

## Diploma Computer Science and Engineering Syllabus Structure (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	2	1	0	6	DCSE202	Computer Fundamentals & Programming	2	0	0	4
DCH172	Chemistry-I Lab	0	0	2	2	DCSE272	Computer Fundamentals & Programming Lab	0	0	2	2
DMA103	Mathematics-I	3	0	0	6	DEE203	Fundamentals of Electrical & Electronics Engineering	2	1	0	6
DME104	Engineering Drawing	2	0	0	4	DEE273	Fundamentals of Electrical & Electronics Engineering Lab	0	0	2	2
DME174	Engineering Drawing Lab	0	0	2	2	DMA204	Mathematics-II	3	1	0	8
DPH105	Applied Physics - I	2	1	0	6	DME205	Engineering Mechanics	3	0	0	6
DPH175	Applied Physics - I Lab	0	0	2	2	DPH206	Applied Physics – II	2	1	0	6
DME176	Workshop Practice	0	1	4	6	DPH276	Applied Physics - II Lab	0	0	2	2
<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>					
DCSE301	Computer Architecture and Organization	3	1	0	8	DCSE401	Data Structure using C	3	1	0	8
DCSE302	System Programming	3	0	0	6	DCSE471	Data Structure using C Lab	0	0	3	3
DCSE372	System Programming Lab	0	0	3	3	DCSE402	Computer Communication & Networking	3	0	0	6
DECE303	Digital Electronics	2	1	0	6	DIE403	Microprocessor	3	0	0	6
DECE373	Digital Electronics Lab	0	0	2	2	DIE473	Microprocessor Lab	0	0	3	3
DMA301	Mathematics-III	3	0	0	6	DCSE404	Operating System	3	1	0	8
DHSS302	Engineering Economics and Accountancy	3	1	0	8	DCSE405	Computer Hardware and Networking	1	1	0	4
						DCSE475	Computer Hardware and Networking Lab	0	0	3	3
<b>Contact Hours: 22</b>		<b>14</b>	<b>3</b>	<b>5</b>	<b>39</b>	<b>Total Contact Hours 25</b>		<b>13</b>	<b>3</b>	<b>9</b>	<b>41</b>
<b>Semester V</b>						<b>Semester VI</b>					
DCSE501	Database Management Systems	3	0	0	6	DCSE601	Web Technology	3	0	0	6
DCSE571	Database Management Systems Lab	0	0	3	3	DCSE671	Web Technology Lab	0	0	3	3
DCSE502	Software Engineering	3	0	0	6	DCSE691	Major Project	0	0	12	12
DCSE503	Object Oriented Programming with C++	3	0	0	6	DCSE692	Industrial Visit and Seminar	0	0	2	2
DCSE573	Object Oriented Programming with C++ Lab	0	0	3	3	DHSS601	Industrial Management & Entrepreneurship	3	0	0	6
DCSE504	Cryptography & Network Security	3	0	0	6	DCSE61*	Elective 1	3	0	0	6
DCSE574	Cryptography & Network Security Lab	0	0	3	3	DCSE61*	Elective 2	3	0	0	6
DCSE51*	Elective (Any One)	3	0	0	6						
<b>Total Contact Hours 24*</b>		<b>15</b>	<b>0</b>	<b>9</b>	<b>39</b>	<b>Total Contact Hours 25*</b>		<b>12*</b>	<b>0</b>	<b>15*</b>	<b>41</b>
<b>Total Mandatory Credits: 238</b>											

## List of Elective Courses

Semester V						Semester VI					
Course No.	Course Name	L	T	P	C	Course No.	Course Name	L	T	P	C
DCSE510	Mobile Computing	3	0	0	6	DCSE610	Design and Analysis of Algorithms	3	0	0	6
DCSE511	VLSI & Embedded Systems	3	0	0	6	DCSE611	Parallel Processing	3	0	0	6
DCSE512	Artificial Intelligence	3	0	0	6	DCSE612	Data Mining	3	0	0	6
						DCSE613	Formal Language and Automata Theory	3	0	0	6
						DCSE614	Graph Theory and Combinatorics	3	0	0	6

## Semester I

**Paper Code: DHSS101**

**Paper Name: Communication in English**

**Total Contact Hours: 39**

**Credit: 6**

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

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### **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 / References:**

1. Essential English Grammar with Answers by Raymond Murphy (Cambridge University Press)
2. English for Polytechnics by Dr Paporri Rani Barooah (Eastern Book House Publishers)

3. English Grammar by Annie Brinda (Cambridge University Press)

**Paper Code: DCH102**

**Paper Name: Chemistry-I**

**Total Contact Hours: 40**

**Credit: 6**

**L-T-P: 2-1-0**

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**Module 1: Periodic table, Atomic structure**

**Contact hours: 4**

- 1.1 Electrons, protons, neutron
- 1.2 Atomic mass (A), atomic number (Z)
- 1.3 Isotopes, isobars, isotone, orbit and orbitals, electronic configuration (upto Z=30)
- 1.4 Modern periodic table, groups and periods.

**Module 2: Electrochemistry**

**Contact hours: 5**

- 2.1 Electrolytes, Faraday's law of electrolysis
- 2.2 Numerical problems, application of electrolysis
- 2.3 Oxidation and reductions
- 2.4 Redox reactions.

**Module 3: Metallurgy**

**Contact hours: 5**

- 3.1 General principles of metallurgy
- 3.2 Minerals, ore, gangue, slag, flux, roasting, calcination etc.
- 3.3 Metallurgy of iron and aluminium
- 3.4 Manufacture of steel by Bessemer process
- 3.5 Open hearth process and LD process, alloys

**Module 4: Building Materials**

**Contact hours: 3**

- 4.1 Portland cement
- 4.2 Types of manufacturing
- 4.3 Setting and hardening of cement, special cement. Glass, Bricks.

**Module 5: Lubricant**

**Contact hours: 3**

- 5.1 Definition and classification of lubricants
- 5.2 Important functions of lubricants.

**Module 6: Polymer and Polymerization**

**Contact hours: 4**

- 6.1 Types of polymer, thermoplastic and thermosetting plastic
- 6.2 Preparation and applications of PE, PVC, PP, Perpex, Teflon, Bakelite, nylon
- 6.3 Natural rubber, Synthetic rubber.

**Module 7: Organic Chemistry**

**Contact hours: 6**

- 7.1 IUPAC nomenclature, Alkane, alkene, alkyne, alcohol synthesis and applications.

**Module 8: Environmental Chemistry**

**Contact hours: 6**

- 8.1 Definition, Types of pollution, pollutants, Water quality measurements- D.O, B.O.D, C.O.D, hardness of water, removal of hardness, TDS
- 8.2 Greenhouse effect, acid rain, Ozone layer depletion.

**Module 9: Industrial chemistry**

**Contact hours: 4**

- 9.1 Ethanol manufacture from starch by fermentation
- 9.2 Fuels- Classifications, calorific values, natural gas, water gas, producer gas, LPG, power alcohol
- 9.3 Petroleum- refining, octane number, cetane number.

**Books / References:**

1. S. Chawla; A Text Book of Engineering Chemistry, Dhanpat Rai Publishing Co.
2. Jain and Jain; Engineering Chemistry, Dhanpat Rai Publishing Co.
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. 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 Lab**  
**Total Contact Hours: NA**

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

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**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 Stalagmeter.

**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

**Module 1: Algebra**

**Contact hours: 20**

- 1.1 Vector and Scalar quantities – types of vectors, geometric representation of vectors, addition and subtraction of vectors, magnitude of a vector, product of a vector by a scalar, Module vectors  $i, j, k$ .
- 1.2 Arithmetic and geometric progressions –  $n$ th term of A.P. and G.P., Geometric mean between two numbers.
- 1.3 Complex numbers – origin, general form, polar form, examples. Simple problems.
- 1.4 Binomial theorem – Factorials, positive integral values, binomial expansion, rules, calculation of appropriate value.
- 1.5 Logarithm and exponential series.
- 1.6 Determinants: Definition, operations and Cramer's rule for solving simultaneous linear equations.
- 1.7 Basic concepts of permutation and Combinations..

**Module 2: Trigonometry**

**Contact hours: 15**

- 2.1 Trigonometric functions and ratios.
- 2.2 Trigonometric functions of allied angles – half, double, triple, compound angles.
- 2.3 Addition and subtraction formulae.
- 2.4 Solution of triangles using properties.
- 2.5 Simplification of trigonometric expressions using different formulae.
- 2.6 Basic concept of inverse trigonometric functions and hyperbolic functions.

**Books / References:**

1. Mathematics for Polytechniques: Vol – I&II, TTTI, Bhopal
2. Mathematics for Polytechniques: S.P. Deshpande
3. Engineering Mathematics: I.B. Prasad
4. Engineering Mathematics: Grewal
5. Plain Trigonometry: Bansilal
6. College Algebra: Shah and Desai
7. Mathematics Textbook for class XI and XII: NCERT

**Paper Code: DME104**  
**Paper Name: Engineering Drawing**  
**Total Contact Hours: 48**

**Credit: 4**  
**L-T-P: 2-0-0**

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**Module 1: Introduction**

**Contact hours: 5**

- 1.1 Drawing as a medium of communication
- 1.2 Use and care of Drawing Instruments Assignments: Such as Drawing of Horizontal and Vertical Lines, Square, Rectangle  
Mosaic Pattern, Angular Pattern, Stamping with circular pattern.
- 1.3 Types of Lines and Dimensioning as per 15696/72

**Module 2: Geometrical Constructions**

**Contact hours: 8**

- 2.1 Freehand curves, free hand Drawing
- 2.2 Construction of triangles, Perpendicular and angles of 300, 450, 600, 900
- 2.3 Construction of Regular Polygons
- 2.4 Regular Polygons inscribed in circles.
- 2.5 Regular figures by using T – square and Set – square

**Module 3: Lettering, Scales**

**Contact hours: 5**

- 3.1 Single Stroke Lettering Straight and Inclined by graph and Free Hand Letters and digits as per 15696/72
- 3.2 Scale- Representative Fraction, Types or Scales
- 3.3 Simple problems on Plain and Diagonal Scale

**Module 4: Projection of Points**

**Contact hours: 5**

- 4.1 Position / location of Points, Horizontal plane, Vertical plane
- 4.2 Assignments of Simple problems on different quadrants and Find the distance between two points
- 4.3 Position/ Location of Points

**Module 5: Projection of Lines**

**Contact hours: 5**

- 5.1 Position / location of Points, Horizontal plane, Vertical plane
- 5.2 Assignments of Simple problems on different quadrants and Find the distance between two points
- 5.3 Position/ Location of Lines

**Module 6: Orthographic Projection**

**Contact hours: 5**

- 6.1 Top View, Front View and Side View of Simple objects, block and machine parts with dimensional scale.
- 6.2 Sectional Front, Top and Side Views as per IS – 696 for simple parts and blocks.

**Module 7: Rivet Heads and Joints**

**Contact hours: 5**

- 7.1 Different types of Rivet Heads and Joints.
- 7.2 Top and Sectional Front views of Lap and Butt Joints with single double cover plates.

**Module 8: Isometric Projection**

**Contact hours: 5**

- 8.1 Isometric Projection to true scale and isometric scale.

**Module 9: Thread/Screwed**

**Contact hours: 5**

- 9.1 Thread Profiles (REF IS 2043 IS – 554 ETC.)
- 9.2 Screwed Fastenings
- 9.3 Representation of external and internal threaded assembly symbolic.
- 9.4 Representation of threads.
- 9.5 Representation of Screws, Bolts, Nuts and Cutter.

**Books / References:**

1. Elementary Engineering Drawing [Plane and Solid Geometry] By N.D. Bhatt, V.M. Panchal.
2. Geometrical and Machine Drawing by N.D. Bhatt

**Paper Code: DME174**  
**Paper Name: Engineering Drawing Lab**  
**Total Contact Hours: NA**

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

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<b>Hands-on experiments related to the course contents of DME104</b>
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**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, DilipSarma, N G Chakraborty, and K N Sharma, Kalyani Publisher, New Delhi.
2. Applied Physics Part I & II, Manpreet Singh, Dr. Major Singh, and Mrs. Hitashi Gupta, S K Kataria & Sons- New Delhi.
3. Basic Applied Physics, R K Gaur, Dhanpat Rai Publication- New Delhi.

Paper Code: DPH175

Paper Name: Applied Physics – I Lab

Total Contact Hours: 18

Credit: 2

L-T-P: 0-0-2

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**Experiment-1:** Vernier Callipers: To determine the volume of a metallic/wooden cube.

**Experiment-2:** Screw Gauge: to determine cross sectional area of a wire/ thickness of a glass piece.

**Experiment-3:** Spherometer: To determine the radius of curvature of concave and convex mirrors.

**Experiment-4:** To determine the value of acceleration due to gravity (g) of a place with simple pendulum.

**Experiment-5:** To measure the velocity of sound in resonance tube.

**Experiment-6:** To determine the frequency of a tuning fork using Sonometer.

**Experiment-7:** Measurement of Specific gravity of solid, liquid, using Nicolson hydrometer, Hare's apparatus and specific gravity bottles.

**Experiment-8:** To determine the atmospheric pressure by using Boyle's law apparatus.

**Experiment-9:** To determine water equivalent of a calorimeter by method of mixture.

Paper Code: DME176

Credit: 6

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**Module 1: Carpentry Shop**

**Contact hours: 12**

- 1.1 Introduction with the shop
- 1.2 Various structure of wood and types of wood
- 1.3 Different types of tools, machine and accessories used in Carpentry shop
- 1.4 Safety Precautions in workshop
  - Details of Practical Contents (3+3 hrs)
  - Demo of different wood working tools and machines
  - Demo of different wood working processes
  - Simple joints like T joints etc.
  - One simple utility job

**Module 2: Fitting Shop**

**Contact hours: 12**

- 2.1 Introduction with the fitting shop
- 2.2 Various marking, measuring, cutting, holding and striking tools
- 2.3 Different Operations like chipping, filing, marking drilling etc.
- 2.4 Working principle of drilling machine, lapping dies etc.
  - Details of Practical Contents (3+3 hrs)
  - Demo of different fitting tools and machines and power tools
  - Demo of different processes in fitting shop
  - Squaring of a rectangular metal piece
  - One simple utility job.

**Module 3: Welding Shop**

**Contact hours: 12**

- 3.1 Introduction
- 3.2 Types of Welding, Arc Welding, Gas Welding, Gas Cutting
- 3.3 Welding of dissimilar materials, selection of welding rod material, size of rod and work piece
- 3.4 Different types of flames
- 3.5 Elementary symbolic Representation
- 3.6 Safety and precautions
  - Details of Practical Contents (3+3 hrs)
  - Demo of different welding tools and machines
  - Demo of Arc Welding, Gas Welding, Gas Cutter and rebuilding of broken parts with welding
  - Any one Composite job involving lap joint welding process.

**Module 4: Machine Shop**

**Contact hours: 12**

- 4.1 Introduction
- 4.2 Study of Different types of Lathe machine, shaping machine, Drilling machine
- 4.3 Study of Different types of hand tools and machine tools and parts
- 4.4 Safety & precautions
  - Details of Practical Contents (3+3 hrs)
  - Demo of different machines and their operations
  - Preferably prepare a simple job.

**Module 5: Turning Shop**

**Contact hours: 6**

- 5.1 Demo of lathe machine, drilling machine
- 5.2 One job related to plane and taper turning , threading and knurling
- 5.3 One job related to drilling and tapping

**Module 6:Electrical Shop**

**Contact hours: 6**

- 6.1 Demo of simple house wiring and use of tools
- 6.2 One job related to simple house wiring
- 6.3 Fittings of cut outs, fuses and other simple fittings etc.
- 6.4 Difference between Single phase wiring and three phase wiring

**Books / References:**

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., “Elements of Workshop Technology”, Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Kalpakjian S. And Steven S. Schmid, “Manufacturing Engineering and Technology”, 4th edition, Pearson Education India Edition, 2002.
3. Gowri P. Hariharan and A. Suresh Babu,” Manufacturing Technology – I” Pearson Education, 2008.
4. Roy A. Lindberg, “Processes and Materials of Manufacture”, 4th edition, Prentice Hall India, 1998
5. Rao P.N., “Manufacturing Technology”, Vol. I and Vol. II, Tata McGraw Hill House, 2017

# Semester II

**Paper Code: DHSS271**  
**Paper Name: Communication in English Lab**  
**Total Contact Hours: 39**

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

## **Module 1: Speaking and Listening practices**

**Contact hours: 16**

- 1.1 Practices of sounds of English
- 1.2 Proper Body language while speaking
- 1.3 Presentation and public speaking practices
- 1.4 Practicing to enhance listening skills
- 1.5 Different types of listening
- 1.6 Good listening practices
- 1.7 Overcoming barriers to effective listening

## **Module 2: Business Writing**

**Contact hours: 3**

- 2.1 Letter Writing Formal letter formats.
- 2.2 Practice of letter writing in different situations: Order letter, Complaint letter, Letter of Adjustment, Quotation letter, Letter to the Editor, Application for leave of absence.
- 2.3 Job Application and Cover Letter, format of a job application.
- 2.4 Resume, Curriculum Vitae, bio data.

## **Module 3: Paragraph Writing and Summary Writing**

**Contact hours: 5**

- 3.1 Definition, Cohesion and Linkage using Transition words on everyday topics.
- 3.2 Practicing how to compose coherent passages.
- 3.3 Definition, Use of Transition words, important points to remember while summarizing.
- 3.4 Explain and practicing how to arrive at a summary of a paragraph / text.

## **Module 4: Email Writing**

**Contact hours: 5**

- 4.1 Writing the perfect e-mail,
- 4.2 Steps to the perfect e-mail, formal and informal greetings, requests through an e-mail, writing an apology, complaint and seeking help and information in an e-mail.
- 4.3 Informing about a file attached in in an email, writing the formal ending of an e-mail.
- 4.4 Explaining and practicing how to write formal and informal emails.

## **Module 5: Report writing**

**Contact hours: 2**

- 5.1 Definition, types of reports with a focus on annual report, non-profit annual report, technical and academic report.
- 5.2 Necessity and purpose of writing a report, qualities of a good report.
- 5.3 Language used in a report.
- 5.4 Different formats of reports and sample reports.

## **Module 6: Facing an interview**

**Contact hours: 5**

- 6.1 How to approach, what to speak, how to speak in an interview and answer interview questions, the business etiquettes to maintain
- 6.2 Body language, negative body language, handling an awkward situation in an interview, the dress code
- 6.3 Successful job interview practices
- 6.4 Perfect handshake, points to remember while applying for a job

## **Module 7: British English and American English**

**Contact hours: 3**

- 7.1 Difference between American and British English words – vocabulary and spelling
- 7.2 Pronunciation and accents

## **Books / References:**

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

**Module 1: Computer Fundamentals**

**Contact hours: 10**

- 1.1 Brief history.
- 1.2 Block diagram and different components.
- 1.3 Memory & it's different types.
- 1.4 I/O devices.
- 1.5 Introduction to Operating System, Types and Role of OS.
- 1.6 Computer languages, translator software, editor.
- 1.7 Data, different types of data, information and its characteristics.
- 1.8 Introduction to computer network and the Internet.

**Module 2: Number System and codes**

**Contact hours: 10**

- 2.1 Different number systems - decimal, binary, octal, hexadecimal number system.
- 2.2 Number Conversions.
- 2.3 1's and 2's Complement, subtraction using complements.
- 2.4 Different codes- ASCII, BCD, Ex-3, Gray.
- 2.5 Conversion from Gray to binary and vice-versa.
- 2.6 BCD Addition.

**Module 3: Introduction to C programming**

**Contact hours: 15**

- 3.1 Fundamentals of Programming-Algorithm & Flowchart.
- 3.2 Source code and object code.
- 3.3 Basic structure of C programs.
- 3.4 Executing a C program.
- 3.5 C Tokens, Keywords and Identifier, Constants, Variables, Storage Class and Data types.
- 3.6 Operators and expression.
- 3.7 Input Output functions like printf, scanf, getchar, putchar, gets, puts
- 3.8 Decision making and branching using IF..Else, Switch.
- 3.9 Looping using for, while, and do-while.
- 3.10 Array.

