response of op amp amplifier circuit using function generator and DSO.

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Course Title: Power Electronics
Course Code: DIE504 **Credit: 06**
Total contact hours: 35 **L-T-P: 2-1-0**

Module1: Introduction and Power Electronics Devices (8Hours)

Introduction to thyristors and other power Electronics devices- Construction, working principles of SCR two transistor analogy of SCR, VI characteristics of SCR; SCR specifications and ratings; Different methods of SCR Triggering; Different commutation circuits for SCRs; Series and parallel operations of SCRs; Basic idea about the selection of heat sinks for thyristors; Construction and working principle of DiacsandTriacs and their V-I characteristics; Construction, workings and ratings of Gate Turn off (GTO) thyristors; Characteristics of SCR diac. Triac, programmable uni-junction transistor (PUT), ASCR, RCT, LASCR, SCS ; Contribution and working of UJT and its application as relaxation oscillators; Comparison between BJT and SCR;Construction, working and characteristics of MOSFET, IGBT, MLT, their specifications and ratings

Module2:Application of SCR and Triacs (3Hours)

Illumination control; Temperature control; Battery charger; Fan regulators; Emerging light using SCR; Speed control of DC and universal motor; LDR operated SCR circuit; Switched mode power supply; Uninterrupted power supply; Solid state relays

Module3:Controlled Converters (7Hours)

Half wave controlled rectifier with resistive load; Half wave ; controlled rectifier with inductive load; Full wave half controlled rectifier with resistive load; Full wave half controlled rectifier with inductive load; Full wave fully controlled rectifier with resistors as well as inductive load; Three-phase half wave fully controlled rectifier with resistors as well as inductive load; Three phase fully wave fully controlled and half controlled with resistive as well inductive loads; Duel converters and their applications.

Module4:Inverters (4Hours)

Voltage and current source inverters; Working principle of single phase series and parallel inverter; Working principle of single phase bridge inverter; Working principle of three phase bridge inverter.

Module5:Choppers (3Hours)

Working of voltage, current and load, commutated choppers; Classification of choppers.

Module6:Cyclo Converter (3Hours)

Working principle of single phase and three phase cyclo converter.

Module7:Electric Device Control **(7Hours)**

D. C. drive control - Speed control of dc series motor using bridge rectifier; Speed control of dc shunt motor using bridge rectifier; Speed control of dc motor using choppers; Study of control scheme for speed control of a separately excited dc motor above and below the base speed; AC drive control - Speed control of induction motor using phase control; Speed control of induction motor using variable frequency; Speed control of induction motor using slip power recovery schemes

Textbooks/References:

1. Industrial Electronics and Control by SK Bhattacharya and S Chetterji; New Age publishers, New Delhi
2. Electrical and Electronic Measurement by A.K. Sawhney, DhanpatRai and Sons, New Delhi
3. Power Electronics – Principle and Application by J Michael Jacob; Vikas Publishing House, New Delhi
4. Power Electronics by M.H. Rashid.
5. Power Electronics by P.C. Sen, Tata McGraw Hill Publishers, New Delhi
6. Thyristors by M.S. Berde, Khanna publishers, New Delhi
7. Thyristors and Thyristors by Sugandhi and Sugandhi
8. Power Electronics by P.S. Bhimbhrah, Khanna publishers, New Delhi
9. Fundamentals of power Electronics by S. Rama Reddy, Narosa publishing House, New Delhi

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Course Title: Power Electronics Lab
Course Code: DIE574 **Credit: 02**
Total contact hours: 2/week **L-T-P: 0-0-2**

List of experiments to be performed by the students for Power Electronics Lab

1. To study the V-I characteristics of a MOSFET.
2. To study the V-I characteristics of an IGBT.
3. To study V-I characteristics of SCR to find its practical latching and holding currents.
4. To study the V-I characteristics of a Triac.
5. To study the UJT Relaxation Oscillator.
6. To study the RR triggering of a SCR.
7. To study the RC triggering of a SCR.
8. To study the SCR based Half-wave rectifier by using RR/RC/UJT oscillator triggering to obtain controlled voltage output.
9. To study the SCR based Full-wave rectifier by using RR/RC/UJT oscillator triggering to obtain controlled voltage output.
10. To study DC motor PWM speed control circuit by using MOSFET/IGBT triggering.

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Course Title: Telemetry
Course Code: DIE511 **Credit: 06**
Total contact hours: 35 **L-T-P: 2-1-0**

Module 1: Introduction to Telemetry Principles (8 Hours)

Purpose of telemetry, basic scheme, voltage, current and frequency telemetry, line length limitations.

Symbols and codes-Bits and symbols, time function pulses, line and channel coding.

Module 2: Signals and Transmission Basics (7 Hours)

Introduction, Signals, Transmission Fundamentals, Amplitude Modulation, Frequency and Phase Modulations, Bandwidth.

Module 3: Multiplexing in Telemetry Systems (8 Hours)

FDM systems, IRIG standards, FM circuits, Phase modulation circuits, Phase Locked Loop, Mixers.

TDM systems- TDM- PAM, PAM- PM, TDM- PCM systems, differential PCM, PCM reception.

Module 4: Digital Modulation Techniques (6 Hours)

Modems, Digital modulation and Shift-keying, FSK, PSK, DPSK, QPSK, QAM.

Module 5: Satellite and Fiber Optic Telemetry (6 Hours)

Basics of satellite Telemetry- Satellite telemetry, TT and C services, subsystems, the earth station.
Introduction to Fiber optic Telemetry

Books / References:

1. D. Patranabis, Telemetry Principles, TMH, New Delhi
2. Modern Digital and Analog Communication Systems by B.P. Lathi
3. Introduction to Analog and Digital Communication by Simon Hykin.

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Department of Food Engineering&Technology

5TH SEMESTER

FOOD PROCESSING TECHNOLOGY						
A. THEORY						
Sl no.	Code	Subject	L	T	P	Credits
1.	DFET501	FOOD ENGINEERING OPERATION-I	3	1	0	8
2.	DFET502	FOOD PRODUCT TECHNOLOGY-II	3	0	0	6
3.	DFET503	FOOD STORAGE AND PACKAGING	3	0	0	6
4.	DFET504	FOOD QUALITY CONTROL	3	0	0	6
5.	DFET510	PROFESSIONAL PRACTICE-III	1	0	0	2
B. PRACTICAL						
6.	DFET571	FOOD PRODUCT TECHNOLOGY-II LAB	0	0	3	3
7.	DFET572	FOOD QUALITY CONTROL LAB	0	0	2	2
8.	DFET573	PROFESSIONAL PRACTICE-III	0	0	2	2
						35

Paper Name: FOOD ENGINEERING OPERATIONS – I **Credit:8**

Paper Code: DFET501 **L-T-P:3-1-0**

Total Conact Hours:40

Unit I: Introduction to Unit Operations; Concept of primary, secondary and tertiary unit operations in food processing. Material and energy balance for the processes.**Contact Hours:10**

Unit II: Material handling: Conveyors, elevators; cleaning and handling of raw materials. Selection and design of material handling equipments.**Contact Hours:10**

Unit III: Food machinery for size reduction, mechanical expression, mechanical separation, mixing and agitation; Emulsification and Homogenization.**Contact Hours:10**

Unit IV: Filtration, membrane separation; Sedimentation and centrifugation.**Contact Hours:10**

References:

1. Unit Operations in Food Processing - Earle, R.L., Pergamon Press New York.
2. Food Engineering Operations - Brennan, J.G. et. Al.; Elsevier Applied Science, Amsterdam
3. Food Process Engineering - Heldman, R.R. and R.P. Singh, CBS Publication
4. Fundamentals of Food Engineering - Toledo, R.T., CBS Publication
5. Unit Operations in Chemical Engg. - McCabe, Smith and Harriot, McGraw Hill Book Co., New York
6. Transport processes and Unit Operations - C.J. Geankopolis, Prentice hall of India, New Delhi

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Paper Name:FOOD PRODUCT TECHNOLOGY – II **Credit:6**

Paper Code: DFET502 **L-T-P:3-0-0**

Total Conact Hours:40

Unit I: Technology of production of market milk, cream & butter, cheese, condensed milk, milk powder, baby foods, Ice cream & indigenous dairy products.**Contact Hours:10**

Unit II: Egg based food products, Egg powder. Meat and Fish based products and their preservation.**Contact Hours:10**

Unit III: Production& processing of cane sugar, Starch derivative & Starch based indigenous products. Processing of Tea Coffee & coco. Carbonated beverages.**Contact Hours:10**

Unit IV: Baking, Extrusion**;**Production of baked, puffed, extruded foods and snacks from cereals. **Contact Hours:10**

References:

1. Food Science- N. N. Potter CBS publisher & Distributors, Delhi, 5th Ed. 1996.
2. Technology of Food Preservation- Desrosier&Desrosier, 4th Ed. 1987.
3. Agricultural process Engineering- Singh & Sahay Vikas Publishing House, New Delhi, 2001.
4. Meat Science- Lawrie, R. A. Pergamon Press, Oxford U. K. 2nd Ed. 1975.

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Paper Name:FOOD STORAGE AND PACKAGINGCredit:6

Paper Code: DFET503 **L-T-P:3-0-0**

Total Conact Hours:45

Unit I: Introduction to Storage, importance of scientifically devised storage systems to minimize loses of food grains, fruits, vegetables, dairy products, poultry and meat. Storage structures: functional and structural designs of grain storage structures such as cover and plinth (CAP), warehouse and silos. BIS Specifications.**Contact Hours:10**

Unit II: Functional, structural and thermal designs of cold stores; controlled and modified atmosphere storage systems for semi and highly perishable products.**Contact Hours:10**

Unit III: Functions of packaging and packaging materials, properties of different types of packaging materials: paper, plastics, metal, natural materials etc. and their application. Packaging requirements: Packaging requirements and their selection of various processes, viz. canning, dehydration etc. Packaging evaluation: WVTR, GTR, bursting strength, tensile strength, tearing strength drop test. Packaging environment: Inert gas, vacuum, aseptic, CAP and MAP. Packaging Machinery: Bottling, canning, form to fill and seal machines, bags and their manufacturing and closing.**Contact Hours:15**

Unit IV: Management practices: Labeling, record keeping and management of stores in godowns, silos and cold storages. Maintenance of buildings and equipments, sanitations of storage system to conform to BIS standards. Package labeling: function and regulations.

Contact Hours:10

References:

1. Handling and storage of food grains in tropical and subtropical areas - Hall, C.W., FAO Publications, Oxford and IBH Pub. Co. Pvt. Ltd.
2. Handling, Transportation and Storage of Fruits and Vegetables - Albert Lloyd Ryall and Warner Flipton Ryall, Avi Pub. Co.
3. Preservation and storage of grains, seeds and their by-products - Multon, J.L., CBS Publishers and distributors
4. Food packaging materials - Mahadeviah, M. and R.V. Gowramma, Tata-McGraw Hill Pub. Co. Ltd.

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Paper Name:FOOD STORAGE AND PACKAGING **Credit:6**

Paper Code: DFET504 **L-T-P:3-0-0**

Total Conact Hours:40

Unit I Introduction: Concept of quality, quality control and assurance, principles and functions of quality control, quality attributes (qualitative, hidden and sensory), plan and method of quality control within and outside the industry. Subjective and objective quality, HACCP; its benefits and application.**Contact Hours:10**

Unit II: Food Analysis: Objective and purposes of food analysis, food adulteration and simple and quick method of adulteration detection, methods and purpose of estimation of moisture, crude fat proteins, crude fiber and ash.**Contact Hours:10**

Unit III: Definition of sampling, purpose, sampling techniques requirements and sampling procedures for liquid, powdered and granular material. Physico-chemical and mechanical properties: Colour, flavour, consistency, viscosity, texture and their relationship with food quality.**Contact Hours:10**

Unit IV Sensory quality control: Definition, objectives, panel selection, Interpretation of sensory results in statistical quality control, TQM and TQC. Food Regulations: Objectives, requirements and benefits of food grades and standards (BIS, AGMARK, PFA, FPO, FAO, CODEX, WHO, ISO).**Contact Hours:10**

References:

1. Quality Control in Food Industry (Vol.I& II) - Kramer & Twigg, AVI
2. Handbook of Analysis F&V products - Rangana, McGraw-Hill Publishing Co.
3. Modern method of analysis - Stewart and Whittaker, Springer
4. Sensory Evaluation Techniques - Morten, C. et.al.
5. Food Analysis principle & technique - Dieter W., Geuwedit& Whitaker
6. Food Analysis: Theory and Practice - Pomeranz &Meloan, Springer.

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Paper Code: DFET510
Paper Name: PROFESSIONAL PRACTICE-III
Total Contact Hours: 15 **Credit:02**
L-T-P:1-0-0

1. Topic related to the branch and current area of interest i.e. articles in internet on which research or review is undergoing may be decided for the students group. The group may be restricted to maximum 5 students. Literature survey from Internet, print media and nearby practices may be undertaken. Minimum of 10 to 15 papers may be suggested for reading to get an overview and idea of matters.
2. Prepare notes for given topic: Making review or concept to be penned down in form of an article (the article or review may be of 8 – 10 pages length).

3. Present given topic in a seminar: A seminar or conference or work shop on branch related topic is to be decided and all students in group of 5-6 students may be asked to present their views.
4. Industrial Lecture Program by Professional / Industrial Expert to be organized.

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Paper code: DFET571 **Credit: 03**

Paper Name: FOOD PRODUCT TECHNOLOGY-II LABL-T-P: 0-0-3

Total contact hours: 30

List of Experiments:

1. To study about the cream separator.
2. Preparation of Paneer
3. Preparation of Kalakand
4. Preparation of Rasgulla
5. Preparation of sweetened condensed milk
6. Preparation of curd.
7. Determination of gluten content in flour
8. Preparation of biscuit.
9. Preparation of bread.
10. Preparation of cake

Paper Code: DFET572 **Credit: 02**
Paper Name: FOOD QUALITY CONTROL LAB **L-T-P: 0-0-2**
Total contact hours: 20
List of Experiments:

1. Determination of pH and titratable acidity of non-alcoholic beverages.
2. Determination of total carbohydrate content in fruit and vegetable products.
3. Determination of moisture content fruit and vegetable products.
4. Viscosity Testing of Fruit and Vegetable Juices and Purees.
5. Colorimetric analysis of fruit and vegetable products.
6. Texture analysis of fruit and bakery products.
7. Determination of adulteration of food sample.
8. Crude fiber analysis of bakery products.
9. Dietary fiber analysis of processed food products.
10. Sensory quality analysis of processed food products.

Paper Code: **DFET573Credit**: **02**
Paper Name: **PROFESSIONAL PRACTICE-IIIL-T-P**: **0-0-2**
Total contact hours: **15**

A. Industrial Visit.
A visit to various food processing and food plant manufacturing industries be arranged and the report of their visit should be submitted by the individual student.

B. A topic on best practices and product development may be assigned to the student group. The group may be asked to prepare a survey, come to opinion making and list out the activities to develop the activities with SWOT analysis.

Paper Code: DCSE501 **Credit: 6**

Paper Name: Database Management Systems. **L-T-P: 3-0-0**

Total Contact Hours: 42

Module1: Introduction **Contact Hours: 4**

1.1.Database system applications.

1.2.Purpose of Database Systems.

1.3.View of Data

1.4.Database Languages.

1.5.Relational Databases.

1.6.Database Design, Data Storage and Querying

1.7.Transaction Management

1.8.Database Architecture

1.9 Database users and administrators.

Module2: Introduction to the Relational Model **Contact Hours: 5**

2.1 Structure of relational Databases.

2.2 Database Schema, keys

2.3 Schema Diagram

2.4 Relational Query Languages

2.5 Relational Operations

Module 3: Structured Query Language (SQL) **Contact Hours: 7**

3.1 Overview of the SQL Query Language

3.2 SQL Data Definition

3.3 Basic Structure of SQL Queries

3.4 Set Operations, null Values,

3.5 Aggregate Functions

3.6Nested Subqueries

3.7 Views in SQL

3.8 Integrity Constraints.

Module 4: E-R Model **Contact Hours: 6**

4.1 Overview of the Design Process

4.2 The Entity-Relationship Model

4.3 Constraints

4.4 Entity-Relationship Diagrams

4.5 Reduction to Relational Schemas

4.6 Extended E-R Features

Module 5: Functional Dependencies and Normalization **Contact Hours: 7**

5.1 Functional dependencies

5.2 Normal forms based on primary keys

5.3 General definitions of First, second and third normal forms

5.4 Boyce-Codd Normal Form

Module 6: Transaction processing concepts **Contact Hours: 6**

6.1 Transaction and system Concept

6.2 Desirable properties of transactions, Schedules and Serializability

6.3 Recoverable Schedules and Cascadeless Schedule

Module 7: Concurrency Control Techniques **Contact Hours: 4**

7.1 Basic Concepts; Concepts of Locks

7.2 Deadlock handling

Module 8: Recovery System **Contact Hours: 3**

8.1 Failure Classification, Storage

8.2 Recovery and Atomicity

Book/References:

1. Database System Concepts – Silberschatz, Korth and Sudarshan

1. Fundaments of Database System- Elmasri and Navathe

2. Database Management- CJ Date

3. Principles of Database Systems- John E. Hopcroft& Jeffrey D. Ullma

4. Developing personal oracle7 Application- David Lockman

5. Oracle8 DBA handbook- by Kevin Loney

Paper Code: DCSE571 **Credit: 3**

Paper Name: Database Management Systems Lab **L-T-P: 0-0-3**

Lab Exercises

1. Introduction to Structured Query Language (SQL)

1.1 Data Definition Language (DDL)-Create, alter, drop table

1.2 Data Manipulation Language (DML)-select, insert, update, delete

1.3 Data Control Language-Grant, revoke

1.4 Creating and deleting Views, index

2. Introduction to PL/SQL

2.1 Block structure, variable and types, looping constructs, Expression and operators, functions

2.2 Cursors variable, cursor fetch, loops

2.3 Procedure, functions, triggers

2.4 Error handling and exceptions

2.5 Composite data-types

3. DBA function

3.1 Installation of software (RDBMS)

3.2 Creation of database

3.3 Routine maintenance of database

3.4 Backup & Recovery of database

Paper Code: DCSE502 **Credit: 6**

Paper Name: Software Engineering **L-T-P: 3-0-0**

Total Contact Hours: 42

Module 1: Introduction to Software Engineering **Contact hours: 5**

1.1 The evolving role of software

1.2 Software crisis causes and solutions

1.3 Software Engineering paradigm

1.4 Classic life cycle

1.5 Prototyping model

1.6 Spiral model

Module 2: Software Requirement Analysis **Contact hours: 6**

2.1 Requirement Analysis fundamentals

2.2 SRS document

2.3 Structured Analysis

2.4 Object oriented analysis and datamodelling (ERD)

2.5 Process modelling

Module 3: Software Design **Contact hours: 5**

3.1 Characteristics of a good software design

3.2 Design Fundamentals

3.3 Flow oriented design and objectoriented design

Module 4: Quality Assurance **Contact hours: 4**

4.1 Software quality factor

4.2 Software quality assurance

4.3 SQA activities

4.4 Software reliability, errors and faults

4.5 Reliability models

Module 5: Verification and Validation **Contact hours: 6**

5.1 Basic concepts

5.2 Software testing strategies

5.3 Black-box and white-boxtesting

Module 6: Software Evaluation and DocumentationContact hours: 4

6.1 Software Evaluation Criteria

6.2 Need and Characteristics of a gooddocument

6.3 Internal and External documentation

Module 7: Software Project Management **Contact hours: 12**

7.1 Basic concepts

7.2 Project planning

7.3 Project estimation

7.4 COCOMO model

7.5 Project scheduling

7.6Staffing management

7.7 Project monitoring

7.8 Risk analysis

7.9 Tracking and control, version management.

Books / References:

1. Software Engineering-A Beginners Guide by Pressman –TMH

2. Software Engineering - PankajJalote-WILEY

3.Fundamentals of Software Engineering - Rajib Mall-PHI

Paper Code: DCSE503 **Credit: 6**

Paper Name: Object Oriented Programming with C++ **L-T-P: 3-0-0**

Total Contact Hours: 42

Module 1: Introduction to C++ **Contact hours: 3**

1.1 Basic Concepts of Object Oriented Programming

1.2 Structure of a C++ program

1.3 Data types, Operators and Expressions

1.4 Reference Variables

1.5 Scope Resolution Operator, Type Cast Operator and Manipulator

Module 2: Classes and Objects **Contact hours: 5**

2.1 Class declaration and definition, use of different Access Modifiers

2.2 Defining Member Function, Private Member Functions, Creating Objects

2.3 Static Data Member, Static Member Function

2.4 Array of Objects, Object as Function Arguments

Module 3: Functions in C++ **Contact hours: 4**

3.1 Function Prototyping, Call by Reference, Return by Reference

3.2 Inline Function, Friend Function and Virtual Function

3.3 Function Overloading

Module 4: Constructors and Destructors **Contact hours: 4**

4.1 Introduction to Constructors

4.2 Dynamic Constructor and Copy Constructor

4.3 Destructors

Module 5: Operator Overloading and Type conversions **Contact hours: 3**

5.1 Defining Operator Overloading, rules for

overloading Operators

5.2 Overloading Unary and Binary Operators

5.3 Type Conversion

Module 6: Inheritance **Contact hours: 6**

6.1 Definition

6.2 Different forms of Inheritance,

defining Derived Classes,

6.3 Virtual Base Class, Abstract Classes

Module 7: Pointers, Virtual Functions and Polymorphism **Contact hours: 6**

7.1 Introduction to Polymorphism

7.2 Pointers, Pointers to Objects, this Pointer

7.3 Pointers to Derived Classes

7.4 Virtual Functions, Pure Virtual Functions

Module 8: Templates **Contact hours: 4**

8.1 Definition of Templates

8.2 Class Templates, Function Templates

8.3 Overloading Template Functions, Member Function Templates

Module 9: Exception Handling **Contact hours: 2**

9.1 Basics of Exception Handling

9.2 Catch Statement, Throwing Exception

Module 10: File Handling **Contact hours: 5**

10.1 Classes for File Stream Operations

10.2 Opening and Closing a file, File modes

10.3 Types of Files-Sequential and Random

10.4 Error Handling during File Operations

10.5 Command-line Arguments

Books / References:

1. Object Oriented Programming with C++ -E Balagurusamy, Tata McGraw-Hill

2. C++ - The Complete Reference -Herbert Schildt, Tata McGraw-Hill

3. The C++ Programming Language-Bjarne Stroustrup,Addison-Wesley

Paper Code: DCSE573 **Credit: 3**

Paper Name: Object Oriented Programming with C++ Lab **L-T-P: 0-0-3**

- Programming exercises on classes and objects
- Programming exercises on constructors and destructors
- Programming exercises on function overloading
- Programming exercises on inline function, friend function and virtual function
- Programming exercises on operator overloading (unary and binary)
- Programming exercises on various forms of inheritance
- Programming exercises on virtual function and pointers
- Programming exercises on use of Templates (class and function)
- Programming exercises on handling exceptions.
- Programming exercises on File handling

Paper Code: DCSE504 **CREDITS: 6**

Paper Name: Cryptography & Network Security **L-T-P: 3-0-0**

Total Contact Hours: 42

Module 1: Introduction to Cryptography & Network Security **Contact hours 4**

1.1 The need for security
1.2 Principles of Security: confidentiality, integrity, authentication, non-repudiation, access control and availability
1.3 Types of Attacks: passive and active attacks, Virus, worm, Trojan horse, Applets and ActiveX control, Cookies, Specific Attacks: Spoofing and Sniffing(snooping), Phishing, Pharming.

