Diploma in Civil Engineering Syllabus Structure and Details
(July 2020 onwards)

Course No.	Course Name	L	T	P	C	Course No.	Course Name	L	T	P	C
	Semester I						**Semester II**				
DHSS101	Communication in English	3	0	0	6	DHSS271	Communication in English Lab	0	0	2	2
DCH102	Chemistry-I (THEORY)	2	1	0	6	DCSE202	Computer Fundamentals & Programming	2	0	0	4
DCH172	Chemistry-I (PRACTICAL)	0	0	2	2	DCSE272	Computer Fundamentals & Programming Lab	0	0	2	2
DMA103	Mathematics-I	3	0	0	6	DEE203	Fundamentals of Electrical & Electronics Engineering	2	1	0	6
DME104	Engineering Drawing	2	0	0	4	DEE273	Fundamentals of Electrical & Electronics Engineering Lab	0	0	2	2
DME174	Engineering Drawing Lab	0	0	2	2	DMA204	Mathematics-II	3	1	0	8
DME176	Workshop Practice	0	1	4	6	DME205	Engineering Mechanics	3	0	0	6
DPH105	Applied Physics - I (THEORY)	2	1	0	6	DPH206	Applied Physics – II (THEORY)	2	1	0	6
DPH175	Applied Physics - I (PRACTICAL)	0	0	2	2	DPH276	Applied Physics - II (PRACTICAL)	0	0	2	2
Contact Hours: 25		**12**	**3**	**10**	**40**	**Contact Hours: 23**		**12**	**3**	**8**	**38**
	Semester III						**Semester IV**				
DHSS302	Engineering Economics and Accountancy	3	1	0	8	DCE401	Structural Analysis	3	1	0	8
DCE301	Construction Materials	3	1	0	8	DCE402	Water Supply & Sanitary Installation	3	0	0	6
DCE302	Surveying-I	3	0	0	6	DCE403	Fluid Mechanics	3	0	0	6
DCE372	Surveying-I Lab	0	0	2	2	DCE473	Fluid Mechanics Lab	0	0	2	2
DCE303	Strength of Materials	3	1	0	8	DCE404	Surveying-II	3	0	0	6
DCE304	Environmental Engineering	3	0	0	6	DCE474	Surveying-II Lab	0	0	2	2
DCE374	Environmental Engineering Lab	0	0	2	2	DCE405	Building Construction & drawing in AutoCAD	3	0	0	6
						DCE475	Building Construction & drawing in AutoCAD Lab	0	0	2	2
Contact Hours: 22		**15**	**3**	**4**	**40**		**Total Contact Hours 22**	**15**	**1**	**6**	**38**
	Semester V						**Semester VI**				
DCE501	Construction Technology	3	0	0	6	DCE601	Estimation and costing	3	0	0	6
DCE502	Concrete Technology	3	0	0	6	DCE602	Design of steel structures	3	1	0	8
DCE572	Concrete Technology Lab	0	0	2	2	DCE603	Construction and project Management	2	1	0	6
DCE503	Geotechnical Engineering	3	0	0	6	DCE679	Project	0	0	10	10
DCE573	Geotechnical Engineering Lab	0	0	2	2	DCE61*	Elective	3	1	0	8
DCE504	Design of RCC Structures	3	1	0	8						
DCE505	Transportation Engineering	3	0	0	6	Elective subject List					
DCE575	Transportation Engineering Lab	0	0	2	2	DCE611	Construction Methods and Machinery				
						DCE 612	Water Resource Engineering				
						DCE 613	Computational Methods in Civil Engineering				
Total Contact Hours 22		**15**	**1**	**6**	**38**	**Total Contact Hours 24**		**11**	**3**	**10**	**38**

Total Mandatory Credits: 232

Semester I

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

Unit I: Periodic table, Atomic structure   (4L)

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

Unit II: Electrochemistry
(5L)

Electrolytes, Faraday's law of electrolysis, Numerical problems, application of electrolysis, oxidation and reductions, Redox reactions.

Unit III: Metallurgy   (5L)

General principles of metallurgy, minerals, ore, gangue, slag, flux, roasting, calcination etc. Metallurgy of iron and alluminium, Manufacture of steel by Bessemer process, open hearth process and LD process, alloys.

Unit IV:Buliding materials   (3L)

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

Unit V: Lubricant   (3L)

Defination, classification of lubricants, important functions of lubricants.

Unit VI: Polymer and polymerization   (4L)

Types of polymer, thermoplastic and thermosetting plastic, preparation and applications of PE, PVC, PP, Perpex, Teflon, Bakelite, nylon, Natural rubber, Synthetic rubber.

Unit VII: Organic chemistry   (6L)

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

Unit VIII: Environmental Chemistry   (6L)

Defination, Types of pollution, pollutants, Water quality measurements- D.O, B.O.D, C.O.D, hardness of water, removal of hardnes, TDS, Green house effect, acid rain, Ozone layer depletion.

Unit IX: Industrial chemistry   (4L)

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

Texts-Books / References:
1. S. Chawla;*A Text Book of Engineering Chemistry*, DhanpatRai Publishing Co.
2. Jain and Jain;*Engineering Chemistry*, DhanpatRai Publishing Co.
3. 3.V.R. Gowariker, N.V. Viswanathan, J. Sreedhar, *PolymerScience*, New AgeInternational Publisher.