**Books / References:**

1. Computer Fundamentals Paperback by Priti Sinha Pradeep K.Sinha (Author), BPB Publication
2. Byron Gottfried, "Programming with C", Tata McGraw Hill.
3. Herbert Schildt, "The complete Reference C", TMH
4. Balagurusamy, E. (2019). *Programming in ANSI C, 8/e*. McGraw-Hill Education.
5. YashwantKanetkar, "Let us C", BPB Publication
6. 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.

**Module 1: Basic Commands for Computer System** **Contact hours: 2**

**Module 2: Preparation of Documents** **Contact hours: 6**

- 2.1 Introduction to Word processing: Opening a document, preparing documents, inserting diagrams and tables.
- 2.2 Editing document- (a) Character, word and line editing, (b) Margin Setting, Paragraph alignment, (c) Block Operations, (d) Spell Checker, (e) Saving a document, (f) Mail merge.

**Module 3: Information Presentation through Spreadsheet** **Contact hours: 8**

- 3.1 Application of Spreadsheet.
- 3.2 Structure of spreadsheets.
- 3.3 Preparing table for simple data and numeric operations.
- 3.4 Using formulae and functions in excel operations, Creation of graphs, Pie charts, bar charts.

**Module 4: Preparation of presentation** **Contact hours: 6**

- 4.1 Creation of electronic slides on any topic
- 4.2 Practice of animation effect
- 4.3 Presentation of slides

**Module 6: Programming in C** **Contact hours: 10**

- 5.1 Editing a C program.
- 5.2 Defining variables and assigning values to variables.
- 5.3 Arithmetic and relational operators, arithmetic expressions and their evaluation.
- 5.4 Practice on input/output functions like getchar, putchar, gets, puts, scanf, printf etc.
- 5.5 Programming exercise on simple if statement, If..else statement, switch statement.
- 5.6 Programming exercise on looping with do-while, while, for loop.
- 5.7 Programming exercise on array.

**Books / References:**

1. Foundations of Information Technology Coursebook 9: Windows 7 and MS Office 2007 (With MS Office 2010 Updates)-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. Briain W. Kenigham and Dennis Ritchie, "C Programming language", Prentice Hall of India.

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**Module 1: Introduction**

**Contact hours: 2**

1.1 Sources of energy; General structure of electrical power systems, Power transmission and distribution via overhead lines and underground cables.

**Module 2: DC circuits**

**Contact hours: 8**

2.1 Definitions of active, passive, linear, non-linear circuits elements and networks, Kirchoff's laws, Nodal and mesh analysis, voltage and current sources, network theorems, superposition. Thevenin's, Norton's, maximum power transfer, Millman's, and reciprocity theorems, analysis of simple circuits with DC excitation.

**Module 3: Single phase AC circuits**

**Contact hours: 10**

3.1 Generation of single phase sinusoidal EMF, instantaneous, average and effective value, form and peak factor, examples of other alternating waveforms and average and effective value calculations, concept of phasor and phasor diagrams, lagging and leading of phasors, pure resistive, inductive and capacitive circuits, power factor, complex power, R-L, R-C and R-L-C series circuits, parallel AC circuits, series and parallel resonance.

**Module 4: Semiconductor Devices:**

**Contact hours: 4**

4.1 Review of atomic structure, Intrinsic and Extrinsic semiconductors, current carriers in semiconductors, P-type and N-type materials, P-N junction, biasing, characteristic curve, load line, Zener diode. Special semiconductor devices (Qualitative only) – tunnel diode, backward diode, varactor and PIN diode, their construction, operation and applications.

**Module 5: Bipolar transistor (Qualitative only)**

**Contact hours: 3**

5.1 Construction and schematic representation of PNP and NPN transistors, formation of PNP / NPN junctions, energy band diagram; transistor mechanism and principle of transistors.

**Module 6: Bipolar transistor (Qualitative only)**

**Contact hours: 2**

6.1 Different types of biasing system, bias stabilisation, analysis of CE, CB & CC configuration, their I/P & O/P characteristics, transistor rating and specifications.

**Module 7: Rectifier Circuits**

**Contact hours: 3**

7.1 Half wave and full wave rectifier (Qualitative only): ripple factor, rectification efficiency, Peak Inverse Voltage. Filtering (passive) and voltage regulation (Qualitative only): Capacitor filter, Inductor filter, 'T' filter, ' $\pi$ ' filter. Zener as voltage regulator.

**Module 8: Cathode Ray Oscilloscope**

**Contact hours: 2**

8.1 Construction features of cathode ray tube, concept of dual beam CRO; application of CRO for different electrical measurements: amplitude frequency and phase of sine wave, Lissajous figure.

**Books / References:**

1. D.P. Kothari & I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. B.L. Thereja, A.K. Thereja, "A Textbook of Electrical Technology", S.Chand
4. Jacob Millman, "Electronics Devices & Circuits", McGraw Hill Education; 4 editions (2015).
5. Boyestad&Nashelsky, "Electronics Devices and circuit theory", Pearson Education India; 11th edition (2015).
6. S. Salivahanan& N. Suresh Kumar, "Electronic Devices and Circuits", McGraw Hill Education; Fourth edition (2017).
7. Albert Malvino& David Bates, "Electronic Principles", Tata McGraw Hill Publication, 2010.
8. A.K. Maini, "Analog Circuits", Khanna Publishing House, Ed. 2018.



**Paper Code: DEE273**

**Paper Name: Fundamentals of Electrical & Electronics Engineering Lab**

**Total Contact Hours:16**

**Credit: 2**

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

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**Experiment-1:** Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, rheostat and wattmeter.

**Experiment-2:** Make a measured resistance from a given rheostat.

**Experiment-3:** Verification of Kirchhoff's laws.

**Experiment-4:** Verification of Superposition theorem.

**Experiment-5:** Verification of Thevenin's theorem.

**Experiment-6:** P-N Junction.

**Experiment-7:** Half-wave rectifier circuit.

**Experiment-8:** Full-wave rectifier circuit.

**Experiment-9:** V- I characteristics of transistors.

**Experiment-10:** Wiring.

**Module 1: Calculus-I**

**Contact hours: 16**

**a. Differential Calculus**

- 1.1 Sets: Definition, types and operation on Sets.
- 1.2 Relation: Definition, domain and range, equivalence relation.
- 1.3 Functions: definition, types of functions.
- 1.4 Limits: Concept and evaluation of limits, indeterminate forms, L'Hospital's Rule.
- 1.5 Differentiation: Differentiation by first principle. Differentiation of sum, product and quotient, function of function, Chain rule. Differentiation of trigonometric, inverse trigonometric, hyperbolic, logarithmic and parametric functions, applications.
- 1.6 Basic concepts of partial differentiation.

**b. Integral Calculus**

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

**Module 2: Statistics**

**Contact hours: 10**

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

**Module 3: Co-ordinate Geometry**

**Contact hours: 14**

- 3.1 Co-ordinate Systems, Cartesian and polar co-ordinates, distance between two points, section formula, area of triangle, collinearly and co-planarity.
- 3.2 Straight Line: Definition, general and standard form of equations, intersection of straight lines: angle between them, bisector of angle between them.
- 3.3 Change of co-ordinate axes, shifting of origin and rotation of axes.
- 3.4 Circle: Standard equations and simple problems, tangent and normal.
- 3.5 Basic idea of parabola, ellipse and hyperbola, their standard equations and basic properties.

**Books / References:**

1. Mathematics for Polytechniques, TTTI, Bhopal, Latest Edition.
2. Mathematics for Polytechniques, S. P. Deshpande, Latest Edition.
3. Engineering Mathematics, I.B. Prasad, Latest Edition.
4. A text Book Matrices, Shanti Narayan, S. Chand & Co. New Delhi, 1998
5. Introduction to Statistics, L. Choudhury, KitapGhar, Guwahati. Latest Edition.
6. Fundamental of Statistics, Kapoor & Gupta, Latest Edition.
7. Mathematics Textbook for class XI and XII, NCERT, Latest Edition.

**Paper Code: DME205**  
**Paper Name: Engineering Mechanics**  
**Total Contact Hours:41**

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

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**Module 1: Forces and Moments**

**Contact hours: 12**

- 1.1 Force, Moment and Couple, Resultant of forces, Forces in space.
- 1.2 Equilibrium, FBD, General equations of equilibrium

**Module 2: Friction**

**Contact hours: 8**

- 2.1 Introduction to dry friction. Laws of friction, friction of simple machines- inclined planes, Screw jacks.

**Module 3: Center of gravity and moment of inertia**

**Contact hours: 8**

- 3.1 Center of gravity of axes, volume and composite bodies: Area moment of inertia and mass moment of inertia for plane figures and bodies.

**Module 4: Center of gravity and moment of inertia**

**Contact hours: 5**

- 4.1 Linear and circular motion, Linear and angular velocities and acceleration,
- 4.2 Units relation in between centrifugal force, Its uses in Engineering problems.
- 4.3 Angle of banking super elevation problems. Bodies moving on a level circular path, skidding, overturning.

**Module 5: Work, Power and Energy**

**Contact hours: 3**

- 5.1 Work, power and Energy definition and application
- 5.2 Potential and kinetic energy-definition and Units and their Engineering problems.

**Module 6: Simple Lifting Machines**

**Contact hours: 5**

- 6.1 Definition and importance of Simple Machines.
- 6.2 Law of Machine, problems. Simple lifting Machines –simple Wheel and axle, differential wheel and axle and screw jack(simple) problems.
- 6.3 Definition M.A, V.R and efficiency and their relationship. Simple problems

**Books / References:**

1. Engineering Mechanics: S Timoshenko & D H Young. 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

**Module 1: Light**

**Contact hours: 5**

- 1.1 Reflection, Reflection on spherical mirror, idea of real and virtual image, mirror formula, sign conventions (mirror formula to be assumed), nature size and position of images of different positions of objects, numerical problems.
- 1.2 Refraction, refractive index, critical angle, total internal reflection, between critical angle and refractive index, Prism, refraction through prism, minimum deviation, numerical problems. Lens, refraction through lens (lens formula to be assumed of a lens), numerical problems.

**Module 2: Electrostatics**

**Contact hours: 3**

- 2.1 Concept of Electric charge according to modern electron theory, unit of charge, Inverse square law, electric field, Electric line of force, electric intensity
- 2.2 Potential at a point due to a point charge, relation between intensity and potential with deduction of the formula
- 2.3 Capacity of a condenser, series and parallel combination, different type of condenser, numerical problems.

**Module 3: Current Electricity**

**Contact hours: 11**

- 3.1 Potential difference and electric current with their units.
- 3.2 Difference between emf. and potential difference; internal resistance of cell. Voltaic cell; defects of cell: local action and polarization and their removal.
- 3.3 Difference between primary and secondary cells with examples, grouping of cells, series, parallel and mixed combinations of cells.
- 3.4 Basic D.C. Circuits: Ohm's Law and its verification, mathematical expression, Kirchoff's Law, numerical problems.
- 3.5 Definition of resistance, conductance, effects of temperature on resistance, Series and parallel combination of resistance, resistance per unit length, numerical problems.
- 3.6 Heating Effect of Current: Joule's law, electricity energy and power, numerical problems
- 3.7 Thermoelectric effect: Thermocouple, Seebeck effect, Peltier effect and Thomson effect.
- 3.8 Chemical effect of current: electrolysis, Faradays's laws of electrolysis

**Module 4: Magnetism**

**Contact hours: 5**

- 4.1 Nature and artificial magnets theories, different types of magnets, induced magnetism, nature of polarities.
- 4.2 Inverse square law, magnetic intensity at end – on and broad – side on position, uniform and non – uniform field, magnetic moment, couple on a magnet in a uniform field, Tangent law.
- 4.3 Elements of terrestrial magnetism

**Module 5: Electromagnetism**

**Contact hours: 4**

- 5.1 Magnetic effect of current, nature of magnetic field due to straight and circular conductor, due to solenoid, Fleming's left and right hand rules, effect of current following through two parallel conductors.
- 5.2 Electro Magnetic induction: e. m. f. induced in a coil due to magnet, Faraday's laws of electro – magnetic induction, Lenz Law, self and mutual induction.

**Module 6: Modern Physics**

**Contact hours: 4**

- 6.1 Photo Electric Emission: explanation and demonstration of photo electric current, photo electric equation with its physical signification.
- 6.2 Nuclear Energy: Atomic mass unit, mass energy equivalence, mass defect
- 6.3 X- rays: Properties and its application in industry (Production apparatus not necessary)

6.4 Radio – activity: Natural and artificial radioactivity, emission of alpha, beta and gamma radiation, their properties and uses.

**Module 7: Electronics**

**Contact hours: 2**

7.1 Thermionic emission: vacuum tube, diode and triode, their working principle, concept of rectifier and amplifier, use of diode as rectifier.

**Module 8: Semi-conductor Physics**

**Contact hours: 2**

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

**Books / References:**

1. Modern Approach to Physics Part I & II, DilipSarma, N G Chakraborty, and K N Sharma, Kalyani Publisher, New Delhi.
2. Applied Physics Part I & II, Manpreet Singh, Dr. Major Singh, and Mrs. Hitashi Gupta, S K Kataria & Sons- New Delhi.
3. Basic Applied Physics, R K Gaur, Dhanpat Rai Publication- New Delhi

**Paper Code: DPH276**

**Credit: 2**

**Paper Name: Applied Physics – II Lab**

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

**Total Contact Hours:20**

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**Experiment-1** To verify the laws of reflection using a plane mirror and to study the characteristics of image formed.

**Experiment-2:** To determine the refractive index of the material of the glass slab by pin method.

**Experiment-3:** To determine the focal length of a convex lens by U-V method.

**Experiment-4:** To determine the focal length of a convex lens by plane mirror method.

**Experiment-5:** To draw I-D curve and to determine the refractive index of the material of a prism.

**Experiment-6:** To locate the poles of a bar magnet and to measure the magnetic length.

**Experiment-7:** To plot magnetic lines of force of a bar magnet with north pole pointing north and to locate the neutral point/to plot magnetic lines of force of a bar magnet with south pole pointing north and to locate the neutral point.

**Experiment-8:** To verify Ohm's law by Ammeter-voltmeter method.

**Experiment-9:** To find equivalent resistance using voltmeter with I. Three resistances connected in series II. Three resistances connected in parallel.

**Experiment-10:** To measure the unknown resistance of the material of a wire by meter bridge using Wheatstone bridge principle.

# Semester III

**Paper Code: DCSE301**  
**Paper Name: Computer Architecture and Organization**  
**Total Contact Hours:42**

**Credit: 8**  
**L-T-P: 3-1-0**

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**Module 1: Introduction to Computer Architecture** **Contact hours: 6**

- 1.1 Stored program concept — Von Neumann architecture (definition only)
- 1.2 Functional units, Bus structure
- 1.3 Brief introduction to logic gates, flip-flop, encoder/decoder, multiplexer, half adder/full adder

**Module 2: Number Representation** **Contact hours: 6**

- 2.1 Signed numbers
- 2.2 Fixed point and floating point representation
- 2.3 Complements, various Arithmetic operation (with signed magnitude & floating point numbers)
- 2.4 Booth's algorithm

**Module 3: Basic Computer Organisation and Design** **Contact hours: 7**

- 3.2 Instruction codes, Computer registers
- 3.3 Computer instructions, Timing and Control, Instruction cycle
- 3.4 Memory-Reference Instructions
- 3.5 Input-output and interrupt
- 3.6 Complete computer description
- 3.7 Design of Basic computer, design of Accumulator Unit

**Module 4: Central Processing Unit** **Contact hours: 9**

- 4.1 Component of ALU (in block diagram only)
- 4.2 General Register organisation
- 4.3 Stack organisation, Instruction format
- 4.4 Different types of Instructions, addressing modes
- 4.5 Hardware control unit- its different functions
- 4.6 Microprogrammed control unit – control memory, micro program example, design of control unit.

**Module 5: Memory Organisation** **Contact hours: 7**

- 5.1 Concept of bits, bytes and words
- 5.2 Storage of numbers and characters
- 5.3 Memory hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, Virtual memory

**Module 6:Input-Output Organisation** **Contact hours: 7**

- 6.1 Various I/O devices
- 6.2 Input-output interface
- 6.3 Asynchronous Data Transfer
- 6.4 Mode of Transfer, Priority interrupt
- 6.5 DMA, Input output processor

**Books / References:**

- 1. Computer System Architecture – by Mano, PHI

2. Computer Organisation & Architecture – by Stallings, PHI
3. Computer Organisation – by Carl Hamacher, Zvonko Vranesic and Safwat Zaky, MGH

**Paper Code: DCSE302**  
**Paper Name: System Programming**  
**Total Contact Hours: 40**

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

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**Module 1: Assembly Language**

**Contact hours: 6**

- 1.1 Introduction to Assembly Language
- 1.2 Description of functional Characteristics, addressing modes
- 1.3 Data types and instruction structure
- 1.4 Registers
- 1.5 Indexing
- 1.6 Instruction set description

**Module 2: Macros**

**Contact hours: 4**

- 2.1 Recursive macros
- 2.2 Sub routines
- 2.3 Stacks, procedures, exception handling

**Module 3: Assemblers**

**Contact hours: 8**

- 3.1 Overview of assembly, assembly processes
- 3.2 Processing of imperative, declarative and assembler directive statements
- 3.3 Relocation, linking and loading concepts
- 3.4 One and Two Pass assembler
- 3.5 Symbol table organization, program sections, output forms

**Module 4: Macro Assembler**

**Contact hours: 6**

- 4.1 Macro definitions and parameters
- 4.2 Macro call Expansion
- 4.3 Macro definition and macro call within a macro
- 4.4 Conditional assembly macro processor

**Module 5: Loaders**

**Contact hours: 6**

- 5.1 Review of loading, linking and relocation
- 5.2 Absolute, dynamic and direct loading schemes
- 5.3 Program linking schemes and relocation of external references
- 5.4 Optional features in loaders and linking editors
- 5.5 Overlay structures and dynamic loading

**Module 6: Compiler Construction**

**Contact hours: 10**

- 6.1 Introduction to Compiler
- 6.2 Phases and passes, Bootstrapping
- 6.3 Lexical Analysis
- 6.4 Syntax analysis
- 6.5 Bottom Up and Top Down parsers
- 6.6 Translation
- 6.7 Code Optimization
- 6.8 Code Generation

**Books / References:**

1. Systems Programming by DmDhamdhare, Tata McGraw-Hill Education.
2. Systems Programming by Donovan, Tata McGraw-Hill Education.

**Paper Code: DCSE372**  
**Paper Name: System Programming Lab**  
**Total Contact Hours: 30**

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

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**Basics of Unix:** Introduction, Unix Architecture, Files and Directories Management, Environment, Basic Utilities, Pipes and Filters, Processes, Text Editors, Shell and Basics of Shell Scripting.

**NASM Assembler:** Introduction, Installation and Environmental Setup

**Assembly Language:** Basic Syntax, Memory Segments, Registers, System Calls, Addressing Modes, Variable, Constants, Arithmetic Instructions, Logical Instructions, Conditions, Loops, Numbers, String, Arrays, Procedure, Recursion, Macros, File & Memory Management

Assembly Language programs that demonstrate all the above

**Lex and Yacc:** Writing basic compiler using Lex and yacc

**Books / References:**

1. Das, S. (2000). UNIX, Concepts and Applications. Tata McGraw-Hill.
2. Das, S. (2012). Your UNIX/Linux: The Ultimate Guide. McGraw-Hill
3. Duntemann, J. (2000). Assembly language step-by-step: programming with DOS and Linux. John Wiley & Sons.