Module 2: Concept and Techniques of Cryptography **Contact Hours 8**

2.1 Concept of Plain Text and Cipher Text
2.2 Substitution Techniques: Caesar Cipher, Mono-alphabetic Cipher, Homophonic Substitution Cipher, Polygram Substitution Cipher, Polyalphabetic Substitution Cipher, Play fair Cipher, Hill Cipher.
2.3 Transposition techniques: Rail Fence Technique, Simple columnar Technique.
2.4 Encryption and Decryption, Symmetric and Asymmetric Key, Steganography.

Module 3: Symmetric Key Algorithm **Contact Hours 10**

3.1 Algorithm types and modes (ECB, CBC, CFB, OFB, CTR)
3.2 An overview of Symmetric Key Cryptography
3.3 Data Encryption Standard (DES), Advanced Encryption Standards (AES)

Module 4: Asymmetric Key Algorithm **Contact Hours 10**

4.1 An overview of Asymmetric Key Cryptography.
4.2 The RSA algorithm.
4.3 Symmetric and Asymmetric Key Cryptography together.
4.4 Digital Signature, Message Digest, MD5, Secure Hash Algorithm(SHA), Hash-based Message Authentication Code(HMAC).

Module 5: Authentication **Contact Hours 5**

5.1 Authentication Basics, Password, Authentication Tokens
5.2 Public Key infrastructures
5.3 Certification authorities and key distribution centres
5.4 Kerberos

Module 6: Firewall **Contact Hours 5**

6.1 Firewall Characteristics
6.2 Firewall's Capabilities and Limitations
6.3 Types of Firewall, Firewall Configuration

6.4 Trusted system, Virtual Private Networks

Books / References:

1. Cryptography and Network Security -Atul Kahate, Tata McGraw Hill
2. Cryptography and NetworkSecurity(Principles and Practices) -William Stallings, PHI
3. Cryptography and Network Security -Behrouz A. Forouzan, Debdeep Mukhopadhyay, Tata McGraw Hill

Paper Code: DCSE574 **CREDITS: 3**

Paper Name: Cryptography & Network Security Lab **L-T-P: 0-0-3**

ExperimentI. Write a program using C or C++ to encrypt and decrypt the general Caesar cipher.

Experiment II.

Perform encryption and decryption applying the following algorithms (Use C or C++)

i. Caesar Cipher
ii. Rail Fence Technique
iii. Simple Transposition Technique

ExperimentIII. Write a program to implement the Play fair cipher using C or C++.

Experiment IV. Write a C or C++ program to implement the Diffie-Hellman Key Exchange mechanism.

ExperimentV. Consider a plain text message I AM AN INTRUDER. Encrypt it with the help of the following algorithms:

(Use C or C++ programming language)

i. Replace each alphabet with its equivalent 7-bit ASCII code.
ii. Add a 0 bit as the leftmost bit to make each of the above bit patterns 8 position long.
iii. Swap the first four bits with the last four bits for each alphabet
iv. Write the hexadecimal equivalent of every four bits.

ExperimentVI. Implement the DES algorithm logic using C or C++ programming language.

Experiment VII. Using the C or C++ programming language, calculate the message digest of a text using the MD5 algorithm.

ExperimentVIII. Using the C or C++ programming language, implement the RSA algorithm.

ExperimentIX. Many programming languages allow the generation of random numbers. Implement a C or C++ program to generate a series of 12 random numbers. Repeat the same program execution many times to see how the random numbers are repeated.

ExperimentX. Write a program in C or C++ to perform the application of a digital signature on a given text.

Paper Code: DCSE510 **CREDITS: 6**

Paper Name: Mobile Computing **L-T-P: 3-0-0**

Total Contact Hours: 42

Module 1:Concept of Mobile Computing **Contact hours 9**

1.1 Concept of Mobile Communication
1.2 Different generations of wireless technology
1.3 Basics of cell, cluster and frequency reuse concept
1.4 Noise and its effects on mobile computing
1.5 Understanding GSM and CDMA
1.6 Basics of GSM architecture and services like voice call, SMS, MMS, LBS, VAS
1.7 Different modes used for Mobile Communication

Module 2: Architecture and Design of Mobile Computing **Contact Hours 9**

2.1 Architecture of Mobile Computing (3tier)
2.2 Design considerations for mobile computing
2.3 Characteristics of Mobile Communication
2.4 Application of Mobile Communication
2.5 Security Concern Related to Mobile Computing
2.6 Middleware and Gateway required for mobile Computing
2.7 Making Existing Application Mobile Enable

Module 3: Concept of Mobile IP in Mobile Communication **Contact Hours 8**

3.1 Mobile IP
3.2 Basic Mobile Computing Protocol
3.3 Mobile Communication via Satellite: Low orbit satellite, Medium orbit satellite, Geo stationary satellite
3.4 Satellite phones

Module 4: Application of Androidin Mobile Communication **Contact Hours 8**

4.1 Overview of Android
4.2 What does Android run On, Android Internals?
4.3 Android for mobile apps development
4.4 Environmental setup for Android apps Development
4.5 Framework: Android- SDK, Eclipse
4.6 Emulators: What is an Emulator / Android AVD
4.7 Android Emulation: Creation and set up
4.8 First Android Application

Module 5: Activities of Android and Concept of GUI Design **Contact Hours 8**

5.1 Design criteria for Android Application: Hardware Design Consideration, Design Demands for Android application, Intent, Activity, Activity Lifecycle and Manifest

5.2 Creating Application and Activities

5.3 Simple UI, Layouts and Layout properties, Introduction to Android UI Design

5.4 XML Introduction to GUI objects: Push Button, Text / Labels, Edit Text, Toggle Button, Padding

Books / References:

1. Building Android Apps, IN EASY STEPS, McGraw-Hill Education.
2. Professional Android 2 Application Development -Reto Meier, Wiley India Pvt Ltd.
3. Beginning Android -Mark L Murphy, Wiley India Pvt Ltd.
4. Pro Android -Sayed Y Hashimi and Satya Komatineni, Wiley India Pvt Ltd.
5. Mobile Communications - Jochen Schiller, Addison-Wesley.

Paper Code: DCSE511 **CREDITS: 6**

Paper Name: VLSI &Embedded Systems **L-T-P: 3-0-0**

Total Contact Hours: 42

Module 1:VLSI Design **Contact Hours 6**

1.1 Introduction to VLSI
1.2 Design styles and parameters
1.3 Popular technologies

Module 2: VLSILogic Implementation **Contact Hours 6**

2.1 Logic implementation with NMOS, CMOS & PLA
2.2 Pass transistor logic, transit time, clocking, scaling
2.3 PLA minimization & folding

Module 3: VLSI Testing **Contact Hours 4**

3.1 Testing & testability issues

Module 4: Physical Design Algorithms of VLSI **Contact Hours 8**

4.1 Partitioning, floor, planning & placement, routing, compaction, gate arrays, EPGAs
4.2 Data structure for layout design magic
4.3 Design rule checking, symbolic layout, complexity of layout algorithms

Contact Hours 5

Module 5: Embedded Systems

5.1 Introduction to embedded systems
5.2 Architecture of embedded systems, design mythologies

Contact Hours 6

Module 6:Real Time Issues of Embedded Systems

6.1 Modelling, specification, communication, scheduling, protocols etc.

Contact Hours 7

Module 7: Hardware and Software Partitioning for Embedded systems

7.1 Hardware and Software partitioning,
7.2 Approaches to software and code generation, operating issues,
7.3 Memory and low power issues, validations approach, distributed embedded system

Books / References:

1. Introduction to VLSI System -C. Mead & L. Conway, Addition Wesley
2. Introduction to VLSI Design -Fabricus, Prentice Hall
3. Layout Design & Verification -T. Ohtsuki, North Holland
4. Algorithms for VLSI Physical Design Automation - N. Sherwani
5. An Introduction to VLSI Physical Design -M. Sarafzadeh & C.K Wong, MHI
6. Hardware Software Co Design of Embedded Systems -Ralf Niemann, Kluwer Academic
7. Design principles of Distributed Embedded Application-Hermann Kopez,Kluwer Academic
8. Real time Design -Levi & Agarwal, MH

Paper Code: DCSE512 **Credit: 6**

Paper Name: Artificial Intelligence **L-T-P: 3-0-0**

Total Contact Hours: 42

Module 1: Introduction to Artificial Intelligence **Contact Hours: 5**

1.1 History and progress of AI

1.2 Simulation and AI

1.3 Intelligent Systems

Module 2: Knowledge Representation **Contact Hours: 8**

2.1 Introduction

2.2 Propositional Calculus

2.3 Predicate Calculus

2.4 Rule based knowledge representation

2.5 Knowledge representation issues.

Module 3: Problem Solving: State Space Search &Strategies **Contact Hours: 8**

3.1 Introduction

3.2 General Problem Solving

3.3 Characteristic of Problem

3.4 Exhaustive Searches

3.5 Heuristic Search Techniques

Module 4: Learning **Contact Hours: 8**

4.1 Definition and mechanisms of learning

4.2 Candidate Elimination Algorithm

4.3 Discovery, Analogy, Formal Learning Theory

4.4 Neural net learning and Genetic learning.

Module 5: Expert Systems **Contact Hours: 8**

5.1 Introduction and general concepts of ES

5.2 Elements and Applications of ES

5.3 Production systems

5.4 Markov and Rete Algorithm

Module 6: Basics of Prolog **Contact Hours: 5**

6.1 Introduction to Prolog programming

6.2 Terminologies and variables

6.3 Control structures.

6.4 Matching, cuts and recursion.

Book/ References

1: Artificial Intelligence - Elaine Rich, Kevin Knight, and Shivshankar B. Nair, 3rd edition, McGraw-Hill Publishing

2: Expert Systems - Joseph C. Giarratano and Gary D. Riley, 4th edition

3: Artificial Intelligence - Saroj Kaushik, Cengage Learning.

4: An Introduction to Logic Programming Through Prolog,- J. M. Spivey, Prentice Hall.

V Semester

Paper code: DECE501Credit: 6 L-T-P: 3-0-0

Paper name: Embedded Systems

Total contact hours: 32

Unit I: Introduction to Embedded System (9L)

1.1 Core of the embedded system, Memory, Sensors (resistive, optical, position, thermal) and Actuators (solenoid valves, relay/switch, opto-couplers), Communication Interface, Embedded firmware (RTOS, Drivers, Application programs), Power-supply (Battery technology, Solar), PCB and Passive components, Safety and reliability, environmental issues. Ethical practice.

1.2 Characteristics and quality attributes (Design Metric) of embedded system. Real time system's requirements, real time issues, interrupt latency.

1.3 Embedded Product development life cycle, Program modelling concepts: DFG, FSM, Petri-net, UML

Unit II: Embedded Hardware and Design (7L)

2.1 Embedded system board organization Embedded Processors, Arm Cortex-M4 Processor, 2.2 Memory Systems, 2.3 Embedded Board PC Board Design

Unit III: Buses and I/O, Networking: (7L)

3.1 Study of basic communication protocols like SPI, SCI (RS232, RS485), I2C, 10 CAN, Field-bus (Profibus), USB (v2.0), 3.2 Bluetooth, Zig-Bee, Wireless sensor network

Unit IV: Embedded Software, Firmware Concepts (9L)

4.1 Basic embedded C programs/applications for ARM-v7, using ARM-GCC tool-chain, Emulation of ARM-v7 (e.g. using QEMU), and Linux porting on ARM-v7 (emulation) board

4.2 Real time operating system: Need of RTOS in Embedded system software, Foreground/Background systems, multitasking, context switching, IPC, Scheduler policies, Architecture of kernel, task scheduler, ISR, Semaphores, mailbox, message queues, pipes, events, timers, memory management, RTOS services in contrast with traditional OS.

Case study

Smart card, ECU, ADAS, Smart Watch

Texts Books/References:

1. Embedded Systems: Frank Vahid , Wiley India, 2002
2. Frank Vahid& Tony Givargis, –Embedded System Design-A Unified Hardware/Software Introduction", Third Edition, John Wiley & Sons Inc., Reprint 2010
3. Introduction to Embedded Systems : Shibu K. V. (TMH)
4. Embedded Microcomputer Systems – Real Time Interfacing – Jonathan W. Valvano; Cengage Learning; Third or later edition
5. Steve Furber, –ARM System-on-Chip Architecture", 2nd Edition, Pearson Education, India ISBN: 9788131708408, 8131708403 , 2015
6. Embedded Systems: Real-Time Interfacing to ARM Cortex M Microcontrollers, Fifth edition 2016, ISBN: 978-1463590154

Paper code: DECE571 **Credit: 2 L-T-P: 0-0-2**

Paper name: Embedded Systems Lab

Total contact hours: 02/Week

1. Study of ARM evaluation system
2. Interfacing ADC and DAC.
3. Interfacing LED and PWM.
4. Interfacing real time clock and serial port.
5. Interfacing keyboard and LCD.
6. Interfacing EPROM and interrupt.
7. Mailbox.
8. Interrupt performance characteristics of ARM and FPGA.
9. Flashing of LEDS.
10. Interfacing stepper motor and temperature sensor.
11. Implementing zigbee protocol with ARM.

Paper code: DECE502 **Credit: 6 L-T-P: 3-0-0**

Paper name: Modern communication system

Total contact hours: 34

Unit I: Satellite Communication:
1.1 Kepler's Law – Artificial Satellite – Orbits – Geostationary Orbit – Satellite Speed – Power
Systems – Satellite Angles – Station Keeping – Satellite Launching – Attitude Control.
1.2 Transponder and satellite frequency allocations – Frequencies reuse.
1.3 Block schematic description of communication satellite 1.4 Elementary idea of FDMA ,TDMAand CDMA**(6L)**

Unit II: Optical Communication:
2.1 Concept of fibre optic communication system – Advantages and limitations of optical fibre
communication – Construction of optical fibre – Optical fibre types: Mono mode and Multimode.
2.2 OPTICAL FIBRE PERFORMANCE: Bandwidth-distance product – Transmission loss.
2.3 OPTICAL SOURCES: LED and LASER – Modulation of LED and LASER – Functions of optical detectors.
2.4 Block schematic description of optical fibre communication system.
2.5 Components of optical fibre – Coupler connector splice.
2.6 Basic idea of Fibre optic networking
2.7 Fibre Distributed Data Interface – Synchronous optical network.
2.8 Multiplexing on optical fibre cable – Wavelength division multiplexing , Orthogonal Frequency Division Multiplexing (basic idea only)
2.9 Applications of fibre optics.**(9L)**

Unit III: Cryptography :
3.1 Concept of cryptography and Network security, Symmetric Key cryptography and Asymmetric-key cryptography. Traditional and modern round ciphers, X-OR, DES, 3DES.
3.2 Asymmetric Key cryptography techniques: RSA, Diffie-Helman.
3.3 Security Services, Message integration, Message authentication, Digital signature and Entity authentication. **(6L)**

Unit IV: Spread-spectrum Communication
4.1 Introduction, PN Sequence.
4.2 Model of spread spectrum modulation system.
4.3 Direct sequence spread spectrum signal.
4.4 Frequency hop spread spectrum, slow frequency hopping, and fast frequency hopping.
4.5 Application S. S. modulations):**(6L)**

Unit V: Modern Telephony
5.1 Working of facsimile or fax – Idea of image processing by Charged Coupled Device.
5.2 Concept of ISDN.

5.3 Cellular telephone system: Concept – Mobile Telephone Switching Office – Cellular telephone unit – Frequency synthesizer – Number Assignment Module – Mobile Identification Number – Digital cellular telephone system – Global System for Mobile communication – Concept of CDMA.
5.4 Concept of 1G, 2G , 3G,4G and 5G
5.5 Wireless Communication—Wi-Fi and Wi-max (Basic ideas only)
5.6 Concept of Video Phone**(7L)**

Texts Books/References:

1) Behrouz, A. Forouzan, and C. F. Sophia. "Data Communications and Networking." Forouzan with Sophia Chung Fegan (2007).
2) Frenzel, Louis E. Principles of electronic communication systems. McGraw-Hill, 2016.
(3) Kennedy, George, Brendan Davis, and S. R. M. Prasanna. Electronic communication systems. Vol. 20. Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 1985.
(4) Viswanathan, Thiagarajan, and Manav Bhatnagar. Telecommunication switching systems and networks. PHI Learning Pvt. Ltd., 2015.

Paper code: DECE572Credit: 2 L-T-P: 0-0-2

Paper name: Modern communication system Lab

Total contact hours: 02/Week

1. To study the function of fibre optic analog link. To study the frequency response of optical receiver at various load conditions.
2. To study the losses in optical fibre:— (a) propagation loss, (b) bending loss.
3. To study the numerical aperture of optical fibre.
4. To be familiar with the following network components:— Cables – Connectors – Hubs – Network Interface Card. To be familiar with fax.
5. To be familiar with cordless telephone.
6. To be familiar with mobile telephone.
7. Understanding basic cyphers and symmetric key cryptography algorithms in Python
8. Understanding PN sequence and spread spectrum communication.

Suggested list of MINI PROJECT (any one)
To design a wireless fibre link To develop any control system using optical source
To design a voice communication link using optical fibre. i) Use of OTDR (Demonstration) ii) Use of Splicing Technique (Demonstration).

Paper code: DECE513(A)Credit: 6L-T-P: 3-0-0

Paper name: Industrial Automation

Total contact hours: 30

Unit I - Industrial automation overview and data acquisition **(8L)**

Architecture of Industrial Automation Systems.

Measurement Systems Characteristics

Data Acquisition Systems

Unit II - Control Generation Introduction to Automatic Control P-I-D Control Feedforward Control Ratio Control The branching operations based on conditions expression **(7L)**

Unit III Sequential control and PLC Introduction to Sequence Control, PLC, RLL **(7L)**

Unit IV Industrial control application Hydraulic Control Systems, Pneumatic Control Systems

Energy Savings with Variable Speed Drives, Introduction to CNC Machines**(8L)**

Texts Books/ References:

1.) Industrial Instrumentation, Control and Automation, S. Mukhopadhyay, S. Sen and A K Dey, Jaico Publishing House, 2013.
2.) Electric Motor Drives, Modelling, Analysis and Control, R Krishnan, Prentice Hall India, 2002 ISBN: 978-0130910141

Paper code: DECE583 (A) Credit:2 L-T-P: 0-0-2

Paper name: Industrial AutomationLab

Total contact hours: 02/Week

1.) Temperature control system using PID
2.) Level control system based on error feedback
3.) Development of data acquisition system using Arduino
4.) PLC timer, counter, registers and analog input/output functions
5.) PLC programming using Relay ladder Logic for AND, OR, XOR and NOR gate
6.) PLC, RLL programming using CASCADE method

Paper code: DECE513 (B) **Credit: 6 L-T-P: 3-0-0**

Paper name: Control System and PLC

Total contact hours: 34

Unit I:
Control system: Basics of control system block diagram and practical examples
Classification of control systems: Open loop and closed loop systems-block diagram, practical example and comparison, Linear and non-linear systems, Time varying and Time In-varying systems- practical example and comparison.
servo system -
Transfer function: Close loop and open loop system
RC, LC and RLC circuits-Differential equations and transfer functions and analysis using Laplace transform
Block diagram reduction technique: Need, reduction rules.**(7L)**

Unit II:
Time Response: Transient and steady state response.
Standard test inputs: Step, ramp, parabolic, impulse and their corresponding Laplace transform
Analysis of first and second order control system: Poles and zeros - S-plane representation
Order of system (0, 1, 2)- standard equations, examples and numerical problems

i. First order system-Analysis for unit step input, concept of time constant
ii. Second order system- Analysis for unit step input (no derivation), concept, definition and effect of damping

Time response specifications (no derivations) Tp, Ts, Tr, Td, Mp, Ess, numerical problems
Steady state analysis: Type 0, 1, 2 systems steady state error numerical problems and error constants,
Stability: Concept of stability, root locations in S-plane and analysis- stable system, unstable system, critically stable systems, conditionally stable system, relative stability Routh's stability criterion: Steps and procedures to find stability by Routh's stability criteria. **(9L)**

Unit III:
Process Control System: Block diagram, functions of each block
Control actions: Discontinuous mode- ON-OFF controllers equation, neutral zone
Continuous modes: Proportional Controller - offset, proportional band. Proportional, Integral and Derivative controllers -o/p equation, response, characteristics,
Composite controllers: PI, PD, PID controllers- o/p equation, response**(5L)**

Unit IV:
PLC-Block diagram, classification, (fixed and modular PLCs), need and benefits of PLC in automation, Description of different parts of PLC: CPU -function, scanning cycle, speed of execution, Power supply-block diagram and function of each block.

Memory function and organization of ROM - and RAM, Input and output modules- function, different input and output devices of PLC (only name and their uses).PLC Installation**(6L)**

Unit V:
Discrete input modules: Block diagram, specifications of AC input modules and DC input module. Sinking and sourcing concept in DC input modules
Discrete output modules: Block diagram description, specifications of AC output module and DC output modules Analog input and output modules: Block diagram, specifications
I/O addressing of PLC: Addressing data files, format of logical address, different addressing types, PLC Instruction set: Relay instructions, timer and counter instructions, data movement instructions, logical and comparison instructions
PLC Programs using Ladder programming language.**(7L)**

Texts Books/ References:

1. Johnson, C. D. –Process control instrumentation Technology", Prentice Hall, 8th edition, United States of America, 2014 ISBN: 978-0131194571
2. Gary Dunning, –Intro. To Programmable logic control", Cenage Learning, United States of America, 2005 ISBN: 9781401884260
3. Naggrath JJ; Gopal M, –Control System Engineering", Anshan Publishers (2008) ISBN: 9781848290037
4. Ogata K, –Modern control Engineering", PHI, 5th Edition, NEW DELHI,2010 ISBN: 978812034010
5. Madhuchandra Mitra; Samarjit Sen Gupta, –Programmable logic controllers and industrial automation: an introduction", Penram, 1st Edition, Mumbai. 2007 ISBN: 9788187972174.
6. Petruzella, F.D. –Programmable logic controllers", Tata- McGraw Hill, 3rd Edition. 2010 ISBN: 9780071067386.

Paper code: DECE583 (B) **Credit: 2 L-T-P: 0-0-2**

Paper name: Control System and PLC Lab

Total contact hours: 02/Week

1. Use potentiometer as error detector.
2. Determine error of angular position of DC servo system.
3. Test the Step response of R-C (first order) circuit.
4. Test the Step response of R-L-C (second order) circuit.
5. Test the functionality of temperature control with on-off controller.
6. Use PI controller to control temperature of the given process.
7. Use PD controller to control temperature of the given process.
8. Use PID controller to control temperature of the given process.
9. Identify and test different parts of PLC.
10. Develop ladder diagram to test the functionality of the logic gates.
11. Develop ladder diagram to test Demorgan's theorem.
12. Develop the ladder diagram for Adder and Subtractor by using PLC.
13. Develop ladder diagram for ON and OFF control of lamp using timer and counter.
14. Develop ladder diagram for traffic light Control system.
15. Develop ladder diagram for stepper motor control.
16. Develop ladder diagram for temperature controller.

