Diploma in Electronics and 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**					
DHSS101	Communication in English	3	0	0	6	DHSS271	Communication in English Lab	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 & 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
DME176	Workshop Practice	0	1	4	6	DME205	Engineering Mechanics	3	0	0	6
DPH105	Applied Physics - I (THEORY)	2	1	0	6	DPH206	Applied Physics – II	2	1	0	6
DPH175	Applied Physics - I (PRACTICAL)	0	0	2	2	DPH276	Applied Physics - II (PRACTICAL)	0	0	2	2
Contact Hours: 25		**12**	**3**	**10**	**40**	**Contact Hours: 23**		**12**	**3**	**8**	**38**
Semester III						**Semester IV**					
DECE301	Principles of Electronic Communication	2	1	0	6	DECE401	Microcontroller and Applications	3	0	0	6
DECE371	Principles of Electronic Communication Lab	0	0	2	2	DECE471	Microcontroller and Applications Lab	0	0	2	2
DECE302	Electronic Devices and Circuits	2	1	0	6	DECE402	Consumer Electronics	3	0	0	6
DECE372	Electronic Devices and Circuits Lab	0	0	2	2	DECE403	Digital Communication Systems	3	0	0	6
DECE303	Digital Electronics	2	1	0	6	DECE473	Digital Communication Systems Lab	0	0	2	2
DECE373	Digital Electronics Lab	0	0	2	2	DECE404	Linear Integrated Circuits	3	0	0	6
DECE304	Electronic Measurements and Instrumentation	2	1	0	6	DECE474	Linear Integrated Circuits Lab	0	0	2	2
DECE374	Electronic Measurements and Instrumentation Lab	0	0	2	2	DECE485	Simulation Software Lab	0	0	6	6
DECE305	Electric circuits and network	2	1	0	6	DECE496	Minor Project	0	0	4	4
DECE396	Summer Internship-I (4weeks) after II Semester	0	0	0	2	DECE407	Essence of Indian Knowledge and Tradition	2	0	0	0
Contact Hours: 23		**10**	**5**	**8**	**40**	**Contact Hours: 30**		**14**	**0**	**16**	**40**
Semester V						**Semester VI**					
DECE501	Embedded Systems	3	0	0	6	DECE601	Computer Networking and Data Communication	3	0	0	6
DECE571	Embedded Systems Lab	0	0	2	2	DECE671	Computer Networking and Data Communication Lab	0	0	2	2
DECE502	Mobile and Wireless Communication	3	0	0	6	DHSMC601	Entrepreneurship and Start ups	3	1	0	8
DECE572	Mobile and Wireless Communication Lab	0	0	2	2	DECE612	A: Power Electronics B: MEMS C: Computer Aided Electronic Design	3	0	0	6
DECE513	A: Industrial Automationor B: Control System and PLC	3	0	0	6	DECE613	A: Internet of Things B: Artificial Intelligence C: Scientific Computing	3	0	0	6
DECE583	A: Industrial Automation Labor B: Control System and PLC Lab	0	0	2	2	DECE604	Indian Constitution	2	0	0	0
DECE514	A: Microwave and RADAR or B: Optical Communication and networking	3	0	0	6	DECE695	Major Project * One credit is carried forward from Minor Project (DECE496) in the Semester V	0	0	8	8*
DECE584	A: Microwave and RADAR Lab or B: Optical Communication and networking Lab	0	0	2	2	DECE696	Seminar	0	0	4	4
DECE515	A: PC System Technology B: Medical Electronics	3	0	0	6						

	C: Industrial Electronics										
DECE596	Summer Internship- II (6weeks) after IV Semester	0	0	0	2						
DECE597	Major Project	0	0	0	*						
Contact Hours 23		**15**	**0**	**8**	**40**	**Contact Hours 29**		**14**	**1**	**14**	**40**
Total Mandatory Credits: 238											

Diploma in Electronics and Communication Syllabus Details

Semester I

Paper code: DCH102
Paper name: Chemistry-I (Theory) **Credit: 6**
Total contact hours: 40 **L-T-P: 2-1-0**

Unit I: Periodic table, Atomic structure (4L)
Electrons, protons, neutron, Atomic mass (A), atomic number (Z) isotopes, isobars, isotone, orbit and orbitals, electronic configuration (upto Z=30). Modern periodic table, groups and periods.

Unit II: Electrochemistry (5L)
Electrolytes, Faraday's law of electrolysis, Numerical problems, application of electrolysis, oxidation and reductions, Redox reactions.

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

Unit IV:Buliding materials (3L)
Portland cement, Types of manufacturing, setting and hardening of cement, special cement. Glass, Bricks.

Unit V: Lubricant (3L)
Defination, classification of lubricants, important functions of lubricants.

Unit VI: Polymer and polymerization (4L)
Types of polymer, thermoplastic and thermosetting plastic, preparation and applications of PE, PVC, PP, Perpex, Teflon, Bakelite, nylon, Natural rubber, Synthetic rubber.

Unit VII: Organic chemistry (6L)
IUPAC nomenclature, Alkane, alkene, alkyne, alcohol synthesis and applications.

Unit VIII: Environmental Chemistry (6L)
Defination, Types of pollution, pollutants, Water quality measurements- D.O, B.O.D, C.O.D, hardness of water, removal of hardnes, TDS, Green house effect, acid rain, Ozone layer depletion.