4. S.K. Ghosh Advanced General OrganicChemistry (A Modern Approach) (Set I & Ii) NCBA Publisher, New Delhi, 2009
5. B. Viswanathan, P. S. Raghavan; Practical Physical Chemistry, Viva
6. 6.Dr. S. Rattan; Experiments in Applied Chemistry, S. K. Kataria& Sons.
7. J.C. Kuriacose and J. Rajaram; *Chemistry in Engineering*, Tata McGraw-Hill Publishing Company Limited, New Delhi
8. Dr. S. Rabindra and Prof. B.K. Mishra ;*Engineering Chemistry,* Kumar and Kumar Publishers (P) Ltd. Bangalore-40
9. SS Kumar; *A Text Book of Applied Chemistry-I* , Tata McGraw Hill, Delhi
10. Dr. G.H. Hugar; *Progressive Applied Chemistry –I and II* , Eagle Prakashan
11. M. L. Sharma, P.N. Chaudhury, B. R, Khanal, D.R.Paudel; *Engineering Practical Chemistry*, Ekta Books Distributors.

Paper code: DCH172
Paper name: Chemistry-I (Practical)   **Credit: 2**
Total contact hours: N/A   **L-T-P: 0-0-2**

Experiment-1: Introduction to chemistry laboratory, precautions, name of common chemicals, apparatus, instruments etc.
Experiment-2: Volumetric analysis and study of apparatus used therein.
Experiment-3: Determine the degree of temporary hardness of water by EDTA titration.
Experiment-4: Determination of solubility of a solid at room temperature.
Experiment-5: To verify the first law of electrolysis (electrolysis of copper sulphate solution using copper electrode).
Experiment-6: Determination of pH of unknown solutions.
Experiment-7: To determine the coefficient of viscosity of the alcohol by using *Ostwald's* viscometer.
Experiment-8: To determine the surface tension of the given liquid with respect to water at room temperature by using *Stalagnometer.*
Experiment-9 Preparation of standard solution of Na_2CO_3
Experiment-10 Determination of strength of NaOH by titrating with 0.1 N HCL

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

Module 1: UNITS & DIMENSION   **Contact   hours: 2**

    1.1. Need of measurement and Unit in Engineering and Science definition of unit, fundamental and derived quantities and their units, different system of units (CGS and SI), Illustrations.

    1.2 Explanation of dimensions of physical quantities, dimensional equations of physical quantities and their   uses with examples.

Module 2: BASIC MECHANICS   **Contact hours:12**

  2.1 Introduction to scalar and vector quantities, representation of   vector, addition, subtraction and multiplication   of vectors, parallelogram law of vector addition, resolution of vector, dot and scalar product of two vectors (details not required).

  2.2 Newton's laws of motion: First law, explanation, definition of force, Concept of   Inertia, types of
       inertia (inertia of rest and inertia of motion), Newton's second law, momentum, impulse, mass &

weight, simple problems, Newton's third law, explanation and its examples, Principle of conservation of linear momentum, statement and simple examples (e.g. recoil of a gun), numerical problems.

2.3 Circular motion, time period and angular velocity, relation between angular velocity and linear velocity, centripetal and centrifugal force, bending of a cyclist on a curved path, banking of roads and railway track, numerical problems.

2.4 Work, power and energy, its concept, units and dimension, Potential and Kinetic energy, its mathematical relations, Principle of conservation of energy, its proof in case of a free falling body under gravity, numerical problems.

2.5 Simple Harmonic Motion, its geometrical representations and 1derivation of its equations, definition of amplitude, time period, frequency, phase etc., mathematical relations and units, simple pendulum & second's pendulum, numerical problems.

Module 3: GRAVITY AND GRAVITATION   Contact hours:3

3.1 Newton's law of gravitation, acceleration due to gravity, relation between 'G' and 'g', their units, variation of

the value of g with altitude and depth, Centre of gravity and Centre of mass, Numerical problems

Module 4: ELASTIC PROPERTIES OF SOLID   Contact hours:3

4.1 Deforming force, restoring force, Elastic and plastic bodies, explanation of stress and strain with their types, Hook's law, elastic limit, Young's modulus, Bulk modulus, Rigidity modulus, Poisson's ratio, their units and numerical problems.

Module 5: HEAT AND THERMODYNAMICS   Contact hours:10

5.1   Concept of heat and temperature, thermometer, different scales of temperatures and their conversion formulae, numerical problems.

5.2   Thermal expansion: expansion of solid, linear, superficial and cubical expansion of solid, their coefficients & their relations; Expansion of liquid: co-efficient of Real and Apparent expansion, their relation, variation of density with temperature, Anomalous expansion of water (experimental determination not necessary). Concept of Absolute scale of temperature.

5.3   Calorimetry: Unit of heat, Joule and calorie, Specific heat, thermal capacity and water equivalent.

5.4   Change of state of a body, melting and freezing point, effect of pressure on melting point, latent heat, Evaporation, difference between vaporisation and evaporation, factors on which rate of evaporation depends.

5.5   Transmission of heat, three modes of heat transfer, conduction, convection and Radiation, good and bad conductor of heat, coefficient of thermal conductivity, its S.I. unit and dimension.