Paper code: DECE514(A)Credit:6 L-T-P: 3-0-0

Paper name: Electromagnetic waves and Applications

Total contact hours: 30

Unit I -Introduction to electromagnetic waves, review of Vector Analysis, orthogonal Coordinate Systems, Del operator, Gradient, Divergence, Curl – their physical interpretations; Laplacian operator.**(5L)**

Unit-2- Coulomb's law, electric field intensity, charge distribution. Gauss' law, flux density and electric field intensity. Divergence theorem. Current Densities, Poisson's & Laplace's equations, Biot-Savart law, Ampere's law, Relation between J & H. **(5L)**

Unit-3- Faraday's law & Lenz's law, Displacement Current, $J_C - J_D$ relation, Maxwell's equations, Time- harmonic fields, Wave Equation, Boundary Conditions between media interface; Uniform Plane wave; Wave Propagation in Lossy Dielectric, Loss-less Dielectric, Free space (solution excluded). Poynting Theorem, Skin Depth, Reflection and Transmission of wave for normal incidence. **(7L)**

Unit-4-Transmission Lines: Concept of Lump parameters and Distributed parameters, Line Parameters, Transmission line equations (solution excluded) , Propagation constant, Characteristic Impedance; Velocity of Propagation, Distortion-less Line, Reflection and Transmission coefficients, Standing Waves, VSWR, Input Impedance, Smith Chart and its applications **(8L)**

Unit-5- Introduction to Microwaves, History and applications of Microwaves, Rectangular and Circular Waveguides (concept only without complex mathematical formulation),Bethe-hole coupler, Two holes directional Coupler, Power Divider, Attenuator, Resonator, phase shifter, circulator, isolator.**(5L)**

Texts Books/ References:

1. Electromagnetic Waves & Radiating Systems, 2ed Edition –E. C. Jordan and K.G. Balmain, Pearson Education
2. Elements of Electromagnetics, 4th Edition – Matthew N O Sadiku Oxford University Press
3. SY Liao Microwave Devices & Circuits Pearson Education /PHI
4. S Das & A Das Microwave Engineering Tata-McGraw Hill
5. ML Sisodia & GS Raghuvansi Microwave Circuits and Passive Devices New Age Publishers
6. David M Pozar Microwave Engineering John Willy & Sons Inc

7. Introduction to Radar Systems – Merrill I. Skolnik, SECOND EDITION, McGraw-Hill, 1981.

Paper code: DECE584 (A)Credit:2 L-T-P: 0-0-2

Paper name: Electromagnetic waves and Applications Lab

Total contact hours: 02/Week

1.) To study the characteristics of Gunn oscillator Gun diode as modulated source.
2.) Introduction to Smith chart and its application for the unknown impedance measurement.
3.) Study the behaviour of impedance matching for passive network using Smith Chart.
4.) To determine the frequency and wavelength in a rectangular waveguide working in TE_{10} mode.
5.) To study waveguide components.

Paper code: DECE514 (B) **Credit:6 L-T-P: 3-0-0**

Paper name: Optical Communication and Networking

Total contact hours: 30

Unit 1:OVERVIEW OF OPTICAL FIBER COMMUNICATION: Introduction, Historical development, general system, advantages, disadvantages, and applications of optical fiber communication, optical fiber waveguides, Ray theory, cylindrical fiber (no derivations), single mode fiber, cutoff wave length, mode filed diameter. Optical Fibers: fiber materials, photonic crystal, fiber optic cables, specialty fibers **(8L)**

Unit 2:TRANSMISSION CHARACTERISTICS OF OPTICAL FIBERS: Introduction, Attenuation, absorption, scattering losses, bending loss, dispersion, Intra modal dispersion, Inter modal dispersion. **(5L)**

Unit 3:OPTICAL SOURCES AND DETECTORS: Introduction, LED's, LASER diodes, Photo detectors, Photo detector noise, Response time, double hetero junction structure, Photo diodes, comparison of photo detectors. **(6L)**

Unit 4:OPTICAL RECEIVER: Introduction, Optical Receiver Operation, receiver sensitivity, quantum limit, eye diagrams, coherent detection, burst mode receiver operation, Analog receivers. **(6L)**

Unit 5:OPTICAL AMPLIFIERS AND NETWORKS: Optical amplifiers, basic applications and types, semiconductor optical amplifiers, EDFA. Optical Networks: Introduction, SONET / SDH, Optical Interfaces, SONET/SDH rings, High – speed light – waveguides. **(5L)**

Texts Books/ References:

1. Optical Fiber Communication – Gerd Keiser, 4th Ed., MGH, 2008.

2. Optical Fiber Communications– – John M. Senior, Pearson Education. 2007.

3. Fiber Optic Communication – Joseph C Palais: 4th Edition, Pearson Education.

4. Fiber Optic Communication Systems – G. P. Agrawal, 4th Ed., Wiley.

5. Optical Networks – R. Ramaswamy, 3rd Ed., Morgan Kaufmann.

Paper code: DECE584 (B) **Credit:2 L-T-P: 0-0-2**

Paper name: Optical communication and networking Lab

Total contact hours: 02/Week

1. To study the V-I Characteristics of LED.
2. To study the characteristics of laser diode
3. To study the Intensity Modulation of the Digital Signal.
4. Measurement of the data rate for digital optical link.
5. To study the Analog Subcarrier multiplexing technique (SCM).

Paper code: DECE515 (A) **Credit:6 L-T-P: 3-0-0**

Paper name: P C System Technology

Total contact hours: 42

Unit 1:PC ARCHITECTURE: 1.1 Introduction to Computer system, operation (block diagram) of Computer, Personal Computer history and comparison- the IBM PC, PC, PC-XT, PC-AT. 1.2 Microprocessor types & specification used in IBM PCs, processor sockets & slots. 1.3 Different supporting chips & their functions; Concepts of DMA & Interrupts, Chipset. 1.4 Motherboard: architecture of PC-XT & PC-AT systems, motherboard form factors; peripheral interfacing, concept of bus system & types; Expansion Slots. 1.5 Different types of memory used in a computer: SRAM, DRAM, FPRAM, EDORAM, SIMM, DIMM, RIMM, DDR etc.
(**8L**)

Unit 2:OPERATING SYSTEM: 2.1 Booting procedure, concept of BIOS & POST; CMOS setup, EFI firmware 2.2 Introduction to Operating Systems: DOS, Windows, their comparisons 2.3 Different version of Microsoft Windows – their features. 2.4 Description of the system & configuration files. 2.5 Overview of other operating systems- LINUX, UNIX.
(6L)

Unit 3:STORAGE DEVICE: 3.1 General concepts of storage device; different technologies, their comparison 3.2 Optical Drive construction & operation, specifications, different types. 3.3 Hard Disk Drive construction & operation, different types; Concepts of cylinders, sectors, seek time etc., 3.4 Other types of storage devices like Blu-Ray, DVD, Tape Drive, MO Drive, SSD storage 3.5 Interfacings: features of parallel AT attachment (PATA), Serial ATA (SATA), ATA devices jumper selections: Master, slave, cable select, ATA cables 3.6 Hard disk partitioning, concepts of FAT, MBR, VBR etc. GPT partition 3.7 Types of file systems, their comparison. **(10 L)**

Unit 4: I/O INTERFACING: 4.1 I/O Ports: Legacy ports - Serial & Parallel communication ports, their standards, use. 4.2 New generation ports-USB, Fire-Wire etc.
(2L)

Unit 5: INPUT DEVICES: 5.1 Keyboards: Basic construction, different Key Switches, their features. 5.2 Pointing devices: Mouse, types & specifications, Joystick, Light Pen, Track balls etc, operation of Optical mouse.
(3L)

Unit 6:OUTPUT DEVICES: 6.1 Printers: Generic block diagram, Types of printers–Dot Matrix, Inkjet, Laser, line printer, MFP (Multi function Printer), Features 6.2 Scanner: Flat bed, sheeted, Handheld : Specifications, OCR, TWAIN, Resolution 6.3 Video Display: Basics - pixel, resolution, H/V Frequency etc. 6.4 Display Types: CRT Display, Panel

Displays-LED, LCD and TFT Displays their features and comparisons 6.5 Display cards – different components, types, AGP bus.

(6L)

Unit 7: POWER SUPPLY: 7.1 General power supply issues &overview of Switched Mode Power Supply 7.2 Power Supply (SMPS): SMPS types and their comparison, Mother board integrated power supply. 7.3 Power Line Disturbances, Power conditioners. 7.4 UPS–types and features 7.5 Power Managements. **(4L)**

Unit 8: Laptop computers 8.1 Difference between laptop and desktop-Types of laptops, power settings – SMD components. 8.2 Laptop components: Adapter– types, Battery– types, RAM–types, CPU–types, Laptop Mother Board- block diagram, 8.3 Laptop Keyboard – Mouse and Touchpad - Ports. 8.4 Notebook computers- Features & specifications. **(3L)**

Texts books/ References:

1. IBMPC & Clones– Govindarajalu
2. Upgrading & Repairing PCs– Scott Muller
3. Maintenance & Repairing PCs– Mark Minasi
4. Troubleshooting, Maintenance & Repairing PC– Bigelow
5. Complete guide to upgrading & repairing PC– Peter Norton

Paper code: DECE515 (B) **Credit:6 L-T-P: 3-0-0**

Paper name: Medical Electronics

Total contact hours: 34

Unit I: Introduction to Biomedical Instrumentation:The age of biomedical engineering, Development of biomedical instrumentation, biometrics. Introduction to the man, components of the man, instrument system, physiological systems, some conclusions, body, problems encouraged in measuring a living system.**(6L)**

Unit II: Basic Transducer principles: Transducer and transduction principles, Transducer classification-active transducers, passive transducers, transducers used in biomedical applications.**(5L)**

Unit III: Sources of Bioelectric Potentials: Introduction to Bioelectricity - Resting Membrane potential, transmission of impulses, Electrical activity of the heart, Pacemaker potential, electro cardiograph. Biological transducers- receptor potentials, electrical activity of the brain, Resting and action potentials, Propagation of action potentials.**(6L)**

Unit IV: Electrodes: Electrode theory, bio-potential electrodes, Bio-chemical Transducers. **(3L)**

Unit V: The Cardiovascular System: The heart and cardiovascular system, the heart, heart sounds, Blood pressure, characteristics of blood flow.**(5L)**

Unit VI: Cardiovascular Measurements: Electrocardiography (ECG), Measurement of blood pressure, Measurements of blood flow and cardiac output.**(5L)**

Unit VII: Patient care and Monitoring: The elements of intensive- care monitoring, Diagnosis calibration and reparability of patient, Monitoring equipment. Pacemakers, defibrillator.**(4L)**

Texts Books/ References:

1.) Massey and Meredeth, Medical Physics.
2.) Joseph Bronzino, Biomedical Instrumentation.
3.) Khandpur R S, Handbook of Medical Instrumentation, Tata Mc Graw Hill.
4.) David Cooney, Principles of Biomedical Engineering.
5.) Ruch and PattoŶ, Bio Physics and Medical Physiology.

Paper code: DECE515 (C)Credit:6 L-T-P: 3-0-0

Paper name: Industrial Electronics

Total contact hours: 34

Unit I: CHOPPERS- Principle of operation of chopper and its application, functional operation of forced, commutated and Jones chopper and their areas of applications, Principle of operation of 4-quadrant chopper, Principle of operation of cyclo-converter and its applications. **(6L)**

Unit II- SPEED CONTROL OF DC MOTORS- Types of speed control of dc motor: Armature Volt –Field Current Control, Drive System: Controlled Rectifier Drive – Reversible Drive –Quadrant Drive**.** **(6L)**

Unit III-SPEED CONTROL OF AC MOTORS- Introduction to induction motor, Types of speed variation –Frequency variation–Stator voltage variation – Closed loop control – Types of feedback, Types of breaking: Regenerative breaking – Plugging. **(6L)**

Unit IV-PROGRAMMABLE LOGIC CONTROLLER- Evolution and Role of PLC in Automation, Block Diagram & Principle of Working, PLC Characteristics and hardware configuration– CPU, Racks, Power Supply,Memory, Input & Output Modules, Application Specific Modules, Speed of execution, Communication, Redundancy.Introduction to PLC Programming Languages– Ladder, Instruction List, Structured Text, Grafcet **(8L)**

Unit V-NUMERICAL CONTROL SYSTEMS- Basic concepts of numerical control - Block diagram of numerical control system– Advantages, disadvantages, applications of numerical control system, Programming systems – Data processing unit – Data reading – Part programming – steps - Post processor, Introduction to CNC – Basic concepts of CNC – Comparison between NC & CNC – Typical CNC system – Block diagram, Advantages. **(8L)**

Texts Books/References:

1.) Power Electronics P. C. Sen

2.) Modern power Electronics- P. C. Sen

3.) Power Electronics: Converters, Application & Design–Mohan, Undealand, Robbins

4.) Industrial Electronics and control by Biswanath Paul–PHI publications-2ndEdition - 2010

5.) Programmable Logic Controller – Pradeep Kumar & Srivashtava-BPB Publications

6.) Numerical control of Machines– Yoram Korean & Joseph Ben

7.) Robotics–An Introduction– Doughales– R. Halconnjr

CENTRAL INSTITUTE OF TECHNOLOGY KOKRAJHAR

BACHELOR OF TECHNOLOGY (B.Tech)

GRADE SHEET

Sl. No: *Date :*

The following are the grades obtained by

Roll No. *of* *Department*

at the B.Tech *Semester Examination held in*

COURSES OFFERED	COURSE CREDIT	GRADE OBTAINED	GRADE POINT OBTAINED	HONOUR POINT
TOTAL				
SGPA				
CGPA				

(Authorised Signatory)

1. Anti-Copy Base Text

3. Constant Barcode

CENTRAL INSTITUTE OF TECHNOLOGY KOKRAJHAR

BACHELOR OF TECHNOLOGY (B.Tech)

2. Border Text

GRADE SHEET

Sl. No: *Date :*

The following are the grades obtained by

Roll No. *of* *Department*

at the B.Tech *Semester Examination held in*

COURSES OFFERED	COURSE CREDIT	GRADE OBTAINED	GRADE POINT OBTAINED	HONOUR POINT
TOTAL				
SGPA				
CGPA				

4. Water Mark

9. Rainbow Printing

5. Anti-Copy Base Text

7. Golden Hit Foiling Embossed

CITK

6. UV ink Logo/Signature

8. Micro Text Printing

(***Authorised Signatory***)

List of Successful candidates branch wise for PG program

Branch: Computer Science & Engineering

Sl. No.	Roll. No.	Name
1	20190402001	DHANJIT SARMA
2	20190402002	NITURAJ PATOWARY
3	20190402003	MRIDUSMITA DAS

Branch: Food Engineering Technology

Sl. No.	Roll. No.	Name
1	20190405001	SAURAV BAISHYA
2	20190405002	PRITAM SEKHAR SARMA
3	20190405003	ALAK JYOTI BAISHYA
4	20190405004	JANARDON SINGHA
5	20190405005	BHUYASHI BORUAH
6	20190405006	NAMRATA SINGH
7	20190405007	SUSMITA GOSWAMI
8	20190405008	PRIYA BASUMATARY
9	20190405009	KHWMTHAGWR NARZARY
10	20190405010	SACHIN KUMAR SINGH
11	20190405011	SAGARIKA DAS
12	20190405012	SAHALAM ALI
13	20190405013	SUJUMA BASUMATARY

Branch: Green Energy Technology

Sl. No.	Roll. No.	Name
1	20190419001	MUNMUN BARMAN
2	20190419002	NITYA SUNDAR BASUMATARY
3	20190419003	ULLASH ROY
4	20190419004	HARI BHUSHAN DEBNATH

Branch: Water Resource and Hydraulic Engineering

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1	20190401001	SAGAR BASUMATARY
2	20190401003	PURNIMA HAJOWARY
3	20190401004	JAFUNGSHA GAYARI

Branch: Multimedia Communication and Design

Sl. No.	Roll. No.	Name
1	201905081001	HARI BRAT SAIKIA
2	201905081002	HIMADRI SALOI
3	201905081003	PHILIP DAIMARY
4	201905081004	JULIAN SIMBUK S RAXAM
5	201905081005	ARPITA PRAMANIK

LIST OF EXPERTS FOR SELECTION COMMITTEE FOR FACULTY POSITIONS
(DIRECT RECRUITMENT AND CAS PROMOTION)

DEPARTMENT OF BIOSCIENCE AND BIOENGINEERING

Sl. No.	Name & Address	Specialization/ Research Area	Phone / Fax No. and email ID
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2.	Punit Kaur Professor and Head Department of Biophysics, AIIMS, Sri Aurobindo Marg, Ansari Nagar East, Delhi 110029	Biophysics, Structural Biology, Bioinformatics, Drug Design	Email .: punitkaur@aiims.edu, punitkaur1@hotmail.com, Tel No. +91-11-26594288 ; +91-11-26593201 mobile : 9910026423
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5.	Desirazu N. Rao Professor, Indian Institute of Science Bangalore	Protein-DNA Interactions using Restriction-Modification Enzymes and DNA Mismatch Repair Proteins as Model Systems	dnrao@iisc.ac.in, Office: (080) 2293 2538
6.	Sudip Chattopadhyay Professor, Department of Biotechnology, NIT Durgapur, A-Zone, Durgapur, West Bengal 713209	Plant Growth and Development	email: sudipchatto@gmail.com, sudip.chattopadhyay@bt.nitdgp.ac.in; Tel: 9434788029
7.	Supriyo Chakraborty Professor, School of Life Sciences Jawaharlal Nehru University New Delhi - 110067, India. Room No.: 405, 416	Molecular Biology, Plant Virology	Off. Phone: 26704153 Mobile: 9868628684 E-mail : schakraborty@mail.jnu.ac.in , supriyachakrasls@yahoo.com
8.	Manoj Prasad, Staff Scientist VII, NIPGR New Delhi Aruna Asaf Ali Marg, New Delhi, Delhi 110067	Plant Molecular Genetics and Genomics, Stress Biology.	Tel: 91-11-26741612,14,17 Ext. - 160 Direct - 26735160, Fax: 91-11-26741658 Mobile: 8800184445 E-mail: manoj_prasad@nipgr.ac.in, manoj_pds@yahoo.com
9.	Ajay Parida, Director Institute of Life Sciences (ILS) NALCO Square, Bhubaneswar, Odisha, India Pin Code: 751023	Biotechnology	EPABX: 91 – 674 – 2301476, 2301460, 2300137, 2301219 Fax: 91 – 674 – 2300728 Mob: 8917539605 Email: drajayparida@gmail.com director@ils.res.in

10.	N. S. Punekar Professor, Dept. of Biosciences and Bioengineering, IIT Bombay, Powai, Mumbai 400076	Microbial Biochemistry and Molecular Enzymology	Tel: 91 22 2576 7775 nsp@iitb.ac.in
11.	Raghavan Varadarajan Professor, MBU, IISc Bangalore, Bangalore 560012	Structural Biology, Proteins	Tel: 80 2293 2612 varadar@iisc.ac.in
12.	Rajesh S. Gokhale Staff Scientist VII, NII, Aruna Ashraf Ali Marg, New Delhi 1100067	Disease Biology, Immunology	Tel: 011 26717121 to 26717145
13.	S Ganesh Deputy Director, Biological Sciences & Bioengineering Indian Institute of Technology, Kanpur 208016, India	Molecular biology	
14.	Dr. Karunagaran D Professor, Dept. of Biotechnology, IIT Madras, Tamil Nadu	Cancer Biology	Email: karuna@iitm.ac.in; Phone No. 9789096126
15.	S. MURTY SRINIVASULA Professor, School of Biology Indian Institute of Science Education and Research, Maruthamala P.O, Vithura Thiruvananthapuram – 695551, Kerala, India	Cell signaling, Health Science	Email: sms@iisertvm.ac.in Phone: 0471-2778171
16.	Yogendra Sharma Professor, J C Bose National Fellow, Professor, IISER, Berhampur, Department: Biological Sciences	Cell signaling	Email: yogendra@iiserbpr.ac.in Phone: +91 680 2227 776
17.	Rajesh Khanna Professor, IIT Delhi	Colloids and Interfacial science	rajkh@chemical.iitd.ac.in, +91 11 2659 1031
18.	Animangsu Ghatak Professor, IIT Kanpur	Bio-inspired Soft Materials	aghatak@iitk.ac.in, +91-512-259-7146
19.	Aditya Mittal Professor, IIT Delhi	Kinetics and self assembly in biological systems	amittal@bioschool.iitd.ac.in, +91-11-26591052
20.	U. C. Banerjee Professor, NIPER Mohali	Pharmaceutical Biotechnology, Bioprocess Engineering, Nanobiotechnology	ucbanerjee@niper.ac.in, 0172-2214682-687
21.	Narayanan Srinivasan Professor, Centre of Behavioural and Cognitive Sciences	Cognitive Science	nsrini@cbcs.ac.in
22.	Krishnaveni Mishra Professor, Dept. of Biochemistry School of Life Sciences University of Hyderabad Hyderabad-500046, India	Cell biology and Organelle biology	email: kmsl.uohyd@nic.in Phone: + 91 40 23134544 Fax: +91 40 23010120
23.	Krishnamurthy Natarajan Professor, Laboratory of Eukaryotic Gene Regulation314/325, School of Life Sciences, Jawaharlal Nehru University New Delhi 110067, India.	Cell and Molecular biology	Phone: (011)26704512 (Lab/Office) E-mail: nat0200@mail.jnu.ac.in
24.	Mahitosh Mandal	Cancer Biology	mahitosh@smst.iitkgp.ac.in ,