Unit IX: Industrial chemistry (4L)
Ethanol manufacture from starch by fermentation, Fuels- Classifications, calorific values, natural gas, water gas, producer gas, LPG, power alcohol. Petroleum- refining, octane number, cetane number.

Texts-Books / References:

1. S. Chawla;*A Text Book of Engineering Chemistry*, DhanpatRai Publishing Co.

2. Jain and Jain;*Engineering Chemistry*, DhanpatRai Publishing Co.
3. 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. 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 ;*Engineering Chemistry,* 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
Paper name: Chemistry-I (Practical) **Credit: 2**
Total contact hours: N/A **L-T-P: 0-0-2**

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 Na_2CO_3
Experiment-10 Determination of strength of NaOH by titrating with 0.1 N HCL

Paper name: Applied Physics – I (Theory)
Paper code: DPH105 **Credit: 06**
Total contact hours: 36 hours **L-T-P: 2-1-0**

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.

2.4Work, 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 gwith 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 THERMODYNAMICSContact 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: SOUNDContact 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, 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.

Paper name: Applied Physics-I (Practical)
Paper code: DPH175 **Credit: 02**
Total contact hours: 18 hours **L-T-P: 0-0-2**

1. Vernier Callipers: 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 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.

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

Module –I: ALGEBRA (20 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, Module 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. Simple problems.
- 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.

Module-II: TRIGONOMETRY (15 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.

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

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 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. .	**Contact hours: 3**
Module 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 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.	**Contact hours: 5**
Module 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.	**Contact hours: 2**
Module 4: Subject Verb Agreement 4.1 Rules that guide the agreement of the subject to its verb	**Contact hours: 5**
Module 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.	**Contact hours: 5**
Module 6 Voice 6.1 Change from Active Voice to Passive Voice and vice versa	**Contact hours: 3**
Module 7: Punctuation 7.1 Use of the comma, semi-colon, colon, apostrophe, exclamation mark, question mark and quotation marks	**Contact hours: 5**

Module 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	**Contact hours: 2**
Module 9: Affixation 9.1 Prefixes and Suffixes and new word formations	**Contact hours: 2**
Module 10: Nominal Compounds 10.1 Common nominal compound	**Contact hours: 2**
Module 11: Paragraph Writing 11.1 Descriptive Paragraph on various related topics.	**Contact hours: 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)

Paper codes: DME104 / DME174
Paper name: Engineering Drawing / Engineering Drawing Lab
DME104 → L-T-P-C: 2-0-0-4
DME174 → L-T-P-C: 0-0-2-2 **Total contact hours= 48**

Module 1. INTRODUCTION [Contact Hrs: 5 Hrs]

i. Drawing as a medium of communication,
ii. 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.
iii. Types of Lines and Dimensioning as per 15696/72

Module 2. GEOMETRICAL CONSTRUCTIONS [Contact Hrs = 8Hrs.]

i. Freehand curves, free hand Drawing
ii. Construction of triangles, Perpendicular and angles of 300, 450, 600, 900
iii. Construction of Regular Polygons. .
iv. Regular Polygons inscribed in circles.
v. Regular figures by using T – square and Set – square.

Module 3. LETTERING, SCALES [Contact Hrs = 5 Hrs.]

i. Single Stroke Lettering Straight and Inclined by graph and Free hand Letters and digits as per 15696/72
ii. Scale- Representative Fraction, Types or Scales
iii. Simple problems on Plain and Diagonal Scale
.

Module 4. PROJECTION OF POINTS [Contact Hrs = 5 Hrs.]

i. Position / location of Points, Horizontal plane, Vertical plane .
ii. Assignments of Simple problems on different quadrants and Find the distance between two points.
iii. Position/ Location of Points.

Module 5. PROJECTION OF LINES [Contact Hrs = 5 Hrs.]

i. Position / location of Points, Horizontal plane, Vertical plane .
ii. Assignments of Simple problems on different quadrants and Find the distance between two points.
iii. Position/ Location of Lines.

Module 6. ORTHOGRAPHIC PROJECTION [Contact Hrs = 5 Hrs.]

i. Top View, Front View and Side View of Simple objects, block and machine parts with dimensional scale.
ii. Sectional Front ,Top and Side Views As per IS – 696 for simple parts and blocks.

Module 7. RIVET HEADS AND JOINTS [Contact Hrs = 5 Hrs.]

i. Different types of Rivet Heads and Joints.
ii. Top and Sectional Front views of Lap and Butt Joints with single double cover plates.

Module 8. ISOMETRIC PROJECTION [Contact Hrs = 5 Hrs.]

i. Isometric Projection to true scale and isometric scale.

Module 9. THREAD/ SCREWED [Contact Hrs = 5 Hrs.]

i. Thread Profiles (REF IS 2043 IS – 554 ETC.)
ii. Screwed Fastenings
iii. Representation of external and internal threaded assembly symbolic .

iv. Representation of threads.
v. Representation of Screws, Bolts, Nuts and Cutter.