**Paper Code: DECE303**  
**Paper Name: Digital Electronics**  
**Total Contact Hours: 30**

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

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**Module 1: Number Systems & Boolean Algebra**

**Contact hours: 4**

- 1.1 Introduction to different number systems – Binary, Octal, Decimal, Hexadecimal
- 1.2 Conversion from one number system to another
- 1.3 Boolean variables – Rules and laws of Boolean Algebra De-Morgan's Theorem
- 1.4 Karnaugh Maps and their use for simplification of Boolean expressions

**Module 2: Logic Gates**

**Contact hours: 6**

- 2.1 Logic Gates – AND, OR, NOT, NAND, NOR, XOR, XNOR: Symbolic representation and truth table
- 2.2 Implementation of Boolean expressions and Logic Functions using gates. Simplification of expressions

**Module 3: Combinational Logic Circuits**

**Contact hours: 6**

- 3.1 Arithmetic Circuits – Addition, Subtraction 1's 2's Complement, Half Adder, Full Adder, Half Subtractor, Full Subtractor, Parallel and Series Adders, Encoder, Decoder
- 3.2 Multiplexer – 2 to 1 MUX, 4 to 1 MUX, 8 to 1 MUX.
- 3.3 Applications Demultiplexer – 1 to 2 DEMUX, 1- 4 DEMUX, 1- 8 DEMUX problems

**Module 4: Sequential Logic Circuits**

**Contact hours: 6**

- 4.1 Flip Flops – SR, JK, T, D, FF, JK-MS, Triggering
- 4.2 Counters – 4 bit Up – Down Counters, Asynchronous/ Ripple Counter, Decade Counter- Mod 3, Mod 7 Counter, Johnson Counter, Ring Counter
- 4.3 Registers – 4bit Shift Register: Serial In Serial Out, Serial in Parallel Out, Parallel In Serial Out, Parallel In Parallel Out

**Module 5: Memory Devices**

**Contact hours: 8**

- 5.1 Classification of Memories – RAM Organization, Address Lines and Memory Size, Static RAM, Bipolar RAM, cell Dynamic RAM, D RAM, DDR RAM
- 5.2 Read Only memory – ROM organization, Expanding memory, PROM, EPROM, EEPROM, Flash memory
- 5.3 Data Converters – Digital to Analog converters, Analog to Digital Converters

**Books / References:**

1. Digital principles & Applications: Albert Paul Malvino & Donald P. Leach McGraw Hill Education; Eighth edition (ISBN: 978-9339203405)
2. Digital Electronics: Roger L. Tokheim & Macmillian McGraw-Hill Education (ISE Editions); International 2 Revised ed edition (ISBN: 978-0071167963)
3. Digital Electronics – an introduction to theory and practice: William H. Gothmann Prentice Hall India Learning Private Limited; 2 edition (ISBN: 978-8120303485)
4. Fundamentals of Logic Design: Charles H. Roth Jr. Jaico Publishing House; First edition (ISBN: 978-8172247744)
5. Digital Electronics: R. Anand Khanna Publications, New Delhi (Edition 2018) ISBN: 978-93-82609445

**Paper Code: DECE373**

**Credit: 2**

**Hands-on experiments related to the course contents of DECE303**

**Paper Code: DMA301**  
**Paper Name: Mathematics-III**  
**Total Contact Hours: 40**

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

**Module 1: Matrices**

**Contact hours: 8**

- 1.1 Definition, Operation of matrices.
- 1.2 Special Matrices – Square, diagonal, row, column, zero or null, unit matrix, upper and lower triangular, symmetric and skew – symmetric matrices.
- 1.3 Adjoint of a matrix, inverse of a matrix, finding inverse using adjoints and elementary transformations.
- 1.4 Rank of a matrix.
- 1.5 Solution of simultaneous linear equations.

**Module 2: Ordinary differential equations (ODE)**

**Contact hours: 20**

**First Order ODE**

- 2.1 Formation of differential equations.
- 2.2 Separable equations.
- 2.3 Equations reducible to separable form.
- 2.4 Exact equations.
- 2.5 Integrating factors
- 2.6 Linear first order equations; Bernoulli equation.
- 2.7 Orthogonal Trajectories.

**Second Order ODE**

- 2.8 Homogenous linear equations of arbitrary order with constant coefficients.
- 2.9 Non homogenous linear equations with constant coefficients.
- 2.10 Euler's and Cauchy's equations.
- 2.11 Method of variation of parameters.
- 2.12 System of linear differential equations.

**Module 3: Vector Calculus**

**Contact hours: 12**

- 3.1 Introduction to vector Calculus.
- 3.2 Scalar field and vector field.
- 3.3 Derivative and integration of vector functions.
- 3.4 Partial derivative of vectors.
- 3.5 Directional derivatives.
- 3.6 Tangent plane and normal to a level surface.
- 3.7 Gradient, divergence and curl.

**Books / References:**

1. S.S. Sastry, Prestice Hall of India, New Delhi Ed. 1994, Engineering Mathematics Vol-I
2. Thomas & Finney, Narosa Publishing Co. New Delhi, Ed. 1999, Calculus and Analytical Geometry
3. B.S. Grewal, Krishna Publishers, New Delhi, Ed. 1999, Higher Engineering Mathematics
4. Murray R. Spiegel and Seymour Lipschutz, Mcgraw Hill, (Schaum's Outlines Series), 2nd edition 2009, Vector Analysis
5. Bhu Dev Sharma, KedarNath Ram Nath, Latest Ed., Differential Equations
6. Dr. M. D. Raisinghania, S. Chand, 19th Edition, Ordinary and partial Differential Equations
7. Shepley L. Ross, Wiley, Third Edition (Wiley Student Edition), Differential Equations

**Paper Code: DHSS302**  
**Paper Name: Engineering Economics and Accountancy**  
**Total Contact Hours: 52**

**Credit: 8**  
**L-T-P: 3-1-0**

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### **Part-A Engineering Economics**

**Module 1: Introduction to Economics** **Contact hours: 4**

- 1.1 Definition of Economics, Its utility and scope of the Study.
- 1.2 Definition of Engineering Economics
- 1.3 Meaning and concepts of Utility, Consumption, value, price, Goods and National income, Inflation.
- 1.4 Wants, Definition and Characteristics
- 1.5 Wealth and Welfare – Definition, meaning and types.

**Module 2: Demand and Supply** **Contact hours: 6**

- 2.1 Meaning and types of Demand
- 2.2 The law of Demand, its limitations
- 2.3 Preparation of Demand Schedule
- 2.4 Meaning of Supply
- 2.5 The law of supply, its limitations
- 2.6 Preparation of supply schedule

**Module 3: Production** **Contact hours: 4**

- 3.1 Meaning and factors of Production
- 3.2 Factors determining efficiency of labour
- 3.3 Saving, investment and capital formation
- 3.4 Meaning of Production Function

**Module 4: Money** **Contact hours: 3**

- 4.1 Meaning of Money
- 4.2 Types of Money
- 4.3 Functions of Money

**Module 5: Banking Organisation** **Contact hours: 3**

- 5.1 Central Bank – its functions
- 5.2 Commercial Banks – its functions

**Module 6: Pricing** **Contact hours: 4**

- 6.1 Objective of Pricing Policy
- 6.2 Price determinants
- 6.3 Price discrimination

### **Part-B Accountancy**

**Module 7: Introduction to Book Keeping and Accountancy** **Contact hours: 5**

- 7.1 Definition and objectives of Book Keeping
- 7.2 Need and Advantages of Book Keeping
- 7.3 Definition of Accounting
- 7.4 Difference between book keeping and accounting
- 7.5 Double Entry Systems – main features

## 7.6 Advantage and disadvantages of Double Entry System

### **Module 8: Introduction to Computerised Accounting System**

**Contact hours: 3**

8.1 Components of Computerised Accounting Software

8.2 Need for Computerised Accounting

8.3 Difference between computerised Accounting and Manual Accounting

### **Module 9: Transaction**

**Contact hours: 3**

9.1 Definition

9.2 Meaning of Account

9.3 Classification of Accounts: Traditional Approach and Modern Approach

9.4 Meaning of Debit and Credit

9.5 Rules of Debit and Credit

### **Module 10: Journal and Ledger**

**Contact hours: 5**

10.1 Meaning of Journal

10.2 Recording of Transaction in Journal

10.3 Meaning of Ledger

10.4 Objective and Utility of Ledger

10.5 Posting and Balancing of Ledger

10.6 Distinction between Journal and Ledger

10.7 Names of Different Books of Accounts

### **Module 11: Cash Book**

**Contact hours: 5**

11.1 Meaning and Importance of Cash Book

11.2 Characteristics and Advantages of Cash Book

11.3 Discount – Trade Discount and Cash Discount

11.4 Different Types of Cash Book: Single column cash book, Double column Cash Book and Triple column Cash book

11.5 Bank Reconciliation Statement – Basic Idea

### **Module 12: Trial Balance and Error in Accounting**

**Contact hours: 3**

12.1 Meaning and Objects of Trial Balance

12.2 Main features and Advantage of Trial Balance

12.3 Preparation of Trial Balance

12.4 Types of Error in Accounting

### **Module 13: Components of Final Accounts**

**Contact hours: 4**

13.1 Meaning and objectives of Trading Account

13.2 Contents of Trading Account

13.3 Meaning and objectives of Profit and Loss Account

13.4 Contents of Profit and Loss Account

13.5 Meaning of Depreciation, revenue expenditure and capital expenditure

13.6 Contents of Balance Sheet

### **Books / References:**

1. Introductory Micro Economics- Sandeep Garg- Dhanpat Rai Publication Pvt. Ltd. New Delhi.
2. Introductory Macro Economics- Sandeep Garg- Dhanpat Rai Publication Pvt. Ltd. New Delhi.
3. Theory and Practice of Accountancy-B.B. Dam, R.A. Sarada, R. Barman, B. Kalita-Capital Publishing Company, Guwahati-5.
4. Book-Keeping & Accountancy- Juneja. Chawla & Saksena- Kalyani Publisher, New Delhi-110002.
5. Tally. ERP 9 for Beginners- Tally Solutions Pvt. Ltd.- Sahaj Enterprises, Bangalore.

# Semester IV

**Paper Code: DCSE401**

**Credit: 8**

**Paper Name: Data Structure using C**

**L-T-P: 3-1-0**

**Total Contact Hours: 42**

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## **Module 1: Introduction to Data Structure**

**Contact hours: 2**

- 1.1 Introduction
- 1.2 Basic Terminology
- 1.3 Elementary Data Organization
- 1.4 Data Structures
- 1.5 Data Structure Operations
- 1.6 Algorithms, Complexity, Time-space Trade off

## **Module 2: Preliminary Concept**

**Contact hours: 3**

- 2.1 Mathematical notations and functions
- 2.2 Algorithm Notations
- 2.3 Control Structures
- 2.4 Complexity of Algorithms
- 2.5 Asymptotic notations
- 2.6 Sub Algorithms
- 2.7 Variables, Data types

## **Module 3: String Processing and Terminology**

**Contact Hours: 2**

- 3.1 Introduction to String
- 3.2 Basic Terminology
- 3.3 Storing Strings
- 3.4 Character Data Types
- 3.5 String Operation
- 3.6 Word Processing
- 3.7 Pattern Matching Algorithms

## **Module 4: Concept of Arrays, Records and Pointers**

**Contact Hours: 4**

- 4.1 Introduction to Array
- 4.2 Linear Arrays
- 4.3 Representation of Linear Arrays in memory
- 4.4 Traversing Linear Array
- 4.5 Inserting and Deleting
- 4.6 Multidimensional Array
- 4.7 Pointers, pointer Array
- 4.8 Record and Its Structure
- 4.9 Representation of Records in Memory
- 4.10 Matrices, Spares Matrices

**Module 5: Introduction to Linked List**

**Contact Hours: 5**

- 5.1 Introduction to Linked Lists
- 5.2 Representation of Linked List in Memory
- 5.3 Traversing a Linked List
- 5.4 Searching a linked list
- 5.5 Memory Allocation, Garbage Collection
- 5.6 Insertion into a linked list
- 5.7 Deletion form a linked list
- 5.8 Header Linked list, Circular Linked List
- 5.9 Two-Ways Lists

**Module 6: Concept of Stacks, Queues, Recursion**

**Contact Hours: 6**

- 6.1 Stacks
- 6.2 Array Representation of Stacks
- 6.3 Arithmetic Expression, Polish Notation
- 6.4 Application of stacks
- 6.5 Recursion
- 6.6 Towers of Hanoi
- 6.7 Implementation of Recursive Procedures of stacks
- 6.8 Queues
- 6.9 Deques
- 6.10 Priority Queues
- 6.11 Application of Queues

**Module 7: Concept of Tree and Tree Traversal**

**Contact Hours: 9**

- 7.1 Introduction to Trees
- 7.2 Binary Tree

- 7.3 Representation of Binary Tree in memory
- 7.4 Traversing of Binary Tree
- 7.5 Traversal Algorithm using stacks
- 7.6 Header Nodes, threads
- 7.7 Binary Search Tree
- 7.8 Searching and inserting in a Binary Search tree
- 7.9 Deleting a Binary Search tree
- 7.10 Balanced Binary Trees
- 7.11 AVL Search Trees
- 7.12 Heap
- 7.13 General Tree

### **Module 8: Graphs & its Representation**

**Contact Hours: 4**

- 8.1. Introduction to Graphs
- 8.2 Graph Theory Terminology
- 8.3 Sequential Representation of Graphs, Adjacency matrix, path matrix
- 8.4 Warshall's Algorithms
- 8.5 Linked Representation of a graph
- 8.6 Operation of Graph
- 8.7 Traversing a Graph
- 8.8 Spanning Trees

### **Module 9: Searching and Sorting Techniques**

**Contact Hours: 7**

- 9.1 Introduction
- 9.2 Searching: Linear Search and Binary Search
- 9.3 Sorting: Bubble sort, Selection Sort, Insertion sort, Quick sort, Merge sort, Heap Sort
- 9.4 Hashing

#### **Books / References:**

1. Data Structure Using C - Seymour Lipschutz. , Mc graw Hill.
2. Fundamentals of Computer Algorithms- Horowitz, E & Sahani, S- Galgotia
3. Data Structures Using C - Reema Thareja, Oxford University Press

**Paper Code: DCSE471**

**Credit: 3**

**Paper Name: Data Structure Using C Lab**

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

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1. Implementation Traversing, Insertion, and Deletion operation of linear array.
2. Implementation of linked list.
3. Implementation of Stack using array and linked list.
4. Implementation of Queues using array and linked list.
5. Implementation of Linear and Binary Search techniques
6. Implementation of different sorting algorithms.
7. Implementation of Binary tree traversal
8. Implementation of Graph traversal



**Paper Code: DCSE402**

**Credit: 6**

**Paper Name: Computer Communication & Networking**

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

**Total Contact Hours: 42**

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**Module 1: IntroductionComputer Network**

**Contact hours: 5**

- 1.1 Introduction to Networks
- 1.2 Uses of Computer Network
- 1.3 Network Architecture
- 1.4 Types of Computer Network
- 1.5 Protocols and Standards
- 1.6 O.S.I Reference Model
- 1.7 Service Primitives, Relationship of Services to protocols
- 1.9 Connection Oriented and Connection Less Services
- 1.10 TCP/IP Protocol Suite

**Module 2: Physical Layer**

**Contact hours: 6**

- 2.1 Transmission Medium
- 2.2 Wireless Transmission
- 2.3 Telephone System
- 2.4 ISDM
- 2.5 Transmission and Switching

**Module 3: Medium Access Sub layer**

**Contact hours: 5**

- 3.1 ALOHA
- 3.2 CSMA
- 3.3 Collision Free Protocols
- 3.4 Channelization protocols
- 3.5 IEEE Standard 802 for LAN Ethernet, Token Bus, Token Ring
- 3.6 Bridges

**Module 4: Data Link Layer**

**Contact hours: 4**

- 4.1 Data Link Layer Design Issue
- 4.2 Error Detection and Correction
- 4.3 Elementary Data Link Protocols
- 4.4 Sliding windows protocols

**Module 5: Network Layer****Contact hours: 4**

- 5.1 Network Layer Design Issues
- 5.2 Logical Addressing
- 5.3 Routing Algorithms
- 5.4 Congestion Control Algorithms

**Module 6: Transport Layer****Contact hours: 4**

- 6.1 Transport layer Services
- 6.2 Elements of Transport Protocols
- 6.3 Different Transport Layer Protocols

**Module 7: Session Layer****Contact hours: 4**

- 7.1 Design Issues
- 7.1 Concepts of Data Exchange, dialog management, activity management
- 7.2 Remote Procedure Call, Client server model

**Module 8: Presentation Layer****Contact hours: 4**

- 8.1 Design Issues
- 8.2 Data compression Techniques
- 8.3 Elementary idea of cryptography

**Module 9: Application Layer****Contact hours: 4**

- 9.1 Design Issues
- 9.2 File Services
- 9.3 DNS, E Mail, FTP, HTTP

**Module 10: Concepts of Internet and www, HTML****Contact hours: 2****Books / References:**

1. Computer Networks- A.S. Tanenbaum, PHI
2. Data Communications and Networking- Behrouz A.Forouzan, Tata McGraw-Hill
3. Data Communication & Computer Networks –W.Stallings, PHI

**Paper Code: DIE403**

**CREDITS: 6**

**Paper Name: Microprocessor**

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

**Contact Hours: 40**

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**Module 1: Evolution of Microprocessor**

**Contact hours 2**

- 1.1 Evolution of Microprocessor, Features of Microprocessors
- 1.2 Application Microprocessor in daily life with a few examples

**Module 2: Architecture of a Microprocessor**

**Contact Hours 7**

- 2.1 Explanation of the blocks
- 2.2 Concept of bus structure
- 2.3 Register to register transfer
- 2.4 Communication with I/O and memory (w.r.t 8086/8088 microprocessor).
- 2.5 Pin details of 8086/8088 CPU and their function in brief.

**Module 3: Addressing Modes and Instruction Execution**

**Contact Hours 5**

(w.r.t 8086/8088 CPU),

- 3.1 Instruction cycles, Instruction set, Timing diagram (w.r.t 8086/8088 CPU).
- 3.3 Concept of Assembler and Compilers.

**Module 4: Memory and I/O interfacing**

**Contact Hours 7**

- 4.1 Concept of address space, address/data bus de-multiplexing
- 4.2 Address and data bus buffering, address decoding
- 4.3 I/O concept, Memory interfacing concept, I/O mapped I/O and memory mapped I/O
- 4.4 Interrupts, Types of interrupts, data transfer schemes- Synchronous, asynchronous and interrupt driven
- 4.5 DMA data transfer scheme.

**Module 5: Application of Assembly Language Programming in Microprocessor**

**Contact Hours 7**

(Use of assembly language may be limited to 8086/8088 CPU)

- 5.1 Examples of register to register, register to memory, memory to register, block of data movement from one area of memory to another, merging of two blocks of data, data block exchange.
- 5.2 Examples of arithmetic addition, subtraction, multiplication and division
- 5.3 Examples of searching and sorting (simple)

5.4 Examples using of look up tables

5.5 Use subroutines and delay program.

**Module 6: Interfacing of Peripheral Chips**

**Contact Hours 6**

6.1 Brief description of 8255, 8253, 8251, 8257, 8237 and 8259

6.2 Interfacing of the chips with some standard CPU.

**Module 7: PC interfacing and Intel 386 & 486 processors**

**Contact Hours 6**

7.1 Interfacing of Input/output peripherals like LED

7.2 Seven(7) segment LED display modules, stepper motor, relays through digital I/O card or through the parallel port, EPROM programming using PC port

7.3 Architecture, register organisation and memory organisation of 386 and 486 processors

**Books / References:**

1. Advanced Microprocessor and Interfacing - Badri Ram, TMH
2. Microprocessor Architecture, Programming & Application – R.S. Gaonkar
3. Introduction to Microprocessor- R. Mathur
4. Microprocessors and Interfacing- Douglas V Hall

**Paper Code: DIE473**

**CREDITS: 3**

**Paper Name: Microprocessor Lab**

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

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**Experiment I.**

Acquaintance with the microprocessor trainer kit hardware and the user's commands (Dynalog/Vinyties/ALS)

**Experiment II.** Assembly Language Program development in TASM/NASM

Data transfer program:

- i. Register to register, register to memory and vice-versa
- ii. Arithmetic Operation- 8bit addition and subtraction
- iii. Multi-byte addition and subtraction
- iv. Multiplication using repeated addition
- v. Multiplication using shift – add process
- vi. Signed multiplication, Binary division, BCD division.