5.6   1st law and 2nd law of thermodynamics, Joule's law and Mechanical equivalent of heat.

Module 6: SOUND   Contact hours:6

6.1   Wave Motion: amplitude, time period, frequency and wavelength, relation between velocity, frequency and wavelength. Transverse and longitudinal waves with examples.

6.2   Propagation of sound wave: Expression of velocity of sound in air, Newton's formula and Laplace's correction, Effect of temperature, and pressure on velocity of sound.

6.3   Audible range, ultrasonic and infrasonic sound, application of ultrasonic sound to calculate the depth of ocean.

6.4   Reflection of sound and its application, Echo and reverberation of sound, acoustic of building

6.5   Doppler's effect with Mathematical expressions.

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

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

1. Vernier Callipers: To determine the volume of a metallic/wooden cube.
2. Screw Gauge: to determine cross sectional area of a wire/ thickness of a glass piece.
3. Spherometer: To determine the radius of curvature of concave and convex mirrors.
4. To determine the value of acceleration due to gravity (g) of a place with simple pendulum.
5. To measure the velocity of sound in resonance tube.
6. To determine the frequency of a tuning fork using Sonometer.
7. Measurement of Specific gravity of solid, liquid, using Nicolson hydrometer, Hare's apparatus and specific gravity bottles.
8. To determine the atmospheric pressure by using Boyle's law apparatus.
9. To determine water equivalent of a calorimeter by method of mixture.

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

Module –I: ALGEBRA   (20 HOURS)

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

Module-II: TRIGONOMETRY   (15 HOURS)

- Trigonometric functions and ratios.

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

Reference Books:

Sl. No.	Title	Author/ Publisher
1	Mathematics for Polytechniques: Vol – I&II	TTTI, Bhopal
2	Mathematics for Polytechniques	S.P. Deshpande
3	Engineering Mathematics	I.B. Prasad
4	Engineering Mathematics	Grewal
5	Plain Trigonometry	Bansilal
6	College Algebra	Shah and Desai
7	Mathematics Textbook for class XI and XII	NCERT

Paper code: DHSS101 **Credit: 6**
Paper name: COMMUNICATION IN ENGLISH **L-T-P: 3-0-0**
Total contact hours:39

Module 1: Parts of Speech 1.1 Recognition and review of Nouns, Pronouns, Verbs, Adverbs, Adjectives, Prepositions, Conjunctions, Interjections 1.2 Knowledge of Subject, Object and Compliment of the Verb 1.3 Herbals –Infinitival, Gerund and Preposition. .	**Contact hours: 3**
Module 2: Prepositions of time and place 2.1 Contextual teaching of prepositions of time - on, in , at, since, for, ago, before, to, past, to, from, till/until, by 2.2 prepositions of place: in, at, on, by, next to, beside, near, between, behind, in front of, under, below, over, above, across, through, to, into, towards, onto, from.	**Contact hours: 5**
Module 3: Clause, phrases and Relative Clauses 3.1 Basic definitions of clauses and phrases 3.2 Focus on Relative Pronouns and their use in sentences as relative clauses.	**Contact hours: 2**
Module 4: Subject Verb Agreement 4.1 Rules that guide the agreement of the subject to its verb	**Contact hours: 5**
Module 5: Sentence types and Transformation of sentences 5.1 Assertive sentences, Exclamatory sentences, Interrogative sentences, Negative sentences, Compound sentences, complex sentences, simple sentences, Degrees of Comparison.	**Contact hours: 5**
Module 6 Voice 6.1 Change from Active Voice to Passive Voice and vice versa	**Contact hours: 3**
Module 7: Punctuation 7.1 Use of the comma, semi-colon, colon, apostrophe, exclamation mark, question mark and quotation marks	**Contact hours: 5**
Module 8: Word formation 8.1 Change of one part of speech to the other: from Verbs to Nouns, Nouns to Verbs,	**Contact hours: 2**

Adjectives to Nouns, Nouns to Adjectives, Verbs to adverbs, and Adverbs to Verbs	
Module 9: Affixation 9.1 Prefixes and Suffixes and new word formations	**Contact hours: 2**
Module 10: Nominal Compounds 10.1 Common nominal compound	**Contact hours: 2**
Module 11: Paragraph Writing 11.1 Descriptive Paragraph on various related topics.	**Contact hours: 5**

BOOKS RECOMMENDED: 1. Essential English Grammar with Answers by Raymond Murphy (Cambridge University Press)
2. English for Polytechnics by Dr Papori Rani Barooah (Eastern Book House Publishers)
3. English Grammar by Annie Brinda (Cambridge University Press)

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

Module 1. INTRODUCTION   [Contact Hrs: 5 Hrs]
   i.   Drawing as a medium of communication,
   ii.   Use and care of Drawing Instruments Assignments:
                Such as Drawing of Horizontal and Vertical Lines, Square, Rectangle,
                Mosaic Pattern, Angular Pattern, Stamping with circular pattern.
   iii. Types of Lines and Dimensioning as per 15696/72

Module 2. GEOMETRICAL CONSTRUCTIONS   [Contact Hrs = 8 Hrs.]
   i.   Freehand curves, free hand Drawing
   ii.   Construction of triangles, Perpendicular and angles of 300, 450, 600, 900
   iii. Construction of Regular Polygons. .
   iv.   Regular Polygons inscribed in circles.
   v.   Regular figures by using T – square and Set – square.

