# Curriculum Structure& Syllabus (Effective from 2016-17 admission batch) Curriculum for B.Tech. Under Autonomy

			1st Semester					
Sl.	Categ	Paper			C Hou	onta rs/V	ict Veek	Cred it
N 0.	ory	Code	Subject	L	Т	Р	Tot al	Point s
			A. THEORY					
1	BS	M 101	Mathematics – I	3	1	0	4	4
2	BS	CH 101	Chemistry – I	3	1	0	4	4
3	ES	EE 101	Basic Electrical Engineering	3	1	0	4	4
4	HS	HU 101	Communicative English	2	0	0	2	2
5	ES	ME 101	Engineering Mechanics	3	1	0	4	4
			Total of Theory				18	18
			<b>B. PRACTICAL</b>					
6	HS	HU 191	Language Laboratory and Seminar Presentation	0	0	2	2	1
7	BS	CH 191	Chemistry – I Laboratory	0	0	3	3	2
8	ES	EE 191	Basic Electrical Engineering Laboratory	0	0	3	3	2
9	ES	ME 191	Engineering Drawing and Graphics	0	0	3	3	2
			Total of Practical				11	07
			C. SESSIONAL					
10	HS	XC 181	Extra-Curricular Activity (NSS / NCC)	0	0	2	2	1
		Tot	al of Theory, Practical and Sessional				31	26

			2nd Semester										
Sl	Catego	Paper			C Hou	onta rs/V	ict Veek	Cred it					
N 0.	ry	Code	Subject	L	T	P	Tot al	Poin ts					
			A. THEORY										
1	BS	M 201	Mathematics – II	3	1	0	4	4					
2	BS	PH 201	Physics – I	3	1	0	4	4					
3	ES	EC 201	Basic Electronics Engineering	3	1	0	4	4					
4	ES	CS 201	3	1	0	4	4						
5	ES	1	0	4	4								
			20	20									
	BSPH 201Physics – I310ESEC 201Basic Electronics Engineering310ESCS 201Computer Fundamentals and Principle of Computer Programming310ESME 201Engineering Thermodynamics and Fluid Mechanics310ESME 201Engineering Thermodynamics and Fluid Mechanics310Total of TheoryB. PRACTICALESCS 291Computer Fundamentals and Principle of Computer Programming Laboratory003MBSPH 291Physics – I Laboratory003BESEC 291Basic Electronics Engineering Laboratory003												
NoCatego ryPaper CodeSubjectHours/Week LTot alNoNTPTot alNoNMMathematics – II31041BSMMPhysics – I31042BSPH201Physics – I31043ESEC201Basic Electronics Engineering31044ESCS201Computer Fundamentals and Principle of Computer Programming31045ESME201Engineering Thermodynamics and Fluid Mechanics31046ESCS291Computer Fundamentals and Principle of Computer Programming Laboratory00337BSPH291Physics – I Laboratory003338ESEC291Basic Electronics Engineering Laboratory003339ESME292Workshop Practice003339ESME292Workshop Practice1212C. SESSIONAL													
7	BS	PH 291	Physics – I Laboratory	0	0	3	3	2					
8	ES	EC 291	Basic Electronics Engineering Laboratory	0	0	3	3	2					
9	ES	ME 292	Workshop Practice	0	0	3	3	2					
			Total of Practical				12	08					
			C. SESSIONAL										
1 0	MC	MC 281	Soft Skill Development	0	0	2	2	0					
		Tot	tal of Theory, Practical and Sessional				34	28					

# **Detailed** Syllabus

			1st Semester					
Sl. N	Categ	Paper	Subject		C Hou	onta rs/V	ict Veek	Cred it
0.	ory	Code	Subject	L	Т	Р	Tot al	Point s
			A. THEORY					
1	BS	M 101	Mathematics – I	3	1	0	4	4
2	BS	CH 101	Chemistry – I	3	1	0	4	4
3	ES	EE 101	Basic Electrical Engineering	3	1	0	4	4
4	HS	HU 101	Communicative English	2	0	0	2	2
5	ES	ME 101	Engineering Mechanics	3	1	0	4	4
			Total of Theory				18	18
			<b>B. PRACTICAL</b>					
6	HS	HU 191	Language Laboratory and Seminar Presentation	0	0	2	2	1
7	BS	CH 191	Chemistry – I Laboratory	0	0	3	3	2
8	ES	EE 191	Basic Electrical Engineering Laboratory	0	0	3	3	2
9	ES	ME 191	Engineering Drawing and Graphics	0	0	3	3	2
			Total of Practical				11	07
			C. SESSIONAL					
10	HS	XC 181	Extra-Curricular Activity (NSS / NCC)	0	0	2	2	1
		Tot	al of Theory, Practical and Sessional				31	26

Subject: Mathematics 1 Subject Code: M 101 Contact: 3L:1T:0P Credits: 4

Prerequisites: Any introductory course on matrix algebra, calculus, geometry.