**Experiment III.**

Array processing:

- i. Adding one entry to an array, checking of an ordered list
- ii. Replacing one or more entries in a list, storing and searching
- iii. Block movement, block exchange and data insertion.

**Experiment IV.**

Look-up table:

- i. Finding square cubes etc. of a number using look-up table
- ii. Code conversion using look-up table.

**Experiment V.** Delay program, use of subroutine (use the above programme as a sub routine in a main program)

**Paper Code: DCSE404**

**Credit: 8**

**Paper Name: Operating System**

**L-T-P: 3-1-0**

**Total Contact Hours: 42**

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**Module 1: Introduction to Operating System**

**Contact hours: 2**

1.1 Definition

1.2 Brief history

1.3 Structure and Function of Operating System

1.4 Different Types of Operating Systems

**Module 2: Processes and Process Control Block**

**Contact hours: 2**

2.1 Definition

2.2 Process States

2.3 PCB

2.4 Threads

**Module 3: Process Synchronization**

**Contact hours: 5**

3.1 Inter-process Communication

3.2 Critical Section Problem

3.3 Synchronization Hardware

3.4 Semaphores

3.5 Classical Problems of Synchronization

**Module 4: Process Scheduling and Context switching**

**Contact hours: 4**

4.1 Basic concepts

4.2 Context Switching

4.3 Scheduling criteria

4.4 Different Scheduling Algorithms

**Module 5: Memory Management**

**Contact hours: 8**

5.1 Resident Monitor

5.2 Multiple Partition

5.3 Garbage Collection and Compaction

5.4 Page Memory Management, Page replacement Algorithm

5.5 Swapping

5.6 Segmentation,

5.7 Segmented page memory management

5.8 Demand paging

5.9 Virtual Memory

**Module 6: File System & its implementation**

**Contact hours: 5**

6.1 Concept of files and directories

6.2 File system Implementation

6.3 Security Issues in File

6.4 Protection Mechanism

6.5 Case Studies of UNIX file system

**Module 7: Input/Output**

**Contact hours: 4**

7.1 Principles of I/O Hardware and Software

7.2 Disk

7.3 Clocks

7.4 Serial and Parallel port Access

7.5 Terminal Access

**Module 8: Device Management**

**Contact hours: 4**

8.1 Techniques of Device Management –Dedicated, shared and Virtual

8.2 Device Allocation Consideration, I/Otraffic Control and I/O Schedule, I/Odevice handlers

8.3 Spooling

**Module 9: Deadlock & its Prevention**

**Contact hours: 5**

9.1 Concepts of Deadlock

9.2 Resources

9.3 Deadlock prevention: Ostrich Algorithm, Banker Algorithm and safety Algorithm

9.4 Deadlock Detection and Recovery

**Module 10: Distributed Operating System**

**Contact hours: 3**

10.1 Definition and types of distributed OS

10.2 WorkStation Server Model

10.3 The Processor Pool Model

10.4 The Hybrid Model

10.5 Case study: SUN NFS File Server

**Books / References:**

1. Operating System –Madnick and Donovan, MGH
2. Operating System Concepts –A. Silberschatz and P. Galvin, ADP
3. Modern Operating Systems-Andrew S. Tanenbaum, Pearson Education Limited

**Paper Code: DCSE405**

**Credit: 4**

**Paper Name: Computer Hardware and Networking**

**L-T-P: 1-1-0**

**Total Contact Hours: 28**

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**Module 1: Computer System Layout**

**Contact Hours: 3**

- 1.1 Identification of System Layout.
- 1.2 Front Panel Indicators and Switches.
- 1.3 Front side and rear side Connectors.
- 1.4 Familiarize the System Layout: Making Positions of SMPS, Motherboard, FDD, HDD, CD, DVD, add on cards.

**Module 2: Process of Installation & Configuration of BIOS and Secondary Memory**

**Contact Hours: 3**

- 2.1 Configuring BIOS SETUP program and practicing the trouble shooting of typical problems using BIOS utility.
- 2.2 a) Install Hard disk, Configure CMOS- Setup.  
b) Partition HDD using FDISK.  
c) Format Hard Disk.  
d) Master/Slave/IDE Devices.
- 2.3 a) Install and configure a CD- Writer & a DVD writer and Recording a blank CD and DVD.

**Module 3: Installation of various Devices**

**Contact Hours: 5**

- 3.1 Printer Installation and Servicing.
  - a) Head Cleaning.
  - b) Install and Configure Dot Matrix and Laser Printer.
  - c) Troubleshoot DMP and Laser printer.
  - d) Check the data cable connectivity.
- 3.2 Network Installation and Troubleshooting
  - a) NIC, Router, Installing NIC, router and Modem for XP/Linux Environment.
  - b) Configuring using device drivers.
  - c) Diagnosis and trouble shooting.
- 3.3 Installation of multimedia components
  - a) Install audio/video devices, microphone, speaker and head set and Digital camera.
  - b) Trouble shoot the audio-video devices.
  - c) Install and configure Web Cam.



**Module 4: Basic Trouble Shootings****Contact Hours: 5**

4.1 a) Identifying the Problems in PC with add on Cards.

b) Identify problems with software installation using drivers available in the motherboard CD.

4.2 Practice with scan disk, disk clean-up, disk Defragmentation, Virus Detection and Rectification Software.

4.3 Practice with backup and restore data in a network server using external storage Device.

4.4 Assemble a PC with add on cards and check the working condition on the system.

**Module 5: Operating System Installation****Contact Hours: 2**

Windows and Linux- Operating System Installation.

**Module 6: Basics of Networking****Contact Hours: 3**

6.1 Do the following cabling works in a network

a) Cable Crimping.

b) Creating straight Cable.

c) Creating Cross Cable.

6.2 Establish a LAN connection amongst three nodes in a bus topology.

6.3 Establish Peer-to-Peer network connection between two nodes in LAN.

6.4 Interface PCs using connectivity devices-Hub, router and switch.

**Module 7: Configuration of LAN****Contact Hours: 3**

7.1 a) Configure IP address in a system in LAN (TCP/IP Configuration).

b) Configure DNS to establish interconnection between systems.

7.2 a) Transfer files between systems in LAN using FTP Configuration.

b) Login a system remotely using telnet protocol.

7.3 a) Install and configure Network interface card in a LAN system.

b) Share a file and printer (remotely) between two systems in a LAN.

**Module 8: Fundamentals of Security****Contact Hours: 2**

8.1 Establish security in a system using firewall configuration.

8.2 Create and share the user rights by accessing server for a specific user groups.

8.3 Install and configure the following:

a) A DHCP server in windows with IP Address ranging from 192.168.1.1 to 192.168.1.100

b) Configure a DHCP Client

8.4 Transfer Files Between systems using wireless Communication.

8.5 Configure Mail Server.

**Module 9: Basics of Networking Implementation****Contact Hours: 2**

Write a Client Server Program to connect different PCs

**Books / References:**

1. Repairing and Upgrading PC's - Scott Mueller, Pearson
2. The Complete PC Upgrade and Maintenance Guide -Mark Minasi
3. Modern Computer Hardware Course - ManaharLotia, Pradeep Nair and PayalLotia.

**Paper Code: DCSE475**

**Credit: 3**

**Paper Name: Computer Hardware and Networking Lab**

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

**Experiment on:**

1.
  - i) Identification of Front Panel Indicators and Switches.
  - ii) Identification of Front side and rear side Connectors.
  - iii) Making Positions of SMPS
  - iv) Identification of Motherboard components
2.
  - i) Configuring BIOS SETUP
  - ii) Install Hard disk, Configure CMOS- Setup.
  - iii) Partition HDD using FDISK. iv) Format Hard Disk.
  - v) Data transfer using Master/Slave/IDE Devices.
  - vi) Install and configure a CD- Writer & a DVD writer and Recording a blank CD and DVD.
3.
  - i) Install and Configure Dot Matrix and Laser Printer.
  - ii) Installing NIC, router and Modem for XP/Linux Environment.
  - iii) Configuring devices using device drivers
  - iv) Installation of multimedia components
  - v) Install audio/video devices, microphone, speaker and head set and Digital camera.
  - vi) Install and configure Web Cam.
4.
  - i) Practice with scan disk, disk clean-up, disk Defragmentation, Virus Detection and Rectification Software.
  - ii) Practice with backup and restore data in a network server using external storage Device.
  - iii) Assemble a PC with add on cards and check the working condition on the system.
5. Installation of Windows and Linux- Operating System.
6.
  - i) Cable Crimping. ii) Creating straight Cable. iii) Creating Cross Cable.
  - iv) Establish a LAN connection amongst three nodes in a bus topology.
  - v) Establish Peer-to-Peer network connection between two nodes in LAN.
  - vi) Interface PCs using connectivity Devices-Hub, router and switch.
7.
  - i) Configure IP address in a system in LAN (TCP/IP Configuration).
  - ii) Configure DNS to establish interconnection between systems.
  - iii) Transfer files between systems in LAN using FTP Configuration.
  - iv) Login a system remotely using telnet protocol.
  - v) Install and configure Network interface card in a LAN system.

- vi) Share a file and printer (remotely) between two systems in a LAN.
- 8. i) Establish security in a system using firewall configuration.
- ii) Create and share the user rights by accessing server for a specific user groups.
- iii) Install and configure the following:
- iv) Configure a DHCP Client
- v) Transfer Files Between systems using wireless Communication.

## Semester V

**Paper Code: DCSE501**

**Credit: 6**

**Paper Name: Database Management Systems.**

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

**Total Contact Hours: 42**

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### **Module1: Introduction**

**Contact Hours: 4**

- 1.1.Database system applications.
- 1.2.Purpose of Database Systems.
- 1.3.View of Data
- 1.4.Database Languages.
- 1.5.Relational Databases.
- 1.6.Database Design, Data Storage and Querying
- 1.7.Transaction Management
- 1.8.Database Architecture
- 1.9 Database users and administrators.

### **Module2: Introduction to the Relational Model**

**Contact Hours: 5**

- 2.1 Structure of relational Databases.
- 2.2 Database Schema, keys
- 2.3 Schema Diagram
- 2.4 Relational Query Languages
- 2.5 Relational Operations

### **Module 3: Structured Query Language (SQL)**

**Contact Hours: 7**

- 3.1 Overview of the SQL Query Language
- 3.2 SQL Data Definition
- 3.3 Basic Structure of SQL Queries
- 3.4 Set Operations, null Values,

3.5 Aggregate Functions

3.6 Nested Subqueries

3.7 Views in SQL

3.8 Integrity Constraints.

**Module 4: E-R Model**

**Contact Hours: 6**

4.1 Overview of the Design Process

4.2 The Entity-Relationship Model

4.3 Constraints

4.4 Entity-Relationship Diagrams

4.5 Reduction to Relational Schemas

4.6 Extended E-R Features

**Module 5: Functional Dependencies and Normalization**

**Contact Hours: 7**

5.1 Functional dependencies

5.2 Normal forms based on primary keys

5.3 General definitions of First, second and third normal forms

5.4 Boyce-Codd Normal Form

**Module 6: Transaction processing concepts**

**Contact Hours: 6**

6.1 Transaction and system Concept

6.2 Desirable properties of transactions, Schedules and Serializability

6.3 Recoverable Schedules and Cascadeless Schedule

**Module 7: Concurrency Control Techniques**

**Contact Hours: 4**

7.1 Basic Concepts; Concepts of Locks

7.2 Deadlock handling

**Module 8: Recovery System**

**Contact Hours: 3**

8.1 Failure Classification, Storage

8.2 Recovery and Atomicity

**Book/References:**

1. Database System Concepts – Silberschatz, Korth and Sudarshan
1. Fundamentals of Database System- Elmasri and Navathe
2. Database Management- CJ Date
3. Principles of Database Systems- John E. Hopcroft & Jeffrey D. Ullma
4. Developing personal oracle7 Application- David Lockman
5. Oracle8 DBA handbook- by Kevin Loney

**Paper Code: DCSE571**

**Credit: 3**

**Paper Name: Database Management Systems Lab**

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

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### **Lab Exercises**

#### **1. Introduction to Structured Query Language (SQL)**

- 1.1 Data Definition Language (DDL)-Create, alter, drop table
- 1.2 Data Manipulation Language (DML)-select, insert, update, delete
- 1.3 Data Control Language-Grant, revoke
- 1.4 Creating and deleting Views, index

#### **2. Introduction to PL/SQL**

- 2.1 Block structure, variable and types, looping constructs, Expression and operators, functions
- 2.2 Cursors variable, cursor fetch, loops
- 2.3 Procedure, functions, triggers
- 2.4 Error handling and exceptions
- 2.5 Composite data-types

#### **3. DBA function**

- 3.1 Installation of software (RDBMS)
- 3.2 Creation of database
- 3.3 Routine maintenance of database
- 3.4 Backup & Recovery of database

**Paper Code: DCSE502**

**Credit: 6**

**Paper Name: Software Engineering**

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

**Total Contact Hours: 42**

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**Module 1: Introduction to Software Engineering**

**Contact hours: 5**

- 1.1 The evolving role of software
- 1.2 Software crisis causes and solutions
- 1.3 Software Engineering paradigm
- 1.4 Classic life cycle
- 1.5 Prototyping model
- 1.6 Spiral model

**Module 2: Software Requirement Analysis**

**Contact hours: 6**

- 2.1 Requirement Analysis fundamentals
- 2.2 SRS document
- 2.3 Structured Analysis
- 2.4 Object oriented analysis and data modelling (ERD)
- 2.5 Process modelling

**Module 3: Software Design**

**Contact hours: 5**

- 3.1 Characteristics of a good software design
- 3.2 Design Fundamentals
- 3.3 Flow oriented design and object oriented design

**Module 4: Quality Assurance**

**Contact hours: 4**

- 4.1 Software quality factor
- 4.2 Software quality assurance
- 4.3 SQA activities
- 4.4 Software reliability, errors and faults

4.5 Reliability models

**Module 5: Verification and Validation**

**Contact hours: 6**

5.1 Basic concepts

5.2 Software testing strategies

5.3 Black-box and white-box testing

**Module 6: Software Evaluation and Documentation**      **Contact hours: 4**

6.1 Software Evaluation Criteria

6.2 Need and Characteristics of a good document

6.3 Internal and External documentation

**Module 7: Software Project Management**      **Contact hours: 12**

7.1 Basic concepts

7.2 Project planning

7.3 Project estimation

7.4 COCOMO model

7.5 Project scheduling

7.6 Staffing management

7.7 Project monitoring

7.8 Risk analysis

7.9 Tracking and control, version management.

**Books / References:**

1. Software Engineering-A Beginners Guide by Pressman –TMH
2. Software Engineering - Pankaj Jalote-WILEY
- 3.Fundamentals of Software Engineering - Rajib Mall-PHI

**Paper Code: DCSE503**

**Credit: 6**

**Paper Name: Object Oriented Programming with C++**

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

**Total Contact Hours: 42**

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**Module 1: Introduction to C++**

**Contact hours: 3**

- 1.1 Basic Concepts of Object Oriented Programming
- 1.2 Structure of a C++ program
- 1.3 Data types, Operators and Expressions
- 1.4 Reference Variables
- 1.5 Scope Resolution Operator, Type Cast Operator and Manipulator

**Module 2: Classes and Objects**

**Contact hours: 5**

- 2.1 Class declaration and definition, use of different Access Modifiers
- 2.2 Defining Member Function, Private Member Functions, Creating Objects
- 2.3 Static Data Member, Static Member Function
- 2.4 Array of Objects, Object as Function Arguments

**Module 3: Functions in C++**

**Contact hours: 4**

- 3.1 Function Prototyping, Call by Reference, Return by Reference
- 3.2 Inline Function, Friend Function and Virtual Function
- 3.3 Function Overloading

**Module 4: Constructors and Destructors**

**Contact hours: 4**

- 4.1 Introduction to Constructors
- 4.2 Dynamic Constructor and Copy Constructor
- 4.3 Destructors



**Module 5: Operator Overloading and Type conversions****Contact hours: 3**

5.1 Defining Operator Overloading, rules for overloading Operators

5.2 Overloading Unary and Binary Operators

5.3 Type Conversion

**Module 6: Inheritance****Contact hours: 6**

6.1 Definition

6.2 Different forms of Inheritance, defining Derived Classes,

6.3 Virtual Base Class, Abstract Classes

**Module 7: Pointers, Virtual Functions and Polymorphism****Contact hours: 6**

7.1 Introduction to Polymorphism

7.2 Pointers, Pointers to Objects, this Pointer

7.3 Pointers to Derived Classes

7.4 Virtual Functions, Pure Virtual Functions

**Module 8: Templates****Contact hours: 4**

8.1 Definition of Templates

8.2 Class Templates, Function Templates

8.3 Overloading Template Functions, Member Function Templates

**Module 9: Exception Handling****Contact hours: 2**

9.1 Basics of Exception Handling

9.2 Catch Statement, Throwing Exception

**Module 10: File Handling****Contact hours: 5**

10.1 Classes for File Stream Operations

10.2 Opening and Closing a file, File modes

10.3 Types of Files-Sequential and Random

10.4 Error Handling during File Operations

10.5 Command-line Arguments

**Books / References:**

1. Object Oriented Programming with C++ -E Balagurusamy, Tata McGraw-Hill

2. C++ - The Complete Reference -Herbert Schildt, Tata McGraw-Hill

3. The C++ Programming Language- Bjarne Stroustrup,Addison-Wesley

**Paper Code: DCSE573**

**Credit: 3**

**Paper Name: Object Oriented Programming with C++ Lab**

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

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- Programming exercises on classes and objects
- Programming exercises on constructors and destructors
- Programming exercises on function overloading
- Programming exercises on inline function, friend function and virtual function
- Programming exercises on operator overloading (unary and binary)
- Programming exercises on various forms of inheritance
- Programming exercises on virtual function and pointers
- Programming exercises on use of Templates (class and function)
- Programming exercises on handling exceptions.
- Programming exercises on File handling

**Paper Code: DCSE504**

**CREDITS: 6**

**Paper Name: Cryptography & Network Security**

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

**Total Contact Hours: 42**

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**Module 1: Introduction to Cryptography & Network Security**

**Contact hours 4**

1.1 The need for security

1.2 Principles of Security: confidentiality, integrity, authentication, non-repudiation, access control and availability

1.3 Types of Attacks: passive and active attacks, Virus, worm, Trojan horse, Applets and ActiveX control, Cookies, Specific Attacks: Spoofing and Sniffing(snooping), Phishing, Pharming.

**Module 2: Concept and Techniques of Cryptography**

**Contact Hours 8**

2.1 Concept of Plain Text and Cipher Text

2.2 Substitution Techniques: Caesar Cipher, Mono-alphabetic Cipher, Homophonic Substitution Cipher, Polygram Substitution Cipher, Polyalphabetic Substitution Cipher, Play fair Cipher, Hill Cipher.