Module 3. LETTERING, SCALES   [Contact Hrs = 5 Hrs.]
   i.   Single Stroke Lettering Straight and Inclined by graph and Free hand Letters and digits as per
         15696/72
   ii.   Scale- Representative Fraction, Types or Scales
   iii. Simple problems on Plain and Diagonal Scale
         .
Module 4. PROJECTION OF POINTS   [Contact Hrs = 5 Hrs.]
   i.   Position / location of Points, Horizontal plane, Vertical plane .
   ii.   Assignments of Simple problems on different quadrants and Find the distance between two
         points.
   iii. Position/ Location of Points.

Module 5. PROJECTION OF LINES   [Contact Hrs = 5 Hrs.]
   i.   Position / location of Points, Horizontal plane, Vertical plane .
   ii.   Assignments of Simple problems on different quadrants and Find the distance between two
         points.
   iii. Position/ Location of Lines.

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

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

Module 7. RIVET HEADS AND JOINTS [Contact Hrs = 5 Hrs.]
i. Different types of Rivet Heads and Joints.
ii. Top and Sectional Front views of Lap and Butt Joints with single double cover plates.

Module 8. ISOMETRIC PROJECTION [Contact Hrs = 5 Hrs.]
i. Isometric Projection to true scale and isometric scale.

Module 9. THREAD/ SCREWED [Contact Hrs = 5 Hrs.]
i. Thread Profiles (REF IS 2043 IS – 554 ETC.)
ii. Screwed Fastenings
iii. Representation of external and internal threaded assembly symbolic .
iv. Representation of threads.
v. Representation of Screws, Bolts, Nuts and Cutter.

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

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

Module 1: Carpentry shop (Theory and Practice: 12hrs)
1.1 Introduction with the shop
1.2 Various structure of wood and types of wood
1.3 Different types of tools, machine and accessories used in Carpentry shop
1.4 Safety Precautions in workshop
Details of Practical Contents (3+3 hrs)
Demo of different wood working tools and machines
Demo of different wood working processes
Simple joints like T joints etc.
One simple utility job.

Module 2: Fitting Shop (Theory and Practice: 12hrs)
2.1 Introduction with the fitting shop
2.2 Various marking, measuring, cutting, holding and striking tools
2.3 Different Operations like chipping, filing, marking drilling etc.
2.4 Working principle of drilling machine, lapping dies etc.
Details of Practical Contents (3+3 hrs)
Demo of different fitting tools and machines and power tools
Demo of different processes in fitting shop
Squaring of a rectangular metal piece
One simple utility job.

Module 3: Welding Shop (Theory and Practice: 12hrs)
3.1 Introduction
3.2 Types of Welding, Arc Welding, Gas Welding, Gas Cutting
3.3 Welding of dissimilar materials, selection of welding rod material, size of rod and work piece

3.4 Different types of flames
3.5 Elementary symbolic Representation
3.6 Safety and precautions
Details of Practical Contents (3+3 hrs)
Demo of different welding tools and machines
Demo of Arc Welding, Gas Welding, Gas Cutter and rebuilding of broken parts with welding
Any one Composite job involving lap joint welding process.

Module 4: Machine Shop   (Theory and Practice: 12hrs)
4.1 Introduction
4.2 Study of Different types of Lathe machine, shaping machine, Drilling machine
4.3 Study of Different types of hand tools and machine tools and parts
4.4 Safety & precautions
Details of Practical Contents (3+3 hrs)
Demo of different machines and their operations
Preferably prepare a simple job.

Module 5 Turning shop   (6 hrs)
Demo of lathe machine, drilling machine
One job related to plane and taper turning , threading and knurling
One job related to drilling and tapping

Module 6 Electrical Shop   (6 hrs)
Demo of simple house wiring and use of tools
One job related to simple house wiring
Fittings of cut outs, fuses and other simple fittings etc.
Difference between Single phase wiring and three phase wiring

Suggested Text/Reference Books:
(i) Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
(ii) Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
(iii)Gowri P. Hariharan and A. Suresh Babu,"Manufacturing Technology – I" Pearson Education, 2008.
(iv) Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998
(v) Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGraw Hill House, 2017

Semester II

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

Module 1: LIGHT   Contact hours: 5

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

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

Module 2: ELECTROSTAICS   Contact hours: 3

2.1 Concept of Electric charge according to modern electron theory, unit of charge, Inverse square law, electric field, Electric line of force, electric intensity

2.2 Potential at a point due to a point charge, relation between intensity and potential with deduction of the formula

2.3 Capacity of a condenser, series and parallel combination, different type of condenser, numerical problems.

Module 3: CURRENT ELECTRICITY   Contact hours: 11

3.1 potential difference and electric current with their units.

3.2 Difference between emf. and potential difference; internal resistance of cell. Voltaic cell; defects of cell: local action and polarization and their removal.

3.3 Difference between primary and secondary cells with examples, grouping of cells, series, parallel and mixed combinations of cells.

3.4 Basic D.C. Circuits: Ohm's Law and its verification, mathematical expression, Kirchoff's Law, numerical problems.

3.5 Definition of resistance, conductance, effects of temperature on resistance, Series and parallel combination of resistance, resistance per unit length, numerical problems.

