

## 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
<b>Semester I</b>						<b>Semester II</b>					
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
<b>Contact Hours: 25</b>		<b>12</b>	<b>3</b>	<b>10</b>	<b>40</b>	<b>Contact Hours: 23</b>		<b>12</b>	<b>3</b>	<b>8</b>	<b>38</b>
<b>Semester III</b>						<b>Semester IV</b>					
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
<b>Contact Hours: 23</b>		<b>10</b>	<b>5</b>	<b>8</b>	<b>40</b>	<b>Contact Hours:31</b>		<b>14</b>	<b>1</b>	<b>16</b>	<b>40</b>
<b>Semester V</b>						<b>Semester VI</b>					
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 Automation or 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	*						
<b>Total Contact Hours 23</b>		<b>15</b>	<b>0</b>	<b>8</b>	<b>40</b>	<b>Total Contact Hours 29</b>		<b>14</b>	<b>1</b>	<b>14</b>	<b>40</b>
<b>Total Mandatory Credits: 238</b>											

## Diploma in Electronics and Communication Syllabus Details

### Semester I

**Paper code: DCH102**

**Paper name: Chemistry-I (Theory)**

**Total contact hours: 40**

**Credit: 6**

**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 aluminium, Manufacture of steel by Bessemer process, open hearth process and LD process, alloys.

**Unit IV: Building materials**

(3L)

Portland cement, Types of manufacturing, setting and hardening of cement, special cement. Glass, Bricks.

**Unit V: Lubricant**

(3L)

Definition, 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, Perplex, 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)

Definition, Types of pollution, pollutants, Water quality measurements- D.O, B.O.D, C.O.D, hardness of water, removal of hardness, 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*, Dhanpat Rai Publishing Co.

2. Jain and Jain; *Engineering Chemistry*, Dhanpat Rai Publishing Co.
3. 3.V.R. Gowariker, N.V. Viswanathan, J. Sreedhar, *Polymer Science*, New Age International Publisher.
4. S.K. Ghosh *Advanced General Organic Chemistry (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)**

**Total contact hours: N/A**

**Credit: 2**

**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  $\text{Na}_2\text{CO}_3$

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

**Paper name: Applied Physics – I (Theory)**

**Paper code: DPH105**

**Total contact hours: 36 hours**

**Credit: 06**

**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.
- 2.4 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 derivation 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, 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**

**Total contact hours: 18 hours**

**Credit: 02**

**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**  
**Total contact hours: 35**

**Credit: 6**  
**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**  
**Paper name: COMMUNICATION IN ENGLISH**  
**Total contact hours:39**

**Credit: 6**  
**L-T-P: 3-0-0**

<b>Module 1:</b> 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.  .	<b>Contact hours: 3</b>
<b>Module 2:</b> 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.	<b>Contact hours: 5</b>
<b>Module 3:</b> 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.	<b>Contact hours: 2</b>
<b>Module 4:</b> Subject Verb Agreement  4.1 Rules that guide the agreement of the subject to its verb	<b>Contact hours: 5</b>
<b>Module 5:</b> 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.	<b>Contact hours: 5</b>
<b>Module 6</b> Voice  6.1 Change from Active Voice to Passive Voice and vice versa	<b>Contact hours: 3</b>
<b>Module 7:</b> Punctuation  7.1 Use of the comma, semi-colon, colon, apostrophe, exclamation mark, question mark and quotation marks	<b>Contact hours: 5</b>

<p><b>Module 8:</b> Word formation</p> <p>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</p>	<p><b>Contact hours: 2</b></p>
<p><b>Module 9:</b> Affixation</p> <p>9.1 Prefixes and Suffixes and new word formations</p>	<p><b>Contact hours: 2</b></p>
<p><b>Module 10:</b> Nominal Compounds</p> <p>10.1 Common nominal compound</p>	<p><b>Contact hours: 2</b></p>
<p><b>Module 11:</b> Paragraph Writing</p> <p>11.1 Descriptive Paragraph on various related topics.</p>	<p><b>Contact hours: 5</b></p>

- BOOKS RECOMMENDED: 1. Essential English Grammar with Answers by Raymond Murphy (Cambridge University Press)  
2. English for Polytechnics by Dr Papor 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**

**Total contact hours: 36 hours**

**Credit: 06**

**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' 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: 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**

**Total contact hours: 20 hours**

**Credit: 02**

**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**

**Total contact hours: 40 hours**

**Credit: 08**

**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**

**Total hours : 41 hours**

**L-T-P-C: 3-0-0-6**

**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. McGraw 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. McGraw 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**

**Total contact hours: 34**

**Credit: 6**

**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; 11<sup>th</sup> 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**  
**Total contact hours:39**