Reference Books :
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: DME176
Paper name: Workshop Practice **L-T-P-C: 0-1-4-6**
Total contact hours = 60

Module 1: Carpentry shop(Theory and Practice: 12hrs)
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 (Theory and Practice: 12hrs)
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 (Theory and Practice: 12hrs)
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 (Theory and Practice: 12hrs)
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 (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

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) Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
(iii)Gowri P. Hariharan and A. Suresh Babu,"Manufacturing Technology – I" Pearson Education, 2008.
(iv) Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998
(v) Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGraw Hill House, 2017

Semester II

Paper name: Applied Physics – II (Theory)
Paper code: DPH206 **Credit: 06**
Total contact hours: 36 hours **L-T-P: 2-1-0**

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: ELECTROSTAICS **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: ELECTROMAGNETISMContact hours: 4

5.1 Magnetic effect of current, nature of magnetic field due to straight and circular conductor, due to solenoid,Fleming's leftand righthand 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: SEMICONDUCTOR PHYSICS Contact hours: 2

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

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

Paper name: Applied Physics-II (Practical)
Paper code: DPH276 **Credit: 02**
Total contact hours: 20 hours **L-T-P: 0-0-2**

1. To verify the laws of reflection using a plane mirror and to study the characteristics of image formed.
2. To determine the refractive index of the material of the glass slab by pin method.
3. To determine the focal length of a convex lens by U-V method.
4. To determine the focal length of a convex lens by plane mirror method.
5. To draw I-D curve and to determine the refractive index of the material of a prism.

6. To locate the poles of a bar magnet and to measure the magnetic length.
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.
8. To verify Ohm's law by Ammeter-voltmeter method.
9. To find equivalent resistance using voltmeter with I. Three resistances connected in series II. Three resistances connected in parallel.
10. To measure the unknown resistance of the material of a wire by meter bridge using Wheatstone bridge principle.

Paper name: Mathematics – II
Paper code: DMA204 **Credit: 08**
Total contact hours: 40 hours **L-T-P: 3-1-0**

MODULE I: CALCULUS-I (16 HOURS)

a. Differential Calculus

- Sets: Definition, types and operation on Sets.
- Relation: Definition, domain and range, equivalence relation.
- Functions: definition, types of functions.
- Limits: Concept and evaluation of limits, indeterminate forms, L'Hospital's Rule.
- 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.
- Basic concepts of partial differentiation.

b. Integral Calculus

- Integration: Definition and fundamental properties.
- Methods of integration – integration by substitution, by parts, partial fractions
- Applications

MODULE-II: STATISTICS (10 HOURS)

- Measures of Central Tendency: Mean,Median and Mode and empirical relationship between them and related problems.
- Measures of Dispersion: Range, Mean Deviation, Standard Deviation, Quartile deviation.
- Correlation

MODULE-III: CO-ORDINATE GEOMETRY (14 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.

Books for Reference:-

Sl. No.	Name of the books	Author/Publisher	Edition/Year
1.	Mathematics for Polytechniques	TTTI, Bhopal	Latest
2.	Mathematics for Polytechniques	S. P. Deshpande	Latest
3.	Engineering Mathematics	I.B. Prasad	Latest
4	A text Book Matrices	Shanti Narayan, S. Chand & Co. New Delhi	1998
5	Introduction to Statistics	L. Choudhury, KitapGhar, Guwahati.	Latest

6	Fundamental of Statistics	Kapoor & Gupta	Latest
7	Mathematics Textbook for class XI and XII	NCERT	Latest

Paper code: DME 205
Paper name: Engineering Mechanics **L-T-P-C: 3-0-0-6**
Total hours : 41 hours

Module 1: Forces and Moments (12 hrs)
Force, Moment and Couple, Resultant of forces, Forces in space. Equilibrium, FBD, General equations of equilibrium,

Module 2: Friction (8 hrs)
Introduction to dry friction. Laws of friction, friction of simple machines- inclined planes, Screw jacks.

Module 4: Center of gravity and moment of inertia (8 hrs)
Center of gravity of axes, volume and composite bodies: Area moment of inertia and mass moment of inertia for plane figures and bodies.

Module 5: Motion (5 hrs)
Linear and circular motion, Linear and angular velocities and acceleration,Units relation in between centrifugal force, Its uses in Engineering problems. Angle of banking super elevation problems. Bodies moving on a level circular path, skidding, overturning.

Module 6: Work, Power and Energy (3hrs)
Work, power and Energy definition and application, Potential and kinetic energy-definition and Units and their Engineering problems.

Module 7: Simple Lifting Machines (5 hrs)
Definition and importance of Simple Machines. Law of Machine, problems. Simple lifting Machines –simple Wheel and axle, differential wheel and axle and screw jack(simple) problems. Definition M.A, V.R and efficiency and their relationship. Simple problems

Reference books:

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: DEE203
Paper name: Fundamentals of Electrical & Electronics Engineering **Credit: 6**
Total contact hours: 34 **L-T-P: 2-1-0**

Module 1: **Contact hours: 2L**
Introduction: Sources of energy; General structure of electrical power systems, Power transmission and distribution via overhead lines and underground cables.

Module 2: **Contact hours: 8L**
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 theorems, superposition. Thevenin's, Norton's, maximum power transfer, Millman's, and reciprocity theorems, analysis of simple circuits with DC excitation.