3.6 Heating Effect of Current: Joule's law, electricity energy and power, numerical problems

3.7 Thermoelectric effect: Thermocouple, Seebeck effect, Peltier effect and Thomson effect.

3.8 Chemical effect of current: electrolysis, Faradays's laws of electrolysis.

Module 4: MAGNETISM   Contact hours: 5

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

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

4.3 Elements of terrestrial magnetism

Module 5: 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.

Suggested Reference books.

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

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

1. To verify the laws of reflection using a plane mirror and to study the characteristics of image formed.
2. To determine the refractive index of the material of the glass slab by pin method.
3. To determine the focal length of a convex lens by U-V method.
4. To determine the focal length of a convex lens by plane mirror method.
5. To draw I-D curve and to determine the refractive index of the material of a prism.
6. To locate the poles of a bar magnet and to measure the magnetic length.
7. To plot magnetic lines of force of a bar magnet with north pole pointing north and to locate the neutral point/to plot magnetic lines of force of a bar magnet with south pole pointing north and to locate the neutral point.
8. To verify Ohm's law by Ammeter-voltmeter method.
9. To find equivalent resistance using voltmeter with I. Three resistances connected in series II. Three resistances connected in parallel.
10. To measure the unknown resistance of the material of a wire by meter bridge using Wheatstone bridge principle.

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

MODULE I: CALCULUS-I   (16 HOURS)
a. Differential Calculus
- Sets: Definition, types and operation on Sets.
- Relation: Definition, domain and range, equivalence relation.
- Functions: definition, types of functions.
- Limits: Concept and evaluation of limits, indeterminate forms, L'Hospital's Rule.
- Differentiation: Differentiation by first principle. Differentiation of sum, product and quotient, function of function, Chain rule. Differentiation of trigonometric, inverse trigonometric, hyperbolic, logarithmic and parametric functions, applications.
- Basic concepts of partial differentiation.

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

MODULE-II: STATISTICS   (10 HOURS)
- Measures of Central Tendency: Mean,Median and Mode and empirical relationship between them and related problems.
- Measures of Dispersion: Range, Mean Deviation, Standard Deviation, Quartile deviation.
- Correlation

MODULE-III: CO-ORDINATE GEOMETRY   (14 HOURS)
- Co-ordinate Systems, Cartesian and polar co-ordinates, distance between two points, section formula, area of triangle, collinearly and co-planarity.
- Straight Line: Definition, general and standard form of equations, intersection of straight lines: angle between them, bisector of angle between them.
- Change of co-ordinate axes, shifting of origin and rotation of axes.
- Circle: Standard equations and simple problems, tangent and normal.
- Basic idea of parabola, ellipse and hyperbola, their standard equations and basic properties.

Books for Reference:-

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

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

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

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

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

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

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

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

Reference books:
   1.   Engineering Mechanics: S Timoshenko & D H Young. McGrow Hill Int.
   2.   Engineering Mechanics: R S Khurmi. S Chand & Co.
   3.   Engineering Mechanics: R K Bansal. Laxmi Publication (P) Ltd
   4.   Engineering Mechanics: K L Kumar. McGrow Hill Publishing Co.
   5.   Irving H. Shames (2006), Engineering Mechanics, 4th Edition, Prentice Hall
   6.   F. P. Beer and E. R. Johnston (2011), Vector Mechanics for Engineers, Vol I –
             Statics, Vol II, – Dynamics, 9th Ed, Tata McGraw Hill
   7.   R.C. Hibbler (2006), Engineering Mechanics: Principles of Statics and
             Dynamics, Pearson Press

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

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

Module 2:   **Contact hours: 8L**
DC circuits: Definitions of active, passive, linear, non-linear circuits elements and networks, Kirchoff's laws, Nodal and mesh analysis, voltage and current sources, network theorems, superposition. Thevenin's, Norton's, maximum power transfer, Millman's, and reciprocity theorems, analysis of simple circuits with DC excitation.

Module 3:   **Contact hours:**
10L

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

Module 4:   **Contact hours:**
4L

Semiconductor Devices:

Review of atomic structure, Intrinsic and Extrinsic semiconductors, current carriers in semiconductors, P-type and N-type materials, P-N junction, biasing, characteristic curve, load line, Zener diode.

Special semiconductor devices (Qualitative only) – tunnel diode, backward diode, varactor and PIN diode, their construction, operation and applications.

Module 5:   **Contact hours:**
3L

Bipolar transistor (Qualitative only): Construction and schematic representation of PNP and NPN transistors, formation of PNP / NPN junctions, energy band diagram; transistor mechanism and principle of transistors.

Module 6:   **Contact hours:**
2L

Bipolar transistor (Qualitative only):

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

Module 7:   **Contact hours:**
3L

Rectifier Circuits:

Half wave and full wave rectifier (Qualitative only): ripple factor, rectification efficiency, Peak Inverse Voltage.

Filtering (passive) and voltage regulation (Qualitative only): Capacitor filter, Inductor filter, 'T' filter, 'π' filter. Zener as voltage regulator.