	Professor & J C Bose National Fellow, School of Medical Science and Technology, Indian Institute of Technology Kharagpur -721302, India		mahitoshm@gmail.com Phone : + 91- 3222-283578 (Off). +91-3222-283579 (Home)
25.	Soumyo Mukherji, Ph.D. Professor, Department of Biosciences and Bioengineering. Associated Faculty Member: Centre for Research in Nanotechnology and Sciences Centre of Excellence in Nanoelectronics IIT-Bombay Powai, Mumbai 400 076	Biosensors and Bioinstrumentation	Phone #1 : +(91-22) 2576-7767 (direct) Phone #2 : +(91-22) 2572-2545 (extn. 7767)
26.	Amit K Dinda MD, PhD Professor-Incharge, Division of Renal & Transplant Pathology, Department of Pathology, All India Institute of Medical Sciences, New Delhi - 110029, INDIA Honorary Professor, Deakin University, Australia, General Secretary, Indian Society of Nanomedicine (ISNM)	Nanotechnology	(Tel) 911126593412, (Fax) 911126588663 Website: www.amitdinda.com
27.	Sagar Sengupta, FNASc, FASc, FNA J C Bose Fellow Senior Scientist, J.C. Bose Fellow, National Institute of Immunology, Aruna Asaf Ali Marg, New Delhi 110067, India	Cancer Biology, Molecular and Cellular Biology and Cell signalling	Phone: 91-11-26703786, 91-11-26715025 Fax: 91-11-26742125 Email: sagar@nii.ac.in
28.	Saraswathi Vishveshwara Professor, Molecular Biophysics Unit, Indian Institute of Science, Bengaluru, Karnataka 560012, India	Computational Biology	Phone: 080-22932611; Fax: 080-23600535; Email: saraswathi@iisc.ac.in
29.	Sanjay Gupta Professor, Department of Mechanical Engineering, IIT Kharagpur, Kharagpur 721302	Biomechanics	email: sangupta@mech.iitkgp.ac.in, Ph:
30.	Rama S Verma Professor, IIT Madras	Stem cells and nanotechnology	vermars@iitm.ac.in, +91-44-2257-4109
31.	B. Ravi Professor, S 34 (2nd Floor), Mechanical Engg. Dept., IIT Bombay, Bombay 400076	Biomedical Engineering, Medical Device Design	b.ravi@iitb.ac.in, Phone: +91 22 2576 7510 (Office)
32.	Dilip Kumar Pratihar Professor, Dept of Mechanical Engineering, IIT Kharagpur, Kharagpur 721302	Robotics, AI, Biomechanics and Orthotics	dkpra@mech.iitkgp.ac.in, Ph: +91-3222-282992
33.	Arindam Banerjee Senior Professor, Indian Association for the Cultivation of Science	Molecular Assembly, Soft Materials & Hybrid Nanomaterials, Bio-organic Chemistry	bcab@iacs.res.in, Telephone: (033) 2473 4971/1504
34.	Mukesh Sharma Professor, Department of Civil Engineering Indian Institute of Technology	Bio aerosol modelling and Air quality modelling	Phone+91-512-2597759 (Offc.) Fax+91-512-2597395, 2590260 mukesh@iitk.ac.in

	Kanpur Kanpur - 208016, UP, India		
35.	Tanmay Basak Professor, CHI 204 ,Chemical Engineering Laboratory, Indian Institute of Technology Madras, Chennai – 600 036.	Material Processing	Phone : +91-44-2257 4173 tanmay@iitm.ac.in
36.	S. Jayaraj Professor, Mechanical Engineering Department, National Institute of Technology Calicut-673601.	Bio diesel	Academic: sjayaraj@nitc.ac.in PERSONAL: sjayaraj2002@gmail.com
37.	K V Venkatesh Professor, Indian Institute of Technology Bombay	Biochemical Engineering, Biotechnology, System Biology, Biosystem Engineering	venks@iitb.ac.in, 022-25767223
38.	Pramod P Wangikar Professor, Indian Institute of Technology Bombay	Biochemical Engineering, System Biology, Fermentation Technology, Biofue-bioenergy,	wangikar@iitb.ac.in, 022-25767232
39.	Guhan Jayaraman Professor, IIT Madras	Bioprocess monitoring and control, Metabolic engineering and system biology,. Recombinant protein production	guhanj@iitm.ac.in,
40.	D. N. Rao Professor, Department of Biochemistry, Division of Biological Sciences, Indian Institute of Science, Bengaluru 560012	Protein-Nucleic acid interactions	Email: dnrao@iisc.ac.in, Tel: (080) 2293 2538
41.	R. Sankararamakrishnan Professor & Head, Department of Biological Sciences and Bioengineering Indian Institute of Technology, Kanpur Kanpur 208 016	Modeling and simulation of biomolecules; bioinformatics; computational biology	rsankar@iitk.ac.in Tel: 512-259-4014
42.	Umesh Varshney Professor, SA-08, New Biological Sciences Building, Dept. of Microbiology & Cell Biology, Indian Institute of Science, Bangalore 560012	Molecular Biology, Protein Biosynthesis and DNA Repair	varshney@iisc.ac.in Phone : +91-80-22932686, +91-80-23600169

DEPARTMENT OF CHEMICAL ENGINEERING

Sl. No	Name	Publications / Awards	Designation	Area of specialization	Address
1	Prof. Goutam Deo	He has contributed significantly in the form of numerous publications in his areas of specialization. He is author of six books. Awards: AICTE career award for the young teacher (1997) DAE-BNRS award for young scientist (1997).	Professor	Supported metal oxide catalysis: synthesis, characterization and reactivity / Reaction kinetics / Water treatment	Department of Chemical Engineering IIT Kanpur-208016, INDIA Phone: 91-512-2597881 / 2597363 Email: goutam@iitk.ac.in
2	Prof. Nishith Verma	He is a Professor and has contributed significantly in the form of two patents and numerous publications in his areas of specialization. Awards: Alexander von Humboldt Research Fellowship, M. H. Shukla Memorial Award for the Best technical paper presented, CHEMCON, Kolkata (December 2000), AICTE career award for the young teacher (1998), University of Arizona Graduate Fellowship (1991-92), S. K. Nandi Memorial merit scholarship, IIT Kharagpur (1985-86).	Professor	Adsorption, Environmental Pollution Control, Synthesis and Application of Carbon Nanofibres and Nanoparticles, Mathematical Modelling and Simulation, Transport Phenomena	Department of Chemical Engineering IIT Kanpur-208016, INDIA Phone: 91-512-2597704 Email: nishith@iitk.ac.in
3	Prof. Jayesh Bellare	He is a senior Professor and has contributed significantly in the form of 6 patents and numerous publications in his areas of specialization. Awards: Elected Fellow of Electron Microscopy Society of India, 2010, Elected Fellow of National Academy of Sciences India, 2010, Elected Fellow of Indian National Academy of Engineering, 2010, ICI Award for Excellence in Process/Product Development, Ind. Inst. of Chem. Engineers, 1996, Best Microscopist from Developing Countries Award, Microscopy Society of America, 1993 Presidential Award, Electron Microscopy Society of America, 1986, Kazato Grant, International Congress on Electron Microscopy, 1986, NRDC Invention Intelligence/National R&D Council Prize for Automatic R.I. sensor, 1983	Professor	Liposome and vesicle microreactors, Electron Microscopy of Complex Fluids, Membrane Technology, Artificial organs, Ceramic materials, Micro-chemical engineering, Industry interaction	Department of Chemical Engg. IIT Bombay, Powai, Mumbai 400076, INDIA Phone: +91-22-2576-7207 (O), +91-22-2422-4582(R); Fax: +91-22-2572-6895 Email: jb@ iitb.ac.in
4	Prof. A. K. Suresh	He has vast experience in his areas of specialization and contributed significantly in the form of numerous publications.	Professor	Reaction Engineering/ Multiphase systems/ Biochemical / Engineering / Interfacial / polycondensation	Department of Chemical Engineering IIT Bombay, Powai, Mumbai 400076, INDIA Phone (O): +91 (22) 2576 7240, (R): +91 (22) 2576 8240/2572 8729 Fax: +91 (22) 2572 6895/3480 Email: aksuresh@che.iitb.ac.in

5	Prof. Sanjay M. Mahajani	He is a senior Professor and has contributed significantly in the form of one patent and numerous publications in his areas of specialization. Award: Manudhane Best Undergraduate Teacher Award (2006), Manudhane Award for Applied Research (2007), Excellence in Teaching, IIT Bombay (2008)	Professor	Reaction Engineering, Catalysis and Multifunctional Reactors, Energy: Coal gasification, Biofuels, Fischer-Tropsch Synthesis, Computer Aided Design Simulations, Reaction Engineering Applications of Computational Fluid Dynamics	Department of Chemical Engineering IIT Bombay, Powai, Mumbai 400076, Maharashtra, India Fax: +91.22.25726895 Tel:+91.22.25767246 Email: sanjaym@che.iitb.ac.in
6	Prof. K.V. Venkatesh	He has published over 63 papers. Award: Swaranajayanthi Fellowship, 2004 From Department of Science and Technology Anil Kumar Bose Award, 2004, From Indian National Science Academy INSA Young Scientist Award, 1999, From Indian National Science Academy INAE Young Engineer Award, 1998, From Indian National Academy of Engineers Amar-Dye-Chem Award, 1998, From Indian Institute of Chemical Engineers (IIChE)	Professor	Biosystems Engineering Flux analysis Bioreaction Engineering Food Engineering	Department of Chemical Engineering IIT Bombay Powai, Mumbai 400076 Maharashtra, India Fax: +91.22.25726895 Tel:+91.22.25767223 Email: venks@che.iitb.ac.in
7	Prof. Devang V Khakhar	He is a senior professor and ex-director of IIT Bombay. o Amar Dyechem Award, Indian Institute of Chemical Engineers, 1993. o Fellow, Indian Academy of Sciences, Bangalore, December 1996. o Shanti Swarup Bhatnagar Prize, Engineering Sciences, Council for Scientific and Industrial Research, 1997. o Swarnajayanti Fellowship, Department of Science and Technology, 1998.	Professor	Granular flow, rheology, fluid mechanics, multiphase flow	Department of Chemical Engineering IIT Bombay Powai, Mumbai 400076 Maharashtra, India Fax: +91.22.25726895 Tel:+91.22.25767212 Email: khakhar@che.iitb.ac.in
8	Prof. Ravindra D Gudi	He is a senior professor and head of the department. He has vast experience in processes control and optimization. He has several publications and received awards such as Hardillia award, Distinguished Instrumentation and control award and is current president of ACDOS	Professor & Head	Process control, Optimization, system engineering	Department of Chemical Engineering IIT Bombay Powai, Mumbai 400076 Maharashtra, India Fax: +91.22.25726895 Tel:+91.22.25767231 Email: ravigudi@che.iitb.ac.in
9	Prof. S. Basu	He is senior Professor. He has vast experience in his areas of specialization and contributed significantly in the form	Professor	Interfacial and Electrochemical Engineering	Department of Chemical Engineering

		of over 50 journal publications and 3 books.		Fuel Cell Enhanced oil recovery	IIT Delhi, HauzKhas, New Delhi-110 016, INDIA Phone: +91-11-26591035 Email: sbasu@chemical.iitd.ac.in
10	Prof. R. Ravi	He is Professor. He has vast experience in his areas of specialization and contributed significantly in the form of numerous publications.	Professor	Statistical Thermodynamics, Process Control of Integrated Systems, Property Estimation of Liquid Metals	Department of Chemical Engineering IIT Madras, Chennai - 600036 Phone: +91-44-2257 4167 Email: rravi@iitm.ac.in
11	Prof. P.S.T Sai	He is a Professor and contributed significantly in the form of Numerous publications in his areas of specialization.	Professor	Analysis and Design of Chemical Reactors Mass Transfer Environmental Engineering	Department of Chemical Engineering IIT Madras, Chennai - 600036, INDIA Phone: +91-44-2257 4163 Email: psts@iitm.ac.in
12	Prof. R. Nagarajan	He is a senior Professor and contributed significantly in the form of numerous publications in his areas of specialization.	Professor & Head	Nano particle technology, Process system engineering	Department of Chemical Engineering IIT Madras, Chennai - 600036, Phone: +91-44-2257 4158 Email: nag@iitm.ac.in nagaraj@che.iitm.ac.in
13	Prof. S. Jayanti	He is a senior Professor and contributed significantly in the form of numerous publications (More than 57) in his areas of specialization.	Professor	Computational Fluid Dynamics, Fuel cells, Combustion Technologies, Coal gasification	Department of Chemical Engineering IIT Madras, Chennai - 600036, INDIA Phone: +91-44-2257 4168 Email: sjayanti@iitm.ac.in
14	Prof. S. Pushpavanam	He is senior Professor. He has vast experience in his areas of specialization and contributed significantly in the form of numerous journal publications and several conference publications.He is author of one book.	Professor	Mathematical Modeling and Simulation / Nonlinear dynamics	Department of Chemical Engineering IIT Madras, Chennai - 600036, INDIA Phone: +91-44-2257 4161 Email: spush@iitm.ac.in, spush@che.iitm.ac.in
15	Prof. V. S. Ramachandra Rao	He is senior Professor. He has vast experience in his areas of specialization and contributed significantly in the form of numerous journal publications.	Professor	Internal Model control, Adaptive control.	Department of Chemical Engineering IIT Madras, Chennai - 600036, INDIA Phone: +91-44-2257 4162 Email: vsrr@iitm.ac.in
16	Prof. T. Swaminathan	He has vast experience in his areas of specialization and contributed significantly in the form of numerous journal publications (more than 109) and 2 patents	Professor	Environmental Management (HWM), Membrane Technology (RO, UF, MF), Environmental Biotechnology, Environmental Risk Assessment, Environmental Policy and	Department of Chemical Engineering IIT Madras, Chennai - 600036, INDIA Phone: +91-44-2257 8222 Email: tswami@iitm.ac.in

				Environmental Economics	
17	Prof. Abhijit P. Deshpande	He has vast experience in his areas of specialization and contributed significantly in the form of numerous referred journal.	Professor	Polymeric materials, Ionic polymers, Rheology, Composite processing.	Department of Chemical Engineering, HSB 151 IIT Madras, Chennai - 600036, INDIA Email: abhijit@iitm.ac.in Phone: 044-22574169
18	Prof. Arun K. Tangirala	Dr. Arun K. Tangirala is a Professor at the Department of Chemical Engineering, IIT Madras since 2004. His research interests span the fields of process control and monitoring, identification, applied signal processing and fuel cell systems. He has been teaching several full-term and short-term courses on process control, system identification, theory and applications of wavelet transforms, random processes and fuel cell systems.	Professor	Controller Performance Monitoring, Data Mining, Fault Diagnosis, Wavelet Applications & Spectral Analysis, Fuel Cells.	Department of Chemical Engineering, IIT Madras, Chennai 600036, Tamilnadu, INDIA. Ph: +91-44-22574181 Fax:+91-44-22574152 Email: arunkt@iitm.ac.in
19	Prof. Kannan A	He is a senior professor	Professor	Mass Transfer, Process Analysis, Modeling and Simulation, Drying and Adsorption	Department of Chemical Engineering, IIT Madras, Chennai 600036, Tamilnadu, INDIA. Email: kannan[at]iitm.ac.in Phone: 91-44-22574170
20	Prof. T. Panda	He is a very senior Professor	Professor	Bioprocess optimization, Enzyme design and Bionanotechnology	Department of Chemical Engineering, IIT Madras, Chennai 600036, Tamilnadu, INDIA. Email: panda@iitm.ac.in Phone: 91-44-22574160
21	Prof. Preeti Aghalayam	She has vast experience on underground coal gasification	Professor	Underground Coal Gasification, Reduction of Automotive NOx, Reduction of Large Reaction Mechanisms, Reactor Modeling.	Department of Chemical Engineering, IIT Madras, Chennai 600036, Tamilnadu, INDIA. Email: preeti@iitm.ac.in Phone: 91-44-22574185
22	Prof. Raghunathan Rengasamy	He is a senior Professor and Institute Chair & Dean[Global Engagement]	Professor	Fuel Cell Technology, Energy Systems, Systems Biology, Multiscale Modeling and Optimization, Process Fault Diagnosis.	Department of Chemical Engineering, IIT Madras, Chennai 600036, Tamilnadu, INDIA. Email: raghur@iitm.ac.in Phone: 91-44-22574159
23	Prof. B.N. Rai	He is Professor. He has vast experience in his areas of specialization and contributed significantly in the form	Professor	Chemical Technology, Air & Water Poll. Control,	Department of Chemical Engineering Indian Institute of Technology,

		of numerous publications and several conference publications.		Transfer Processes	Banaras Hindu University Varanasi - 221005, UP, INDIA Email:bnrai.che@itbhu.ac.in
24	Prof. P. Ahuja	He is Professor. He has vast experience in his areas of specialization and contributed significantly in the form of numerous publications and several conference publications.	Professor	Modelling &Sumulation Kinetics & Thermodynamics, Energy & Polymer Technology	Department of Chemical Engineering Indian Institute of Technology, Banaras Hindu University Varanasi - 221005, UP, INDIA Email:pahuja.che@itbhu.ac.in
25	Prof. R. Prasad	He is Professor. He has vast experience in his areas of specialization and contributed significantly in the form of numerous publications and several conference publications.	Professor	Chemical reaction Engg. & Catalysis, Process Design & Development	Department of Chemical Engineering Indian Institute of Technology, Banaras Hindu University Varanasi - 221005, UP, INDIA Email:prasad.che@itbhu.ac.in
26	Prof. A.S.K. Sinha	He is Professor. He has vast experience in his areas of specialization and contributed significantly in the form of numerous publications and several conference publications.	Professor	Reaction Engg, Heterogeneous Catalysis, Photocatalysis., Process Development	Department of Chemical Engineering Indian Institute of Technology, Banaras Hindu University Varanasi - 221005, UP, INDIA Email:asksinha.che@itbhu.ac.in
27	Prof. S. De	He is Professor. He has vast experience in his areas of specialization and contributed significantly in the form of numerous publications and several conference publications. Award: S.S. Bhatnagar Award 2011	Professor	Membrane separations Transport Processes Flow through microchannels	Department of Chemical Engineering IIT Kharagpur-721302, INDIA Phone (O): +91 – 3222 - 283926, (R): +91 - 3222 - 283927 Fax:+91-3222-282250 Email: sde@che.iitkgp.ernet.in
28	Prof. A. N. Samanta	He is senior Professor. He has vast experience in his areas of specialization and contributed significantly in the form of numerous publications and several conference publications.	Professor	Computer Aided Process Engineering / Process Modelling and Simulation	Department of Chemical Engineering IIT Kharagpur-721302, INDIA Phone (O): +91-3222-283948, (R):+91-3222-283949 Fax:+91-3222-282250 Email: amar@che.iitkgp.ernet.in
29	Prof. S. Neogi	He is Professor. He has vast experience in his areas of specialization and contributed significantly in the form of two patents, numerous publications and several conference publications.	Professor	Biomedical applications	Department of Chemical Engineering IIT Kharagpur-721302, INDIA Phone (O): +91 -3222 - 283936, (R): +91 - 3222 - 283937

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31	Prof. Gargi Das	She is a senior Professor. She has vast experience in Multiphase flow. She received AICTE Career Award, Amar Dye-Chem Award by IIChE Institute Silver Medal by IIT ISCA Young Scientist Award, University Gold Medal by JU	Professor & Head	Process intensification of mass transfer controlled processes in reacting and non-reacting systems, multiphase flows.	Department of Chemical Engineering IIT Kharagpur-721302, INDIA Email: gargi@che.iitkgp.ac.in Phone: +91-3222-283952
32	Prof. B.C Meikap	He is a Senior Professor.	Professor	industrial pollution control & management, fluidization, coal beneficiation, air and water quality monitoring,	Department of Chemical Engineering IIT Kharagpur-721302, INDIA Email: bcmeikap@che.iitkgp.ac.in Phone: +91-3222-283958
33	Prof. Sudipto Chakraborty	He is a Senior Professor.	Professor	Industrial Scale Heat Transfer, Ultra-fast Transport Phenomena, Process modelling and simulation CFD and Heat transfer	Department of Chemical Engineering IIT Kharagpur-721302, INDIA Email: sc@che.iitkgp.ac.in Phone: +91-3222-283942
34	Prof. Vilas G. Gaikar	He is senior Professor. He has vast experience in his areas of specialization and contributed significantly in the form of numerous publications (more than 85) and several conference publications. He is author of 2 books and has filed 3 patents. Awards : Herdillia Award of IIChE for Excellence in Basic Research in Chemical Engineering(2004)	Professor	Reactive Extraction/ Distillation/ crystallization / Adsorptive Separations	Mumbai University, Institute of Chemical Technology, Matunga, Mumbai-19, India; Fax: +91-22-2414 5614 Email: v.g.gaikar@udct.org
35	Prof. B. N. Thorat	He has vast experience in his areas of specialization and contributed significantly in the form of numerous publications and several conference publications.	Professor	Drying Technology, Food Processing, Functional foods,	Mumbai University, Institute of Chemical Technology, Matunga, Mumbai-19, India Fax: +91-22-3361 2022

				Pro-biotic formulations, Crystallization, Process Development, Multi phase reactor design	Email: bn.thorat@ictmumbai.edu.in
36	Prof. S. S. Bhagwat	He has vast experience in his areas of specialization and contributed significantly in the form of numerous publications (more than 30) and several conference publications. Awards : Prof. R. A. Rajadhyakasha Best Teacher Award, 1996, 2004, 2006	Professor	Applications of Artificial Neural Networks/ Computer Aided Design and Simulation of chemical processes	Mumbai University, Institute of Chemical Technology, Matunga, Mumbai-19, India; Fax: +91-22-2414 5614 Email: ssb@udct.org
37	Prof. J.K. Modak	He is senior Professor. He has vast experience in his areas of specialization and contributed significantly in the form of numerous publications (more than 90) and several conference publications. He has filed 3 patents. Awards: Elected Fellow, Indian National Academy of Engineering, 2004, Sir C. V. Raman Young Scientist Award, Government of Karnataka, 2004, Biotechnology Process Development Award, Department of Biotechnology, Government of India, 2003 AvH Research Fellowship, Alexander von Humboldt Foundation, Germany (1999-2000), Amar Dye Chem award for Excellence in Research, Indian Institute of Chemical Engineers, (1996) P. C. Ray Award, Indian Institute of Chemical Engineers (1983) G. P. Kane Gold Medal, University of Bombay, India (1983)	Professor	Bioleaching and biobeneficiation Biochemical reactors Neural networks	Department of Chemical Engineering Indian Institute of Science Bangalore, 560012, India Telephone: (80) 2293-3108 Fax: (80) 2360-8121 Email: modak@chemeng.iisc.ernet.in
38	Prof. K GanapathyAyappa	He is senior Professor. He has vast experience in his areas of specialization and contributed significantly in the form of numerous publications (27 selected publications up to 2005 from now) and several conference publications.	Professor	Structure and dynamics of molecularly confined fluids and interfaces, Statistical mechanics, Molecular simulations, Microwave driven transport processes	Department of Chemical Engineering Indian Institute of Science Bangalore - 560 012 Ph: (080)-2293-2769 Fax: (080)-2360-8121 email:ayappa@chemeng.iisc.ernet.in
39	Prof. Giridhar Madras	He has vast experience in his areas of specialization and contributed significantly in the form of numerous (More than 160) publications and several conference publications. Awards: Presidential Swarnajayanthi Fellowship, 2006, awarded by Department of Science and Technology, India, Scopus Young Scientist, 2006, awarded by Elsevier, Largest number of publications (151),	Professor	Synthesis and degradation of polymers, Separations and reactions in supercritical fluids	Department of Chemical Engineering Indian Institute of Science Bangalore - 560 012 Phone : +91-80-2293-2321 Fax: +91-80-2360-8121 Email : giridhar@chemeng.iisc.ernet.in

		citations (1212) between 2000-2007 and highest h-index (24) among all engineering faculty in IISc., Ranked by Essential Science Indicators (ESI of ISI) as among the top 1% of all scientists in the world based on number of citations. Editorial Board, Current Science, Editorial Board, Thermodynamics Journal, Member, Committee for gas hydrates, Ministry of Oil and Gas, India, 2003-till date			
40	Prof. Prabhu R Nott	He has vast experience in his areas of specialization and contributed significantly in the form of numerous publications and several conference publications.	Professor	Complex fluids, Granular flows, Rheology and dynamics of particle suspensions	Department of Chemical Engineering Indian Institute of Science Bangalore - 560 012 Phone : +91-80-2293-2317 Fax: +91-80-2360-8121 Email : prnott@chemeng.iisc.ernet.in
41	Prof. K. Kesava Rao	He is a senior professor, and ex chairman of chemical engineering. He has published a number of publication in granular flow.	Professor	Granular flow, fluid mechanics, water pollution	Department of Chemical Engineering Indian Institute of Science Bangalore - 560 012 Phone : +91-80-2293-2341 Fax: +91-80-2360-8121 Email : kesava@chemeng.iisc.ernet.in
42	Prof. V. Kumaran	He has vast experience in his areas of specialization and contributed significantly in the form of numerous publications and several conference publications. Awards and honors TWAS Prize Engineering Sciences (2014) RustomChokshi Award, Indian Institute of Science (2012) JC Bose National Fellowship (2007) Fellow, Indian National Academy of Engineering (2006) Swarnajayanti Fellowship, Government of India (2002) Fellow, Indian National Science Academy (2001) Bhatnagar Award, Government of India (2000) Amar Dye-Chem Award, Indian Institute of Chemical Engineers (1999) Fellow, Indian Academy of Sciences (1998) Indian National Academy of Engineering Young Engineer Award (1997) Indian National Science Academy Young Scientist Medal (1996)	Professor	Microfluidics, Statistical mechanics of granular flow, Turbulent gas-particle suspension, Flow past flexible surfaces, Multiscalemodeling of liquid crystalline phases, dynamics of rarefied gas flows	Department of Chemical Engineering Indian Institute of Science Bangalore - 560 012 Phone : +91-80-2293-3112 Fax: +91-(80)-2360-8121 E-mail: kumaran@chemeng.iisc.ernet.in