Module 3: **Contact hours: 10L**
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: 4L**
Semiconductor Devices:
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: **Contact hours: 3L**
Bipolar transistor (Qualitative only): 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: **Contact hours: 2L**
Bipolar transistor (Qualitative only):
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: **Contact hours: 3L**
Rectifier Circuits:
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: **Contact hours: 2L**
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, 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 edition (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
Paper name: Fundamentals of electrical & electronics engineering lab **Credit: 2**
L-T-P: 0-0-2

DEE273: Fundamentals of Electrical & Electronics Engineering Lab [0L: 0T: 2P]
(2 credits)
Total contact hours: 02/Week

Hands-on experiments related to the course contents **DEE203**

Paper code: DHSS271
Paper name: COMMUNICATION IN ENGLISH LAB **Credit: 2**
Total contact hours:39 **L-T-P-C: 0-0-2-2**

Module 1: Speaking and Listening practices 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 istening 1.6 Good listening practices 1.7 Overcoming barriers to effective listening	
Module 1: Business Writing 1.1 Letter Writing Formal letter formats, 1.2 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 1.3 Job Application and Cover Letter, format of a job application 1.4 Resume, Curriculum Vitae, bio data.	**Contact hours: 3**
Module 2: Paragraph Writing and Summary Writing 2.1Definition, Cohesion and Linkage using Transition words on everyday topics 2.2. Practicing how to compose coherent passages. 2.3 Definition, Use of Transition words, important points to remember while summarizing 2.4 Explain and practicing how to arrive at a summary of a paragraph / text	**Contact hours: 5**
Module 4 Email Writing 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 4.3 Explaining and practicing how to write formal and informal emails	**Contact hours: 5**
Module 3: Report writing 3.1 Definition, types of reports with a focus on annual report, non-profit annual report, technical and academic report, 3.2 necessity and purpose of writing a report, qualities of a good report, 3.3 language used in a report, 3.4 different formats of reports and sample reports	**Contact hours: 2**
Module 5: Facing an interview 5.1 How to approach, what to speak, how to speak in an interview and answer interview questions, the business etiquettes to maintain 5.2 body language, negative body language, handling an awkward situation in an interview, the dress code	**Contact hours: 5**

5.3 Successful job interview practices 5.4 Perfect handshake, points to remember while applying for a job	
Module 6 British English and American English 6.1 Difference between American and British English words – vocabulary and spelling 6.2 Pronunciation and accents	**Contact hours: 3**

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)

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 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.

Paper Code: DCSE272 **Credit: 2**
Paper Name: Computer Fundamentals and Programming **LabL-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) 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.

Semester III

DECE301	**Principles of Electronic Communication**	**2L: 1T: 0P** **Total contact hours: 30**	**6 credits**

Unit-1 ANALOG MODULATION: Concept of frequency translation. Amplitude Modulation: Description offull AM, DSBSC, SSB and VSB in time and frequency domains, methods of generation & demodulation,descriptions of FM signal in time and frequency domains (5L)

Unit-2 PULSE ANALOG MODULATION: Ideal sampling, Sampling theorem, aliasing, interpolation, naturaland flat top sampling in time and frequency domains (4L)

Unit-3 PCM & DELTA MODULATION SYSTEMS: Uniform and Non-uniform quantization. PCM and deltamodulation, Signal to quantization noise ratio in PCM and delta modulation. (4L)

Unit-4 DIGITAL MODULATION: Baseband transmission: Line coding (RZ, NRZ), inter symbol interference(ISI), pulse shaping, Nyquist criterion for distortion free base band transmission, raised cosine spectrum.
Pass band transmission: Geometric interpretation of signals, orthogonalization. (9L)

Unit-5 SPREAD-SPECTRUM MODULATION: Introduction, Pseudo-Noise sequences, direct sequence spread spectrum (DSSS) with coherent BPSK, processing gain, probability of error, frequency-hop spread spectrum (FHSS). Application of spread spectrum: CDMA. (8L)

Total: 30L

Books:

1. Principles of communication systems By Taub Schilling, T.M.H.
2. Fundamentals of communication systems By Proakis & Salehi, Pearson education
3. Communication Systems by Simon Haykin, John Wiley
4. Communication Systems (Analog and Digital) By R.P. Singh, S.D. Sapre, T.M.H.
5. Modern Digital & Analog Communication By B.P. Lathi, Oxford Publications
6. Digital & Analog Communication Systems By K.S. Shanmugam, John Wiley

DECE371: Principles of Electronic Communication Lab [0L: 0T: 2P] (2 credits)
Total contact hours: 02/Week
Hands-on experiments related to the course contents **DECE301**

DECE302	**Electronic Devices and Circuits**	**2L: 1T: 0P** **Total contact hours: 30**	**6 credits**

Unit 1 – Semiconductor and Diodes: Definition, Extrinsic/Intrinsic, N-type & p-type
PN Junction Diode – Forward and Reverse Bias Characteristics, Zener Diode – Principle, characteristics, construction, working, Diode Rectifiers – Half Wave and Full Wave
Filters – C, LC and PI Filters (4L)

Unit 2 – Bipolar Junction Transistor (BJT): NPN and PNP Transistor – Operation and characteristics
Common Base Configuration – characteristics and working
Common Emitter Configuration – characteristics and working
Common Base Configuration – characteristics and working
High frequency model of BJT
Classification of amplifiers, negative feedback (6L)