Module 8:   **Contact hours:**
2L

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

Books / References:

1. D.P. Kothari & I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. B.L. Thereja, A.K. Thereja, " A Textbook of Electrical Technology", S.Chand
4. Jacob Millman, "Electronics Devices & Circuits", McGraw Hill Education; 4 edition (2015).
5. Boyestad & Nashelsky, "Electronics Devices and circuit theory", Pearson Education India; 11th edition (2015).
6. S. Salivahanan & N. Suresh Kumar, "Electronic Devices and Circuits", McGraw Hill Education; Fourth edition (2017).

7. Albert Malvino & David Bates, "Electronic Principles", Tata McGraw Hill Publication, 2010.
8. A.K. Maini, "Analog Circuits", Khanna Publishing House, Ed. 2018.

Paper code: DEE273
Paper name: Fundamentals of electrical & electronics engineering lab　　　**Credit: 2**
Total contact hours: 16　　　**L-T-P: 0-0-2**

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, rheostat and wattmeter.
2. Make a measured resistance from a given rheostat
3. Verification of Kirchhoff's laws
4. Verification of Superposition theorem
5. Verification of Thevenin's theorem
6. P-N Junction
6. Half-wave rectifier circuit
7. Full-wave rectifier circuit
8. V- I characteristics of transistors
9. Wiring

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

Module 1: Speaking and Listening practices 1.1 Practices of sounds of English 1.2 Proper Body language while speaking 1.3 Presentation and public speaking practices 1.4 Practicing to enhance listening skills 1.5 Different types of istening 1.6 Good listening practices 1.7 Overcoming barriers to effective listening	
Module 1: Business Writing 1.1 Letter Writing Formal letter formats, 1.2 practice of letter writing in different situations: Order letter, Complaint letter, Letter of Adjustment, Quotation letter , Letter to the Editor, Application for leave of absence 1.3 Job Application and Cover Letter, format of a job application 1.4 Resume, Curriculum Vitae, bio data.	**Contact hours: 3**
Module 2: Paragraph Writing and Summary Writing 2.1Definition, Cohesion and Linkage using Transition words on everyday topics 2.2. Practicing how to compose coherent passages. 2.3 Definition, Use of Transition words, important points to remember while summarizing 2.4 Explain and practicing how to arrive at a summary of a paragraph / text	**Contact hours: 5**
Module 4 Email Writing 4.1 writing the perfect e-mail, 4.2 steps to the perfect e-mail, formal and informal greetings, requests through an e-mail, writing an apology, complaint and seeking help and information in an e-mail, 4.3 informing about a file attached in in an email, writing the formal ending of an e-mail 4.3 Explaining and practicing how to write formal and informal emails	**Contact hours: 5**
Module 3: Report writing 3.1 Definition, types of reports with a focus on annual report, non-profit annual report, technical and academic report, 3.2 necessity and purpose of writing a report, qualities of a good report, 3.3 language used in a report,	**Contact hours: 2**

3.4 different formats of reports and sample reports	
Module 5: Facing an interview 5.1 How to approach, what to speak, how to speak in an interview and answer interview questions, the business etiquettes to maintain 5.2 body language, negative body language, handling an awkward situation in an interview, the dress code 5.3 Successful job interview practices 5.4 Perfect handshake, points to remember while applying for a job	**Contact hours: 5**
Module 6 British English and American English 6.1 Difference between American and British English words – vocabulary and spelling 6.2 Pronunciation and accents	**Contact hours: 3**

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

Paper Code: DCSE202   **Credit: 4**
Paper Name: Computer Fundamentals and Programming   **L-T-P: 2-0-0**
Total Contact Hours:35

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

Paper Code: DCSE272   **Credit: 2**
Paper Name: Computer Fundamentals and Programming Lab   **L-T-P: 0-0-2**
Total contact hours:32
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Module 1: Basic Commands for Computer System   **Contact hours:2**

Module 2: Preparation of Documents   **Contact hours:6**
2.1 Introduction to Word processing: Opening a document, preparing documents, inserting diagrams and tables
2.2 Editing document- (a) Character, word and line editing, (b) Margin Setting, Paragraph alignment, (c) Block Operations, (d) Spell Checker, (e) Saving a document, (f) Mailmerge.

Module 3: Information Presentation through SpreadSheet   **Contact hours:8**
3.1 Application of SpreadSheet
3.2 Structure of spreadsheets
3.3 Preparing table for simple data and numeric operations
3.4 Using formulae and functions in excel operations, Creation of graphs, Pie charts, bar charts.

Module 4: Preparation of presentation   **Contact hours:6**
4.1 Creation of electronic slides on any topic
4.2 Practice of animation effect
4.3 Presentation of slides

Module 5: Programming in C   **Contact hours:10**
5.1 Editing a C program
5.2 Defining variables and assigning values to variables
5.3 Arithmetic and relational operators, arithmetic expressions and their evaluation
5.4 Practice on input/output functions like getchar, putchar, gets, puts, scanf, printf etc.
5.5 Programming exercise on simple if statement, If..else statement, switch statement
5.6 Programming exercise on looping with do-while, while, for loop and array.