43	Dr. Ashish Lele	He is a Chemical Engineer and a senior scientist. He is actively involved in the R&D activities of RIL. He was earlier with NCL, Pune. He has received several awards including the SS Bhatnagar award.	Senior Scientist	Polymer processing and rheology, fuel cells	Reliance Industries Limited Maker Chambers - IV Nariman Point Mumbai 400 021, India Email: ashish.lele@ril.com aklele@gmail.com Tel.: +91 960065550
44	Dr. V. K. Srivastava	He is a Chemical Engineer and a senior industrialist. He is actively involved in the R&D activities of BARC.	Head, TDS Desaliation Division, BARC	R&D activities	V K Srivastava Head, TDS , Desalination Division BARC , Trombay, Mumbai 400 085 [O] (022) 2559-4649, 2550-5050 Ext.2559, [M] (0)9833415096 E-mail: vksriv@barc.gov.in
45	Prof. Kamal K Pant	He is a senior professor and head of the department of chemical engineering. He is FIPI chair professor and has received several awards including Hardillia award, Dr A V Rama Rao Award	Professor and Head	Heterogeneous catalysis and Reaction kinetics, Catalytic hydrocarbon conversion processes, Water treatment	Department of Chemical Engineering IIT Delhi, Hauz Khas, New Delhi-110 016, INDIA Phone: +91-11-26596172 Email: kkpant@chemical.iitd.ac.in
46	Prof. Yogesh M Joshi	He is a senior professor. Awards: National Academy of Sciences (NASI) – Scopus Young Scientist Award 2012 (2013) Department of Atomic Energy – Science Research Council (DAE – SRC) Outstanding Investigator Award (2012). Indian National Academy Engineering (INAE) Young Engineer Award (2008) Associate of Indian Academy of Sciences (2006-2009) Indian National Science Academy (INSA) Medal for Young Scientist (2006)	Professor	Dynamics of Structured Fluids, Soft Matter, Rheology	Dean of International Relations and Professor Department of Chemical Engineering Indian Institute of Technology Kanpur Kanpur 208016 Phone(office): 91-512-2597993 Email: joshi@iitk.ac.in
47	Prof. Anurag Mehra	He is a senior professor at IITB Awards: INSA Medal for Young Scientists (1989) o Associate, Indian Academy of Sciences (1989-1994) o IIChE Amar Dye Chem Award (1994) o EC Marie Curie Fellowship (1995) o Excellence in Teaching (2002) o Manudhane Excellence Award (2005) [consulting] o Fellow, Indian National Academy of Engineering (2009) o Fellow, National Academy of Sciences India (2011	Professor	Transport processes, reaction engineering, nanomaterials, food engineering	Department of Chemical Engg. IIT Bombay, Powai, Mumbai 400076, INDIA Phone: +91-22-2576-7217 Fax: +91-22-2572-6895 Email: mehra@ iitb.ac.in

DEPARTMENT OF CHEMISTRY

Organic Chemistry

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37	**Prof. Puneet Tandon** Professor, Dept. of Mechanical Engineering, Indian Institute of Information Technology Design & Manufacturing Jabalpur (IIIT DM), Dumna Airport Road, Dumna - 482005	• Product Innovation, • Intelligent Product • Design, Nature / Bio Inspired Design.	Phone: 091-761-2794411 Email: ptandon@iiitdmj.ac.in
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DEPARTMENT OF ELECTRONICS AND ELECTRICAL ENGINEERING

Sl. No.	Name	Area of Specialization	Additional Information, if any
Research Areas: Signal Processing			
1	Prof. Vikram M. Gadre Dept of Electrical Engineering IIT Bombay, Mumbai 400076 Tel: +91-22-2576-7426 Email: vmgadre@ee.iitb.ac.in	Signal processing with emphasis on multiresolution and multirate signal processing	Senior Professor and active researcher
2	Prof. Rajendar Bahl Centre for Applied Research in Electronics (CARE) Indian Institute of Technology Delhi New Delhi-110016 rbahl@care.iitd.ernet.in Phone: +91-11-26591103	Signal and image processing, acoustic imaging, target identification, sensor systems simulation and design, bio-sonar	Emeritus Professor and active researcher
3	Prof. Arun Kumar Professor, Centre for Applied Research in Electronics (CARE) Indian Institute of Technology Delhi New Delhi-110016 Email: arunkm@care.iitd.ernet.in Phone: +91 11 2659 1101 Fax: +91 11 2659 6219	Digital signal processing, speech and audio processing technologies for man-machine interaction, underwater acoustics.	Senior Professor and active researcher
4	Prof. P. K. Biswas Electronics and Electrical Communication Engineering, IIT Kharagpur West Bengal – 721302 Email: pkb@ ece.iitkgp.ernet.in Phone: +91-3222-283506	Image and Signal Processing, Computer Vision, Computer and Multimedia Network, Embedded System Design	Senior Professor and active researcher
5	Prof. Subhasis Choudhury Department of Electrical Engineering IIT Bombay, Mumbai 400076 Email: sc@ee.iitb.ac.in Tel: 022 - 2576 7437 **Current Address:** Director, IIT Bombay, Powai, Mumbai 400 076, Maharashtra, India Phone: +91 (22) 2572 2545 Fax: +91 (22) 2572 3480	Multimedia, Computer Vision, Image Processing, Pattern Recognition, Biomedical Signal Processing	Senior Professor and active researcher, Bhatnagar Awardee, Fellow IEEE, FNAE, FIETE
6	Prof. A. N. Rajagopalan Department of Electrical Engineering IIT Madras Email: raju@ee.iitm.ac.in Tel: 044-2257 4433	Image Processing and Computer Vision	Senior Professor and active researcher
7	Prof. P. C. Pandey Dept of Electrical Engineering, IIT Bombay Powai, Mumbai 400 076 Email: pcpandey@ee.iitb.ac.in Tel: 022-2576-7445	Speech and Signal Processing, Biomedical Signal Processing and Instrumentation, Electronic Instrumentation, Embedded Electronic System Design.	Professor and active researcher
8	Prof. K. S. Venkatesh Dept of Electrical Engineering IIT Kanpur Email: venkats@iitk.ac.in Tel: 0512-259-7150 / 7486	Signal processing, Image and Video processing, Computer vision with applications in Robotics, Signal and System Theory	Senior Professor and active researcher

9	Prof. Preeti Rao Department of Electrical Engineering IIT Bombay, Mumbai 400 076, India Email: prao@ee.iitb.ac.in Phone: (0091 22) - 2576 7695 Phone (Internal(R)) : 8695 Fax: (0091 22) – 25723707	Digital Signal Processing, Speech and Audio Signal Processing	Senior Professor and active researcher
10	Prof. Santanu Choudhury Department of Electrical Engineering IIT Delhi Phone: +91 11 2659 1081 Email:santanuc@ee.iitd.ac.in **Current Address:** Prof. Santanu Choudhury Director Indian Institute of Technology Jodhpur NH 65 Nagaur Road Karwar 342037, Dist. Jodhpur	Computer Vision, Multimedia Systems, Computational Intelligence.	Senior Professor and active researcher Director, IIT Jodhpur
Research Area: Communication Systems			
1	Prof. B. Sundar Rajan Dept of ECE, IISc Bangalore Email: bsrajan@ece.iisc.ernet.in Tel: 80-2293 2855	Error Control Codes, Algorithms in Coding, Space-Time Coding and Modulation for Wireless Communication	Professor and active researcher
2	Prof. A. Chockalingam Department of ECE, IISc Banaglore Email: achockal@ece.iisc.ernet.in Tel: 080-2293 3156	Communication Networks, Wireless Communication Systems	Senior Professor and active researcher
3	Prof. Subrat Kar Department of Electrical Engineering and Bharti School of Telecommunication Technology and Management, IIT Delhi Email: subrat@ee.iitd.ac.in Tel: +91 11 2659 1088 +91 11 2659 6200	Computer Communication Networks Optical Networks, Photonic Switching	Senior Professor and active researcher
4	Prof. Abhay Karandikar Department of Electrical Engineering IIT Bombay, Powai Mumbai 400 076, India Phone : (+91 22) 2576 7439 Fax : (+91 22) 2572 3707 Email : karandi@ee.iitb.ac.in **Current Address:** Director, IIT Kanpur, Kanpur -208 016 Email: director@iitk.ac.in Phone: +91-512-259 7220/0763	Control and Performance Modelling of Wireless Networks, Quality of Service and Resource Allocation in Wired/Wireless Networks, Co-operative Relay and Self Organizing Network, Rural Wireless Network	Senior Professor and active researcher, Coordinator of Tata Teleservices-IIT Bombay Centre for Excellence in Telecom (TICET) Director, IITK
5	Prof. Ranjan Bose Department of Electrical Engineering, IIT Delhi Phone: +91 11 2659 1048 Email: rbose@ee.iitd.ac.in **Current Address:** Director, Indrapastha Institute of Information Technology Delhi Tel: +91-11-26907480, +91-11-26907481 Email: director@iiitd.ac.in, bose@iiitd.ac.in	Wireless Communication, Ultra Wideband Communications(UWB)	Senior Professor and active researcher Head, Center of Excellence in Cyber Systems and Information Assurance at IIT Delhi Director, IIITD
6	Prof. D. Manjunath Department of Electrical Engineering IIT Bombay, Powai Mumbai 400 076	Computer and Communication Network Protocols, Systems and Algorithms Performance Modelling, Queuing Theory and Simulation	Senior Professor and active researcher

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7	Prof. K. Giridhar Department of Electrical Engineering IIT Madras Email: giri@ee.iitm.ac.in Tel: 044-2257 4420	Communications Networks: Co-channel Interference Management, Channel Estimation for Mobile Broadband Systems, Performance Analysis of Broadband Cellular Networks, Co-operative Communication and Cognitive Networks	Professor and active researcher
8	Prof. Devendra Jalihal Department of Electrical Engineering IIT Madras Email: dj@ee.iitm.ac.in Tel: 044-2257 4418	Communications Networks, Digital communication, detection and estimation theory	Professor and active researcher
9	Prof. Neelesh Mehta Room No - SPW 205 Signal Processing Building West Wing Dept. of Electrical Communication Engineering (ECE) Indian Institute of Science (IISc) Bangalore - 560 012, India Email: nbmehta@iisc.ac.in Phone: +91 (80) 2293 3174	Base Station-Side Estimation Distributed Selection Algortihms D2D Communication In-band Full Duplex Cognitive Radio Energy Harvesting Wireless Sensor Networks	Professor and Fellow IEEE
10	Prof. Manav Bhatnagar Department of Electrical Engineering, Indian Institute of Technology Delhi, Hauz Khas, IN-110016 New Delhi, India E-Mail: manav@ee.iitd.ac.in Tel: +91(11)26597251	Signal processing for MIMO systems, Cooperative communications, Non-coherent communication systems, Distributed signal processing for cooperative networks, Cognitive networks, Multiuser communications, Ultrawideband-based communications, Free-space optical communication, Software defined radio, Power line communications, Satellite communications	Professor and active researcher
Research Area: RF and Microwaves			
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4	Prof. S. K. Koul Centre For Applied Research in Electronics (CARE) Indian Institute of Technology Delhi	Microwave integrated circuits, CAD, microwave phase shifters, optical and millimeter wave dielectric	Senior Professor and active researcher Deputy Director (Strategy & Planning)

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6	Prof. Ramesh Garg Professor, Dept of Electrical Engineering, Indian Institute of Technology Ropar, Nangal Road, Rupnagar, Punjab, INDIA 140001	RF and Microwave Engineering	Senior Professor and active researcher
7	Prof. K. J. Vinoy Dept of Electrical Communication Engineering Indian Institute of Science, Bangalore, Karnataka, India Tel: (+91) 80-2293 2853; 2360 0446 Email: kjvinoy@iisc.ac.in	Wireless Power Transfer, Microwave Antennas and Circuits, Computational Electromagnetics	Professor and active researcher
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Research Area: VLSI, Microelectronics and Devices			
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2	Prof. Amitava Dasgupta Dept of Electrical Engineering IIT Madras Email: adg@ee.iitm.ac.in Tel: 044-2257 4416	Semiconductor Device Modelling, MEMS	Senior Professor and active researcher
3	Prof. M. S. Baghini IIT Bombay, Powai Mumbai 400 076 Email: mshojaei@ee.iitb.ac.in Tel: 022-2576-7425	VLSI design and embedded systems, circuit and system design with organic thin film components, RF/Microwave integrated circuit design, , Sensor-Circuit Integration,	Senior Professor and active researcher

		Analog/Mixed-signal/RF EDA	
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5	Prof. V. R. Sule Dept of Electrical Engineering IIT Bombay, Powai Mumbai 400 076 Email: vrs@ee.iitb.ac.in Tel: 022-2576-7492	Control Systems, cryptography, Finite state systems and control of their behaviours	Senior Professor and Active Researcher
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4	Prof. Mahesh Kumar Dept of Electrical Engineering IIT Madras Email: mahesh@ee.iitm.ac.in Tel: 044-2257 4429	Power Systems, Power Electronics and High Voltage	Senior Professor and Active Researcher
5	Prof. K. Shanti Swarup Dept of Electrical Engineering IIT Madras Email: swarup@ee.iitm.ac.in Tel: 044-2257 4440	Power system optimization and control, Computer modelling, simulation, analysis of Electrical Power Systems, Digital and Numerical Protection of Power Systems, Substation and Distribution System Automation, Energy management Systems and SCADA	Senior Professor and Active Researcher,
6	Prof. S. A. Khaparde Dept of Electrical Engineering, IIT Bombay Email: sak@ee.iitb.ac.in Tel: 022-2576-7434	Deregulation in Power Industry, Object oriented power system analysis, Controlled series compensation using SSSC	Senior Professor and Active Researcher,
7	Prof. D. Kastha Department of Electrical Engineering Indian Institute of Technology Kharagpur– 721302 Email: kastha@ee.iitkgp.ernet.in Phone: +91-3222-283058	Switched mode power supplies, wind electrical systems, machine drives	Senior Professor and Active Researcher
8	Prof. S. P. Das Department of Electrical Engineering IIT Kanpur, Kanpur - 208 016, INDIA. Email: spdas@iitk.ac.in Phone: +91-512-2597106	Power electronics, Electric Drives, Electrical machines, Microprocessor Systems & instrumentation	Senior Professor and Active Researcher
9	Prof. Krishna Vasudevan Dept of Electrical Engineering IIT Madras Email: krishna@ee.iitm.ac.in Tel: 044-2257 4428	Power Electronics and control for renewable energy, motor drives	Senior Professor and Active Researcher
10	Prof. Pramod Agarwal Dept of Electrical Engineering, IIT Roorkee Email: pramgfee@iitr.ernet.in Tel: 01332-285069	Power Electronics, Electrical machines	Senior Professor and Active Researcher
11	Prof Vivek Agarwal Department of Electrical Engineering IIT Bombay, Powai Mumbai 400 076, India Tel: (0091 22) - 2576 7422 Email: agarwal@ee.iitb.ac.in	Power conversion, Power quality issues, Non-conventional energy	Senior Professor and Active Researcher
12	Prof Mukul C. Chandorkar Department of Electrical Engineering IIT Bombay, Mumbai 400 076, India Tel: (0091 22) - 2576 7475 Email: mukul@ee.iitb.ac.in	Power electronics, electrical Machines	Senior Professor and Active Researcher
13	Prof. S. C. Srivastava Dept of Electrical Engineering IIT Kanpur	Power system dynamics & voltage stability studies, Wide Area Control of	Senior Professor and Active Researcher, Co-author of the book

	Email: scs@iitk.ac.in Tel: 512-2597625	Power System, Optimal power dispatch, Security analysis and control, Energy management system, Power system restructuring	Operation and Management of Power System in Electricity Markets

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

Sl. No.	Name with contact details	Area of interest	Phone / Fax No. and e-mail ID
Archaeology			
1	**Dr Prakash Sinha** Department of Ancient History, Culture & Archaeology, University of Allahabad Allahabad – 211 002	Experimental, Theoretical, Field oriented Archaeology, Lithic Technology, Micro-wear Analysis, Sampling Techniques, Quantitative Techniques & Computer Application in Archaeology.	Telephone No. (R) 0532-2441191, 9415236386 e-mail : passinha@yahoo.com Web: prakasharchaeo.com
2	**Dr. K Krishnan** HOD, Department of Archaeology and Ancient History Faculty of Arts, M.S. University, Baroda - 390 002.	Artefact Analysis and Interpretation Ancient Technology , Environmental Archaeology, Harappan Studies, Origin and Development of urbanism in South Asia	Landline # 0265-2792436 Cell # 09586528477 e-mail:krishnan_msu@yahoo.com kkrishnan-archaeology@msubaroda.ac.in
3	**Prof. Suchandra Ghosh,** Professor, Department of Ancient Indian History & Culture, University of Calcutta. Address 1/3, Gopal Chandra Bose Lane, Kolkata-700050, India	Historical Archaeology, Urbanisation of Ancient India	E-mail suchandra64@gmail.com Telephone +91 9830347484 (mobile)
4	**Prof. Jaya Menon** Head Department of History School of Humanities and Social Sciences (SoHSS)	Field methods of archaeology, South Asian Bronze Age, early historic period, archaeology of households.	e-mail: jaya.menon@snu.edu.in E 386, Block-E, Library Building, Shiv Nadar University, Greater Noida, Uttar Pradesh, India 91-0120-7170100 Extn: 307
5	**Prof. Supriya Varma,** Centre for Historical Studies, School of Social Sciences Room No: 216	Social Archaeology	Off. Phone: 011-26704126 Residence: 09971801818, 09313813388 Email: supriyav@jnu.ac.in , varma.supriya@gmail.com Personal Webpage: http://www.jnu.ac.in/Faculty/svarma/cv.pdf
6	**Professor Sutapa Sinha** 15/2/4. Jheel Road, Flat - N2, Sweetland, P.O. Santoshpur, Kolkata PIN - 700075, West Bengal, India.	a. Medieval Archaeology with emphasis on surface survey and field study b. Study of Coin Hoards of the Bengal Sultans with emphasis on Islamic coins of Bengal and other provincial sultans including Delhi c. Architecture of Sultanate Bengal and comparative study of contemporaryIndoIslamic architecture in India. d. Chinese Ming porcelain	Professor Sutapa Sinha Residence: 15/2/4. Jheel Road, Flat - N2, Sweetland, P.O. Santoshpur, Kolkata PIN - 700075, West Bengal, India. Contact details: +91 9830403927; Email: ssinha9133@gmail.com; sutapasinha@hotmail.com
Development Studies			
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6.	**Prof. Ramila Bisht** Professor Centre of Social Medicine and Community Health, Jawaharlal Nehru University, New Mehrauli Road New Delhi – 110067	Health policy and administration, Health care eform, Women's health, Health inequalities, mountain development and environmental health.	Phone: 0091-11-26704488(O) Mobile-9717793765 Email: ramila.bisht@gmail.com ; ramila@mail.jnu.ac.in
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Economics			
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English			
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Sociology

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6	**Prof. Sanjay Srivastava** Professor Institute of Economic Growth, Delhi University Enclave, Delhi 110 007	Urbanism, Urban Cultures and Technologies of Planning, Young People, New Forms of Work and Youth Cultures, Gender and Globalisation, Social Theory	9873462058 (M) sanjaysri@iegindia.org sanjays3050@gmail.com

DEPARTMENT OF MATHEMATICS

Experts in Mathematics			
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1.	Prof. R. Balasubramanian Institute of Mathematical Sciences C.I.T. Campus, Taramani, Chennai--600 113 Email: balu@imsc.res.in Phone: 044-2254-1856 Extn:201 (Associated with IIT Bombay also)	Algebraic Number Theory, Number Theory, Cryptography.	Bhatnagar Awardee.
2.	Prof. S.G. Dani Department of Mathematics IIT Bombay, Mumbai 400 076 Email: sdani@math.iitb.ac.in Phone: 022-2576 7453 (off) Fax: 022-2572 3480	Lie groups	Bhatnagar Awardee
3.	Prof. S. B. Rao CR Rao Advanced Institute of Mathematics, Statistics & Computer Science (AIMSCS), University of Hyderabad Campus, Near Central University P.O., Hyderabad-46 E mail : siddanib@yahoo.co.in	Discrete Mathematics (Graph Theory)	Senior Professor. Ex-Director of ISI Calcutta. Present Director of CRRao Institute.
4.	Prof. R. B. Bapat ISI Delhi, 7 SJSS Marg, New Delhi-16 Email. rbb@isid.ac.in Phone: 91-11-41493934 (Office) 91-11-26852513 (home)	Linear Algebra, Matrix Theory Algebraic Graph Theory	INSA Fellow
5.	Prof. R. Tandon Department of Mathematics and Statistics University of Hyderabad P.O. Central University Hyderabad – 500 046 Email: rajattan@gmail.com, rtsm@uohyd.ernet.in Phone: 040-23134006 (office) 040- 23010272 (Res)	Algebraic Number Theory, Cryptology	Renowned Researcher A leading expert
6.	Prof. J. K. Verma Department of Mathematics IIT Bombay, Mumbai 400 076 Email: jkv@math.iitb.ac.in Phone: 022-25767478 (off) 022-25768478 (home) Mobile: 9819307484	Commutative Algebra	Fellow of National Academy of Sciences, India
7.	Prof. R. V. Gurjar School of Mathematics, TIFR Dr HomiBhabha Road, Mumbai - 400 005 Email: gurjar@math.tifr.res.in Phone: 022-22782472 (Off.)	Complex algebraic surfaces	INSA Fellow
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9.	Prof. Murali K. Srinivasan Department of Mathematics IIT Bombay, Mumbai 400 076 Email: mks@math.iitb.ac.in	Combinatorics	Renowned Researcher A leading expert