#### **Course Outcomes (COs):**

On successful completion of the learning sessions of the course, the learner will be able to:

**M 101.1:** Recall the distinctive characteristics of matrix algebra, differential calculus, integral calculus and vector analysis.

**M 101.2:** Understand the theoretical working of matrix algebra, differential calculus, integral calculus and vector analysis.

**M 101.3:** Apply the principles matrix algebra, differential calculus, integral calculus and vector analysis for the solutions of the problems.

M 101.4: Analyze the application of matrix algebra, differential calculus, integral calculus and vector analysis.

M 101.5: Evaluate the result for application to the problems on matrix algebra, differential calculus, integral calculus and vector analysis

### Course Content

### MODULE – I: Matrix Algebra

Elementary row and column operations on a matrix, Rank of matrix, Normal form, Inverse of a matrix using elementary operations, Consistency and solutions of systems of linear equations using elementary operations, Linear dependence and independence of vectors, Concept & Properties of different matrices (unitary, orthogonal, symmetric, skew-symmetric, hermitian, skew-hermitian), Eigen values and Eigen vectors of a square matrix (of order 2 or 3), Characteristic polynomials, Caley-Hamilton theorem and its applications, Reduction to diagonal form (upto 3rd order).

MODULE – II:Calculus – I (Functions of single variable)[10L]Rolle's theorem, Mean value theorem- Lagrange & Cauchy, Taylor's and Maclaurin's theorems, Expansionof simple functions by Taylor's and Maclaurin's Theorems, Fundamental theorem of integral calculus,Evaluation of plane areas, volume and surface area of a solid of revolution and lengths, Convergence ofImproper integrals, Beta and Gamma Integrals – Elementary properties and the Inter relations.

#### [10L]

[12L]

### MODULE – III: Calculus – II (Functions of several variables)

Introduction to functions of several variables with examples, Knowledge of limit and continuity, Partial derivatives, Total Differentiation, Derivatives of composite and implicit functions, Euler's theorem on homogeneous functions, Chain rule, Maxima and minima of functions of two variables – Lagrange's method of Multipliers, Change of variables – Jacobians (up tothree variables), Double and tripleintegrals.

### MODULE – IV: Vector Calculus

Scalar and vector triple products, Scalar and Vector fields, Vector Differentiation, Level surfaces, Directional derivative, Gradient of scalar field, Divergence and Curl of a vector field and their physical significance, Line, surface and volume integrals, Green's theorem in plane, Gauss Divergence theorem, Stokes' theorem, Applications related to Engineering problems.

### **Text Books:**

- 1. E. Kreyszig, Advanced engineering mathematics (8th Edition), John Wiley, 1999.
- 2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publications, 2009.
- 3. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, Narosa Pub. House, 2008.
- 4. H. Anton, Elementary linear algebra with applications (8th Edition), John Wiley, 1995.
- 5. G. Strang, Linear algebra and its applications (4th Edition), Thomson, 2006.

### **Reference Books:**

- 1. S. Kumaresan, Linear algebra A Geometric approach, Prentice Hall of India, 2000.
- 2. M. Apostol, Calculus, Volumes 1 and 2 (2nd Edition), Wiley Eastern, 1980.
- 3. TG. B. Thomas and R. L. Finney, Calculus and Analytic Geometry (9th Edition), ISE Reprint, Addison- Wesley, 1998.
- 4. Hughes-Hallett et al., Calculus Singleand Multivariable (3rd Edition), John-Wiley and Sons, 2003.
- 5. J. Stewart, Calculus (5th Edition), Thomson, 2003.
- 6. J. Bird, Higher Engineering Mathematics (4th Edition, 1st India Reprint), Elsevier, 2006.
- 7. L.Rade and B.Westergen, Mathematics Handbook: for Science and Engineering (5th edition, 1st Indian Edition), Springer, 2009.
- 8. Murray R Spiegel and Seymour Lipschutz, Schaum's Outline of Vector Analysis. Richard Bronson, Schaum's Outline of Matrix Operations.