Books / References:
1. Foundations of Information Technology Coursebook 9: Windows 7 and MS Office 2007 (With MS Office 2010 Updates)-*Sangeeta Panchal,Alka Sabharwal*
2. Microsoft Office 2016 Step by Step by Joan Lambert and Curtis Frye
3. Herbert Schildt, "The complete Reference C", TMH
4. YashwantKanetkar, "Let us C", BPB Publication
5. Balagurusamy, E. (2019). *Programming in ANSI C, 8/e*. McGraw-Hill Education.
6. Henrry Mulish, Herbert L. Cooper, "The Spirit of C: An Introduction to Modern Programming", Jaico Books.
7. Briain W. Kenigham and Dennis Ritchie, "C Programming language", Prentice Hall of India.

Semester III

Paper code: DHSS302: (Engineering Economics and Accountancy) **Credit: 08**
Total contact hours: 52 **L-T-P: 3-1-0**

Part-A Engineering Economics	
Module 1: Introduction to Economics 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.	**Contact hours: 4**
Module 2: Demand and Supply 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	**Contact hours: 6**
Module 3: Production 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	**Contact hours: 4**
Module 4: Money 4.1 Meaning of Money 4.2 Types of Money 4.3 Functions of Money	**Contact hours: 3**
Module 5: Banking Organisation 5.1 Central Bank – its functions 5.2 Commercial Banks – its functions	**Contact hours: 3**
Module 6: Pricing 6.1 Objective of Pricing Policy 6.2 Price determinants 6.3 Price discrimination	**Contact hours: 4**

Part-B: Accountancy	
Module 7: Introduction to Book Keeping and Accountancy 7.1 Definition and objectives of Book Keeping 7.2 Need and Advantages of Book Keeping 7.3 Definition of Accounting 7.4 Difference between book keeping and accounting 7.5 Double Entry Systems – main features 7.6 Advantage and dis advantages of Double Entry System	**Contact hours: 5**

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 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	**Contact hours: 3**
Module 10: Journal and Ledger 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	**Contact hours: 5**
Module 11: Cash Book 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	**Contact hours: 5**
Module 12: Trial Balance and Error in Accounting 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	**Contact hours: 3**
Module 13: Components of Final Accounts 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	**Contact hours: 4**

Books / References:

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

Paper code: DCE301: Construction Materials **Credit: 08**
Total contact hours: 40 **L-T-P: 3-1-0**

Module 1: Rock: Classification, quarrying and dressing. **04**

Module 2: Bricks: Manufacturing processes, classification and properties. Flooring and **07**
roofing tiles.

Module 3: Production, properties and uses of lime; cement and sand-mortar. Concrete: **09**
Plain and reinforced.

Module 4: Timber: Types, defects, methods of seasoning, methods of preservation, timber **07**
products.

Module 5: Iron and structural steel: Manufacturing processes, properties, defects. **05**

Module 6: Types and uses of paints; varnishes and distemper. Sound and heat insulting **08**
materials; Glasses; plastics and asphaltic materials.

Books / References:
1. Civil Engineering Materials, TTTI, Chandigarh, Tata McGraw Hill, New Delhi
2. Engineering Materials, Sushil Kumar, Metropolitan Publishers, New Delhi
3. Engineering Materials, Rangwala, S.C., Charotar Publishing House, Anand, India
4. Engineering Materials, K P Roy Chowdhury, Oxford & IBH, New Delhi

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

Module 1: **Contact hours: 8**
Introduction, classification of survey, chain surveying - principle, instruments used, procedure, Problems and errors in chain survey.

Module 2: **Contact hours: 8**
Compass surveying: types, description and uses, measurement of bearings in WCB and QB systems, local attraction and related problems.

Module 3: **Contact hours: 9**
Levelling: differential levelling, booking and reduction of levels, related problems and practices.

Module 4: **Contact hours: 9**
Contouring: Principles, methods and applications, contour gradient.

Books / References:
1. Surveying-Vol-I, B. C. Punamia, Laxmi Publications, New Delhi.
2. Surveying & Levelling Vol.-I, T. P. Kanetkar & S. V. Kulkarni, Pune Vidyarthi Griha Prakashan, Pune.
3. Surveying Vol.-I, S. K. Duggal, Tata McGraw Hill, New Delhi.
4. Surveying and Levelling, N. N. Basak, Tata McGraw Hill, New Delhi.

Paper Code: DCE372: Surveying-I Lab   **Credit: 02**
Total contact hours: 24   **L-T-P: 0-0-2**

Module 1:   **Contact hours: 6**
Chain Surveying

Module 2:   **Contact hours: 6**
Compass: Traversing

Module 3:   **Contact hours: 6**
Levelling: Observation using Dumpy level and staff, Fly levelling

Module 4:   **Contact hours: 6**
Contouring: Direct and Indirect method

Books / References:
5. Surveying-Vol-I, B. C. Punamia, Laxmi Publications, New Delhi.
6. Surveying & Levelling Vol.-I, T. P. Kanetkar & S. V. Kulkarni, Pune Vidyarthi Griha Prakashan, Pune.
7. Surveying Vol.-I, S. K. Duggal, Tata McGraw Hill, New Delhi.
8. Surveying and Levelling, N. N. Basak, Tata McGraw Hill, New Delhi.

Paper Code: DCE303   **Credit: 08**
Paper Name: Strength of Materials   **L-T-P: 3-1-0**
Total contact hours: 45

Module 1: Simple stresses and strains   **Contact hours: 9**
Concept of Stress & Strain, normal & shearing stress, strains , stress-strain relationship, generalized Hooke's law, modulus of Elasticity, modulus of Rigidity, Bulk modulus, Hoop stress, Lateral strain, Poisson's ratio and Volumetric strain, Elastic moduli and the relationship between them, stress – strain diagram for mild steel.