2.3 Transposition techniques: Rail Fence Technique, Simple columnar Technique.

2.4 Encryption and Decryption, Symmetric and Asymmetric Key, Steganography.

**Module 3: Symmetric Key Algorithm**

**Contact Hours 10**

3.1 Algorithm types and modes (ECB, CBC, CFB, OFB, CTR)

3.2 An overview of Symmetric Key Cryptography

3.3 Data Encryption Standard (DES), Advanced Encryption Standards (AES)

**Module 4: Asymmetric Key Algorithm**

**Contact Hours 10**

4.1 An overview of Asymmetric Key Cryptography.

4.2 The RSA algorithm.

4.3 Symmetric and Asymmetric Key Cryptography together.

4.4 Digital Signature, Message Digest, MD5, Secure Hash Algorithm(SHA), Hash-based Message Authentication Code(HMAC).

**Module 5: Authentication**

**Contact Hours 5**

5.1 Authentication Basics, Password, Authentication Tokens

5.2 Public Key infrastructures

5.3 Certification authorities and key distribution centres

5.4 Kerberos

**Module 6: Firewall**

**Contact Hours 5**

6.1 Firewall Characteristics

6.2 Firewall's Capabilities and Limitations

6.3 Types of Firewall, Firewall Configuration

6.4 Trusted system, Virtual Private Networks

**Books / References:**

1. Cryptography and Network Security -AtulKahate, Tata McGraw Hill
2. Cryptography and NetworkSecurity(Principles and Practices) -William Stallings, PHI
3. Cryptography and Network Security -Behrouz A. Forouzan, DebdeepMukhopadhyay, Tata McGraw Hill

**Paper Code: DCSE574**

**CREDITS: 3**

**Paper Name: Cryptography & Network Security Lab**

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

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**ExperimentI.** Write a program using C or C++ to encrypt and decrypt the general Caesar cipher.

**Experiment II.**

Perform encryption and decryption applying the following algorithms (Use C or C++)

- i. Caesar Cipher
- ii. Rail Fence Technique
- iii. Simple Transposition Technique

**ExperimentIII.** Write a program to implement the Play fair cipher using C or C++.

**Experiment IV.** Write a C or C++ program to implement the Diffie-Hellman Key Exchange mechanism.

**ExperimentV.** Consider a plain text message I AM AN INTRUDER. Encrypt it with the help of the following algorithms:

(Use C or C++ programming language)

- i. Replace each alphabet with its equivalent 7-bit ASCII code.
- ii. Add a 0 bit as the leftmost bit to make each of the above bit patterns 8 position long.
- iii. Swap the first four bits with the last four bits for each alphabet
- iv. Write the hexadecimal equivalent of every four bits.

**ExperimentVI.** Implement the DES algorithm logic using C or C++ programming language.

**Experiment VII.** Using the C or C++ programming language, calculate the message digest of a text using the MD5 algorithm.

**ExperimentVIII.** Using the C or C++ programming language, implement the RSA algorithm.

**ExperimentIX.** Many programming languages allow the generation of random numbers. Implement a C or C++ program to generate a series of 12 random numbers. Repeat the same program execution many times to see how the random numbers are repeated.

**ExperimentX.** Write a program in C or C++ to perform the application of a digital signature on a given text.

**Paper Code: DCSE510**

**CREDITS: 6**

**Paper Name: Mobile Computing**

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

**Total Contact Hours: 42**

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**Module 1: Concept of Mobile Computing**

**Contact hours 9**

- 1.1 Concept of Mobile Communication
- 1.2 Different generations of wireless technology
- 1.3 Basics of cell, cluster and frequency reuse concept
- 1.4 Noise and its effects on mobile computing
- 1.5 Understanding GSM and CDMA
- 1.6 Basics of GSM architecture and services like voice call, SMS, MMS, LBS, VAS
- 1.7 Different modes used for Mobile Communication

**Module 2: Architecture and Design of Mobile Computing**

**Contact Hours 9**

- 2.1 Architecture of Mobile Computing (3tier)
- 2.2 Design considerations for mobile computing
- 2.3 Characteristics of Mobile Communication
- 2.4 Application of Mobile Communication
- 2.5 Security Concern Related to Mobile Computing
- 2.6 Middleware and Gateway required for mobile Computing
- 2.7 Making Existing Application Mobile Enable

**Module 3: Concept of Mobile IP in Mobile Communication**

**Contact Hours 8**

- 3.1 Mobile IP
- 3.2 Basic Mobile Computing Protocol
- 3.3 Mobile Communication via Satellite: Low orbit satellite, Medium orbit satellite, Geo stationary satellite
- 3.4 Satellite phones

**Module 4: Application of Android in Mobile Communication**

**Contact Hours 8**

- 4.1 Overview of Android
- 4.2 What does Android run On, Android Internals?
- 4.3 Android for mobile apps development
- 4.4 Environmental setup for Android apps Development
- 4.5 Framework: Android- SDK, Eclipse
- 4.6 Emulators: What is an Emulator / Android AVD
- 4.7 Android Emulation: Creation and set up
- 4.8 First Android Application

**Module 5: Activities of Android and Concept of GUI Design**

**Contact Hours 8**

- 5.1 Design criteria for Android Application: Hardware Design Consideration, Design Demands for Android application, Intent, Activity, Activity Lifecycle and Manifest
- 5.2 Creating Application and Activities

5.3 Simple UI, Layouts and Layout properties, Introduction to Android UI Design

5.4 XML Introduction to GUI objects: Push Button, Text / Labels, Edit Text, Toggle Button, Padding

**Books / References:**

1. Building Android Apps, IN EASY STEPS, McGraw-Hill Education.
2. Professional Android 2 Application Development -Reto Meier, Wiley India Pvt Ltd.
3. Beginning Android -Mark L Murphy, Wiley India Pvt Ltd.
4. Pro Android -Sayed Y Hashimi and Satya Komatineni, Wiley India Pvt Ltd.
5. Mobile Communications - Jochen Schiller, Addison-Wesley.

**Paper Code: DCSE511**

**CREDITS: 6**

**Paper Name: VLSI & Embedded Systems**

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

**Total Contact Hours: 42**

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**Module 1: VLSI Design**

**Contact Hours 6**

- 1.1 Introduction to VLSI
- 1.2 Design styles and parameters
- 1.3 Popular technologies

**Module 2: VLSI Logic Implementation**

**Contact Hours 6**

- 2.1 Logic implementation with NMOS, CMOS & PLA
- 2.2 Pass transistor logic, transit time, clocking, scaling
- 2.3 PLA minimization & folding

**Module 3: VLSI Testing**

**Contact Hours 4**

- 3.1 Testing & testability issues

**Module 4: Physical Design Algorithms of VLSI**

**Contact Hours 8**

- 4.1 Partitioning, floor, planning & placement, routing, compaction, gate arrays, EPGAs
- 4.2 Data structure for layout design magic
- 4.3 Design rule checking, symbolic layout, complexity of layout algorithms

**Contact Hours 5**

**Module 5: Embedded Systems**

- 5.1 Introduction to embedded systems
- 5.2 Architecture of embedded systems, design mythologies

**Contact Hours 6**

**Module 6: Real Time Issues of Embedded Systems**

- 6.1 Modelling, specification, communication, scheduling, protocols etc.

**Contact Hours 7**

**Module 7: Hardware and Software Partitioning for Embedded systems**

- 7.1 Hardware and Software partitioning,
- 7.2 Approaches to software and code generation, operating issues,
- 7.3 Memory and low power issues, validations approach, distributed embedded system

**Books / References:**

1. Introduction to VLSI System -C. Mead & L. Conway, Addison Wesley
2. Introduction to VLSI Design -Fabricus, Prentice Hall

3. Layout Design & Verification -T. Ohtsuki, North Holland
4. Algorithms for VLSI Physical Design Automation - N. Sherwani
5. An Introduction to VLSI Physical Design -M. Sarafzadeh& C.K Wong, MHI
6. Hardware Software Co Design of Embedded Systems -Ralf Niemann, Kluwer Academic
- 7.Design principles of Distributed Embedded Application-Hermann Kopez,Kluwer Academic
8. Real time Design -Levi & Agarwal, MH

**Paper Code: DCSE512**

**Credit: 6**

**Paper Name: Artificial Intelligence**

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

**Total Contact Hours: 42**

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**Module 1: Introduction to Artificial Intelligence**

**Contact Hours: 5**

- 1.1 History and progress of AI
- 1.2 Simulation and AI
- 1.3 Intelligent Systems

**Module 2: Knowledge Representation**

**Contact Hours: 8**

- 2.1 Introduction
- 2.2 Propositional Calculus
- 2.3 Predicate Calculus
- 2.4 Rule based knowledge representation
- 2.5 Knowledge representation issues.

**Module 3: Problem Solving: State Space Search & Strategies**

**Contact Hours: 8**

- 3.1 Introduction
- 3.2 General Problem Solving
- 3.3 Characteristic of Problem
- 3.4 Exhaustive Searches
- 3.5 Heuristic Search Techniques

**Module 4: Learning**

**Contact Hours: 8**

- 4.1 Definition and mechanisms of learning
- 4.2 Candidate Elimination Algorithm
- 4.3 Discovery, Analogy, Formal Learning Theory
- 4.4 Neural net learning and Genetic learning.

**Module 5: Expert Systems**

**Contact Hours: 8**

- 5.1 Introduction and general concepts of ES
- 5.2 Elements and Applications of ES



5.3 Production systems

5.4 Markov and Rete Algorithm

**Module 6: Basics of Prolog**

**Contact Hours: 5**

6.1 Introduction to Prolog programming

6.2 Terminologies and variables

6.3 Control structures.

6.4 Matching, cuts and recursion.

**Book/ References**

1: Artificial Intelligence - Elaine Rich, Kevin Knight, and Shivshankar B. Nair, 3rd edition, McGraw-Hill Publishing

2: Expert Systems - Joseph C. Giarratano and Gary D. Riley, 4th edition

3: Artificial Intelligence - Saroj Kaushik, Cengage Learning.

4: An Introduction to Logic Programming Through Prolog,- J. M. Spivey, Prentice Hall.

# Semester VI

**Paper Code: DCSE601**

**Credit: 6**

**Paper Name: Web Technology**

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

**Total Contact Hours: 42**

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**Module 1: Web Basics**

**Contact hours: 5**

1.1 Introduction to www

1.2 Understanding Web System Architecture

1.3 Web Browser, URL, HTTP, Web Server

1.4 Website design principles, Application development tools, Web Hosting

1.5 Components of Web Publishing, Publishing Tools

**Module 2: Introduction to HTML**

**Contact hours: 4**

2.1 Structure of an HTML Document

2.2 Html tags and simple HTML forms

2.3 Basics of XHTML

**Module 3: Style sheets**

**Contact hours: 2**

1.1 Introduction to CSS

1.2 Basic syntax and structure

1.3 Webpage Styling using CSS

**Module 4: JavaScript**

**Contact hours: 6**

4.1 Client side scripting

4.2 Developing JavaScript

4.3 Variables, Functions, Conditions, Loops and Repetition

4.4 JavaScript and Objects

4.5 DOM and Web Browser environments

**Module 5: DHTML**

**Contact hours: 4**

5.1 Combining HTML, CSS and JavaScript

5.2 Events and Buttons

5.3 Controlling your Browser

**Module 6: XML****Contact hours: 6****6.1** Introduction to XML, XML key components**6.2** DTD and Schemas**6.3** Well-formed XML document**6.4** Applications using XML**6.5** Introduction to XSL, XSL elements**6.6** XML transformation using XSLT**Module 7: CGI****Contact hours: 4****7.1** Introduction**7.2** Server- Browser Interaction**7.3** CGI Script Structure**7.4** CGI .pm module**7.5** Perl variables, CGI environment variables**7.6** Processing forms, sending mail**Module 8: PHP****Contact hours: 8****8.1** Server side scripting**8.2** Basic PHP commands**8.3** Arrays, Functions and forms**8.4** Introduction to Databases and Tables**8.5** Creating Database and Tables, Manipulating Database and Tables**8.6** Listing Database and Tables, Retrieving data**8.7** Accessing Database with PHP**8.8** PHPMyAdmin and Database Bugs**Module 8: AJAX****Contact hours: 3****8.1** Introduction**8.2** AJAX Components**8.3** Handling Dynamic HTML with Ajax**Book/References:**

1. HTML: the Definitive guide, Chuck Musciano& Bui Kennedy
2. Learning PHP, MySQL & JavaScript with jQuery, CSS & HTML5 by Robin Nixon
3. JSP 2.0: The Complete Reference, Second Edition by Phillip Hanna
4. PHP and MySQL Training Guide by Ramesh Bangia

**Paper Code: DCSE671**

**Credit: 3**

**Paper Name: Web Technology Lab**

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

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- Installation of network components in Windows and LINUX
  - Installation of TCP/IP
  - Installation of Intranet
  - Web Server configuration
- Practice problems on HTML (HTML pages, HTML tags, tables, lists, frames and forms)
- Practical on deployment of HTML files in Intranet servers
- Practice how to style html pages using CSS
- Practical on different Internet services (WWW, Mail, FTP, Chat)
- Practical on JavaScript (basics, if else conditional statement, loop, function, event handler etc)
- Practice problems on XML
- Practice problems on PHP basics
- Practical on simple databases
- Practice how to access databases using PHP
- Web hosting and simple web application development

**Paper Code: DCSE691**

**Credit: 12**

**Paper Name: Major Project**

**L-T-P: 0-2-8**

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**Paper Code: DCSE692**

**Credit: 2**

**Paper Name: Industrial Visit and Seminar**

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

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### **Module 1: Industrial Visits**

Structured industrial visits be arranged and report of the same shall be submitted by the individual student, to form a part of the team work. The industrial visits may be arranged in the following areas/ industries. Any two visits may be considered

- Educational organization having advanced technology setup
- Data warehouse
- Industry having advance computer technology setup
- Software development industry
- Computer maintenance centre

### **Module 2: Guest Lectures**

Experts/ Professionals from Field/Industry are to be invited for talks on the listed topics and similar areas. A brief report is to be submitted on the guest lectures by each student as a part of assignment (Any two)

- Cyber security
- Human Resource Management (HRM)
- Big data analytics
- AI
- Mobile Computing
- Internet of Things

### **Module 3: Group Discussion**

Students have to form groups consisting offive to six students and discuss on a chosen topic listed below. A brief report on the same is to be prepared and submitted by each student including the points discussed during the discussion providing a concluding remark. Any two or three topics for group discussions may be selected by faculty members from the suggested topics

- Python/C/OOP(Java/C++/C#)
- Recent development in Computer Architecture

- Big Data
- Machine learning
- Image Processing

#### **Module 4: Seminar**

Seminar topic should be related to the subjects from third, fourth or fifth semester subjects or from guest lectures. Students shall submit a report of at least 12 pages and deliver a seminar (presentation time – 10-15 minutes for a group of 2-3 students)

**Paper Code: DHSS601**

**Credit: 6**

**Paper Name: Industrial Management & Entrepreneurship**

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

**Total Contact Hours: 42**

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#### **Part-A Management**

**Unit -1:** Meaning and concept of Management, Principles and functions of Management, Labour turnover, Payment of wages – factors determining the wage, Methods of payment of wages. **Contact hours: 4**

**Unit -2:** Leadership and Decision Making, qualities and styles of Leadership, decision making process. **Contact hours: 3**

**Unit- 3:** Elements of costs, Analysis and classification of expenditure for cost accounts, preparation of cost sheet, Marginal costing and Break Even Analysis. **Contact hours: 4**

**Unit -4:** Factories Act -1948, Definitions, Main Provisions regarding Health, Safety and welfare of workers. **Contact hours: 3**

**Unit-5:** Industrial Dispute Act – 1947, Definitions, Preventive measure, Machinery for settlement of Industrial Dispute in India. **Contact hours: 4**

**Unit- 6:** Trade Union Act - Meaning and function of Trade Union. **Contact hours: 3**

#### **Part-B Entrepreneurship**

**Unit-7:** Meaning, types, characteristics and function of Entrepreneur, Concept of Startup. **Contact hours: 4**

**Unit-8:** Forms of Business organization: Sole Trader, Main features, merits and demerits, Partnership –main features, merits and demerits. Joint stock Company – main features, difference between private and public limited companies .Introduction to co-operative and public undertaking. **Contact hours: 7**

**Unit-9:** Small scale industries: Definitions, scope with reference to self-employment, procedure to start small scale industries, Sources of finance—Bank, Government and Financial institutions etc. Selection of **Contact hours: 7**

site for factories, Industrial Estate, Growth Centre, Ancillary Industries.

**Unit-10:** System of Distribution – wholesale and Retail Trade and **Contact hours: 3**

Modern Marketing Process

**Book/References:**

1. General Principle and Practice of Management – L M Prasad
2. Management Concepts and Practice – Kanchan Bhatia and Shweta Mittal
3. Micro Economics – Sandeep Garg
4. Self-Employment through Entrepreneurship – J.C. Kalita
5. Entrepreneurship Development & Small Business Management – Dr.BhawnaBhatnagar and AnkurBudhiraja.
6. Labour and Industrial Law of India – S.K. Misra
7. Industrial Safety and Health for Administrative Services---Charles D. Reese
8. Entrepreneurship –D D Mali and J.C. Kalita
9. Industrial Management and Entrepreneurship – ArabindaDebnath



**Paper Code: DCSE610**

**Credit: 6**

**Paper Name: Design and Analysis of Algorithms**

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

**Total Contact Hours: 42**

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**Module 1: Introduction**

**Contact hours: 4**

- 1.1 Algorithm, characteristics of an algorithm
- 1.2 Analyzing algorithms, space and time complexity
- 1.3 Asymptotic notations

**Module 2: Recursion**

**Contact hours: 6**

- 2.1 Definition
- 2.2 Recursion vs Iteration
- 2.3 Basic recursive algorithms: Factorial, Tower of Hanoi

**Module 3: Divide and conquer**

**Contact hours: 6**

- 3.1 Basic idea
- 3.2 Applications-Binary search, Merge sort
- 3.3 Solving recurrences- substitution method and master's theorem

**Module 4: Greedy method**

**Contact hours: 6**

- 4.1 Introduction
- 4.2 Fractional knapsack problem
- 4.3 Minimum cost spanning trees, Prim's and Kruskal's algorithms

**Module 5: Dynamic Programming**

**Contact hours: 5**

- 5.1 Basic concepts
- 5.2 Applications-0/1 knapsack, matrix chain multiplication

**Module 6: Elementary Graph Algorithms**

**Contact hours:4**

- 6.1 Representations of graphs
- 6.2 Breadth-first search and Depth-first search

**Module 7: Backtracking**

**Contact hours: 6**

- 7.1 Basic idea
- 7.2 Applications-n-queens problem, graph coloring problem

**Module 8: Branch and Bound****Contact hours: 5**

8.1 General method

8.2 Different branch and bound strategies- FIFO, LIFO and LCBB

**Books / References:**

1. Introduction to Algorithms, by Cormen, Leiserson, Rivest, and Stein, MIT Press, Third Edition, 2009.
2. Computer Algorithms, by Horowitz, Sahni, and Rajasekaran, Silicon Press, 2007
3. The Design and Analysis of Algorithms, A. Aho, J.Hopcroft and J.Ullman

**Paper Code: DCSE611****Credit: 6****Paper Name: Parallel Processing****L-T-P: 3-0-0****Total Contact Hours: 42**

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**Module 1: Introduction****Contact Hours: 10**

1.1 Evolution of Computer System

1.2 Parallelism in Uniprocessor System

1.3 Parallel Computer Structure

1.4 Architectural Classification Scheme

1.5 Parallel Processing Application

**Module 2: Memory system design****Contact Hours: 10**

2.1 Hierarchical Memory Structure

2.1.1 Memory Hierarchy, Addressing Scheme for Main Memory

2.2 Virtual Memory System, Paged Memory System, Segmented Memory System

2.3 Cache Memories and Management, Characteristics &amp; organization of Cache Memories

**Module 3: Principles of Pipelining and Vector Processing****Contact Hours: 11**

3.1 Definition of Pipelining: An Overlapped Parallelism

3.1.1 Principles of Linear Pipelining, Classification of Pipeline Processor

3.2 Instruction and Arithmetic Pipelines

3.2.1 Design of Pipelined Instruction Units

3.2.2 Arithmetic Pipelines Design Examples

3.3 Vector Processing Requirements

3.3.1 Characteristic of Vector Processing

3.3.2 Pipelined Vector Processing Methods

**Module 4: Structures and Algorithms for Array Processors****Contact Hours: 11**

4.1 SIMD Array Processor

4.1.1 SIMD Computer Organisation

4.1.2 Inner-PE Communication

## 4.2 SIMD Interconnection Network

### 4.2.1 Static versus Dynamic Networks

### 4.2.2 Mesh-Connected Illiac Network

### 4.2.3 Cube Interconnection Network

### 4.2.4 Barrel Shifter and Data Manipulator

### 4.2.5 Shuffle-Exchange and Omega Networks

## 4.3 Parallel Algorithms for Array Processors

### 4.3.1 SIMD Matrix Multiplication

### 4.3.2 Parallel sorting on Array Processor

## **Book/References:**

- 1 Computer Architecture and Parallel Processing, Kai Hwang and F. A. Briggs, McGrawHill
2. Advanced Computer Architecture: Parallelism, Scalability, Kai Hwang, McGrawHill
3. Computer Architecture & Organisation, John P. Hayes, McGrawHill

**Paper Code: DCSE612**

**Credit: 6**

**Paper Name: Data Mining**

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

**Total Contact Hours: 42**

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**Module 1: Introduction**

**Contact Hours: 6**

- 1.1 Motivation, Data Mining-Definition
- 1.2 Data Mining Functionalities
- 1.3 Interestingness measures
- 1.4 Classification of data mining system
- 1.5 Issues in data mining.