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11.	Prof. V. Balaji Chennai Mathematical Institute H1, SIPCOT IT Park, Siruseri Kelambakkam 603103 Email: balaji@cmi.ac.in Ph.: 044-27470226-0229, 044-32983441-3442	Algebraic Geometry	Bhatnagar Awardee 2006
12.	Prof. Vijay Kodiyalam Institute of Mathematical Sciences IV Cross Road, CIT Campus Taramani Chennai 600 113 Emai : vijay@imsc.res.in Phone: 044-2254 3212,2254 3100 (Off), 2442 2188 (Res)	Commutative Algebra, Algebraic Geometry	A leading Expert
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14.	Prof. Dipendra Prasad Department of Mathematics IIT Bombay Mumbai-400 076 Email: dprasad@math.iitb.ac.in Phone: 022-2576 7477	Algebraic Number Theory, Automorphic forms, Representation theory	
15.	Prof. Eknath Ghate School of Mathematics TIFR Homi Bhabha Road Mumbai – 400 005 Email: eghate@math.tifr.res.in Phone: 022 – 22782663	Algebraic Number Theory, Automorphic forms, Galois representation, L-function	Dean of School of Mathematics, TIFR
16	Prof. S. Senthamarai Kannan Chennai Mathematical Institute Plot H1, SIPCOT IT Park Siruseri, Kelambakkam Chennai-603 103 Email: kannan@cmi.ac.in Phone: 9003111830	Algebraic Geometry, Representation Theory	
17	Prof. R. Sujatha School of Mathematics TIFR Mumbai-400 005 Email: sujatha@math.tifr.res.in	Algebraic Number Theory, Arithmetic Geometry	
18	Prof. A. Raghuram Department of Mathematics IISER Pune Pune-411 008 Email: raghuram@iiserpune.ac.in Phone: 020-25908103	Algebra, Geometry, Number Theory, Representation Theory	Distinguished Honorary Professor of IITK, Fellow of Indian Academy of Sciences

19	Prof. C. S. Rajan School of Mathematics TIFR-Mumbai Mumbai-400 005 Email: rajan@math.tifr.res.in Phone: 022-22782665 Mobile: 9869063353	Arithmetic Geometry, Automorphic forms, Representation Theory	Distinguished Honorary Professor of IITK
20	Prof. Mahan Mj. School of Mathematics TIFR Mumbai-400 005 Email: mahan@math.tifr.res.in	Random geometry, Ergodic Theory, Hyperbolic Geometry, Geometric Group Theory	Member of Infosys-Chandrasekharan Virtual Centre for Random Geometry, Distinguished Honorary Professor of IITK
21	Prof. Arbind Kumar Lal Department of Mathematics & Statistics IIT Kanpur Kanpur-208 016 Email: arlal@iitk.ac.in Phone: 0512-2597662	Coding Theory, Matrix Theory	
22	Prof. Parameswaran Sankaran Institute of Mathematical Sciences IV Cross Road, CIT Campus Taramani Chennai 600 113 Email: sankaran@imsc.res.in Phone: 044-2254 321(Off), 2446 0909 (Res.)	Topology and algebraic groups	Senior Professor and leading expert
23	Prof. Siddhartha Gadgil Department of Mathematics IISc Bangalore Bengaluru-560 012 Email: Siddhartha.gadgil@gmail.com	Geometry, Topology, Geometric Group Theory	
24	Prof. K. B. Sinha Jawaharla Nehru Centre for Advanced Scientific Research P.O. Jakkur, Bangalore 560064 Email: kbs@incasr.ac.in; kbs_jaya@yahoo.co.in Phone: 080-22082754 (off)	Spectral Theory and Non-Commutative Geometry, Stochastic Processes	FASc, FIAS, Bhatnagar Awardee Ex-Director, Indian Statistical Institute
25	Prof. Rajendra Bhatia Department of Mathematics Asoka University Email: rajendra.bhatia@ashoka.edu.in	Functional Analysis, Linear Algebra	Bhatnagar Awardee
26	Prof. S. Kumaresan Department of Mathematics and Statistics IIT Kanpur Kanpur-208 016 Email: kumaresa@gmail.com Phone:9959094965 (Mob)	Differential Geometry, Analysis, Mathematics Education	Senior Professor and leading expert Visiting Faculty at IIT Kanpur
27	Prof. B. V. Limaye Department of Mathematics IIT Bombay, Powai, Mumbai – 400076 Email: balmohan.limaye@gmail.com Phone: 9869408144 (M)	Functional Analysis, Function Algebras	Professor Emeritus A leading expert in Functional analysis.
28	Prof. V. Kannan Department of Mathematics and Statistics University of Hyderabad Hyderabad – 500 046 Email: vksm@uohyd.ernet.in Phone: 040-23010329 (office) 040-23010702 (Res)	Topological Dynamics, Chaos Theory.	INSA Fellow

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30	Prof. P. Shunmugaraj Department of Mathematics and Statistics IIT Kanpur Kanpur – 208016 Email: psraj@iitk.ac.in Phone: 0512-2597433 (office)	Functional Analysis	A leading expert in Functional Analysis
31	Prof. S. Madan Distinguished Visiting Professor Department of Mathematics IIT Goa, Goa Email: madan@iitgoa.ac.in Phone:	Harmonic Analysis, Wavelets.	A leading expert in Harmonic Analysis.
32	Prof. P. V. Subramanyam Department of Mathematics IIT Madras, Chennai – 36 Email: pvs@iitm.ac.in Phone: 044-22574609 (off), 044-22461722 (res) Mobile:09444018022 Fax: 044-22574602	Nonlinear analysis, Functional Analysis, Fuzzy set theory.	Renowned researcher
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34	Prof. B. V. Rajarama Bhat Stat-Math Unit R V College Post 8th Mile Mysore Road Bangalore – 560059 Email: bhat@isibang.ac.in Phone: 080-2848 3002 Extn. 470 (off)	Functional Analysis, Operator Theory	Bhatnagar Awardee
35	Prof. S. Ponnusamy Department of Mathematics IIT Madras Chennai-600 036 Email: samy@iitm.ac.in Phone: 044-2257 4615	Complex Analysis, Functional Spaces, Special Functions	
36	Prof. R. Radha Department of Mathematics IIT Madras Chennai-600 036 Email: radharam@iitm.ac.in Phone: 044-2257 4620	Harmonic Analysis, Theory of Wavelets	
37	Prof. Tirthankar Bhattacharyya Department of Mathematics IISc Bangalore Bengaluru-560 012 Email: tirtha@iisc.ac.in Phone: 94482 79673	Operator Theory	Fellow of Academy of Sciences

38	Prof. S. Thangavelu Department of Mathematics IISc Bangalore Bengaluru-560 012 Phone: 080-22932711 Email: veluma@iisc.ac.in	Harmonic Analysis, Integral Geometry	
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40	Prof. Swagato K. Ray Stat-Math Unit ISI Kolkata Kolkata- 700 108 Email: swagato@isical.ac.in Phone: 033-2575 3411	Harmonic Analysis, Lie Groups	
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44	Prof. Pradipta Bandyopadhyay Stat-Math Unit ISI Kolkata Email: pradipta@isical.ac.in	Geometry of Banach Spaces	Renowned researcher
45	Prof. Rudra P Sarkar Stat-Math Unit ISI Kolkata Email:@rudra@isical.ac.in	Harmonic Analysis on Lie Groups	Renowned researcher
46	Prof. Inder K Rana Office 112-B, Department of Mathematics IIT Bombay, Mumbai - 400076 Tel: 022 2576 7462(O) 022 2576 8462(R)	Real Analysis, Measure Theory	Emeritus Fellow, Leading expert
47	Prof. M. N. Narayanan Namboodiri Department of Mathematics Cochin University of Science and Technology Cochin Email:nambu@cusat.ac.in, mnnadri@gmail.com Phone: 9446505953	Operator Algebras	
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54	Prof. M. Vanninathan Visiting Professor Department of Mathematics IIT Bombay Mumbai – 400 076 Email: vanni@math.tifrbng.res.in	Differential Equation, Numerical Analysis	Leading expert Retired Professor of TIFR-CAM
55	Prof. Mythily Ramaswamy TIFR Centre for Applicable Mathematics P.B:6503, Sharada Nagar Chikkabommasandra, Bengaluru- 560065 Email: mythily@math.tifrbng.res.in Phone: 080-6695 3726	Differential Equation, Numerical Analysis	Senior Professor Leading expert Retired Professor of TIFR-CAM
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60	Prof. Neela Nataraj Department of Mathematics IIT Bombay Mumbai-400 006 Email: neela@math.iitb.ac.in Phone: 044-25767468	Differential Equations, Numerical Analysis	
61	Prof. Ramesh Chand Mittal Department of Mathematics Jaypee Inst. of Inf. Technology Noida Email: mitalrc@gmail.com Phone: 01332 285193	Numerical Analysis, Computer Software and Programming Languages.	Senior Professor Leading expert Retired Professor of IIT Roorkee
62	Prof. G.P. Raja Sekhar Department of Mathematics IIT Kharagpur, Kharagpur – 721302 Email: rajas@maths.iitkgp.ernet.in Phone: 03222-283684 Mobile: 9434722291	Fluid dynamics, Numerical analysis, Differential equations	Leading expert
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11	Prof Subhendra Mohanty Physical Research Laboratory, Ahmedabad, 380009, INDIA	Theoretical HEP, Astro-particle physics	*Senior professor, more than 100 publications in reputed international journals.*	Tel: +91 (79) 2631 4461; Fax: +91 (79) 2630 1502 e-mail: mohanty @ prl.res.in
12	Prof. Srubabati Goswami Physical Research Laboratory, PRL Theoretical Physics Division	HEP Phenomenology, Astro-particle physics	*Senior professor, more than 100 publications in reputed international journals. Fellow of INSA, IAS, NASI*	Phone No:+91 79 2631 4471 Email:sruba@prl.res.in

13	Prof. Jan-e Alam Variable Energy Cyclotron Centre, 1/AF, Bidhannagar, Kolkata - 700 064	Nuclear and Hadron Physics, Heavy-ion Collions	*Head, Theoretical Physics Division & Dean-Academic, Physical Sciences, VECC, Distinguished Faculty Award, Physical Sciences, Homi Bhabha National Institute, More than 100 publications in reputed international*	Phone: +91 33 23182414 Email : jane[at]vecc.gov.in Homepage: http://pgweb.vecc.gov.in/activitycategories/peopledetails/16/1
14	Prof. A. Bhattacharyya Department of Physics University of Calcutta 92 A.P.C. Road Kolkata 700 009	Nuclear and Hadron Physics, Heavy-ion Collions, Quark Gluon Plasma	*Professor, About 50 publications in reputed journals.*	Phone: 91-33-23508386 (Extn 417) Email: abphy@caluniv.ac.in Homepage: https://physics-caluniv.in/abhijit-bhattacharyya/index.html
15	Prof. U A Yajnik Department of Physics IIT Bombay, Powai Mumbai – 400076	HEP Phenomenology	*Senior professor, about 100 publications in reputed international journals*	Ph : 022 – 25767575 (Off) / 257678575 (Res) yajnik@phy.iitb.ac.in

High Energy Physics (Expt)

1	Prof. Kajari Mazumdar Dept. High Energy Physics, Tata Institute of Fundamental Research, Homi Bhabha Road, Mumbai 400005, INDIA	Physics at LHC-CMS	*Professor, Large number of publications in national and international journals to her credit. Led the India-CMS collaboration and member of the ILC study group.*	Phone: +91-22-2278-2360 Email: mazumdar@tifr.res.in https://www.tifr.res.in/~mazumdar/
2	Prof. Gobinda Majumder Dept. High Energy Physics, Tata Institute of Fundamental Research, Homi Bhabha Road, Mumbai 400005, INDIA	Physics at LHC-CMS	*Professor, Large number of publications, Member of India-CMS group*	Phone: +91-22-22782378 Email: gobinda@tifr.res.in

Minutes of the meeting held on 26.07.2021 through online mode for discussing on the Academic Calendar and the Time Table for the odd semester

The Dean (Academic) of the institute convened an online meeting on 26.07.2021 at 2:00 P.M. for discussing on the preparation of the Academic Calendar and the Time Table for the odd semester.

Members Present:

1. Dr. Hemanta Kumar Kalita, Dean (Academic) & Professor, Dept. of Computer Science & Engineering.
2. Mr. Anjalu Albis Basumatary, Associate Professor, Department of Mathematics.
3. Dr. Pranjal Kalita, Associate Professor, Department of Chemistry.
4. Dr. Rajiba Lochan Hota, Associate Professor, Department of Physics.
5. Mr. Ranjan Patowary, Assistant Professor, Department of Computer Science & Engineering.
6. Mr. Kaushik Barman, Assistant Professor, Department of Economics.
7. Mr. Abhijit Das, Assistant Professor, Department of Food Engineering and Technology.
8. Mr. Rupjyoti Haloi, Assistant Registrar (Academic).

After deliberations, the following items were discussed and resolved:

1. Keeping in view the ongoing circumstances caused by COVID-19 pandemic, the members present in the meeting revised the Academic Calendar for the Current Odd Semester, 2021 as follows,

Sl. No.	Event	Date
1	**Starting day of the session/classes***	
	a) All batches except first semester	23rd August 2021
	b) First Semester	25th October 2021
2	**Mid Term***	
	a) All batches except first semester	25th to 29th October, 2021
	b) First Semester	27th to 31st December, 2021
3	**Last day of instruction/class**	
	a) All batches except first semester	24th December, 2021
	b) First Semester	18th February, 2022
4	**End Term**	
	a) All batches except first semester	27th December, 2021 onwards
	b) First Semester	21st February, 2022 onwards

***** For lateral entry students there will be special classes and mid term.

2. It was resolved that the class time table for the ensuing odd semester session would be prepared by the academic calendar and time table committee of the institute at the earliest based on the latest approved course structures of the programmes. While preparing the time table, it was suggested that the departmental coordinators would coordinate with the concerned persons/departmental heads/coordinators for allotting slots for the interdisciplinary/common courses.

The meeting ended with a vote of thanks from the chair.

Sd/-
(Prof. Hemanta Kumar Kalita)
Dean (Academic Affairs), CIT Kokrajhar

All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

APPROVAL PROCESS 2019-20

Letter of Approval (LoA)

F.No. Eastern /2019-20/1-4629663461 Date: 18-Mar-2019

To,
The Chairman
CIT SOCIETY
BALAGAON, BODOLAND TERRITORIAL COUNCIL, KOKRAJHAR, ASSAM-783370,
KOKRAJHAR,KOKRAJHAR
Assam,783370

Sub: Letter of Approval for New Institution 2019-20

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations, 2018 notified by the Council vide notification number F.No.AB/AICTE/REG/2018 dated 31/12/2018 and other notifications, as applicable and published from time to time, I am directed to convey the approval to.

Permanent Id		Application Id	1-4629663461
Name of the Deemed to be / State Private University	CENTRAL INSTITUTE OF TECHNOLOGY KOKRAJHAR	Institution Address	BALAGAON, BODOLAND TERRITORIAL COUNCIL, KOKRAJHAR, ASSAM-783370, KOKRAJHAR, KOKRAJHAR, Assam, 783370
University Type	Deemed University(Government)	Region	Eastern

To conduct following Courses with the Intake indicated below for the Academic Year 2019-20*

Sr. No.	Program	Shift	Level	Course	FT/PT+	Intake Approved for 2019-20	NRI Approval Status	PIO / FN / Gulf quota/ OCI/ Approval Status	Twinning/FC
1	ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	COMPUTER SCIENCE & ENGINEERING	FT	90	No	No	Not interested
2	ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	ELECTRONICS & COMMUNICATION ENGINEERING	FT	60	No	No	Not interested
3	ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	CIVIL ENGINEERING	FT	60	No	No	Not interested
4	ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	FOOD ENGINEERING AND TECHNOLOGY	FT	60	No	No	Not interested
5	ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	INSTRUMENTATION ENGINEERING	FT	60	No	No	Not interested
6	ENGINEERING AND TECHNOLOGY	1st	DIPLOMA	ELECTRONICS & COMMUNICATION ENGG	FT	30	No	No	Not interested
7	ENGINEERING AND TECHNOLOGY	1st	DIPLOMA	COMPUTER SCIENCE AND ENGINEERING	FT	30	No	No	Not interested

8	ENGINEERING AND TECHNOLOGY	1st	DIPLOMA	FOOD PROCESSING TECHNOLOGY	FT	30	No	No	Not interested
9	ENGINEERING AND TECHNOLOGY	1st	DIPLOMA	CONTROL AND INSTRUMENTATION	FT	30	No	No	Not interested
10	ENGINEERING AND TECHNOLOGY	1st	DIPLOMA	CIVIL ENGINEERING	FT	30	No	No	Not interested
11	ENGINEERING AND TECHNOLOGY	1st	DIPLOMA	ANIMATION AND MULTIMEDIA TECHNOLOGY	FT	30	No	No	Not interested
12	DESIGN	1st	UNDER GRADUATE	DESIGN	FT	30	No	No	Not interested
13	ENGINEERING AND TECHNOLOGY	1st	POST GRADUATE	FOOD ENGINEERING AND TECHNOLOGY	FT	18	No	No	Not interested
14	ENGINEERING AND TECHNOLOGY	1st	POST GRADUATE	AGRICULTURAL SCIENCE AND TECHNOLOGY	FT	18	No	No	Not interested
15	ENGINEERING AND TECHNOLOGY	1st	POST GRADUATE	COMPUTER SCEINCE & ENGINEERING	FT	18	No	No	Not interested
16	ENGINEERING AND TECHNOLOGY	1st	POST GRADUATE	WATER RESOURCES AND HYDRAULIC ENGINEERING	FT	18	No	No	Not interested
17	ENGINEERING AND TECHNOLOGY	1st	POST GRADUATE	GREEN ENERGY TECHNOLOGY	FT	18	No	No	Not interested
18	DESIGN	1st	POST GRADUATE	DESIGN	FT	15	No	No	Not interested
19	DESIGN	1st	POST GRADUATE	DESIGN	FT	15	No	No	Not interested
20	ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	COMPUTER SCIENCE & ENGINEERING	PT	10	No	No	Not interested
21	ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	FOOD ENGINEERING AND TECHNOLOGY	PT	10	No	No	Not interested
22	ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	MECHANICAL ENGINEERING	FT	60	No	No	Not interested
23	ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	ELECTRICAL ENGINEERING	FT	60	No	No	Not interested
24	ENGINEERING AND TECHNOLOGY	1st	POST GRADUATE	INSTRUMENTATION ENGINEERING	FT	18	No	No	Not interested
25	ENGINEERING AND TECHNOLOGY	1st	POST GRADUATE	ELECTRONICS & COMMUNICATION ENGINEERING	FT	18	No	No	Not interested

26	ENGINEERING AND TECHNOLOGY	1st	POST GRADUATE	GEOTECHNICAL ENGINEERING	FT	18	No	No	Not interested
27	ENGINEERING AND TECHNOLOGY	1st	UNDER GRADUATE	ENGINEERING PHYSICS	FT	30	No	No	Not interested
28	ENGINEERING AND TECHNOLOGY	1st	POST GRADUATE	GREEN ENERGY TECHNOLOGY	PT	5	No	No	Not interested
29	ENGINEERING AND TECHNOLOGY	1st	POST GRADUATE	WATER RESOURCES AND HYDRAULIC ENGINEERING	PT	5	No	No	Not interested
30	ENGINEERING AND TECHNOLOGY	1st	POST GRADUATE	FOOD ENGINEERING AND TECHNOLOGY	PT	5	No	No	Not interested
31	ENGINEERING AND TECHNOLOGY	1st	POST GRADUATE	COMPUTER SCIENCE & ENGINEERING	PT	5	No	No	Not interested
32	ENGINEERING AND TECHNOLOGY	1st	POST GRADUATE	INSTRUMENTATION ENGINEERING	PT	5	No	No	Not interested

+FT –Full Time,PT-Part Time

***Note: The approval is valid for two years from the date of issue of this letter only for getting affiliation with respective University/ Board of Technical Education (BTE)/ Board of Technical Education & Training (BTET) (as applicable) and fulfilling State Govt. requirements for admission. If institution is unable to start in the academic session 2019-20 due to reason mentioned above, the institution will have to apply On-line on AICTE web portal in next academic session for continuation of approval.**

The Society/Trust/Institution shall obtain necessary affiliation / permission from the concerned affiliating University**/** Board of Technical Education (BTE)/ Board of Technical Education & Training (BTET)(as applicable) as per the prescribed schedule of the University/ Board of Technical Education (BTE)/ Board of Technical Education & Training (BTET)(as applicable) Admission authority etc. The Applicant Society/Trust/Institution shall send information about commencement of the above courses to AICTE. In case the Institution is not in a position to commence the above mentioned courses for whatever reason during the two years period from the date of issue of this letter, the approval becomes invalid and the applicant Society/Trust/Institution shall make fresh application to AICTE for grant of approval as per the norms prevailing at that time.

All Institution shall fulfill the following general conditions:

1. The management shall provide adequate funds for development of land and for providing related infrastructural, instructional and other facilities as per norms and standards laid down by the Council from time to time and for meeting recurring expenditure.
2. The Eligibility Criteria for admissions shall be made in accordance with the regulations notified by the Council from time to time.
3. The tuition and other fees shall be charged as prescribed by the Competent Authority within the overall criteria prescribed by the Council from time to time. No capitation fee shall be charged from the students/ guardians of students in any form. If found so, appropriate action as per the notified regulations shall be initiated against the Institution
4. The Curriculum of the course, the procedure for evaluation / assessment of students shall be in accordance with the Model Curriculum and Examination Reforms prescribed by the AICTE from time to time**.**
5. The management of the Institution shall not discontinue any course(s) or start any new course(s) or alter intake capacity of seats without the prior approval of the Council**.**
6. No excess admission shall be made by the Institution over and above the approved intake under any circumstances. In case any excess admission is reported to the Council, appropriate action as per the notified regulations shall be initiated against the Institution.
7. The Institution shall not have any collaborative arrangements with any other Indian and / or Foreign Universities for conduct of technical courses without obtaining prior approval from AICTE. In case any violation is reported to the Council, appropriate action as per the notified regulations shall be initiated against the Institution
8. The Institution shall not conduct any course(s) as specified in the Approval Process Handbook without prior permission / approval of AICTE. If found so, appropriate action as per the notified regulations shall be initiated against the Institution.
9. The Institution shall operate only from the approved location, and that the institution shall not open any off campus study centers / extension centers directly or in collaboration with any other institution / university / organization for the purpose of imparting technical education without obtaining prior approval from the AICTE. If found so, appropriate action as per the notified regulations shall be initiated against the Institution.
10. The accounts of the Institution shall be audited annually by a certified Chartered Accountant and shall be open for inspection by the Council or persons authorized by it.
11. Heads of Departments, the teaching and other staff shall be appointed in given time frame and selection shall be done according to procedures, qualifications and experience prescribed by the Council from time to time and pay scales are as per the norms prescribed by the AICTE from time to time. The Institution shall publish an information booklet before commencement of the academic year giving details regarding the Institution and courses / programs being conducted, Fees charged and details of infrastructural facilities including

faculty etc. in the form of mandatory disclosure. The information booklet may be made available to the stakeholders of the technical education. The mandatory disclosure information, as per directions in the AICTE website / Approval Process Handbook, shall be put on the Institution Website. The information shall be revised every year with updated information about all aspects of the Institution.