CO's	PO	's											PS	0	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
M 101.1	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
M 101.2	3	3	2	1	-	-	-	-	-	-	-	2	-	1	-
M 101.3	3	2	3	2	-	-	-	-	-	-	-	2	2	3	-
M 101.4	2	3	2	2	-	-	-	-	-	-	-	1	2	2	-
M 101.5	3	2	2	1	-	-	-	-	-	-	-	1	-	-	-
Avg.	2	2	2	1								1.	2	2	
	•	•		•								5			

### **CO-PO-PS0** Mapping:

### [8L]

8	4	5						

Subject: Chemistry 1 Subject Code: CH 101 Total Contact Hours: 35 Credits: 3

**Pre requisites:** Knowledge of Chemistry upto 12<sup>th</sup> standard.

**Course Outcomes(COs):** 

CH 101.1: Able to remember fundamental concepts of Chemistry and define relevant terminologies.

**CH 101.2:** Able to understand the principles of thermodynamics, spectroscopy and related physical properties of molecules.

**CH 101.3:** Able to apply the basic concept of Organic Chemistry and knowledge of chemical reactions to industries and technical fields.

CH 101.4: Able to analyze and explain protective measures of corrosion of metals in the industries.

**CH 101.5:** Able to assess theoretical and practical aspects relating to the transfer of the production of chemical products from laboratories to the industrial scale, in accordance with environmental considerations.

#### Course Content

#### Module 1

Chemical Thermodynamics –I

*Concept of Thermodynamic system:* Definition with example of diathermal wall, adiabatic wall, isolated system, closed system, open system, extensive property, intensive property.

Introduction to first law of thermodynamics: Different statements, mathematical form. *Internal energy:* Definition, Example, Characteristics, Physical significance, Mathematical expression for change in internal Energy, Expression for change in internal energy for ideal gas. 2L

*Enthalpy:* Definition, Characteristics, Physical significance, Mathematical expression for change in Enthalpy, Expression for change in enthalpy for ideal gas.

*Heat Capacity:* Definition, Classification of Heat Capacity (Cp and CV): Definition and General expression of Cp - CV. Expression of Cp - CV for ideal gas.

*Reversible and Irreversible processes:* Definition, Work done in Isothermal Reversible and Isothermal Irreversible process for Ideal gas, Adiabatic changes: Work done in adiabatic process, Interrelation between thermodynamic parameters (P, V and T), slope of P-V curve in adiabatic and isothermal process.

#### [8L]

Application of first law of thermodynamics to chemical processes: exothermic, endothermic processes, law of Lavoisier and Laplace, Hess's law of constant heat summation. 3L

**2nd law of thermodynamics:** Statement, Mathematical form of 2nd law of thermodynamics (Carnot cycle). Joule Thomson and throttling processes; Joule Thomson coefficient for Ideal gas,Concept of inversion temperature (brief).

*Evaluation of entropy:* characteristics and expression, physical significance. Work function and free energy: Definition, characteristics, physical significance, mathematical expression of  $\Delta A$  and  $\Delta G$  for ideal gas, standard free energy and chemical potential, Condition of spontaneity and equilibrium reaction.

#### 3L

#### Module 2

*Reaction Dynamics:* Reaction laws: rate and order; molecularity; zero and first order kinetics, second order kinetics (same reactant concentration), Pseudounimolecular reaction, Arrhenius equation.

Mechanism and theories of reaction rates (Content beyond the syllabus)

*Solid state Chemistry:*Introduction to stoichiometric defects (Schottky & Frenkel) and non –stoichiometric defects (Metal excess and metal deficiency).

Role of silicon and germanium in the field of semiconductor, n-type, p-type semiconductor, photo voltaic cell, fabrication of integrated circuits. 4L

#### Module 3

#### Electrochemistry

*Conductance:*Conductance of electrolytic solutions, specific conductance, equivalent conductance, molar conductance and ion conductance, effect of temperature and concentration (Strong and Weak electrolyte).