**Module 2: Data pre-processing**

**Contact Hours: 7**

- 2.1 Form of Data Pre-processing
- 2.2 Process of Data Cleaning: Missing Values,  
Noisy Data (Binning, Clustering, Regression,  
Computer and Human inspection), Inconsistent Data
- 2.3 Data Integration and Transformation
- 2.4 Data Reduction: Data Cube Aggregation, Dimensionality reduction,
- 2.5 Data Compression, Numerosity Reduction, Clustering,
- 2.6 Discretization and Concept hierarchy generation

**Module 3: Data cube computation and data generalization**

**Contact Hours: 5**

- 3.1 Efficient methods for data cube computation
- 3.2 Discovery driven exploration of data cubes
- 3.3 Complex aggregation, attribute oriented induction for data generalization

**Module4: Mining frequent patterns, associations and correlations**

**Contact Hours: 6**

- 4.1 Basic concepts, efficient and scalable frequent item set mining algorithms,
- 4.2 Mining various kinds of association rules – multilevel and multidimensional
- 4.3 Association rule mining versus correlation analysis

4.4 Constraint based association mining

**Module 5: Classification and prediction**

**Contact Hours: 10**

5.1 What is Classification & Prediction

5.2 Issues regarding Classification and prediction

5.3 Decision tree, Bayesian Classification

5.4 Classification by Back propagation

5.5 Multilayer feed-forward Neural Network

5.6 Back propagation Algorithm

5.7 Classification methods K-nearest neighbor classifiers

**Module 6: Cluster analysis**

**Contact Hours: 8**

4.1 Data types in cluster analysis, Categories of clustering methods

4.2 Partitioning methods

4.3 Hierarchical Clustering: CURE and Chameleon

4.4 Density Based Methods-DBSCAN, OPTICS,

4.5 Grid Based Methods, STING, CLIQUE

4.6 Model Based Method –Statistical Approach,

4.7 Neural Network approach

4.8 Outlier Analysis

**Book/References:**

1. Data Mining Concepts & Techniques, Jiawei Han, Micheline Kamber, Elsevier.
2. Data Mining: Introductory and Advanced Topics, .M.H.Dunham, Pearson Education.
3. Data Mining Techniques, Arun K. Pujari, Universities Press.

**Paper Code: DCSE613Credit: 6**

**Paper Name: Formal Language and Automata TheoryL-T-P: 3-0-0**

**Total Contact Hours: 42**

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**Module 1: Finite Automata**

**Contact Hours:10**

1.1 Introduction

1.2 Deterministic Finite Automata (DFA)

1.2.1 Formal definition

1.2.2 Simpler notations (state transition diagram, transition table)

1.2.3 Language of a DFA.

1.3 Nondeterministic Finite Automata (NFA)

1.3.1 Definition of NFA

1.3.2 Language of an NFA

1.4 Equivalence of Deterministic and Nondeterministic Finite Automata

1.5 Applications of Finite Automata.

**Module 2: Regular Expressions**

**Contact Hours: 10**

2.1 Introduction

2.2 Identities of Regular Expressions

2.3 Finite Automata and Regular Expressions- Converting from DFA's to Regular Expressions

2.4 Converting Regular Expressions to Automata

2.5 Applications of Regular Expressions.

2.6 Regular Grammars

2.6.1 Definition

2.6.2 Regular grammars and FA

2.6.3 FA for regular grammar

2.6.4 Regular grammar for FA



**Paper Code: DCSE614**

**Credit: 6**

**Paper Name: Graph Theory and Combinatorics**

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

**Total Contact Hours: 42**

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**Module 1: Basic Concepts.**

**Contact hours: 6**

1.1 Graphs & sub graphs

1.2 Isomorphism & Degrees

1.3 Walks & connected graphs

1.4 Cycles in graphs

1.5 Cut vertices & cut edges

1.6 Matrix representation of graphs

**Module 2: Evaluation of Graphs**

**Contact hours: 5**

2.1 Eulerian graphs

2.2 Hamiltonian Graphs

2.3 Weighted Graphs

**Module 3: Bipartite Graphs**

**Contact Hours: 6**

3.1 Bipartite Graphs

3.2 Perfect matching –the marriage problem

3.3 Trees, Spanning Trees

**Module 4: Planner Graphs**

**Contact Hours: 5**

4.1 Definitions

4.2 Euler Formula

4.3 Characterization of planner graphs –Kuratowski's Theorem (without proof)

4.4 Colouring of planner graphs (vertex colouring only)

**Module 5: Directed Graph**

**Contact Hours: 6**

5.1 Representation

5.2 Connectivity in Digraphs



5.3 Strong Orientation of Graphs

5.4 Eulerian Digraphs, Tournaments

### **Module 6: Graphs Algorithms**

**Contact Hours: 6**

6.1 Depth-First & Breadth-First Algorithms

6.2 Shortest path Algorithms

6.3 Minimal Spanning Trees

### **Module 7: Combinatorics**

**Contact Hours: 8**

#### **7.1 Counting Principles**

7.1.1 Sum & product rules

7.1.2 Counting Functions

7.1.3 Binomial & multinomial theorems

7.1.4 Inclusion & exclusion principles

7.1.5 Marriage Problem Revisited

#### **7.2 Ramsey Theory**

7.2.1 The Pigeonhole Principles

7.2.2 Ramsey's theorem (without proof)

7.2.3 Examples of Ramsey's theorem

#### **7.3 Difference Equation**

7.3.1 Difference operator

7.3.2 Linear difference equations

7.3.3 First order Linear Equations

7.3.4 Linear equation with constant Coefficient

7.3.5 Systems of Difference Equations

#### **7.4 Block Design & Error Correcting code**

#### **Book/References**

1. Graph Theory & Application, N Deo, Prentice Hall
2. Graph Theory, F. Harary, Narosa Publishing House
3. Introduction Combinatorial Mathematics, C.L Liu
4. Discrete Mathematics for Computer Scientists, J.K Truss, Addison -Wesley

## 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: 30</b>		<b>14</b>	<b>0</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	Modern communication system	3	0	0	6	DHSMC601	Entrepreneurship and Start ups	3	1	0	8
DECE572	Modern communication system Lab	0	0	2	2	DECE612	A: Power Electronics B: MEMS C: Computer Aided Electronic Design	3	0	0	6
DECE513	A: Industrial Automation 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: Electromagnetic waves and Applications 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: Electromagnetic wave and Applications Lab 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>Contact Hours 23</b>		<b>15</b>	<b>0</b>	<b>8</b>	<b>40</b>	<b>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. 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. 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 –  $n$ th 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: Parts of Speech</b>  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: Prepositions of time and place</b>  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: Clause, phrases and Relative Clauses</b>  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: Subject Verb Agreement</b>  4.1 Rules that guide the agreement of the subject to its verb	<b>Contact hours: 5</b>
<b>Module 5: Sentence types and Transformation of sentences</b>  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 Voice</b>  6.1 Change from Active Voice to Passive Voice and vice versa	<b>Contact hours: 3</b>
<b>Module 7: Punctuation</b>  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: ELECTROSTATICS**

**Contact hours: 3**

- 2.1 Concept of Electric charge according to modern electron theory, unit of charge, Inverse square law, electric field, Electric line of force, electric intensity
- 2.2 Potential at a point due to a point charge, relation between intensity and potential with deduction of the formula
- 2.3 Capacity of a condenser, series and parallel combination, different type of condenser, numerical problems.

### **Module 3: CURRENT ELECTRICITY**

**Contact hours: 11**

- 3.1 potential difference and electric current with their units.
- 3.2 Difference between emf. and potential difference; internal resistance of cell. Voltaic cell; defects of cell: local action and polarization and their removal.
- 3.3 Difference between primary and secondary cells with examples, grouping of cells, series, parallel and mixed combinations of cells.
- 3.4 Basic D.C. Circuits: Ohm's Law and its verification, mathematical expression, Kirchoff's Law, numerical problems.
- 3.5 Definition of resistance, conductance, effects of temperature on resistance, Series and parallel combination of resistance, resistance per unit length, numerical problems.
- 3.6 Heating Effect of Current: Joule's law, electricity energy and power, numerical problems
- 3.7 Thermoelectric effect: Thermocouple, Seebeck effect, Peltier effect and Thomson effect.
- 3.8 Chemical effect of current: electrolysis, Faradays's laws of electrolysis.

### **Module 4: MAGNETISM**

**Contact hours: 5**

- 4.1 Nature and artificial magnets theories, different types of magnets, induced magnetism, nature of polarities.



- 4.2 Inverse square law, magnetic intensity at end – on and broad – side on position, uniform and non – uniform field, magnetic moment, couple on a magnet in a uniform field, Tangent law.
- 4.3 Elements of terrestrial magnetism

**Module 5: ELECTROMAGNETISM Contact hours: 4**

- 5.1 Magnetic effect of current, nature of magnetic field due to straight and circular conductor, due to solenoid, Fleming's left and right hand rules, effect of current following through two parallel conductors.
- 5.2 Electro Magnetic induction: e. m. f. induced in a coil due to magnet, Faraday's laws of electro – magnetic induction, Lenz Law, self and mutual induction.

**Module 6: MODERN PHYSICS**

**Contact hours: 4**

- 6.1 Photo Electric Emission: explanation and demonstration of photo electric current, photo electric equation with its physical signification.
- 6.2 Nuclear Energy: Atomic mass unit, mass energy equivalence, mass defect
- 6.3 X- rays: Properties and its application in industry (Production apparatus not necessary)
- 6.4 Radio – activity: Natural and artificial radioactivity, emission of alpha, beta and gamma radiation, their properties and uses.

**Module 7: ELECTRONICS**

**Contact hours: 2**

- 7.1 Thermionic emission: vacuum tube, diode and triode, their working principle, concept of rectifier and amplifier, use of diode as rectifier.

**Module 8: 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**

**6 Total hours : 41 hours**

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

**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, ' $\pi$ ' 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: COMMUNICATIONINENGLISHLAB**

**Total contact hours:39**

**Credit: 2**

**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 listening 1.6 Good listening practices 1.7 Overcoming barriers to effective listening	
<b>Module 1: Business Writing</b>  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.	<b>Contact hours: 3</b>
<b>Module 2: Paragraph Writing and Summary Writing</b>  2.1 Definition, 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	<b>Contact hours: 5</b>
<b>Module 4 Email Writing</b>  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	<b>Contact hours: 5</b>
<b>Module 3: Report writing</b>  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	<b>Contact hours: 2</b>



<b>Module 5: Facing an interview</b> 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	<b>Contact hours: 5</b>
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5.3 Successful job interview practices	
5.4 Perfect handshake, points to remember while applying for a job	
<b>Module 6</b> British English and American English	<b>Contact hours: 3</b>
6.1 Difference between American and British English words – vocabulary and spelling	
6.2 Pronunciation and accents	

**BOOKS RECOMMENDED:**

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

**Paper Code: DCSE202**  
**Paper Name: Computer Fundamentals and Programming**  
**0 Total Contact Hours:35**

**Credit: 4**  
**L-T-P: 2-0-**

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**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**  
**2 Total contact hours:32**

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

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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 getch, 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: 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)**

**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: 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)**

### **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

**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**

<b>DECE303</b>	<b>Digital Electronics</b>	<b>2L: 1T: 0P</b> <b>Total contact hours: 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: 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:</b> <b>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) after II Semester</b>	<b>0L: 0T: 0P Total contact hours: 0</b>	<b>2 credits</b>
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## Semester IV

<b>DECE401</b>	<b>Microcontroller and Applications</b>	<b>3L: 0T: 0P</b> <b>Total contact hours:</b> <b>30</b>	<b>6 credits</b>
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### 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**

<b>DECE402</b>	<b>Consumer Electronics</b>	<b>3L: 0T: 0P</b> <b>Total contact hours:</b> <b>30</b>	<b>6 credits</b>
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**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:**

<b>S. No</b>	<b>Title of Book</b>	<b>Author</b>	<b>Publication</b>
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



<b>DECE403</b>	<b>Digital Communication Systems</b>	<b>3L: 0T: 0P</b> <b>Total contact hours:</b> <b>30</b>	<b>6 credits</b>
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**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:**

<b>S. No</b>	<b>Title of Book</b>	<b>Author</b>	<b>Publication</b>
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**

<b>DECE404</b>	<b>Linear Integrated Circuits</b>	<b>3L: 0T: 0P</b> <b>Total contact hours:</b> <b>36</b>	<b>6 credits</b>
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**Course Contents:**

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

**L** 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 8**

**L** 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 5**

**L** 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:**

<b>S. No</b>	<b>Title of Book</b>	<b>Author</b>	<b>Publication</b>
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**

<b>DECE485</b>	<b>Simulation Software Lab</b>	<b>0L: 0T: 6P</b> <b>Total contact hours:</b> <b>02/Week</b>	<b>6 credits</b>
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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.

## **Subject: Essence of Indian Knowledge and Tradition**

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

**Subject code: DECE407**

**Total contact hours: 28**

**UNIT 1: Introduction to Culture:** Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India. **(5L)**

**UNIT 2: Indian Languages, Culture and Literature:** Indian Languages and Literature-I: the role of Sanskrit, significance of scriptures to current society, Indian philosophies, other Sanskrit literature, literature of south India Indian Languages and Literature-II: Northern Indian languages & literature. **(6L)**

**UNIT 3: Religion and Philosophy:** Religion and Philosophy in ancient India, Religion and Philosophy in Medieval India, Religious Reform Movements in Modern India (selected movements only). **(5L)**

**UNIT 4: Fine Arts in India (Art, Technology & Engineering):** Indian Painting, Indian handicrafts, Music, divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (ancient, medieval and modern), Science and Technology in India, development of science in ancient, medieval and modern India. **(6L)**

**UNIT 5: Education System in India:** Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India. **(6L)**

### **Suggested Reading:**

1. Kapil Kapoor, "Text and Interpretation: The India Tradition", ISBN: 81246033375, 2005.
2. "Science in Samskrit", Samskrita Bharti Publisher, ISBN 13: 978-8187276333, 2007
3. NCERT, "Position paper on Arts, Music, Dance and Theatre", ISBN 81-7450 494-X, 200
4. S. Narain, "Examinations in ancient India", Arya Book Depot, 1993.
5. Satya Prakash, "Founders of Sciences in Ancient India", Vijay Kumar Publisher, 1989.
6. M. Hiriyanna, "Essentials of Indian Philosophy", Motilal Banarsi dass Publishers, ISBN 13: 978- 8120810990, 2014.

<b>DECE496</b>	<b>Minor Project</b>	<b>0L: 0T: 4P</b> <b>Total contact hours:</b> <b>02/Week</b>	<b>4 credits</b>
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## V SEMESTER

**Paper code: DECE501**

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

**Paper name: Embedded Systems**

**Total contact hours: 32**

### **Unit I: Introduction to Embedded System**

**(9L)**

1.1 Core of the embedded system, Memory, Sensors (resistive, optical, position, thermal) and Actuators (solenoid valves, relay/switch, opto-couplers), Communication Interface, Embedded firmware (RTOS, Drivers, Application programs), Power-supply (Battery technology, Solar), PCB and Passive components, Safety and reliability, environmental issues. Ethical practice.

1.2 Characteristics and quality attributes (Design Metric) of embedded system. Real time system's requirements, real time issues, interrupt latency.

1.3 Embedded Product development life cycle, Program modelling concepts: DFG, FSM, Petri-net, UML

### **Unit II: Embedded Hardware and Design**

**(7L)**

2.1 Embedded system board organization Embedded Processors, Arm Cortex-M4 Processor, 2.2 Memory Systems, 2.3 Embedded Board PC Board Design

### **Unit III: Buses and I/O, Networking:**

**(7L)**

3.1 Study of basic communication protocols like SPI, SCI (RS232, RS485), I2C, 10 CAN, Field-bus (Profibus), USB (v2.0),

3.2 Bluetooth, Zig-Bee, Wireless sensor network

### **Unit IV: Embedded Software, Firmware Concepts**

**(9L)**

4.1 Basic embedded C programs/applications for ARM-v7, using ARM-GCC tool-chain, Emulation of ARM-v7 (e.g. using QEMU), and Linux porting on ARM-v7 (emulation) board

4.2 Real time operating system: Need of RTOS in Embedded system software, Foreground/Background systems, multitasking, context switching, IPC, Scheduler policies, Architecture of kernel, task scheduler, ISR, Semaphores, mailbox, message queues, pipes, events, timers, memory management, RTOS services in contrast with traditional OS.

### **Case study**

Smart card, ECU, ADAS, Smart Watch

### **Texts Books/References:**

1. Embedded Systems: Frank Vahid , Wiley India, 2002
2. Frank Vahid& Tony Givargis, "Embedded System Design-A Unified Hardware/Software Introduction", Third Edition, John Wiley & Sons Inc., Reprint 2010
3. Introduction to Embedded Systems : Shibu K. V. (TMH)
4. Embedded Microcomputer Systems – Real Time Interfacing – Jonathan W. Valvano; Cengage Learning; Third or later edition

5. Steve Furber, “ARM System-on-Chip Architecture”, 2nd Edition, Pearson Education, India ISBN: 9788131708408, 8131708403 , 2015
6. Embedded Systems: Real-Time Interfacing to ARM Cortex M Microcontrollers, Fifth edition 2016, ISBN: 978-1463590154



**Paper code: DECE571**

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

**Paper name: Embedded Systems Lab**

**Total contact hours: 02/Week**

1. Study of ARM evaluation system
2. Interfacing ADC and DAC.
3. Interfacing LED and PWM.
4. Interfacing real time clock and serial port.
5. Interfacing keyboard and LCD.
6. Interfacing EPROM and interrupt.
7. Mailbox.
8. Interrupt performance characteristics of ARM and FPGA.
9. Flashing of LEDs.
10. Interfacing stepper motor and temperature sensor.
11. Implementing zigbee protocol with ARM.