12. It shall be mandatory for the Institution to maintain a Website providing the prescribed information. The Website information must be continuously updated as and when changes take place.
13. If the Institution fails to disclose the information or suppress and / or misrepresent the information, appropriate action as per the notified regulations shall be initiated against the Institution.
14. AICTE may also conduct inspections with or without notifying the dates to verify specific complaints, to verify adherence to AICTE norms & standards, and to verify any mis-representation, violation of norms & standards, mal-practices etc.
15. The Institution by virtue of the approval given by Council shall not automatically become claimant to any grant-in-aid from the Central or State Government.
16. In the event of a student / candidate withdrawing before the starting of the course, the wait listed candidates should be given admission against the vacant seat. The entire fee collected from the student, after a deduction of the processing fee of not more than Rs. 1000/- (Rupees one thousand only) shall be refunded and returned by the Institution to the student / candidate withdrawing from the program. It would not be permissible for the Institution to retain the School / Institution Leaving Certificates in original to force retention of admitted students and not to charge fees for the remaining period if a student cancels the admission at any point of time.
17. The Institution shall take appropriate measures for prevention of ragging in any form, in the light of AICTE regulation "Prevention and Prohibition of Ragging in Technical Institutions, Universities including Deemed to Universities imparting technical education" Regulation 2009 (F.No. 37-3/Legal/AICTE/2009 dated 01/07/2009). In case of failure to prevent the instances of ragging by the Institutions, the Council shall take appropriate action as per the notified regulations.
18. It is mandatory to comply all the essential requirements as given in APH 2019-20(appendix 6)

The Management of the Institution shall strictly follow further conditions as may be specified by the Council from time to time.The Council may withdraw the approval, in case it observe any violation of the above conditions and/or non- adherence to the norms and standards prescribed by the Council, mis-representation of facts and submitting factually incorrect information to it.

NOTE: If the State Government / UT / DTE / DME has a reservation policy for admission in Technical Education Institutes and the same is applicable to Private & Self-financing Technical Institutions, then the State Government / UT/ DTE / DME shall ensure that 10 % of Reservation for EWS would be operational from the Academic year 2019-20. However, this would not be applicable in the case of Minority Institutions referred to the clause (1) of Article 30 of Constitution of India.

Prof. Alok Prakash Mittal
Member Secretary, AICTE

Copy to:

1. **The Director Of Technical Education**, Assam**

2. **The Registrar**,**
   Central Institute Of Technology Kokrajhar

3. **The Principal / Director,**
   Central Institute Of Technology Kokrajhar
   Balagaon, Bodoland Territorial Council, Kokrajhar, Assam-783370,
   Kokrajhar,Kokrajhar,
   Assam,783370

4. **The Regional Officer,**
   All India Council for Technical Education
   College of Leather Technology Campus
   Block LB, Sector III, Salt Lake City
   Kolkata - 700 098, West Bengal

5. **Guard File(AICTE)**

Note: Validity of the Course details may be verified at http://www.aicte-india.org/

****Copy of this letter will not be communicated through post/email. However, provision is made in the portal for downloading letter through Authorized login credentials allotted to concerned State Secretary/ DTE/Registrar.**

All India Council for Technical Education

(A Statutory body under Ministry of Education, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

APPROVAL PROCESS 2021-22

Extension of Approval (EoA)

F.No. Eastern/1-9321586462/2021/EOA Date: 02-Jul-2021

To,
The Add. Chief Secretary
(Higher & Tech. Education) Govt. of Assam,
Block-C, IIIrd Floor Assam Secretariat Dispur
Guwahati781006, Assam

Sub: Extension of Approval for the Academic Year 2021-22

Ref: Application of the Institution for Extension of Approval for the Academic Year 2021-22

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations, Notified on 4th February, 2020 and amended on 24th February 2021 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to:

Permanent Id	1-4629663461	**Application Id**	1-9321586462
Name of the Institution /University	CENTRAL INSTITUTE OF TECHNOLOGY KOKRAJHAR	**Name of the Society/Trust**	CIT SOCIETY
Institution /University Address	BALAGAON, BODOLAND TERRITORIAL COUNCIL, KOKRAJHAR, ASSAM-783370, KOKRAJHAR, KOKRAJHAR, Assam, 783370	**Society/Trust Address**	BALAGAON, BODOLAND TERRITORIAL COUNCIL, KOKRAJHAR, ASSAM-783370,KOKRAJHAR,KOKRAJHAR,Assam,783370
Institution /University Type	Deemed to be University(Govt)	**Region**	Eastern

To conduct following Programs / Courses with the Intake indicated below for the Academic Year 2021-22

Program	Level	Course	Affiliating Body (University /Body)	Intake Approved for 2020-21	Intake Approved for 2021-22	NRI Approval Status	FN / Gulf quota/ OCI/ Approval Status
ENGINEERING AND TECHNOLOGY	UNDER GRADUATE	COMPUTER SCIENCE & ENGINEERING	Central Institute of Technology Kokrajhar	90	90	NA	NA
ENGINEERING AND TECHNOLOGY	UNDER GRADUATE	ELECTRONICS & COMMUNICATION ENGINEERING	Central Institute of Technology Kokrajhar	60	60	NA	NA
ENGINEERING AND TECHNOLOGY	UNDER GRADUATE	CIVIL ENGINEERING	Central Institute of Technology Kokrajhar	60	60	NA	NA

ENGINEERING AND TECHNOLOGY	UNDER GRADUATE	FOOD ENGINEERING AND TECHNOLOGY	Central Institute of Technology Kokrajhar	60	60	NA	NA
ENGINEERING AND TECHNOLOGY	UNDER GRADUATE	INSTRUMENTATION ENGINEERING	Central Institute of Technology Kokrajhar	60	60	NA	NA
ENGINEERING AND TECHNOLOGY	DIPLOMA	ELECTRONICS & COMMUNICATION ENGG	Central Institute of Technology Kokrajhar	30	30	NA	NA
ENGINEERING AND TECHNOLOGY	DIPLOMA	COMPUTER SCIENCE AND ENGINEERING	Central Institute of Technology Kokrajhar	30	30	NA	NA
ENGINEERING AND TECHNOLOGY	DIPLOMA	FOOD PROCESSING TECHNOLOGY	Central Institute of Technology Kokrajhar	30	30	NA	NA
ENGINEERING AND TECHNOLOGY	DIPLOMA	CONTROL AND INSTRUMENTATION	Central Institute of Technology Kokrajhar	30	30	NA	NA
ENGINEERING AND TECHNOLOGY	DIPLOMA	CIVIL ENGINEERING	Central Institute of Technology Kokrajhar	30	30	NA	NA
ENGINEERING AND TECHNOLOGY	DIPLOMA	ANIMATION AND MULTIMEDIA TECHNOLOGY	Central Institute of Technology Kokrajhar	30	30	NA	NA
DESIGN	UNDER GRADUATE	DESIGN	Central Institute of Technology Kokrajhar	30	30	NA	NA
ENGINEERING AND TECHNOLOGY	POST GRADUATE	FOOD ENGINEERING AND TECHNOLOGY	Central Institute of Technology Kokrajhar	18	18	NA	NA
ENGINEERING AND TECHNOLOGY	POST GRADUATE	COMPUTER SCEINCE & ENGINEERING	Central Institute of Technology Kokrajhar	18	18	NA	NA
ENGINEERING AND TECHNOLOGY	POST GRADUATE	WATER RESOURCES AND HYDRAULIC ENGINEERING	Central Institute of Technology Kokrajhar	18	18	NA	NA

ENGINEERING AND TECHNOLOGY	POST GRADUATE	GREEN ENERGY TECHNOLOGY	Central Institute of Technology Kokrajhar	18	18	NA	NA
DESIGN	POST GRADUATE	DESIGN	Central Institute of Technology Kokrajhar	15	15	NA	NA

Course(s) Applied for Closure by the Institution for the Academic Year 2021-22

Program	Level	Course	Affiliating Body (Univ/Body)	Course Closure Status
ENGINEERING AND TECHNOLOGY	POST GRADUATE	AGRICULTURAL SCIENCE AND TECHNOLOGY	Central Institute of Technology Kokrajhar	Approved
DESIGN	POST GRADUATE	DESIGN	Central Institute of Technology Kokrajhar	Approved
ENGINEERING AND TECHNOLOGY	UNDER GRADUATE	COMPUTER SCIENCE & ENGINEERING	Central Institute of Technology Kokrajhar	Approved
ENGINEERING AND TECHNOLOGY	UNDER GRADUATE	FOOD ENGINEERING AND TECHNOLOGY	Central Institute of Technology Kokrajhar	Approved
ENGINEERING AND TECHNOLOGY	UNDER GRADUATE	MECHANICAL ENGINEERING	Central Institute of Technology Kokrajhar	Approved
ENGINEERING AND TECHNOLOGY	UNDER GRADUATE	ELECTRICAL ENGINEERING	Central Institute of Technology Kokrajhar	Approved
ENGINEERING AND TECHNOLOGY	POST GRADUATE	INSTRUMENTATION ENGINEERING	Central Institute of Technology Kokrajhar	Approved
ENGINEERING AND TECHNOLOGY	POST GRADUATE	ELECTRONICS & COMMUNICATION ENGINEERING	Central Institute of Technology Kokrajhar	Approved
ENGINEERING AND TECHNOLOGY	POST GRADUATE	GEOTECHNICAL ENGINEERING	Central Institute of Technology Kokrajhar	Approved
ENGINEERING AND TECHNOLOGY	UNDER GRADUATE	ENGINEERING PHYSICS	Central Institute of Technology Kokrajhar	Approved
ENGINEERING AND TECHNOLOGY	POST GRADUATE	GREEN ENERGY TECHNOLOGY	Central Institute of Technology Kokrajhar	Approved
ENGINEERING AND TECHNOLOGY	POST GRADUATE	WATER RESOURCES AND HYDRAULIC ENGINEERING	Central Institute of Technology Kokrajhar	Approved
ENGINEERING AND TECHNOLOGY	POST GRADUATE	FOOD ENGINEERING AND TECHNOLOGY	Central Institute of Technology Kokrajhar	Approved

ENGINEERING AND TECHNOLOGY	POST GRADUATE	COMPUTER SCIENCE & ENGINEERING	Central Institute of Technology Kokrajhar	Approved
ENGINEERING AND TECHNOLOGY	POST GRADUATE	INSTRUMENTATION ENGINEERING	Central Institute of Technology Kokrajhar	Approved

It is mandatory to comply with all the essential requirements as given in APH 2021-22 (Appendix 6)
The Institution/ University is having the following deficiencies as per the online application submitted to AICTE (self-disclosure based) and the same shall be complied within Two year from the date of issue of this EoA

Deficiencies* Noted (based on Self Disclosure)
Faculty Deficiency
Establishment: Internal Complaint Committee(ICC).
Insurance for Students.
Examinations Reforms.
General Insurance.
Group accident policy for employees.

***Please refer Deficiency Report for details**

Important Instructions

1. The State Government/ UT/ Directorate of Technical Education/ Directorate of Medical Education shall ensure that 10% of reservation for Economically Weaker Section (EWS) as per the reservation policy for admission, operational from the Academic year 2019-20 is implemented without affecting the reservation percentages of SC/ ST/ OBC/ General. However, this would not be applicable in the case of Minority Institutions referred to the Clause (1) of Article 30 of Constitution of India. Such Institution shall be permitted to increase in annual permitted strength over a maximum period of two years.

2. The Institution offering courses earlier in the Regular Shift, First Shift, Second Shift/Part Time now amalgamated as total intake shall have to fulfil all facilities such as Infrastructure, Faculty and other requirements as per the norms specified in the Approval Process Handbook 2021-22 for the Total Approved Intake. Further, the Institutions Deemed to be Universities/ Institutions having Accreditation/ Autonomy status shall have to maintain the Faculty: Student ratio as specified in the Approval Process Handbook.

3. Strict compliance of Anti-Ragging Regulation, Establishment of Committee for SC/ ST, Establishment of Internal Complaint Committee (ICC), Establishment of Online Grievance Redressal Mechanism, Barrier Free Built Environment for disabled and elderly persons, Fire and Safety Certificate should be maintained as per the provisions made in Approval Process Handbook and AICTE Regulation notified from time to time.

4. In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Prof.Rajive Kumar
Member Secretary, AICTE

Copy ** to:

1. **The Director of Technical Education**, Assam**

2. **The Registrar**,**
   Central Institute Of Technology Kokrajhar

3. **The Principal / Director,**
   CENTRAL INSTITUTE OF TECHNOLOGY KOKRAJHAR

Balagaon, Bodoland Territorial Council, Kokrajhar, Assam-783370,
Kokrajhar,Kokrajhar,
Assam,783370

4. **The Secretary / Chairman,**
BALAGAON, BODOLAND TERRITORIAL COUNCIL, KOKRAJHAR, ASSAM-783370
KOKRAJHAR,KOKRAJHAR
Assam,783370

5. **The Regional Officer,**
All India Council for Technical Education
College of Leather Technology Campus
Block LB, Sector III, Salt Lake City
Kolkata - 700 098, West Bengal

6. **Guard File(AICTE)**

Note: Validity of the Course details may be verified at http://www.aicte-india.org/ .

****** Individual Approval letter copy will not be communicated through Post/Email. However, consolidated list of Approved Institutions(bulk) will be shared through official Email Address to the concerned Authorities mentioned above.

This is a computer generated Statement. No signature Required

The modalities for conducting the online 2nd and 4th semesters D/UG/PG examination are as follows:

1. End term examinations of the 2nd and 4th semesters theory courses of all the D/UG/PG programmes would be conducted from the first week of August, 2021.
2. A routine of the examinations would be published.
3. Examination of each course (subject) would be of 2 hours.
4. Examination of each of the theory courses would be for 60 marks.
5. The type of questions would be as follows:
    i. 20 multiple choice questions (MCQ) carrying 1 mark each,
    ii. 6 very short answer type questions carrying 2 marks each and
    iii. 7 short answer type questions carrying 4 marks each.
6. Question papers would be delivered to the students through Google classroom / Google Forms.
7. If in the case of some courses, difficulty arises due to poor network connectivity or other related issues, the examinations for these would be conducted through any other suitable online mode, as would be considered appropriate by the Examination cell.
8. After completion of the theory examinations, the laboratory examinations would be conducted. The mode of laboratory examinations would be decided based on the relevant guidelines issued by the concerned government in due course.
9. The Examinations would be controlled centrally by the examination cell of the institute.
10. Examination form fill up would be done through online Google Forms.

MoM of the Admission Committee meeting held on 20-07-2021(Wednesday)

An Online meeting was conducted on 20-07-2021 (Wednesday) at 3:00PM to discuss various issues related to the new admission process for 2021-22 and renewal admission process for July-December, 2021 semester.

The meeting was attended by the following members -

1. Mr. Mahananda Brahma, Member Secretary, Admission Committee
2. Mr. Borat Basumatary, Associate Member Secretary, Admission Committee
3. Mr. Abhijit Padun, Member, Admission Committee
4. Dr. Gautam Chandra Roy, Member, Admission Committee
5. Mr. Sanjib Narzary, Member, Admission Committee
6. Mr. Pranav Kumar Singh, Member, Admission Committee
7. Mr. Bodosa Brahma, Member, Admission Committee

The following agenda were discussed in the meeting and conclusions were arrived as followed:

Agenda-1: Status report of the Applicants for admission for session 2021-22.

The Status of the Applications for admission into various programmes as reported by Member Secretary is as follows: Total-1, 506 (Diploma-210, B. Tech (Direct & Lateral) - 1050, B. Des-67, M. Tech-95, M. Des-14, PhD-70). The number of applications has improved as of date but still not satisfactory. The reasons behind the lesser number of responses than expected may be due to the pending class-X and class-XII results. So, the members suggested for the extension of the **deadline of application process by 15th August, 2021**.

Agenda-2: Discussion about the modalities for the Entrance Examination/Selection Process for new admission 2021-22.

The members discussed about the various issues related to conducting of Offline/Online Entrance Examinations at various centres. Since the situation of the pandemic made it uncertain to take any concrete decision earlier, the members discussed about the modalities for Entrance Examination/Selection procedure followed in the previous year (2020-21) and proposed to implement the same modalities with necessary modifications if required.

A draft of the modalities for the entrance examination/selection process was prepared as per the discussion and is given in **Annexure-A**.

Agenda-3: Discussion about the Renewal Admission Process for July-Dec, 2021 semester.

Ther members discussed various issues faced by the admission cell related to the Renewal Admission Process. The Offline and Online registration through Google form link is a rigorous mechanism as to verify the details, payments etc. It is also very difficult to track the registration history of each and every student. Further, it is a tedious work to extract various data trends related to students records. So, the members proposed for development of a Renewal Admission Management web portal for proper regulation of the renewal registration process, storing the trackable registration history and facilitating the extraction of the other necessary information.

As an outcome of the discussion, a draft of the proposal for the development of Renewal Registration portal has been prepared and is as given in **Annexure-B.**

The meeting ended with vote of thanks.

Annexure-A

MODALITIES FOR SELECTION PROCEEDURE PROPOSED FOR THE ADMISSION PROCESS-2021-22

In view of the present scenario of the ongoing pandemic, the Members of Admission Committee proposes the following modalities for Selection Procedure for Admission Process:2021-22.

Diploma: Selection of Candidates applying for Diploma shall be based on the average percentage of marks obtained in the subjects: Mathematics (or Advanced Mathematics), Science and English in the class-X Examination.

B. Tech (Direct Entry): Selection of Candidates applying for B. Tech (Direct Entry) shall be based the merit list prepared on the basis of a consolidated score calculated from (1) 50% weightage taken from the average marks obtained in the subjects: Physics, Chemistry and Mathematics in 10+2(Sc) Examination and (2) 50% weightage from the Online Entrance Test conducted through Online Mode. The Online Entrance Test will contain 50 questions for a duration of one (1) hour. The Online Entrance Test will be accessible from home or from any center of personal arrangement.

B. Tech (Lateral Entry): Selection of Candidates applying for B. Tech (Lateral Entry) shall be according to the merit list prepared on the basis of a consolidated score of the candidates calculated from (1) 50% weightage taken from the average percentage marks obtained in Qualifying Diploma Examination or the average percentage of marks obtained from 1st Semester to 5th Semester (in case the final results are declared during the time of admission) (2) 50% weightage from the Online Entrance Test conducted through Online Mode. The Online Entrance for Lateral Entry Test shall be of duration 1hr15mins consisting of two sections: A-General Paper, B-Branch Paper. The Section-A shall consist of 20 questions and Section-B shall consist 40 questions. The Online Entrance Test will be accessible from home.

B. Des (Direct Entry): Candidates seeking admission through **CEED Score** will be given preference. Selection of candidates for rest of the seats shall be based on the consolidated score prepared from (1) 50% weightages of the average percentage of marks obtained by the candidates in their qualifying Examination, (2) 30% weightage of the marks obtained in Online Entrance Test and (3) 20% weightage from the Home Assignment to be submitted by the candidates within stipulated time. The Online Entrance Test for B. Des shall contain 50 questions and of duration of one (1) hour. The Home Assignment will be designed to test the Creative Art/Drawing Aptitude of the candidates and shall be of total 50 marks. The Online Entrance Test will be accessible from home.

M. Tech: Candidates applying for admission through a valid **GATE Score** will be given preference. For the remaining seats, the Selection of candidates will be based on consolidated score taken from (1) 50% weightage of the marks obtained in the Online Entrance Test and (2) 50% weightage of marks obtained in the Online Personal Interview. The Online Entrance Test shall contain 50 MCQs of duration one (1) hour. The Online Personal Interview shall be conducted by the respective departments. The Online Entrance Test will be accessible from home.

M. Des: Candidates applying for admission through a valid **CEED Score** will be given preference. For the remaining seats, the Selection of candidates will be based on consolidated score taken from (1) 50% weightage of the marks obtained in the Online Entrance Test, (2) 30% weightage of marks obtained in the Online Personal Interview and (3) 20% weightage of marks from the Home Assignment. The Online Entrance Test shall contain 50 MCQs of duration one (1) hour. The Online Personal Interview shall be conducted by the respective departments.

Ph. D: The Selection of Candidates applying for PhD shall be based on the Written Test and Personal Interview to be conducted by respective departments.

Annexure-B

PROPOSAL FOR DEVELOPMENT OF RENEWAL REGISTRATION MANAGEMENT WEBPORTAL

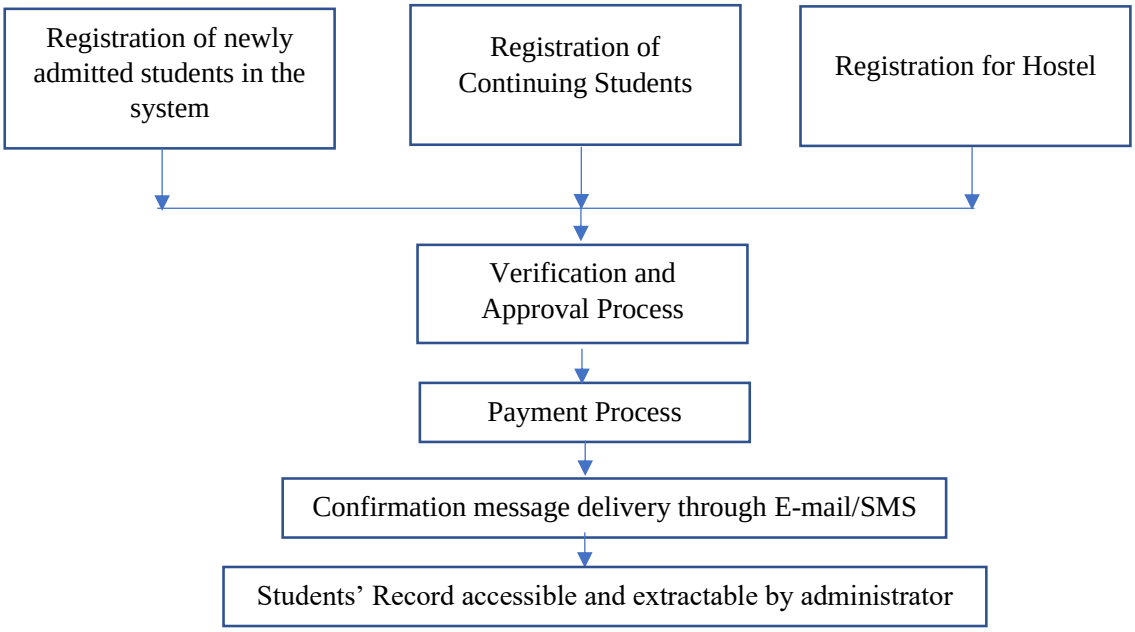
Purpose of Proposal

The Admission Cell of CITK has been managing the admission processes of the fresh and continuing students of the Institute. The whole management mechanism so far practised is manual which involve lots of time and effort for accomplishing the same. The verification of the details all the students from each and every semester of all the programmes and their payments is a rigorous practice. Therefore, the proposal for development of Student Registration Management Web portal has been arrived at through a discussion among the members of the Admission Committee.