Unit 3 – Field Effect Transistors: FET – Working Principle, Classification
MOSFET Small Signal model: N-Channel/ P-Channel MOSFETs – characteristics, enhancement and depletion mode, MOSFETas a Switch
Common Source Amplifiers
Uni-Junction Transistor – equivalent circuit and operation (6L)

Unit 4 – SCR DIAC & TRIAC: SCR – Construction, operation, working, characteristics
DIAC - Construction, operation, working, characteristics
TRIAC - Construction, operation, working, characteristics
SCR and MOSFET as a Switch, DIAC as bidirectional switch
Comparison of SCR, DIAC, TRIAC, MOSFET (6L)

Unit 5 – Amplifiers and Oscillators
Feedback Amplifiers – Properties of negative Feedback, impact of feedback on different parameters
Basic Feedback Amplifier Topologies: Voltage Series, Voltage Shunt Current Series, CurrentShunt
Oscillator – Basic Principles, Crystal Oscillator, Non-linear/ Pulse Oscillator (8L)
Total: 30L
Books:

1. Analog Circuits, A.K. Maini Khanna Publishing House, Ed. 2018 (ISBN: 978-93-86173-584)
2. Electronic Devicesand Circuits, S. Salivahanan andN. Suresh Kumar, McGraw Hill Education; Fourth edition (1 July2017)ISBN: 978-9339219505
3. Electronics Devicesand circuit theory, Boyestad & Nashelsky, Pearson Education India; 11 edition (2015), ISBN: 978-9332542600
4. Electronic Principles Albert Malvino &David Bates, Tata McGraw Hill Publication 2010, ISBN: 978-0070634244
5. Electronics Devices& Circuits, Jacob Millman McGraw Hill Education; 4 edition (2015)
ISBN: 978-9339219543

DECE372: Electronic Devices and Circuits Lab [0L: 0T: 2P] (2 credits)
Total contact hours: 02/Week
Hands-on experiments related to the course contents **DECE302**

DECE303	**Digital Electronics**	**2L: 1T: 0P** **Total contact hours: 30**	**6 credits**

Unit 1 – Number Systems & Boolean Algebra
Introduction to different number systems – Binary, Octal, Decimal, HexadecimalConversion from one number system to another.
Boolean variables – Rules and laws of Boolean AlgebraDe-Morgan's Theorem
Karnaugh Maps and their use for simplification of Boolean expressions (4L)

Unit 2 – Logic Gates
Logic Gates – AND, OR, NOT, NAND, NOR , XOR, XNOR: Symbolic representation and truth table
Implementation of Boolean expressions and Logic Functions using gates. Simplification of expressions (6L)

Unit 3 – Combinational Logic Circuits
Arithmetic Circuits – Addition, Subtraction, 1's 2's Complement, Half Adder, Full Adder, Half Subtractor, Full Subtractor, Parallel and Series Adders, Encoder, Decoder
Multiplexer – 2 to 1 MUX, 4 to 1 MUX, 8 to 1 MUX. ApplicationsDemultiplexer – 1 to 2 DEMUX, 1- 4 DEMUX, 1- 8 DEMUX (6L)

Unit 4 – Sequential Logic Circuits
Flip Flops – SR,JK, T, D, FF, JK-MS, Triggering
Counters – 4 bit Up – Down Counters, Asynchronous/ Ripple Counter, Decade Counter- Mod 3, Mod 7 Counter, Johnson Counter, Ring Counter
Registers – 4bit Shift Register: Serial In Serial Out, Serial in Parallel Out, Parallel In Serial Out, Parallel In Parallel Out (6L)

Unit 5 – Memory Devices
Classification of Memories – RAM Organization, Address Lines and Memory Size,Static RAM, Bipolar RAM, cell Dynamic RAM, D RAM, DDR RAM
Read Only memory – ROM organization, Expanding memory, PROM, EPROM, EEPROM, Flash memory
Data Converters – Digital to Analog converters, Analog to Digital Converters (8L)

Total: 30L

Books:

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

DECE373: Digital Electronics Lab [0L: 0T: 2P] (2 credits)
Total contact hours: 02/Week
Hands-on experiments related to the course contents **DECE303**

DECE304	**Electronic Measurements and Instrumentation**	**2L: 1T: 0P** **Total contact hours: 34**	**6 credits**

Course Content:

Unit – I Basics of Measurements and Bridges
Accuracy & precision, Resolution, Types of Errors
DC Bridges – Wheatstone and Kelvin Double Bridge
AC Bridges - Maxwell's Bridge, Hay's Bridge, Anderson Bridge, De-Sauty's Bridge (5L)

Unit- II Potentiometer
Basic DC slide wire Potentiometer, Crompton's DC Potentiometer, Applications of DCPotentiometer
AC Potentiometers, Applications of AC Potentiometers (4L)

Unit– III Measuring Instruments
Permanent Magnet Moving Coil Instruments (PMMC), Moving Iron type Instruments (MI)
Electro Dynamo Type Instruments
Single Phase Energy Meter (8L)

Unit– IV Electronic Instruments
Electronic Voltmeter and Digital Voltmeter, Electronic Multimeters, Q – Meter
Vector Impedance Meter (4L)

Unit– V Oscilloscopes
Cathode ray tube: construction, operation, screens, graticules
Vertical deflection system, Horizontal deflection system, Delay line,
Measurement of frequency, time delay, phase angle and modulation index (trapezoidal method)
Oscilloscope probe: Structure of 1:1 and 10:1 probe
Multiple Trace CRO (9L)