**Paper code: DECE502**

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

**Paper name: Modern communication system**

**Total contact hours: 34**

**Unit I: Satellite Communication:**

- 1.1 Kepler's Law – Artificial Satellite – Orbits – Geostationary Orbit – Satellite Speed – Power Systems – Satellite Angles – Station Keeping – Satellite Launching – Attitude Control.
  - 1.2 Transponder and satellite frequency allocations – Frequencies reuse.
  - 1.3 Block schematic description of communication satellite
  - 1.4 Elementary idea of FDMA ,TDMAand CDMA
- (6L)**

**Unit II: Optical Communication:**

- 2.1 Concept of fibre optic communication system – Advantages and limitations of optical fibre communication – Construction of optical fibre – Optical fibre types: Mono mode and Multimode.
  - 2.2 OPTICAL FIBRE PERFORMANCE: Bandwidth-distance product – Transmission loss.
  - 2.3 OPTICAL SOURCES: LED and LASER – Modulation of LED and LASER – Functions of optical detectors.
  - 2.4 Block schematic description of optical fibre communication system.
  - 2.5 Components of optical fibre – Coupler connector splice.
  - 2.6 Basic idea of Fibre optic networking
  - 2.7 Fibre Distributed Data Interface – Synchronous optical network.
  - 2.8 Multiplexing on optical fibre cable – Wavelength division multiplexing , Orthogonal Frequency Division Multiplexing (basic idea only)
  - 2.9 Applications of fibre optics.
- (9L)**

**Unit III: Cryptography :**

- 3.1 Concept of cryptography and Network security, Symmetric Key cryptography and Asymmetric-key cryptography. Traditional and modern round ciphers, X-OR, DES, 3DES.
  - 3.2 Asymmetric Key cryptography techniques: RSA, Diffie-Helman.
  - 3.3 Security Services, Message integration, Message authentication, Digital signature and Entity authentication.
- (6L)**

**Unit IV: Spread-spectrum Communication**

- 4.1 Introduction, PN Sequence.
  - 4.2 Model of spread spectrum modulation system.
  - 4.3 Direct sequence spread spectrum signal.
  - 4.4 Frequency hop spread spectrum, slow frequency hopping, and fast frequency hopping.
  - 4.5 Application S. S. modulations):
- (6L)**

**Unit V: Modern Telephony**

- 5.1 Working of facsimile or fax – Idea of image processing by Charged Coupled Device.
  - 5.2 Concept of ISDN.
  - 5.3 Cellular telephone system: Concept – Mobile Telephone Switching Office – Cellular telephone unit – Frequency synthesizer – Number Assignment Module – Mobile Identification Number – Digital cellular telephone system – Global System for Mobile communication – Concept of CDMA.
  - 5.4 Concept of 1G, 2G , 3G,4G and 5G
  - 5.5 Wireless Communication—Wi-Fi and Wi-max (Basic ideas only)
  - 5.6 Concept of Video Phone
- (7L)**

## **Texts Books/References:**

- 1) Behrouz, A. Forouzan, and C. F. Sophia. "Data Communications and Networking." Forouzan with Sophia Chung Fegan (2007).
- 2) Frenzel, Louis E. Principles of electronic communication systems. McGraw-Hill, 2016.
- (3) Kennedy, George, Brendan Davis, and S. R. M. Prasanna. Electronic communication systems. Vol. 20. Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 1985.
- (4) Viswanathan, Thiagarajan, and Manav Bhatnagar. Telecommunication switching systems and networks. PHI Learning Pvt. Ltd., 2015.

**Paper code: DECE572**

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

**Paper name: Modern communication system Lab**

**Total contact hours: 02/Week**

1. To study the function of fibre optic analog link. To study the frequency response of optical receiver at various load conditions.
2. To study the losses in optical fibre:— (a) propagation loss, (b) bending loss.
3. To study the numerical aperture of optical fibre.
4. To be familiar with the following network components:— Cables – Connectors – Hubs – Network Interface Card.  
To be familiar with fax.
5. To be familiar with cordless telephone.
6. To be familiar with mobile telephone.
7. Understanding basic cyphers and symmetric key cryptography algorithms in Python
8. Understanding PN sequence and spread spectrum communication.

Suggested list of MINI PROJECT (any one)

To design a wireless fibre link To develop any control system using optical source

To design a voice communication link using optical fibre. i) Use of OTDR (Demonstration) ii) Use of Splicing Technique (Demonstration).

**Paper code: DECE513 (A)**

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

**Paper name: Industrial Automation**

**Total contact hours: 30**

**Unit I - Industrial automation overview and data acquisition (8L)**

Architecture of Industrial Automation Systems.

Measurement Systems Characteristics

Data Acquisition Systems

**Unit II - Control Generation Introduction to Automatic Control P-I-D Control Feedforward Control Ratio Control The branching operations based on conditions expression (7L)**

**Unit III Sequential control and PLC Introduction to Sequence Control, PLC, RLL (7L)**

**Unit IV Industrial control application Hydraulic Control Systems, Pneumatic Control Systems**

Energy Savings with Variable Speed Drives, Introduction to CNC Machines (8L)

**Texts Books/ References:**

- 1.) Industrial Instrumentation, Control and Automation, S. Mukhopadhyay, S. Sen and A K Dey, Jaico Publishing House, 2013.
- 2.) Electric Motor Drives, Modelling, Analysis and Control, R Krishnan, Prentice Hall India, 2002 ISBN: 978-0130910141

**Paper code: DECE583 (A)**

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

**Paper name: Industrial Automation Lab**

**Total contact hours: 02/Week**

- 1.) Temperature control system using PID
- 2.) Level control system based on error feedback
- 3.) Development of data acquisition system using Arduino
- 4.) PLC timer, counter, registers and analog input/output functions
- 5.) PLC programming using Relay ladder Logic for AND, OR, XOR and NOR gate
- 6.) PLC, RLL programming using CASCADE method

**Paper code: DECE513 (B)**

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

**Paper name: Control System and PLC**

**Total contact hours: 34**

**Unit I:**

Control system: Basics of control system block diagram and practical examples  
Classification of control systems: Open loop and closed loop systems-block diagram, practical example and comparison, Linear and non-linear systems, Time varying and Time In-varying systems- practical example and comparison.  
servo system -  
Transfer function: Close loop and open loop system  
RC, LC and RLC circuits-Differential equations and transfer functions and analysis using Laplace transform  
Block diagram reduction technique: Need, reduction rules. **(7L)**

**Unit II:**

Time Response: Transient and steady state response.  
Standard test inputs: Step, ramp, parabolic, impulse and their corresponding Laplace transform  
Analysis of first and second order control system: Poles and zeros - S-plane representation  
Order of system (0, 1, 2)- standard equations, examples and numerical problems  
i. First order system-Analysis for unit step input, concept of time constant  
ii. Second order system- Analysis for unit step input (no derivation), concept, definition and effect of damping

Time response specifications (no derivations)  $T_p$ ,  $T_s$ ,  $T_r$ ,  $T_d$ ,  $M_p$ ,  $E_{ss}$ , numerical problems  
Steady state analysis: Type 0, 1, 2 systems steady state error numerical problems and error constants,  
Stability: Concept of stability, root locations in S-plane and analysis- stable system, unstable system, critically stable systems, conditionally stable system, relative stability Routh's stability criterion: Steps and procedures to find stability by Routh's stability criteria. **(9L)**

**Unit III:**

Process Control System: Block diagram, functions of each block  
Control actions: Discontinuous mode- ON-OFF controllers equation, neutral zone  
Continuous modes: Proportional Controller - offset, proportional band. Proportional, Integral and Derivative controllers -o/p equation, response, characteristics,  
Composite controllers: PI, PD, PID controllers- o/p equation, response **(5L)**

**Unit IV:**

PLC-Block diagram, classification, (fixed and modular PLCs), need and benefits of PLC in automation, Description of different parts of PLC: CPU -function, scanning cycle, speed of execution, Power supply-block diagram and function of each block.  
Memory function and organization of ROM - and RAM, Input and output modules- function, different input and output devices of PLC (only name and their uses). PLC Installation **(6L)**

**Unit V:**

Discrete input modules: Block diagram, specifications of AC input modules and DC input module. Sinking and sourcing concept in DC input modules  
Discrete output modules: Block diagram description, specifications of AC output module and DC output modules Analog input and output modules: Block diagram, specifications  
I/O addressing of PLC: Addressing data files, format of logical address, different addressing types, PLC Instruction set: Relay instructions, timer and counter instructions, data movement instructions, logical and comparison instructions  
PLC Programs using Ladder programming language. **(7L)**

## **Texts Books/ References:**

1. Johnson, C. D. "Process control instrumentation Technology", Prentice Hall, 8th edition, United States of America, 2014 ISBN: 978-0131194571
2. Gary Dunning, "Intro. To Programmable logic control", Cenage Learning, United States of America, 2005 ISBN: 9781401884260
3. Naggrath JJ; Gopal M, "Control System Engineering", Anshan Publishers (2008) ISBN: 9781848290037
4. Ogata K, "Modern control Engineering", PHI, 5th Edition, NEW DELHI, 2010 ISBN: 978812034010
5. Madhuchandra Mitra; Samarjit Sen Gupta, "Programmable logic controllers and industrial automation: an introduction", Penram, 1st Edition, Mumbai. 2007 ISBN: 9788187972174.
6. Petruzella, F.D. "Programmable logic controllers", Tata- McGraw Hill, 3rd Edition. 2010 ISBN: 9780071067386.



**Paper code: DECE583 (B)**

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

**Paper name: Control System and PLC Lab**

**Total contact hours: 02/Week**

1. Use potentiometer as error detector.
2. Determine error of angular position of DC servo system.
3. Test the Step response of R-C (first order) circuit.
4. Test the Step response of R-L-C (second order) circuit.
5. Test the functionality of temperature control with on-off controller.
6. Use PI controller to control temperature of the given process.
7. Use PD controller to control temperature of the given process.
8. Use PID controller to control temperature of the given process.
9. Identify and test different parts of PLC.
10. Develop ladder diagram to test the functionality of the logic gates.
11. Develop ladder diagram to test Demorgan's theorem.
12. Develop the ladder diagram for Adder and Subtractor by using PLC.
13. Develop ladder diagram for ON and OFF control of lamp using timer and counter.
14. Develop ladder diagram for traffic light Control system.
15. Develop ladder diagram for stepper motor control.
16. Develop ladder diagram for temperature controller.

**Paper code: DECE514 (A)**

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

**Paper name: Electromagnetic waves and Applications**

**Total contact hours: 30**

**Unit I** - Introduction to electromagnetic waves, review of Vector Analysis, orthogonal Coordinate Systems, Del operator, Gradient, Divergence, Curl – their physical interpretations; Laplacian operator.  
**(5L)**

**Unit-2**- Coulomb's law, electric field intensity, charge distribution. Gauss' law, flux density and electric field intensity. Divergence theorem. Current Densities, Poisson's & Laplace's equations, Biot-Savart law, Ampere's law, Relation between J & H. **(5L)**

**Unit-3**- Faraday's law & Lenz's law, Displacement Current,  $J_C - J_D$  relation, Maxwell's equations, Time-harmonic fields, Wave Equation, Boundary Conditions between media interface; Uniform Plane wave; Wave Propagation in Lossy Dielectric, Loss-less Dielectric, Free space (solution excluded). Poynting Theorem, Skin Depth, Reflection and Transmission of wave for normal incidence. **(7L)**

**Unit-4**-Transmission Lines: Concept of Lump parameters and Distributed parameters, Line Parameters, Transmission line equations (solution excluded) , Propagation constant, Characteristic Impedance; Velocity of Propagation, Distortion-less Line, Reflection and Transmission coefficients, Standing Waves, VSWR, Input Impedance, Smith Chart and its applications **(8L)**

**Unit-5**- Introduction to Microwaves, History and applications of Microwaves, Rectangular and Circular Waveguides (concept only without complex mathematical formulation), Bethe-hole coupler, Two holes directional Coupler, Power Divider, Attenuator, Resonator, phase shifter, circulator, isolator. **(5L)**

### **Texts Books/ References:**

1. Electromagnetic Waves & Radiating Systems, 2ed Edition –E. C. Jordan and K.G. Balmain, Pearson Education
2. Elements of Electromagnetics, 4th Edition – Matthew N O Sadiku Oxford University Press
3. SY Liao Microwave Devices & Circuits Pearson Education /PHI
4. S Das & A Das Microwave Engineering Tata-McGraw Hill
5. ML Sisodia & GS Raghuvansi Microwave Circuits and Passive Devices New Age Publishers
6. David M Pozar Microwave Engineering John Willy & Sons Inc
7. Introduction to Radar Systems – Merrill I. Skolnik, SECOND EDITION, McGraw-Hill, 1981.

**Paper code: DECE584 (A)**

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

**Paper name: Electromagnetic waves and Applications Lab**

**Total contact hours: 02/Week**

- 1.) To study the characteristics of Gunn oscillator Gun diode as modulated source.
- 2.) Introduction to Smith chart and its application for the unknown impedance measurement.
- 3.) Study the behaviour of impedance matching for passive network using Smith Chart.
- 4.) To determine the frequency and wavelength in a rectangular waveguide working in  $TE_{10}$  mode.
- 5.) To study waveguide components.

**Paper code: DECE514 (B)**

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

**Paper name: Optical Communication and Networking**

**Total contact hours: 30**

**Unit 1: OVERVIEW OF OPTICAL FIBER COMMUNICATION:** Introduction, Historical development, general system, advantages, disadvantages, and applications of optical fiber communication, optical fiber waveguides, Ray theory, cylindrical fiber (no derivations), single mode fiber, cutoff wave length, mode field diameter. Optical Fibers: fiber materials, photonic crystal, fiber optic cables, specialty fibers. **(8L)**

**Unit 2: TRANSMISSION CHARACTERISTICS OF OPTICAL FIBERS:** Introduction, Attenuation, absorption, scattering losses, bending loss, dispersion, Intra modal dispersion, Inter modal dispersion. **(5L)**

**Unit 3: OPTICAL SOURCES AND DETECTORS:** Introduction, LED's, LASER diodes, Photo detectors, Photo detector noise, Response time, double hetero junction structure, Photo diodes, comparison of photo detectors. **(6L)**

**Unit 4: OPTICAL RECEIVER:** Introduction, Optical Receiver Operation, receiver sensitivity, quantum limit, eye diagrams, coherent detection, burst mode receiver operation, Analog receivers. **(6L)**

**Unit 5: OPTICAL AMPLIFIERS AND NETWORKS:** Optical amplifiers, basic applications and types, semiconductor optical amplifiers, EDFA. Optical Networks: Introduction, SONET / SDH, Optical Interfaces, SONET/SDH rings, High – speed light – waveguides. **(5L)**

### **Texts Books/ References:**

1. Optical Fiber Communication – Gerd Keiser, 4th Ed., MGH, 2008.
2. Optical Fiber Communications – John M. Senior, Pearson Education. 2007.
3. Fiber Optic Communication – Joseph C Palais: 4th Edition, Pearson Education.
4. Fiber Optic Communication Systems – G. P. Agrawal, 4<sup>th</sup> Ed., Wiley.
5. Optical Networks – R. Ramaswamy, 3<sup>rd</sup> Ed., Morgan Kaufmann.

**Paper code: DECE584 (B)**

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

**Paper name: Optical communication and networking Lab**

**Total contact hours: 02/Week**

1. To study the V-I Characteristics of LED.
2. To study the characteristics of laser diode
3. To study the Intensity Modulation of the Digital Signal.
4. Measurement of the data rate for digital optical link.
5. To study the Analog Subcarrier multiplexing technique (SCM).

**Paper code: DECE515 (A)**

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

**Paper name: P C System Technology**

**Total contact hours: 42**

**Unit 1: PC ARCHITECTURE:** 1.1 Introduction to Computer system, operation (block diagram) of Computer, Personal Computer history and comparison- the IBM PC, PC, PC-XT, PC-AT. 1.2 Microprocessor types & specification used in IBM PCs, processor sockets & slots. 1.3 Different supporting chips & their functions; Concepts of DMA & Interrupts, Chipset. 1.4 Motherboard: architecture of PC-XT & PC-AT systems, motherboard form factors; peripheral interfacing, concept of bus system & types; Expansion Slots. 1.5 Different types of memory used in a computer: SRAM, DRAM, FPRAM, EDORAM, SIMM, DIMM, RIMM, DDR etc. **(8L)**

**Unit 2: OPERATING SYSTEM:** 2.1 Booting procedure, concept of BIOS & POST; CMOS setup, EFI firmware 2.2 Introduction to Operating Systems: DOS, Windows, their comparisons 2.3 Different version of Microsoft Windows – their features. 2.4 Description of the system & configuration files. 2.5 Overview of other operating systems- LINUX, UNIX. **(6L)**

**Unit 3: STORAGE DEVICE:** 3.1 General concepts of storage device; different technologies, their comparison 3.2 Optical Drive construction & operation, specifications, different types. 3.3 Hard Disk Drive construction & operation, different types; Concepts of cylinders, sectors, seek time etc., 3.4 Other types of storage devices like Blu-Ray, DVD, Tape Drive, MO Drive, SSD storage 3.5 Interfacings: features of parallel AT attachment (PATA), Serial ATA (SATA), ATA devices jumper selections: Master, slave, cable select, ATA cables 3.6 Hard disk partitioning, concepts of FAT, MBR, VBR etc. GPT partition 3.7 Types of file systems, their comparison. **(10 L)**

**Unit 4: I/O INTERFACING:** 4.1 I/O Ports: Legacy ports - Serial & Parallel communication ports, their standards, use. 4.2 New generation ports-USB, Fire-Wire etc. **(2L)**

**Unit 5: INPUT DEVICES:** 5.1 Keyboards: Basic construction, different Key Switches, their features. 5.2 Pointing devices: Mouse, types & specifications, Joystick, Light Pen, Track balls etc, operation of Optical mouse. **(3L)**

**Unit 6: OUTPUT DEVICES:** 6.1 Printers: Generic block diagram, Types of printers–Dot Matrix, Inkjet, Laser, line printer, MFP (Multi function Printer), Features 6.2 Scanner: Flat bed, sheeted, Handheld : Specifications, OCR, TWAIN, Resolution 6.3 Video Display: Basics - pixel, resolution, H/V Frequency etc. 6.4 Display Types: CRT Display, Panel Displays-LED, LCD and TFT Displays their features and comparisons 6.5 Display cards – different components, types, AGP bus. **(6L)**

**Unit 7: POWER SUPPLY:** 7.1 General power supply issues & overview of Switched Mode Power Supply 7.2 Power Supply (SMPS): SMPS types and their comparison, Mother board integrated power supply. 7.3 Power Line Disturbances, Power conditioners. 7.4 UPS–types and features 7.5 Power Managements. **(4L)**

**Unit 8: Laptop computers** 8.1 Difference between laptop and desktop-Types of laptops, power settings – SMD components. 8.2 Laptop components: Adapter– types, Battery– types, RAM–types, CPU–types, Laptop Mother Board- block diagram, 8.3 Laptop Keyboard – Mouse and Touchpad - Ports. 8.4 Notebook computers- Features & specifications. **(3L)**

### **Texts books/ References:**

1. IBMPC & Clones– Govindarajalu
2. Upgrading & Repairing PCs– Scott Muller
3. Maintenance & Repairing PCs– Mark Minasi
4. Troubleshooting, Maintenance & Repairing PC– Bigelow

**Paper code: DECE515 (B)**

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

**Paper name: Medical Electronics**

**Total contact hours: 34**

**Unit I:** Introduction to Biomedical Instrumentation: The age of biomedical engineering, Development of biomedical instrumentation, biometrics. Introduction to the man, components of the man, instrument system, physiological systems, some conclusions, body, problems encountered in measuring a living system. **(6L)**

**Unit II:** Basic Transducer principles: Transducer and transduction principles, Transducer classification-active transducers, passive transducers, transducers used in biomedical applications. **(5L)**

**Unit III:** Sources of Bioelectric Potentials: Introduction to Bioelectricity - Resting Membrane potential, transmission of impulses, Electrical activity of the heart, Pacemaker potential, electro cardiograph. Biological transducers- receptor potentials, electrical activity of the brain, Resting and action potentials, Propagation of action potentials. **(6L)**

**Unit IV:** Electrodes: Electrode theory, bio-potential electrodes, Bio-chemical Transducers. **(3L)**

**Unit V:** The Cardiovascular System: The heart and cardiovascular system, the heart, heart sounds, Blood pressure, characteristics of blood flow. **(5L)**

**Unit VI:** Cardiovascular Measurements: Electrocardiography (ECG), Measurement of blood pressure, Measurements of blood flow and cardiac output. **(5L)**

**Unit VII:** Patient care and Monitoring: The elements of intensive- care monitoring, Diagnosis calibration and reparability of patient, Monitoring equipment. Pacemakers, defibrillator. **(4L)**

### **Texts Books/ References:**

- 1.) Massey and Meredith, Medical Physics.
- 2.) Joseph Bronzino, Biomedical Instrumentation.
- 3.) Khandpur R S, Handbook of Medical Instrumentation, Tata Mc Graw Hill.
- 4.) David Cooney, Principles of Biomedical Engineering.
- 5.) Ruch and PattoŸ, Bio Physics and Medical Physiology.