Desired Outputs

1. Facilitate the Registration of Student through web portal.
2. Integrated payment gateway.
3. Access to the details of any student/ their registration status/payments
4. Integration Hostel Renewal Registration/ mess fee collection
5. Extract the students' data with respect to their category, region or any other information which might be sought by any agency or Govt.
6. Any other possible and useful output within the framework.

Execution Flowchart



Estimated Cost of Work

The estimated cost of work is limited to a maximum of Rs. 2.5 lakhs.

Delivery Requirement

Before the commencement of Renewal Registration for July-December, 2021 session (20-30days).

MINUTES OF THE MEETING HELD ON 03-08-2021

An Online Meeting of the Admission Committee was held on 03-08-2021 at 2:30PM to discuss the agenda as given below. The meeting was attended by the following members -

1. Ms. Chaitali Brahma, Registrar
2. Mr. Mahananda Brahma, Asst. Professor, Physics
3. Mr. Borat Basumatary, Asst. Professor, IE
4. Mr. Pranav Kumar Singh, Asst. Professor, CSE
5. Mr. Abhijit Padun, Asst. Professor, MCD
6. Dr. Gautam Chandra Roy, Asst. Professor, Mathematics
7. Dr. Bihung Brahma, Asst Professor & Dean, Student Affairs

Agenda-1: Fixation of important dates related to various activities of admission process-2021-22

The members of the committee decided the schedule of dates for various activities related to admission process as follows:

Date of Entrance Examinations

Diploma result - 25th August, 2021
UG/PG Online Entrance Test - 7th September, 2021
PhD - to be conducted by respective departments by 20th September, 2021
Result of Online test for UG/PG - 14th September, 2021

Counseling and admission

Diploma

1st Round of Counselling - 2nd and 3rd September, 2021
2nd Round of Counseling - 8th September, 2021

UG/PG

1st Round of Counselling - 20th, 21st and 22nd September, 2021
2nd round of Counselling - 27th and 28th September, 2021

Agenda-2: Discussion about Question Paper related matters.

Since the question samples are already prepared and submitted by the experts from external and internal faculties, the decision has been taken to complete the process of moderation and finalization of the question papers following the approved modalities. For supervision of the moderation process, the following members have been requested as the member-in-charge as following:

B. Tech Entrance Test (Direct Entry) - Dr.Gautam Chandra Roy, Asst. Professor, Mathematics
B. Des Entrance Test - Mr. Abhijit Padun, Asst. Professor and Head, MCD
B. Tech Entrance Test (Lateral Entry) - Mr. Borat Basumatary, Asst. Professor, IE
M. Tech Entrance Test - Dr. Anuck Islary, Asst. Professor, FET
M. Des Entrance Test - Mr. Abhijit Padun, Asst. Professor and Head, MCD

However, the preparation, moderation and conducting of Entrance Test/Personal Interview will have to be initiated by respective departments. .

Agenda-3: Discussion about tendering of Renewal Registration Webportal

With reference to the approved MoM of the meeting held on 20-07-2021, the members decided to go for the purchase of the same by Purchase Committee as per Rule No.155 of GFR of OM No. 1(1)/2018-POL dated 20.08.2018 and a three member committee has been formed as following -

(1) Dr. Bihung Brahma, Dean (Student Affairs) (Chairperson)
(2) Mr. Pranav Kumar Singh, Asst. Professor and Faculty I/C, Alumni Affairs (Member)
(3) Mr. Sanjib Narzary, Asst. Professor and Faculty I/C, Network Administration (Member)

Agenda-4: Miscellaneous

The members discussed the need of an imprest fund of Rs.50, 000 /-(fifty thousand) only to meet miscellaneous expenditures related to conducting of online Examination, counselling and stationery item required in the admission cell. So, the members decided to propose the sanction of imprest fund of said amount for approval.

The meeting ended with a vote of thanks.

Minutes of the
12th Senate meeting of Central Institute of Technology (CIT) Kokrajhar held on 24th February, 2022 through online mode

Section A: Confirmation of Minutes

Item No. 12.01: Confirmation of the Minutes of the 11th Meeting of the Senate of CIT Kokrajhar held on 18th August, 2021 through online mode.

The Minutes of the 11th Meeting of the Senate held on 18th August, 2021 was circulated amongst the members. The members were requested to place comments if any for consideration.

Members were requested to approve the minutes.

Resolution: The members confirmed the minutes.

Section B: Items requiring approval of the Senate

Item No. 12.02: Amendment in the Academic ordinance of the institute.

Amendments in some clauses of the academic ordinance of the institute were proposed as shown below.

<table>
<tr><th>Clause No.</th><th>Original clause (extract)</th><th>Proposed amendment</th></tr>
<tr><td>5.1 (iv)</td><td>Part 4
This part represents a single digit – “1” for Direct or “2” for Lateral and Vertical entry students.</td><td>Part 4
This part represents a single digit – “1” for Direct entry students or “2” for Lateral and Vertical entry students or “0” for the students of PG (M. Tech & M. Des) and PhD programmes.</td></tr>
<tr><td>7.5</td><td>Final CGPA for Diploma, UG, and PG programs shall be calculated as the weighted averages (the following formula) of the Yearly CGPAs (Y_i for i-th year), as detailed in the following table.
$$\text{CGPA} = \frac{\sum_{i=1}^{n} W_i Y_i}{\sum_{i=1}^{n} W_i}$$
$W_i \rightarrow$ Weightage for yearly CGPA for the i-th year (Y_i)
<table>
<tr><th>4-Year UG</th><th>3-Year UG: Lateral Entry</th><th>3-Year Diploma</th><th>2-Year PG</th></tr>
<tr><td>W_1 =0.4
W_2 =0.6
W_3 =1.0
W_4 =1.0</td><td>W_1 = 0
W_2 =1.0
W_3 =1.0
W_4 =1.0</td><td>W_1 =0.4
W_2 =0.6
W_3 =1.0</td><td>W_1 =1.0
W_2 =1.0</td></tr>
</table></td><td>To be removed. And accordingly the nomenclatures (Sl. Nos.) of the subsequent paras shall be updated.</td></tr>
<tr><td>7.8</td><td>Not present</td><td>The classifications based on CGPA are as follows:</td></tr>
</table>

		CGPA 8.5 and above : First Class with distinction CGPA 6.5 and above, but below 8.5: First Class CGPA 5.5 and above, but below 6.5 : Second Class
10	Not present	To be added afresh against Appendix A
10	BoS is composed of all the Secretaries of DPCs, all Professors in the Department; one other-Dept. Faculty nominated by the HoD.	BoS is composed of all the Secretaries of DPCs, all Professors in the Department; one Faculty from other department of the institute nominated by the HoD and an external member (from outside the institute) to be nominated by the competent authority. *(Proposed by the meeting of the IPPC)*

The members were requested to comment on the same so that the referred clauses can be amended/added in the Academic ordinance.

Resolution: The members approved the proposed amendments in the clauses 5.1 (iv), 7.5 and 10 of the Academic ordinance. Regarding the clauses 7.8 and 10, the members resolved the following.

i. The clause 7.8 needs further review with proper clarification of the existing formula of CGPA to percentage conversion. The members suggested preparing a revised proposal to be placed in the next Senate meeting.

ii. The clause 10 was approved with modification as stated below in underlined.
"BoS is composed of all the Secretaries of DPCs, all Professors in the Department; one Faculty from other department of the institute nominated by the HoD and <u>two external member (one from academic institutions and other from industry)</u> to be nominated by the competent authority."

Item No. 12.03: Amendment in the Academic regulation for UG programmes (RA-2) of the institute.

An amendment in the clause no. 5.3 of the UG academic regulation of the institute was proposed as represented in the table shown below.

Clause No.	Original clause	Proposed amendment
5.3	(ii) All 1st Semester courses must be cleared before getting promoted to the 5th Semester and all 2nd Semester subjects must be cleared before getting promoted to 6th Semester.	To be removed

The said agenda item was proposed in the 11th Senate meeting as also in which the Senate decided to have status quo as some of the hon'ble members were worried about the 'pre-requisites' of the syllabus of a

programme that are required to be fulfilled by a student to be promoted to higher semester.

Thereafter, 14 nos. of students of UG programmes (B. Tech and B. Des) of 2019 admitted batch were debarred from promoting to the 5th semester. The said 14 students were given an opportunity to apply for re-evaluation for the 1st semester courses having compartmental. After processing of the re-evaluation requests submitted by the students, the debarred list was modified and accordingly the nos. of debarred students were updated to 12.

Subsequent to this, office of the Dean (Academic Affairs) received a Minutes of a meeting dated 25.10.2021 from the department of CSE, wherein para no. 6.i. of the Guidelines on Examinations and Academic Calendar for the Universities in View of COVID-19 Pandemic and Subsequent Lockdown of UGC issued in April 2020 was referred. The referred clause is quoted below for reference.

"6.i. The scheme of "Carry forward" (for the subjects in which the student has failed) will be allowed for the current academic year in the universities and every student will be promoted to next semester/year. However, such students may clear the examination for the course in which he/ she has failed/ remained absent, whenever the examination is held next."

Referring to these guidelines, the department recommended that the student should be promoted to the third year.

Based on this departmental representation it was resolved in a meeting to overrule Clause 5.3 (ii) of RA-2 as mentioned for the 2019 batch as per guidelines of relevant bodies of the Govt of India applicable to CITK during Covid-19 pandemic. Accordingly the debarred students were promoted to 5th / 6th Semesters.

As the academic departments are in support of the referred amendment, the Members were requested to approve the same.

Resolution: The proposal was not approved by the members. Regarding the agenda item, it was suggested by the members that supplementary compartmental examinations may be conducted immediately after the regular examinations to provide students with more numbers of opportunities to clear their backlogs.

Item No. 12.04: Amendment in the Academic regulation for PhD programmes of the institute.

Based on some observations made by the competent authority, a three member committee was constituted to look into the existing PhD Academic Regulations related issues and drafting its amendments in compliances with the latest UGC / AICTE guidelines. The said committee had prepared the amended regulation after reviewing. The draft of the amended regulation was placed in the Institutional PhD Programme Committee (IPPC) meeting

held in 08-10-2021. The said draft, after incorporating the comments of the members of the IPPC was placed before the meeting.

Further, keeping in view the current regulations and ordinances of the institute, various forms related to the PhD programmes were drafted for their smooth conduction and appropriate maintenance of records.

Members were requested to approve the drafts as mentioned above.

Resolution: The meeting resolved that the proposed draft of the PhD regulations should be reviewed again by a committee and accordingly a fresh amended draft of the same complete in all aspects may be prepared to be placed in the next Senate meeting.

Item No. 12.05: Proposal for Approval of the 6th, 7th and 8th semester's syllabus of the UG programmes of the institute.

In line with the model curriculums of AICTE, Central Institute of Technology Kokrajhar has finalised the curriculum of the 1st, 2nd, 3rd, 4th and 5th semesters of all the Degree programmes of the institute. In a similar way, the drafts of the curriculum for the remaining semesters (**6th, 7th and 8th)** of these programmes have also been prepared to be implemented from the ensuing even semester session. Drafts of these curriculums of the departments of CE, IE, FET, CSE and ECE were placed before the meeting.

Members were requested to comment on these.

Resolution: The members approved the proposed syllabus.

Item No. 12.06: Proposal for Approval of the 6th semester syllabus of the Diploma programmes of the institute.

Central Institute of Technology Kokrajhar has finalised the curriculum of the 1st, 2nd, 3rd, 4th and 5th semesters of all the Diploma programmes of the institute. In a similar way, the drafts of the curriculum for the 6th semester of these programmes have also been prepared to be implemented from the ensuing even semester session. Drafts of these curriculums of the departments of CE, IE, FET, CSE and ECE were placed before the meeting.

Members were requested to comment on these.

Resolution: The members approved the proposed syllabus.

Item No. 12.07: Review of supervisors for one PhD scholars of the department of MCD of the institute.

Ms. Sushmita Roy, a PhD Scholar was admitted in the department of Multimedia Communication and Design (MCD) in the session January, 2019 under part-time category. She has been working as a contractual faculty in the same department in the institute from 2015. Dr. Pankaj Pratap Singh, Assistant Professor, Department of Computer Science and Engineering were appointed as her supervisor as no eligible PhD supervisor was there in the department of MCD at that time. As per the clause no. 6.2

of the PhD regulations, 2016 of the UGC, no external supervisor should be allotted to a PhD scholar. The said clause is quoted here for reference.

"6.2 Only a full time regular teacher of the concerned University/Institution Deemed to be a University/College can act as a supervisor. The external supervisors are not allowed. However, Co-Supervisor can be allowed in inter-disciplinary areas from other departments of the same institute or from other related institutions with the approval of the Research Advisory Committee."

It is also worth mentioning here that currently the department of MCD has two eligible PhD supervisors. Hence, in order to comply with the guidelines of the UGC, a supervisor from the parent department may be allotted to the scholar afresh keeping Dr. P. P. Singh as Co- supervisor.

The members were requested to comment on this.

Resolution: The members authorized the Director and the Dean of Academic Affairs to take a decision on the referred agenda item.

Item No. 12.08: Proposal for approval of the revised fee structures of all the programmes of the institute.

As per the Resolution no 11.04 of the 11th Senate meeting, a 5-member committee was constituted to review the existing fee structure of all the programmes of the institute. The committee after reviewing the fee structures in line with the fee structures of other similar level institutes has prepared a draft of the revised structure of fee. The same was placed before the meeting**.**

Members were requested to comment on the same.

Resolution: The members approved the proposed fee structure with modifications in terms of removal of the below mentioned proposal for providing tuition fee waiver for the poor and meritorious students other than SC/ST.

"Maximum 10% of the total existing students (other than SC/ST) in each department may be granted for full free tuition fee, maximum 10% of the total existing students (other than SC/ST) in each department may be granted for 50% waiver in tuition fee and maximum 10% of the total existing students (other than SC/ST) in each department may be granted for 25% waiver in tuition fee. The criteria of getting this special fee waiver scheme will be decided by the respective committee constituted by the institute."

The same was suggested to be sent to the FC and BoG meeting of the institute for concurrence.

Item No. 12.09: Proposal for approval of the draft regulation for admission of foreign

students against the supernumerary seats.

As per the Resolution no 11.13 of the 11th Senate meeting, the proposal for introduction of 10% supernumerary seats for admission of foreign students was approved. Accordingly a three-member equivalence committee was formed to frame the rules and regulations of admission of foreign students in the institute. The committee prepared a draft of the same and placed before the meeting**.**

Members were requested to comment on the same.

Resolution: The proposal was approved by the Members.

Item No. 12.10: Proposals for Start-up Research Grant and Institutional PhD Scholarship.

The four-member institutional Committee on Start-up Research Grant have prepared two proposals on providing Start-up Research Grant for new Assistant Professors, and Institutional Scholarship for PhD scholars. The drafts of the proposals were placed before the members.

Members were requested to comment and approve the same.

Resolution: The members suggested preparing proposal to be sent to the concerned body/authority for introducing provisions for providing fellowships to the PhD scholars as per the norms of UGC/AICTE/Government of India. A committee in this regard was proposed to be formed at the institute level.

Item No. 12.11: Proposals for providing special leave to students going for internship/ start-up incubation program in other institution/ organization/ industries.

Internships are now a day considered as educational and career development opportunities, providing practical experience in any field or discipline of interest. AICTE is also giving utmost importance on facilitating internship facilities to the students of higher educational institutes. Various initiatives have also been launch by AICTE in this regard in recent times. In order to avail such opportunities, students of CIT Kokrajhar are willing to drop college for the period of the internship programme. After completion of the program, they will rejoin college.

Members were requested to approve the same.

Resolution: The members approved the proposal. Leave for a period of one year (two semesters) only may be granted to the students for the referred purpose. It was also resolved that the concerned students shall have to complete all the requirements of the programme concerned after rejoing the institute.

Item No. 12.12: Proposals for approval of the Mechanisms for 360^0 Feedback Score calculation with particular consideration to Students' Feedback for faculty promotion.

The Institute does not have a mechanism for 360^0 Feedback score calculation as per clause no. 5.2 of the AICTE regulations (vide gazette notification no**.** F. No. 61-1/RIFD/7th CPC/2016-17 dated 01.03.2019). In view of this, the following mechanisms for 360^0 Feedback Score calculation with particular consideration to Students' Feedback for faculty promotions are proposed:

a) Mechanism for 360^0 Feedback Score calculation

For score calculation corresponding to each of the six (6) 360^0 feedback components requiring the consideration of three (3) academic years (AYs) as per the Annexure IV of the aforesaid AICTE regulations, the best three (3) yearly (academic) scores will be considered.

b) Mechanism for Students' Feedback Score calculation

As per the aforesaid AICTE regulations, students' feedback score (important component of 360^0 feedback score) will be calculated as per the given format**.**

Members were requested to approve the same.

Resolution: The members approved the proposal with modification in terms of removal of the terms *"for faculty promotions"* and suggested that the same should be placed in the next BoG meeting of the institute.

Item No. 12.13: Proposal for approval of the Academic Calendar for the year 2022.

The Academic Calendar for the year 2022 has been prepared and placed before the members. Members are requested to approve the same.

Resolution: The members proposed to further review the referred academic calendar for inclusion of some other parameters like date of declaration of results of the end term examinations, date of convocations, dates of annual festivals etc. The meeting also authorised the Chairman, Senate to approve the revised Academic calendar, 2022.

Section C: Items for ratification

Item No. 12.14: Urgent agenda items of Senate approved through e-mail circulation.

Some urgent agenda items were circulated through E-mail amongst the members of the Senate for taking approval on 5th October, 2021. The resolutions of the same were placed in the meeting for ratification.

Resolution: The members ratified the agenda item.

Section D: Items for reporting

Item No. 12.15: Reporting items.

1. **First convocation of the institute**:

Under the new status of Deemed to be University, CIT Kokrajhar has been offering 17 programmes (all full time) since the academic session 2019-20. These programmes are as follows.

Diploma Programmes are:

1. Electronics & Telecommunications Engineering,
2. Computer Science and Engineering,
3. Control and Instrumentation Engineering,
4. Food Processing Technology,
5. Civil Engineering and
6. Animation and Multimedia Technology.

U.G. (B. Tech. & B. Des.) Programmes are:

1. B. Tech. in Electronics & Communications Engineering,
2. B. Tech. in Computer Science & Engineering,
3. B. Tech. in Instrumentation Engineering,
4. B. Tech. in Food Engineering and Technology,
5. B. Tech. in Civil Engineering and
6. B. Design (Specialisation in Multimedia Communication and Design)

P.G programmes are:

1. M. Tech in Food Engineering and Technology,
2. M. Tech in Water Resources and Hydraulic Engineering,
3. M. Tech in Green Energy Technology,
4. M. Des (Specialized in Multimedia Communication and Design),
5. M. Tech in Computer Science and Engineering.

The institute convened its 1st convocation on 8th November, 2021 to confer degrees to the 1st batches of graduating students in the session 2021-22 from the PG programmes of the institute. Mr. Pramod Boro, Chief Executive Member, BTC was present in the occasion as the Chief Guest. Prof. A. D. Sahasrabudhe, Chairman, AICTE and Dr. Prahlada Ramarao, Pro-chancellor & Director, Centre for Energy Research were present in the ceremony as the guests of honour. A total of 28 students received their degrees in the event.

2. **Report on Examination:**

The end semester examinations of the programmes under DTE, GU, ASTU and CITK (Deemed to be University) were scheduled to be conducted in the month of January 2022. But in view of the unprecedented circumstances caused due to COVID-19 pandemic, all the examinations were postponed till 21st of February, 2022 tentatively by the competent authority of the institute. Later on after reviewing the circumstances, it was again decided to start the End semester examinations from 21st February, 2022 onwards. The minutes of the meetings held in this regard were placed before the meeting.

3. **Admission committee report:**

The admission committee of the institute has conducted the process of admission of students into its Diploma, UG, PG and PhD programmes for the session 2021-22. Status of Admission into various programmes of the institute for this session are as follows.

Module/Branch	ET/ECE	CO/CSE	CAI/IE	FP/FPT	CE	AM	TOTAL
Diploma 1st sem	29	30	25	20	27	8	139
B.Tech 1st sem	46	68	39	41	47	-	241
B.Tech ,Lateral/ Vertical (3rd sem)	23	42	31	18	32	-	146
B.Des 1st sem	20						20
B.DesLatera/ Vertical (3rd sem)	03						03
M.Tech	GET-07	CSE-09	FET-07	WR & HE-14			37
M.Des	10						10
Ph.D	25						25
TOTAL							**621**

Resolution: The members noted the reporting items.

Item No. 12.16: Any other item with the permission of the Chair.

A. Reporting of the minutes of the Institutional PhD programme Committee (IPPC) meeting held on 18-02-2022 through online mode.

Important agendas from the minutes:
Regarding the source/head of TA/DA to be paid to the external invited examiner of the PhD viva-voce examination, the meeting suggested to refer the matter to the Senate.

Resolution: The agenda item was dropped as similar matters related to the PhD programmes including this have already been referred to a committee in the resolution 12.04.

B. Regarding the formation of Doctoral committee to evaluate the progress of the scholars under the department, the department of Electrical Engineering proposed to engage faculty members from other departments of the institute since the electrical engineering department has only one regular faculty member.

Resolution: The members approved the proposal.

C. Subject following subject code change request was submitted by the department of IE.

Semester: B. Tech 5th semester, Department of IE
Subject name- DIGITAL SIGNAL PROCESSING
Subject code- UIE511
Practical paper- UIE574 (wrong code)
As per the institute rules, the correct code for the Practical paper should be UIE581.

Resolution: The members approved the proposal.

D. Subject code change request submitted by the department of CE.

By reviewing the nature of the subject, the department of Civil Engineering of the institute proposed for revision of the course structure of its Diploma programme. There revision of the course structure was in the code of a subject as shown below.

Programme: Diploma in Civil Engineering				
Subject Name	**Existing Subject Code**	**Proposed Subject code**	**Credit**	**Semester**
Professional Practice-II	DCE605	DCE671	02	6th

Resolution: The members approved the proposal.

Central Institute of Technology ESTD-2006 Kokrajhar

(Ms. Chaitali Brahma)
Registrar cum Ex-officio Non-Member Secretary
Senate, CIT Kokrajhar