Unit- VI Transducers
Classification, Selection Criteria, Characteristics, Construction, Working Principles and Application of following Transducers:
RTD, Thermocouple, Thermistor, LVDT, Strain Gauge, Load Cell
Piezoelectric Transducers (4L)

Total: 34L

Books:

1. Electrical & Electronic Measurement & Instruments: A.K. Sawhney, Dhanpat Rai & Sons, India
2. Electronic Instrument and Measurement Technique: W.D. Cooper, Prentice Hall International, India.
3. Electronic Measurement & Instrumentation: J.G. Joshi, Khanna Publishing House, Delhi
4. Measurement systems application and design: E.O. Doebelin and D. N. Manik, The Mcgraw-Hill
5. Electronic Measurements and Instrumentation: Oliver and Cage, The Mcgraw-Hill
6. Basic Electrical Measurement: M.B. Stout, Prentice hall of India, India
7. Electronic Instrumentation: H. S. Kalsi, The Mcgraw-Hill
8. Electrical and Electronics Measurementand Instrumentation: Prithwiraj Pukrait, Budhaditya Biswas, SantanuDas, Chiranjib Koley, The Mcgraw-Hill

DECE374: Electronic Measurements and InstrumentationLab [0L: 0T: 2P] (2 credits)
Total contact hours: 02/Week
Hands-on experiments related to the course contents **DECE304**

DECE305	**Electric circuits and network**	**2L: 1T: 0P** **Total contact hours: 30**	**6 credits**

Course Content:

Unit – 1 Basics of Network and Network Theorem
Node and Mesh Analysis, Superposition Theorem, Thevenin Theorem, Norton Theorem
Maximum Power transfer theorem, Reciprocity Theorem (4L)

Unit– 2 Graph Theory
Graph of network, tree, Incidence matrix, F- Tie Set Analysis, F-Cut Set Analysis
Analysis of resistive network using cut-set and tie-set, Duality (6L)

Unit– 3 Time Domain and Frequency Domain Analysis
Solution of first and second order differential equations for Series and parallel R-L, R-C, R-L-C Circuits, Initial and Final conditions in network elements
Forced and Free response, Time constants
Steady State and Transient State Response
Analysis of electrical circuits using Laplace Transform for standard inputs (unit, Ramp, Step)(6L)

Unit– 4 Trigonometric and exponential Fourier series
Discrete spectra and symmetry of waveform
Steady state response of a network to non-sinusoidal periodic inputs, power factor, effective values
Fourier transform and continuous spectra (6L)

Unit- 5 Two Port Network
Two Port Network
Open Circuit Impedance Parameters, Short Circuit Admittance Parameters, Transmission Parameters, Hybrid Parameters
Interrelationship of Two Port Network, Inter Connection of Two Port Network (8L)

Books:

1 Networks and Systems: Ashfaq Husain, Khanna Publishing House
2 Network Analysis: M. E. Van Valkenburg, Prentice Hall of India
3 Engineering Circuit Analysis: W. H. Hayt, J. E. Kemmerlyand S. M. Durbin, McGraw Hill
4 Electrical Circuits: Joseph Edminister, Schaum's Outline, TataMcGraw Hill
5 Basic Circuit Theory: Lawrence P. Huelsma, Prentice Hall of India
6 Network & Systems: D. Roy Choudhury, Wiley Eastern Ltd
7 Linear Circuit Analysis: De Carlo and Lin, Oxford Press

DECE396	**Summer Internship-I (4weeks) after II Semester**	**0L: 0T: 0P** **Total contact hours: 0**	**2 credits**

Semester IV

DECE401	**Microcontroller and Applications**	**3L: 0T: 0P Total contact hours: 30**	**6 credits**

Course Content:

Unit I Introduction **6L**

Introduction to Microprocessors and Microcontrollers, Architectures [8085,8086] Intel MCS-51 family features – 8051 - organization and architecture

Unit II Programming with 8051 **8L**

10 8051 instruction set, addressing modes, conditional instructions, I/O Programming, Arithmetic logic instructions, single bit instructions, interrupt handling, programming counters, timers and stack

Unit III MCS51 and external Interfaces **4L**

8 User interface – keyboard, LCD, LED, Real world interface -ADC, DAC, SENSORS Communication interface.

Unit IV C programming with 8051 **6L**

I/O Programming, Timers/counters, Serial Communication, Interrupt, User Interfaces-LCD, Keypad, LED and communication interfaces [RS232]

Unit V ARM processor core based microcontrollers **6L**

Need for RISC Processor-ARM processor fundamentals, ARM core based controller [LPC214X], IO ports, ADC/DAC, Timers.