**Paper code: DECE515 (C)**

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

**Paper name: Industrial Electronics**

**Total contact hours: 34**

**Unit I: CHOPPERS-** Principle of operation of chopper and its application, functional operation of forced, commutated and Jones chopper and their areas of applications, Principle of operation of 4-quadrant chopper, Principle of operation of cyclo-converter and its applications. **(6L)**

**Unit II- SPEED CONTROL OF DC MOTORS-** Types of speed control of dc motor: Armature Volt –Field Current Control, Drive System: Controlled Rectifier Drive- Reversible Drive –Quadrant Drive. **(6L)**

**Unit III- SPEED CONTROL OF AC MOTORS-** Introduction to induction motor, Types of speed variation –Frequency variation–Stator voltage variation – Closed loop control – Types of feedback, Types of breaking: Regenerative breaking – Plugging. **(6L)**

**Unit IV- PROGRAMMABLE LOGIC CONTROLLER-** Evolution and Role of PLC in Automation, Block Diagram & Principle of Working, PLC Characteristics and hardware configuration– CPU, Racks, Power Supply, Memory, Input & Output Modules, Application Specific Modules, Speed of execution, Communication, Redundancy. Introduction to PLC Programming Languages– Ladder, Instruction List, Structured Text, Grafcet **(8L)**

**Unit V- NUMERICAL CONTROL SYSTEMS-** Basic concepts of numerical control - Block diagram of numerical control system– Advantages, disadvantages, applications of numerical control system, Programming systems – Data processing unit – Data reading – Part programming – steps - Post processor, Introduction to CNC – Basic concepts of CNC – Comparison between NC & CNC – Typical CNC system – Block diagram, Advantages. **(8L)**

### **Texts Books/References:**

- 1.) Power Electronics P. C. Sen
- 2.) Modern power Electronics- P. C. Sen
- 3.) Power Electronics: Converters, Application & Design–Mohan, Undeland, Robbins
- 4.) Industrial Electronics and control by Biswanath Paul–PHI publications-2ndEdition - 2010
- 5.) Programmable Logic Controller – Pradeep Kumar & Srivashtava-BPB Publications
- 6.) Numerical control of Machines– Yoram Korean & Joseph Ben
- 7.) Robotics–An Introduction– Doughales– R. Halconnjr



## VI SEMESTER

**Paper code: DECE601**

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

**Paper name: Computer Networking and Data Communication**

**Total contact hours: 38**

### **Unit-I: Fundamentals of data communication and computer network**

Process of data communication and its components: transmitter, receiver, medium, message, protocol; protocols, standards, bandwidth, transmission rate, data rate, symbol rate; Modes of communication, Analog and Digital signal, Analog and Digital communication, Analog to Digital and Digital to Analog conversion, Line Coding and scrambling techniques: Unipolar, Polar, Bipolar, Manchester, Differential Manchester, B8ZS, HDB3; Fundamentals of computer network- Definition and need of computer network, applications and benefits of computer network; Classification of computer network- LAN, MAN, WAN; Network architecture- Peer to peer, client server network. **[8L]**

### **Unit-II: Transmission media and switching**

Communication media- Guided transmission media: Coaxial cable, twisted-pair cable, Fibre-optic cable; Unguided transmission media: Radio waves, microwaves, infrared, satellites. Line-of-sight: Point-to-point, broadcast: Multiplexing: time division multiplexing, frequency division multiplexing; Switching: circuit-switched networks, packet-switched networks. **[8L]**

### **Unit-III: Error detection and correction, wireless communication**

Types of Errors: Single Bit Error and Burst Error, Redundancy; Error Detection: Cyclic Redundancy Check (CRC); Forward Error Correction; IEEE standards: 802.1, 802.2, 802.3,802.4, 802.5; Wireless LANs: 802.11 architecture, MAC sublayer, addressing mechanisms; Bluetooth architecture: Piconet, Scatternet; Mobile generations: 1G, 2G, 3G, 4G and 5G. **[7L]**

### **Unit-IV: Network Topologies and Network Devices**

Network Topologies: Introduction, Definition, Selection, Criteria, Types of Topology; Network Connecting Devices: Hub, Switch, Router, Repeater, Bridge, Gateway, Modem, Wireless infrastructure Components. **[7L]**

### **Unit-V: Reference Models**

OSI Reference Model: Layered Architecture, Interfaces between Layer, Protocols, Organization of the Layers, Encapsulation, functions of each layer; TCP/IP model, IP addressing: Classful and classless addressing, IPv4 and IPv6. **[8L]**

### **Suggested books:**

1. Data communication and networking, Behrouz A. Forouzan, Tata McGraw Hill.
2. Computer networks, Andrew S. Tanenbaum, PHI.
3. Internetworking with TCP/IP: Principles, Protocols, and Architecture, 4/e, Douglas E. Comer, PHI.

**Paper code: DECE671**

**Credit: 2 (L-T-P: 0-0-2)**

**Paper name: Computer Networking and Data Communication Lab**

**Total contact hours (approx.): 16 hours**

1. To study the different physical equipment used for networking
2. Study the different internetworking devices in a computer network
3. To study PC to PC communication using parallel port
4. Study of LAN in Bus Topology
5. Study of LAN in star Topology
6. Study of LAN in Hybrid/Tree Topology
7. Share printer and folder in a network and transfer a file from one computer to another
8. Install operating system (Windows/ Linux/ Ubuntu)

**Paper code: DHSMC601**

**Credit: 8 L-T-P: 3-1-0**

**Paper name: Entrepreneurship and Start ups**

**Total contact hours: 30**

**Unit 1:** Introduction to Entrepreneurship and Start-ups. Definitions, Traits of an entrepreneur, Intrapreneurship, Motivation • Types of Business Structures, Similarities/differences between entrepreneurs and managers. **(6L)**

**Unit 2:** Business Ideas and their implementation, Dis-covering ideas and visualizing the business, Activity map, Business plan. **(4L)**

**Unit 3:** Idea to Start-up-Market Analysis – Identifying the target market, Competition evaluation and Strategy Development, Marketing and accounting, Risk analysis. **(6L)**

**Unit 4:** Management-Company's Organization Structure, Recruitment and management of talent, Financial organization and management. **(5L)**

**Unit 5:** Financing and Protection of Ideas, Financing methods available for start-ups in India, Communication of Ideas to potential investors – Investor Pitch, Patenting and Licenses. **(6L)**

**Unit 6:** Exit strategies for entrepreneurs, bankruptcy, and succession and harvesting strategy. **(3L)**

### **Texts Books/References:**

1. The Start-up Owner's Manual: The Step-by-Step Guide for Building a Great Company, Steve Blank and Bob Dorf, K & S Ranch ISBN – 978-0984999392.
2. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to create radically successful businesses, Eric Ries, ISBN – 978- 0670921607 Penguin UK.
3. Demand: Creating What People Love Before they know they want it, Adrian J. Slywotzky, Headline book publishing, ISBN – 978-0755388974 .

**Paper code: DECE612A**

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

**Paper name: Power Electronics**

**Total contact hours: 30**

**Unit 1: POWER SEMICONDUCTOR DEVICES**

Desirable characteristics in switches Power diodes, Thyristors – SCR, DIAC, TRIAC, BJT, MOSFET, GTO, IGBTs – their power rating, characteristics and comparison. **(4L)**

**Unit 2: PROTECTION OF POWER SEMICONDUCTOR DEVICES**

Selection of devices, overload protection, Fuse protection, Circuit breakers, Transient protection. RC networks, Zener, Metal Oxide resistors, Turn ON and OFF snubbers, transient voltage suppressors. **(4L)**

**Unit 3: CONTROLLED RECTIFIERS**

Controlled rectifiers – half wave, full wave half controlled, full wave full controlled rectifiers, firing angle, load voltage, different types of load, free wheel diode, circuits for controlling firing angle. **(6L)**

**Unit 4: INVERTERS**

Basic concept of inverter, single phase and three phase inverters, voltage driven and current driven inverter. Driver circuits, voltage-controlled schemes. **(6L)**

**Unit 5: SWITCHING DC POWER SUPPLIES & UPS**

Principle of operation of switching power supplies, buck regulator, boost regulator, buck-boost regulator. Controlled schemes of SMPS, Comparison of linear & switching power supply. Basic principle & types of UPS –Off-line On-line, Line Interactive, their comparison. **(6L)**

**Unit 6: MOTOR CONTROL**

DC motor characteristics, types of speed control, armature voltage control, field current control, Stepper motor control – open loop operation of stepper motor, closed loop control of stepper motor. **(4L)**

**Text Books/References:**

1. Power Electronics / Modern Power Electronics – P.C. Sen
2. Power Electronics: Converters, Application & Design – Mohan, Undeland, Robbins
3. Power Electronics: Devices, Drivers, applications & Passive Components – B.W. Williams
4. Power & Industrial Electronics – R.K. Khadse, S.Chand & Co.
5. Power Electronics –P.S. Bimbhra, Khanna Publishers
6. Power Electronics – M. H. Rashid, PHI
7. Fundamentals of Power Electronics & Devices – A. K. Chakravarty

**Paper code: DECE612B**

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

**Paper name: MEMS**

**Total contact hours: 44**

**UNIT 1:** Introduction: Historical background, development of microelectronics, evolution of micro sensors, MEMS, emergence of micro machines. MEMS Materials: Metals, semiconductors, ceramic, polymeric and composite materials. Basic IC Technology: Crystal growth, Deposition, pattern transfer, etching, doping semiconductors. **(12L)**

**UNIT 2:** Bulk micro machining: Wet etching, etch-stop techniques, dry etching, buried oxide process, silicon fusion bonding, anodic bonding. Surface Micro Machining: Introduction, sacrificial layer technology, material systems in sacrificial layer technology, plasma etching, combined IC technology and anisotropic wet etching. **(12L)**

**UNIT 3:** Microsterolithography: Materials for 3D printing, Scanning method, two photon MSL, Projection MSL, Polymeric MEMS Architecture with silicon, Metal and ceramics, Applications of MSL. LIGA: Process steps, Applications. **(10L)**

**UNIT 4:** Micro Sensors: Temperature sensors, radiation sensors, accelerometer, microphones, magnetic sensors, biochemical sensors, flow sensors, gyro Sensor, SAW sensors. Micro-actuators: Thermal actuator, Electro-static actuation, Piezo-electric actuation, Thermo-electric actuation. Micro-mirrors, optical switches. **(10L)**

**Text Books:**

1. Julian W. Gardner, Vijay K. Varadan - Microsensors, MEMS, and Smart Devices, John Wiley & Sons Ltd, 2001.
2. Foundations of MEMS by Chang Liu (2nd edition), 2012.

**References:**

1. Tai-Ran Hsu, MEMS & Microsystems: Design, Manufacture, and Nanoscale Engineering, 2<sup>nd</sup> edition, Wiley, 2008.
2. Stephen D. Senturia, " Microsystem Design", New York, NY: Springer, 2004.
3. Madou, Marc. "Fundamentals of Microfabrication", Boca Raton, FL: CRC Press, 1998.
4. Tabib-Azar, Masood. Microactuators. Norwell, MA: Kluwer Academic, 1997
5. Trimmer, William, ed. Micromechanics and MEMS. New York, NY: Wiley-IEEE Press, 1997.
6. Gardner, Julian W. Microsensors: Principles and Applications. New York, NY: John Wiley and Sons, 1994.

**Paper code: DECE612C**

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

**Paper name: Computer Aided Electronic Design**

**Total contact hours: 32**

**Unit 1:** Introduction to computer aided design- Computer as design medium- Hardware/Software requirements. Representation of images- Scan conversion of primitive objects- Text in graphics. Transformation- viewing and modelling transformation in 2D and 3D matrix representation. Segmentation and geometric modelling. (7L)

**Unit 2:** Computer simulation of electronic networks- Mathematical Review: Solution of simultaneous Linear equations – exploiting the sparsity in matrices. DC Analysis of Linear networks- Review of Nodal and loop analysis, DC Analysis of Non-Linear networks, Transient Analysis of Linear circuits, Transient Analysis of Non-Linear circuits. (7L)

**Unit 3:** Semiconductor device model- Low frequency models for semiconductor devices: Models for pn-junction Diodes, AC Ebers Moll model, AC and DC transport model for BJT, Noise Modeling, Introduction to SPICE models. (5L)

**Unit 4:** Logic simulation- Introduction to Hardware Description, Testing for design and manufacturing, Oscillations and other problems- Fault Simulation. Mixed-mode Simulation: Relaxation method for transient analysis-Wave form relaxation. (6L)

**Unit 5:** Computer aided PCB design- Computer Aided setup- Input Packages-Job setup- Libraries, Schematic Capture, Interface techniques Layout and Component Placement- General consideration- Manual, Assisted and Automatic Placement. Conductor routing –The routing problem-Surface Organization, Documentation. (7L)

### **Texts Books/References:**

1. C.S Krishnamoorthy and S Rajeev (Narosa), "Computer Aided Design-Software and analytical tool.
2. R Raghuram, "Computer Simulation of Electronic circuits", Wiley Eastern.
3. Gerald L Ginsberg, "Printed circuit design", MGH.
4. M. M Shah, "Design of electronic circuits and computer aided design", WE

**Paper code: DECE613A**

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

**Paper name: Internet of Things**

**Total contact hours: 25**

**Unit 1:** Introduction of Internet of Things- Define the term internet of things, state the technological trends which have led to IoT, describe the impact of IoT on society. **(7L)**

**Unit 2:** Design consideration of IoT, Enumerate and describe the components of an embedded system. Describe the interactions of embedded systems with the physical world. Name the core hardware components most commonly used in IoT devices. **(9L)**

**Unit 3:** Interfacing by IoT devices, describe the interaction between software and hardware in an IoT device. Explain the use of networking and basic networking hardware. Describe the structure of the Internet. **(9L)**

### **Texts Books/References:**

1. Internet of Things, Raj Kamal, McGraw Hill Education; First edition (10 March 2017).
2. Internet of Things: A Hands-On Approach, Arsheep Bahge and Vijay Madiseti, Orient Blackswan Private Limited - New Delhi; First edition (2015).

**Paper code: DECE613B**

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

**Paper name: Artificial Intelligence**

**Total contact hours: 32**

**Unit 1:** Introduction to Artificial Intelligence, Artificial Intelligence (AI) definition, Goals of AI, History of AI, Applications of AI **(6L)**

**Unit 2:** Agents and Environments, Agent Terminology, Types of Agents – Simple Reflex Agents, Model Based Reflex Agents, Goal Based Agents, Nature of Environments, Properties of Environments. **(8L)**

**Unit 3:** Search Algorithms Terminology, Brute Force Search Strategies – Breadth First Search, Depth First Search. Heuristic Search Strategies, Local Search Algorithms. **(7L)**

**Unit 4:** Fuzzy Logic System- Introduction to Fuzzy Logic and Fuzzy systems, Membership functions, Fuzzification/Defuzzification. **(6L)**

**Unit 5:** Neural Networks Basic structure of Neural Networks, Perceptron, Back-propagation. **(5L)**

**Texts Books/References:**

1. Artificial Intelligence by Example: Develop machine intelligence from scratch using real artificial intelligence use cases, Denis Rothman, Packet Publishing ISBN – 978-1788990547.



**Paper code: DECE613C**

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

**Paper name: Scientific Computing**

**Total contact hours: 32**

**Unit 1:** Introduction: Sources of Approximations, Data Error and Computational, Truncation Error and Rounding Error, Absolute Error and Relative Error, Sensitivity and Conditioning, Backward Error Analysis, Stability and Accuracy Computer Arithmetic: Floating Point Numbers, Normalization, Properties of Floating Point System, Rounding. **(6L)**

**Unit 2:** Systems of Linear Algebraic equations: Introduction, Gauss Elimination Method, LU decomposition, Symmetric and banded coefficient Matrices, Pivoting, Matrix Inversion, Iterative Methods, Other methods. Eigenvalues and singular values: Eigenvalues and Eigenvectors, Methods for Computing All Eigenvalues, Jacobi Method, Methods for Computing Selected Eigenvalues, Singular Values Decomposition, Application of SVD. **(8L)**

**Unit 3:** Interpolation and Curve Fitting: Polynomial Interpolation, Least square fit, Other methods; Roots of equations: Search Methods, Method of Bisection, Roots of Equations, Brent's method, Newton Raphson Method, Systems of Equations, Zeros of Polynomials. **(7L)**

**Unit 4:** Numerical Differentiation: Finite Difference approximations; Numerical Integration; Numerical Integration and Differentiation: Quadrature Rule, Newton-Cotes Rule, Gaussian Quadrature Rule, Finite Difference Approximation. **(6L)**

**Unit 5:** Initial Value Problems; Two-Point Boundary Value Problems; Symmetric Matrix Eigen value problems; Introduction to Optimization. **(5L)**

### **Texts Books/References:**

1. Text/ Reference Books: 1. Heath Michael T., "Scientific Computing: An Introductory Survey", McGraw-Hill, 2nd Ed., 2002
2. Press William H., Saul A. Teukolsky, Vetterling William T and Brian P. Flannery, "Numerical Recipes: The Art of Scientific Computing", Cambridge University Press, 3rd Ed., 2007
3. Jaan Kiusalaas, "Numerical Methods in Engineering with Python", Cambridge University Press, 2005.

**Paper code: DECE604**

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

**Paper name: Indian Constitution**

**Total contact hours: 32**

**UNIT 1: Introduction and Basic Information about Indian Constitution:**

Meaning of the constitution law and constitutionalism, Historical Background of the Constituent Assembly, Government of India Act of 1935 and Indian Independence Act of 1947, Enforcement of the Constitution, Indian Constitution and its Salient Features, The Preamble of the Constitution, Fundamental Rights, Fundamental Duties, Directive Principles of State Policy, Parliamentary System, Federal System, Centre-State Relations. (7L)

**UNIT 2: Union Executive and State Executive:**

Powers of Indian Parliament Functions of Rajya Sabha, Functions of Lok Sabha, Powers and Functions of the President, Comparison of powers of Indian President with the United States, Powers and Functions of the Prime Minister, Judiciary – The Independence of the Supreme Court, Appointment of Judges, Judicial Review, Public Interest Litigation. (7L)

**UNIT 3: Introduction and Basic Information about Legal System:**

**The Legal System:** Sources of Law and the Court Structure: Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law, Principles taken from decisions of judges constitute binding legal rules. The Court System in India and Foreign Courtiers (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court). Arbitration: As an alternative to resolving disputes in the normal courts, parties who are in dispute can agree that this will instead be referred to arbitration. Contract law, Tort, Law at workplace. (9L)

**UNIT 4: Laws of Business Organizations and E-Governance:**

**Sole Traders, Partnerships:** Companies: The Company's Act: Introduction, Formation of a Company, Memorandum of Association, Articles of Association, Prospectus, Shares, Directors, General Meetings and Proceedings, Auditor, Winding up. E-Governance and role of engineers in E-Governance, Need for reformed engineering serving at the Union and State level, Role of I.T. professionals in Judiciary, Problem of Alienation and Secessionism in few states creating hurdles in Industrial development. (9L)

**Texts Books/References:**

- 1.) Brij Kishore Sharma: *Introduction to the Indian Constitution*, 8<sup>th</sup> Edition, PHI Learning Pvt. Ltd.
- 2.) Granville Austin: *The Indian Constitution: Cornerstone of a Nation (Classic Reissue)*, Oxford University Press.
- 3.) Subhash C. Kashyap: *Our Constitution: An Introduction to India's Constitution and constitutional Law*, NBT, 2018.
- 4.) Madhav Khosla: *The Indian Constitution*, Oxford University Press.
- 5.) PM Bakshi: *The Constitution of India*, Latest Edition, Universal Law Publishing.
- 6.) V.K. Ahuja: *Law Relating to Intellectual Property Rights* (2007)