**Credit: 2**  
**L-T-P-C: 0-0-2-2**

<p>Module 1: Speaking and Listening practices</p> <ol style="list-style-type: none"> <li>1.1 Practices of sounds of English</li> <li>1.2 Proper Body language while speaking</li> <li>1.3 Presentation and public speaking practices</li> <li>1.4 Practicing to enhance listening skills</li> <li>1.5 Different types of istening</li> <li>1.6 Good listening practices</li> <li>1.7 Overcoming barriers to effective listening</li> </ol>	
<p><b>Module 1: Business Writing</b></p> <ol style="list-style-type: none"> <li>1.1 Letter Writing Formal letter formats,</li> <li>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</li> <li>1.3 Job Application and Cover Letter, format of a job application</li> <li>1.4 Resume, Curriculum Vitae, bio data.</li> </ol>	<p><b>Contact hours: 3</b></p>
<p><b>Module 2: Paragraph Writing and Summary Writing</b></p> <ol style="list-style-type: none"> <li>2.1 Definition, Cohesion and Linkage using Transition words on everyday topics</li> <li>2.2. Practicing how to compose coherent passages.</li> <li>2.3 Definition, Use of Transition words, important points to remember while summarizing</li> <li>2.4 Explain and practicing how to arrive at a summary of a paragraph / text</li> </ol>	<p><b>Contact hours: 5</b></p>
<p><b>Module 4 Email Writing</b></p> <ol style="list-style-type: none"> <li>4.1 writing the perfect e-mail,</li> <li>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,</li> <li>4.3 informing about a file attached in in an email, writing the formal ending of an e-mail</li> <li>4.3 Explaining and practicing how to write formal and informal emails</li> </ol>	<p><b>Contact hours: 5</b></p>
<p><b>Module 3: Report writing</b></p> <ol style="list-style-type: none"> <li>3.1 Definition, types of reports with a focus on annual report, non-profit annual report, technical and academic report,</li> <li>3.2 necessity and purpose of writing a report, qualities of a good report,</li> <li>3.3 language used in a report,</li> <li>3.4 different formats of reports and sample reports</li> </ol>	<p><b>Contact hours: 2</b></p>
<p><b>Module 5: Facing an interview</b></p> <ol style="list-style-type: none"> <li>5.1 How to approach, what to speak, how to speak in an interview and answer interview questions, the business etiquettes to maintain</li> <li>5.2 body language, negative body language, handling an awkward situation in an interview, the dress code</li> </ol>	<p><b>Contact hours: 5</b></p>

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

**BOOKS RECOMMENDED:**

1. Student's handbook of Written English and Phonetics by Dr Paporani Rani Barooah (Eastern Book House Publishers)
2. Strengthening your writing -V.R. Nayaranswami (Orient Longman)

**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. Henry Mulish, Herbert L. Cooper, "The Spirit of C: An Introduction to Modern Programming", Jaico Books.
- 7. Brian W. Kenigham and Dennis Ritchie, "C Programming language", Prentice Hall of India.

**Paper Code: DCSE272**  
**Paper Name: Computer Fundamentals and Programming**  
**Total contact hours:32**

**Credit: 2**  
**LabL-T-P: 0-0-2**

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**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. Henry Mulish, Herbert L. Cooper, "The Spirit of C: An Introduction to Modern Programming", Jaico Books.
7. Brian W. Kenigham and Dennis Ritchie, "C Programming language", Prentice Hall of India.

## Semester III

<b>DECE301</b>	<b>Principles of Electronic Communication</b>	<b>2L: 1T: 0P</b> <b>Total contact hours:</b> <b>30</b>	<b>6 credits</b>
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**Unit-1 ANALOG MODULATION:** Concept of frequency translation. Amplitude Modulation: Description of full 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, natural and flat top sampling in time and frequency domains (4L)

**Unit-3 PCM & DELTA MODULATION SYSTEMS:** Uniform and Non-uniform quantization. PCM and delta modulation, 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**

<b>DECE302</b>	<b>Electronic Devices and Circuits</b>	<b>2L: 1T: 0P</b> <b>Total contact hours:</b> <b>30</b>	<b>6 credits</b>
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**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,  
 MOSFET as 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, Current Shunt  
 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 Devices and Circuits, S. Salivahanan and N. Suresh Kumar, McGraw Hill Education; Fourth edition (1 July 2017) ISBN: 978-9339219505
3. Electronics Devices and 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

<p><b>DECE372: Electronic Devices and Circuits Lab [0L: 0T: 2P] (2 credits)</b>  <b>Total contact hours: 02/Week</b>          Hands-on experiments related to the course contents <b>DECE302</b></p>
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<b>DECE303</b>	<b>Digital Electronics</b>	<b>2L: 1T: 0P</b> <b>Total contact hours:</b> <b>30</b>	<b>6 credits</b>
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**Unit 1 – Number Systems & Boolean Algebra**

Introduction to different number systems – Binary, Octal, Decimal, Hexadecimal Conversion from one number system to another.

Boolean variables – Rules and laws of Boolean Algebra De-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. Applications Demultiplexer – 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**

<b>DECE304</b>	<b>Electronic Measurements and Instrumentation</b>	<b>2L: 1T: 0P</b> <b>Total contact hours:</b> <b>34</b>	<b>6 credits</b>
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**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 DC Potentiometer

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 Measurement and Instrumentation: Prithwiraj Pukrait, Budhaditya Biswas, Santanu Das, Chiranjib Koley, The Mcgraw-Hill

**DECE374: Electronic Measurements and Instrumentation Lab [0L: 0T: 2P] (2 credits)**

**Total contact hours: 02/Week**

Hands-on experiments related to the course contents **DECE304**

<b>DECE305</b>	<b>Electric circuits and network</b>	<b>2L: 1T: 0P</b> <b>Total contact hours: 30</b>	<b>6 credits</b>
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**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. Kemmerly and 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

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