*Electrochemical cell:*Cell EMF and its Thermodynamic derivation of the EMF of a Galvanic cell (Nernst equation), single electrode potentials, hydrogen half-cell, calomel half cell (representation, cell reaction, expression of potential, Discussion, Application). 3L

*Concept of battery:* Battery and Commercial electrochemical cell: Dry cell, acid storage cell, alkaline storage cell, fuel cell (construction, representation, cell reaction, expression of potential, discussion, application). 2L

*Corrosion and its control:* Introduction, cause and effect of corrosion, types of corrosion: dry, wet and other: Electrochemical corrosion, galvanic corrosion, passivation and protective measure.

2L

3L

#### Module 4

[12L]

*Structure and reactivity of Organic molecule:* Electronegativity, electron affinity, hybridisation, Inductive effect, resonance, hyperconjugation, electromeric effect, carbocation, carbanion and freeradicals. Brief study of some addition, eliminations and substitution reactions.

3L

*Polymers:*Concepts, classifications and industrial applications. Polymer molecular weight (number avg. weight avg.: Theory and mathematical expression only), Poly dispersity index (PDI). *Polymerization processes:* addition and condensation polymerization (mechanism not required), degreeof polymerization, Copolymerization, stereo-regularity of polymer,

#### [7L]

### [8L]

crystallinity (concept of Tm) and amorphicity (Concept of Tg) of polymer.

2L

[5L]

2L

*Preparation, structure and use of some common polymers:* plastic (HDPE, LDPE, PVC, PP, PMMA, Polyester, PTFE, Bakelite), rubber (natural rubber, SBR), fibre (nylon 6, nylon 6,6), Vulcanization of rubber, Conducting polymers and bio-polymers. 7L

*Nano material:* Basic principles of nano science and technology, classification, preparation, properties and application of nano material.

#### Module 5

*Industrial Chemistry Fuels:* Solid Fuel: Coal, Classification of coal, constituents of coal, carbonization of coal (HTC and LTC), proximate analysis of coal, Calorific value. *Liquid fuel:* Petroleum, classification of petroleum, Refining, Octane number, Cetane number, Aviation Fuel (Aviation Gasoline, Jet Gasoline), Biodiesel.

*Gaseous fuels:* Natural gas, water gas, Coal gas, bio gas, CNG, LPG 3L *Water:*Introduction, source of water, water quality parameter, specification for drinking water(BIS and WHO standards), Chlorination of Water, Types of hardness- Units, Brief Softening methods.

Short overview of water treatment plants (Content beyond the syllabus)

#### **Reference Books:**

- 1. Engineering Chemistry: Bandyopadhyay and Hazra Physical Chemistry: P.C. Rakshit
- 2. Organic Chemistry: Finar, vol-1
- 3. Engineering Chemistry: B.Sivasankar, Tata Mc Graw Hill, 2008
- 4. A Text book of Engineering Chemistry: S.S.Dara, 10th Edition, S.Chand & Company Ltd., New Delhi, 2003.
- 5. Engineering Chemistry Simplified: S. Nandi and R. Bhattacharyya, Chayya Prakashani Pvt. Ltd.

CO's	PO	'S											PSO	)	
	1	2	3	4	5	6	7	8	9	10	1	12	1	2	3
											I				
CH 101.1	3	1	-	-	-	-	-	-	-	-	-	-	2	-	-
CH 101.2	3	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CH 101.3	-	-	2	-	2	-	-	-	-	-	-	1	-	-	-
CH 101.4	2	-	1	-	2	-	-	-	-	-	-	-	1	-	-
CH 101.5	2	-	-	-	-	-	2	-	-	-	-	1	2	-	-
Avg.	2.	1.	1.		2		2					1	1.7		
	5	5	3										5		

### **CO-PO-PSO Mapping:**

**Course Name: Basic Electrical Engineering Course Code: EE 101**  Contact: 3L: 0T:0P

#### **Total Contact Hours: 36 Credits: 3**

Pre-requisite: Basic 12<sup>th</sup> standard Physics and Mathematics, Conceptof components of electric circuit.

#### **Course Outcome (COs):**

After completion of the course students able to

**CO1:** Understand Basic Electrical circuits, Power distribution and Safety measures.

**CO2:** Analyze an apply DC network theorems.

**CO3:** Analyze and apply concept of AC circuits of single-phase and three-phase.

CO4: Understand basic principles of Transformers and Rotating Machines.