References:

S. No.	Title of Book	Author	Publication
1	The 8051 Micro Controller and Embedded Systems	Muhammad Ali Mazidi & Janice Gilli Mazidi, .D.Kinely	PHI Pearson Education, 5th Indian reprint
2	Microprocessor and Microcontrollers	Krishna Kant	Eastern Company Edition, Prentice Hall of India, New Delhi
3	Microprocessor & Microcontroller Architecture: Programming & Interfacing using 8085, 8086, 8051	Soumitra Kumar Mandal	McGraw Hill Edu.
4	Microcontrollers: Architecture implementation and Programming	Tabak Daniel, Hintz Kenneth	Tata McGraw Hill, 2007
5	ARM Developer's Guide.UM10139; LPC214X User manual – Rev.4	Andrew N.Sloss, Dominic Symes, Chris Wright	User manual – Rev.4
6	Microprocessors and interfacing: programming and hardware	Douglas V. Hall	Tata McGraw Hill, 2editon, 2007
7	Microcontroller – Fundamentals and Applications with PLC	Valder – Perez	Yeesdee Publishers, Taylor & Francis

DECE471: Microcontroller and Applications Lab [0L: 0T: 2P] (2 credits)
Total contact hours: 02/Week
Hands-on experiments related to the course contents **DECE401**

DECE402	Consumer Electronics	3L: 0T: 0P Total contact hours: 30	6 credits

Course Content:

UNIT-I Audio Fundamentals and Devices **6L**

Basic characteristics of sound signal, Audio level metering, decibel level in acoustic measurement, Microphone & Types, speaker types & working principle, Sound recording principle & types

UNIT-II Audio Systems **6L**

CD player, home theatre sound system, surround sound, Digital console block diagram, working principle, applications, FM tuner , ICs used in FM tuner TDA 7021T , PA address system

UNIT-III Television Systems **8L**

Monochrome TV standards, scanning process, aspect ratio, persistence of vision and flicker, interlace scanning, picture resolution, Composite video signal, Colour TV standards, colour theory, hue, brightness, saturation, luminance and chrominance, Different types of TV camera, Transmission standards

UNIT-IV Television Receivers and Video Systems **6L**

PAL-D colour TV receiver, Digital TVs:- LCD, LED , PLASMA, HDTV, 3-D TV, projection TV, DTH receiver, Video interface, Digital Video, SDI, HDMI Multimedia Interface , Digital Video Interface, CD and DVD player

UNIT-V Home / Office Appliances **4L**

Diagrams, operating principles and controller for FAX and Photocopier, Microwave Oven, Washing Machine, Air conditioner and Refrigerators, Digital camera and cam coder.

References:

S. No.	Title of Book	Author	Publication
1	Consumer Electronics	Bali S.P.	Pearson Education India,2010 , latest edition
2	Audio video systems : principle practices & troubleshooting	Bali R and Bali S.P	Khanna Book Publishing Co. (P) Ltd., 2010Delhi , India, latest edition
3	Modern Television practices	Gulati R.R.	New Age International Publication (P) Ltd. New Delhi Year 2011, latest edition
4	Audio video systems	Gupta R.G.	Tata Mc graw Hill, New Delhi, India 2010, latest edition
5	Mastering Digital Television	Whitaker Jerry & Benson Blair	McGraw-Hill Professional, 2010, latest edition
6	Standard handbook of audio engineering	Whitaker Jerry & Benson Blair	McGraw-Hill Professional, 2010 , latest edition

DECE403	Digital Communication Systems	3L: 0T: 0P Total contact hours: 30	6 credits

Course Content:

UNIT1 **10L**

Block diagram and sub-system description of a digital communication system. Sampling of low-pass and band-pass signals, PAM , PCM, signal to quantization noise ratio analysis of linear and nonlinear quantizers, Line codes and bandwidth considerations; PCM & TDM hierarchies, frame structures, frame synchronization and bit stuffing.

UNIT 2 **6L**

Quantization noise analysis of DM and ADM; DPCM and ADPCM; Low bit rate coding of speech and video signals. Baseband transmission, matched filter, performance in additive Gaussian noise; Intersymbol interference (ISI), Nyquist criterion for zero ISI, sinusoidal roll-off filtering.

UNIT 3 **6L**

Geometric representation of signals, maximum likelihood decoding; Correlation receiver, equivalence with matched filter.Generation, detection and probability of error analysis of OOK, BPSK, coherent and non-coherent FSK, QPSK and DPSK. Comparison of bandwidth and bit rate of digital modulation schemes.

UNIT 4 **8L**

Introduction to Information and Coding Theories: Information Theory: information measures, Shannon entropy, differential entropy, mutual information, capacity theorem for point-to-point channels with discrete and continuous alphabets. Coding theory: linear block codes – definitions, properties, bounds on minimum distance (singleton, Hamming).

References:

S. No.	Title of Book	Author	Publication
1	Communication Systems	Haykin, S	4th Ed., John Wiley & Sons
2	Modern Digital and Analog Communication Systems	Lathi, B.P. and Ding, Z	Intl. 4th Ed., Oxford University Press.
3	Digital Communications	Proakis, J.G. and Saheli, M	5th Ed., McGraw-Hill
4	Digital Communication: Fundamentals and Applications	Sklar, B., and Ray, P.K	2nd Ed., Dorling Kindersley
5	Elements of Information Theory	T. Cover and J. Thomas	2/e, Wiley
6	Principles of Digital Communication	R. G. Gallager	Cambridge Univ. Press
7	A Foundation in Digital Communication	A. Lapidoth	Cambridge Univ. Press
8	Error Control Coding	S. Lin and D. Costello	2/e, Prentice Hall

DECE473: Digital Communication Systems Lab [0L: 0T: 2P] (2 credits)
Total contact hours: 02/Week
Hands-on experiments related to the course contents **DECE403**

DECE404	Linear Integrated Circuits	3L: 0T: 0P Total contact hours: 36	6 credits

Course Contents:

UNIT I - IC Fabrication and Circuit Configuration for Linear IC **8L**

Advantages of ICs over discrete components – Manufacturing process of monolithic Ics Construction of monolithic bipolar transistor – Monolithic diodes – Integrated Resistors Monolithic Capacitors – Inductors. Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, General operational amplifier stages -and internal circuit diagrams of IC 741, DC and AC performance characteristics, slew rate, Open and closed loop configurations.