Module 2: Torsion   **Contact hours: 7**
Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts, torsional rigidity.

Module 3: Shear forces and bending moments.   **Contact hours: 7**
Relationships between load, Shearing force, Bending moment, Shear force and Bending moment diagrams.

Module 4: Stresses in beams.   **Contact hours: 8**
Theory of simple bending stresses in beams, Bending and shear stress distribution over cross-sections of determinate beams.

Module 5: Principal stress and strain   **Contact hours: 7**
Normal stress, tangential stress, principal stresses, principal planes, Mohr's circle of stresses and strain and related problems.

Module 6: Columns and Struts.   **Contact hours: 7**
Axially loaded Compression members, Crushing load, Buckling load, Colums, Euler, Rankine and Secant formulae and related problems.

Books/References:
1. Strength of meterials & mechanics of structures, B. C. Punmia, Standard Publishers & Dristributers, Delhi.
2. Mechanics of Materials, J. M. Gera and S. P. Timoshenko, CBS Publishers & Distributors, Delhi.

Module I: **Contact Hour 06**
Introduction, estimation of quantity of water, per capita demand, design period and factors considered for selection of design period. Population forecasting.

Module 2:   **Contact Hour 08**
Sources of water and their suitability with regard to quality & quantity, storage capacity of reservoirs, water quality parameters, standards.

Module 3:   **Contact Hour 20**
Water treatment plant Layout plan, estimation of raw water discharge for treatment plant, treatment of water- screenings, sedimentation, coagulation and flocculation, types of coagulants, optimum dose of coagulants, mixing devices, design of flocculation unit. theory of filtration, types of filters and their comparison, design of rapid sand filter, washing of filter, disinfection, methods of removing hardness distribution system, methods of water supply and storage

Module 4:   **Contact Hour 10**
Sewerage system, estimation of wastewater discharge in a sewer in sewerage system, hydraulic design of sewers, estimation of storm water discharge in urban area, characteristics of sewage, strength of sewage, population equivalent, treatment of sewage- primary and secondary treatments, oxidations ponds, sewage disposal, self –purification of streams, sludge digestion and disposal, concept of air pollution control

Books/References:

Books: 1. Environmental Engineering Vol. I: Water Supply Engineering, S.K. Garg, Khanna Publications, Delhi, 2009.

2. Environmental Engineering Vol II: Sewage Disposal and Air Pollution Engineering, S.K. Garg, Khanna Publications, Delhi, 2009.

3. Environmental Engineering, Peavy, Tachobanoglous & Rowe, McGraw Hill International, N.Y., 1985.

4. Wastewater Engineering: Treatment, Disposal and Reuse, Metcalf & Eddy, Tata McGraw Hill, New Delhi, 2003.

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

6. Water Supply & Sanitary Engineering, G.S. Birdi and J.S. Bindie, Dhanpat Rai Publishing Co., New Delhi, 1998.

DCE374: Environmental Engineering Lab　　　　　　　　　　**L – T – P　:　CR**
　　　　Total Contact hour: 26　　　　　　　　　　　　　　**0 - 0 – 2　:　02**

Module I:　　　　　　　　　　　　　　　　　　　　**Contact Hour: 02**

INTRODUCTION TO STANDARDS, COLLECTION AND PRESERVATIONOF SAMPLES, SAMPLING TECHNIQUES AND LABORATORY EQUPIMENTS

Module 2:　　　　　　　　　　　　　　　　　　　　**Contact Hour: 02**

EXPERIMENT ON DETERMINATION OF TOTAL DISSOLVED AND SUSPENDED SOLIDS IN WATER

Module 3:　　　　　　　　　　　　　　　　　　　　**Contact Hour: 02**

EXPERIMENT ON DETERMINATION OF pH

Module 4:　　　　　　　　　　　　　　　　　　　　**Contact Hour: 02**

EXPERIMENT ON DETERMINATION OF CONDUCTIVITY

Module 5:　　　　　　　　　　　　　　　　　　　　**Contact Hour: 02**

EXPERIMENT ON DETERMINATION OF CHLORIDES

Module 6:　　　　　　　　　　　　　　　　　　　　**Contact Hour: 02**

EXPERIMENT ON DETERMINATION OF TURBIDITY AND JAR TEST

Module 7:　　　　　　　　　　　　　　　　　　　　**Contact Hour: 02**

EXPERIMENT ON DETERMINATION OF ACIDITY OF WATER

Module 8:　　　　　　　　　　　　　　　　　　　　**Contact Hour: 02**

EXPERIMENT ON DETERMINATION OF ALKALINITY OF WATER

Module 9:　　　　　　　　　　　　　　　　　　　　**Contact Hour: 02**

EXPERIMENT ON DETERMINATION OF TOTAL HARDNESS

Module 10:　　　　　　　　　　　　　　　　　　　**Contact Hour: 02**

EXPERIMENT ON DETERMINATION OF RESIDUAL CHLORINE

Module 11:　　　　　　　　　　　　　　　　　　　**Contact Hour: 06**

EXPERIMENT ON DETERMINATION OF DO, BOD, COD