### Course Content

#### Module – 1: DC Circuits

Definition of electric circuit, linear circuit, non-linear circuit, bilateral circuit, unilateral circuit, Dependent source, node, branch, active and passive elements, Kirchhoff's laws, Source equivalence and conversion, Network Theorems-Superposition Theorem, Thevenin's Theorem, Norton Theorem, Maximum Power Transfer Theorem, Star-Delta Conversions.

#### Module – 2: Magnetic Circuits

Concept of Magnetic circuit, B-H curve, Analogous quantities in magnetic and electric circuits, Faraday's law, iron losses, self and mutual inductance, Energy stored in magnetic field.

### Module – 3: AC Single-Phase Circuits

Sinusoidal quantities, Average and RMS values, peak factor, Form factor, Phase and Phase difference, concept of phasor diagram, V-I Relationship in R,L,C circuit, Combination R,L,C in AC series, parallel and series parallel circuits with phasor diagrams, impedance and admittance, Power factor, Power in AC circuit, Resonance in RLC series and parallel circuit, Q factor, band width of resonant circuit.

### Module – 4: Three-Phase Circuits

Voltages of three balanced phase system, delta and star connection, relationship between line and phase quantities, phasor diagrams. Power measurement by two watt meters method.

### Module – 5: DC Machines

Construction, Basic concepts of winding (Lap and wave). DC generator: Principle of operation, EMF equation, characteristics (open circuit, load) DC motors: Principle of operation, Torque Equation,Speed

## (**8L**)

(3L)

### (**3L**)

### (7L)

# (6L)

(5L)

Torque Characteristics (shunt and series machine), starting (by 3 point starter), speed control (armature voltage and field control).

#### Module – 6: Single-Phase Transformer

Constructional parts, Types of transformers, emf equation, No Load no load and on load operation, phasor diagram and equivalent circuit, losses of a transformer, open and short circuit tests, regulation and efficiency calculation.

### Module – 7: Three-Phase Induction Motor

Types, Construction, production of rotating field, principle of operation, Slip and Frequency, rotor emf and current, Equivalent circuit and phasor diagram, Torque Slip characteristics torque-speed characteristics Starting of induction motor by star delta starter and (DOL starter). Speed Control of Three phase induction motor by variation of supply frequency, supply voltage and number of poles.

#### Module – 8: General Structure of Electrical Power System

Power generation to distribution through overhead lines and underground cables with single line diagram, Earthing of Electrical Equipment, Electrical Wiring Practice.

#### **Text Books:**

- 1. V. Mittle and Arvind Mittal, Basic Electrical Engineering, TMH.
- 2. Ashfaq Hussain, Basic Electrical Engineering, S. Chand Publication
- 3. Chakrabarti, Nath & Chanda, Basic Electrical Engineering, TMH
- 4. C.L. Wadhwa, Basic Electrical Engineering, Pearson Education

#### **Reference Books:**

- 1. H. Cotton, Willey Press
- 2. J.B. Gupta, Basic Electrical Engineering, Kataria & Sons .
- 3. Kothari and Nagrath, Basic Electrical Engineering, TMH

CO's	PO	's											PSC	)	
	1	2	3	4	5	6	7	8	9	10	1	12	1	2	3
											1				
EE 101.1	3	3	2	1	-	1	-	1	1	-	-	3	3	2	2
EE 101.2	2	3	3	3	-	-	2	-	3	-	1	2	3	2	-
EE 101.3	2	3	1	3	-	-	1	-	1	-	-	2	3	3	-
EE 101.4	3	3	2	2	-	2	2	2	3	2	3	3	3	1	1
Avg.	2.5	3	2	2.	-	1.5	1.	1.5	2	2	2	2.5	3	2	1.5
				25			67								

### **CO-PO-PSO Mapping:**

### (6L)

### (**3L**)

Course Name: Communicative English Course Code: HU101 Contact: 2L: 0T:0P Credits: 2

#### **Course Outcomes (COs):**

By doing this course the students will be enabled to do the following:

HU 101.1: Able to define, identify and describe the basics of communication theory and its application.

HU 101.2: Able to recognize, recall and make use of English vocabulary and its varied usage.

**HU101.3**: Able to develop and apply reading and writing skills in an academic and global business context.

HU 101.4: Able to identify, explain and use the grammatical structures and forms in English.

HU 101.5: Able to analyse, classify and elaborate on the forms and formats of business writing.