UNIT II - Applications Of Operational Amplifiers **7L**

Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters, adder, subtractor, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier, peak detector, clipper and clamper, Low-pass, high-pass and band-pass Butterworth filters.

UNIT III - Analog Multiplier and PLL **8L**

Analog Multiplier using Emitter Coupled Transistor Pair - Gilbert Multiplier cell – Variable transconductance technique, analog multiplier ICs and their applications, Operation of the basic PLL, Closed loop analysis, Voltage controlled oscillator, Monolithic PLL IC 565, application of PLL for AM detection, FM detection, FSK modulation and demodulation and frequency synthesis.

UNIT IV - Analog to digital and digital to analog converters **8L**

Analog and Digital Data Conversions, D/A converter – specifications - weighted resistor type, R-2R Ladder type, Voltage Mode and Current-Mode R2R Ladder types switches for D/A converters, high speed sample-and-hold circuits, A/D Converters specifications - Flash type - Successive Approximation type - Single Slope type – Dual Slope type - A/D Converter using Voltage-to-Time Conversion -Over-sampling A/D Converters.

UNIT V - Waveform generators and special function ICs **5L**

Sine-wave generators, Multivibrators and Triangular wave generator, Saw-tooth wave generator, ICL8038 function generator, Timer IC 555, IC Voltage regulators – Three terminal fixed and adjustable voltage regulators - IC 723 general purpose regulator Monolithic switching regulator, Switched capacitor filter IC MF10, Frequency to Voltage and Voltage to Frequency converters, Audio Power amplifier, Video Amplifier, Isolation Amplifier, Opto-couplers and fibre optic IC.

References:

S. No.	Title of Book	Author	Publication
1	Design with operational amplifiers and analog integrated circuits, 3rd Edition	Sergio Franco	Tata McGraw-Hill, 2007
2	Linear Integrated Circuits	D.Roy Choudhry, Shail Jain	New Age International Pvt. Ltd
3	System design using Integrated Circuits	B. S. Sonde	New Age Pub, 2nd Edition, 2001
4	Analysis and Design of Analog Integrated Circuits	Gray and Meyer	Wiley International, 2005
5	OP-AMP and Linear ICs	Ramakant A. Gayakwad	Prentice Hall / Pearson Education, 4th Edition, 2001
6	Operational Amplifier and Linear Integrated Circuits	K Lal Kishore	Pearson Education, 2006

DECE474: Linear Integrated Circuits Lab [0L: 0T: 2P] (2 credits)
Total contact hours: 02/Week
Hands-on experiments related to the course contents **DECE404**

DECE485	**Simulation Software Lab**	**0L: 0T: 6P** **Total contact hours: 02/Week**	**6 credits**

1. **Diode characteristics :** To study the characteristic of diode.

2. **BJT characteristics**: To study the characteristic of a BJT.

3. **MOSFET characteristics**: To study the characteristic of a MOSFET.

4. **Transient Analysis Of Linear Circuit:**

(a) **First order circuit:** Time response study, time constant calculation.

(b) **Second order circuit:** Overdamped, Underdamped and Critically damped response study

5. **Single Phase Half wave Diode Rectifier:** To study the characteristic of a half-wave diode rectifier.

6. **Single Phase Full Wave Diode Bridge Rectifier:** To study the characteristic of a full-wave diode rectifier.

DECE407	Essence of Indian Knowledge and Tradition	2L: 0T: 0P Total contact hours: 30	0 credit

Course Content:

Basic Structure of Indian Knowledge System: **10**

(i) वेद, (ii) उनवेद (आयुवेद, धनुवेद, गन्धवेद, स्थानत्य आदद) (iii) वेदांग (शिक्षा, कल्न, ननरुत, व्याकरण, ज्योनतष छांद), (iv) उनाइग (धर्म स्त्रि, रीशांसा, नुराण, तकमिास्त्र)

• Modern Science and Indian Knowledge System **10**

• Yoga and Holistic Health care **6**

• Case Studies **4**

SUGGESTED TEXT/REFERENCE BOOKS:

S. No.	Title of Book	Author	Publication
1.	Cultural Heritage of India-Course Material	V. Sivaramakrishna	Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
2.	Modern Physics and Vedant	Swami Jitatmanand	Bharatiya Vidya Bhavan
3.	The wave of Life	Fritzof Capra	
4.	Tao of Physics	Fritzof Capra	
5.	Tarkasangraha of Annam Bhatta, Inernational	V N Jha	Chinmay Foundation, Velliarnad, Amaku,am
6.	Science of Consciousness Psychotherapy and Yoga Practices	RN Jha	Vidyanidhi Prakasham, Delhi, 2016

DECE496	**Minor Project**	**0L: 0T: 4P** **Total contact hours: 02/Week**	**4 credits**