### Course Content

The proposed revised syllabus is as follows:

#### Module 1:Communication: Interface in a Globalized World[5L]

- a. Definition of Communication and Scope of Communication
- b. Process of Communication—Models and Types
- c. Verbal—Non-Verbal Communication, Channels of Communication
- d. Barriers to Communication & surmounting them

[to be delivered through case studies involving intercultural communication]

### Module 2: Vocabulary and Reading

- a. Word origin—Roots, Prefixes and Suffixes, Word Families, Homonyms and Homophones
- b. Antonyms and Synonyms, One-word substitution
- c. Reading—Purposes and Skills
- d. Reading Sub-Skills-Skimming, Scanning, Intensive Reading
- e. Comprehension Practice (Fiction and Non fictional Prose/Poetry) Texts:
  - (i) Isaac Asimov, I Robot (—Robbie OR —Little Lost Robot)
  - (ii) George Orwell, —Shooting an Elephant
  - (iii) Ruskin Bond, —The Cherry Tree OR —The Night Train at Deoli

### [5L]

- (iv) Robert Frost, —Stopping by the Woods on a Snowy Evening.
- f. Precis Writing

(Use of daily newspapers for reading practice is recommended)

### Module 3: Functional Grammar and Usage

- a. Articles, Prepositions, Verbs
- b. Verb-Subject Agreement
- c. Comparison of Adjectives
- d. Tenses and their Use
- e. Transformation of Sentences (Singular-Plural, Active-Passive, Direct-Indirect, Degrees of Comparison)
- f. Error Correction

#### Module 4: Business writing

- a. Business Communication in the Present-day scenario
- b. Business Letters (Letters of Inquiry, Sales Letters, Complaint and Adjustment Letters, Job Application Letters)
- c. Drafting of a CV and Résumé
- d. Memo, Notice, Advertisement, Agenda, Minutes of Meetings
- e. E-mails (format, types, jargons, conventions)

#### **References:**

- 1. Raymond Murphy. English Grammar in Use. 3rd Edn. CUP, 2001.
- 2. Seidl & McMordie. English Idioms& How to Use Them. Oxford:OUP, 1978.
- 3. Michael Swan. Practical English Usage. Oxford:OUP, 1980.
- 4. Simeon Potter. Our Language. Oxford:OUP, 1950.
- 5. Pickett, Laster and Staples. Technical English: Writing, Reading & Speaking. 8th ed. London: Longman, 2001.
- 6. IIT Kanpur, English Language & Communication Skills (ENG 112 C) syllabus.

CO's	PO	's											PSC	)	
	1	2	3	4	5	6	7	8	9	10	1 1	12	1	2	3
HU 101.1	-	-	-	-	-	-	1	-	2	3	-	2	-	-	
HU 101.2	-	-	-	-	-	-	1	-	2	3	-	3	-	-	3
HU 101.3	-	-	-	-	-	3	3	3	2	3	2	3	-	-	3
HU 101.4	-	-	-	-	-	3	3	2	-	3	-	3	-	-	2
HU 101.5	-	-	-	-	-	3	3	3	-	3	2	3	-	-	3

### **CO-PO-PSO Mapping:**

#### [10L]

[6L]

Avg. 3 2.2 2.6 2 3 2 2.8 2.75												
	Avg.			3	2.2	2.6	2	3	2	2.8		2.75

Paper Name: Engineering Mechanics Paper Code: ME 101 Contact: 3L:1T:0P Credit: 4

Pre-requisites: Higher Secondary with Physics, Chemistry and Mathematics.

#### **Course Outcomes (COs):**

On successful completion of the learning sessions of the course, the learner will be able to:

**ME 101.1:** Construct free body diagram and calculate the reactions necessary to ensure static equilibrium.

**ME 101.2:** Study the effect of friction in static and dynamic conditions.

**ME 101.3:** Understand the different surface properties, property of masses and material properties.

**ME 101.4:** Analyze and solve different problems of kinematics and kinetics.

#### **Course Content**

#### Module1:

Importance of Mechanics in engineering; Introduction to Statics; Concept of Particle and Rigid Body; Types of forces: collinear, concurrent, parallel, concentrated, distributed; Vector and scalar quantities; Force is a vector; Transmissibility of a force (sliding vector).

2L Introduction to Vector Algebra; Parallelogram law; Addition and subtraction of vectors; Lami's theorem; Free vector; Bound vector; Representation of forces in terms of i,j,k; Cross product and Dot product and their applications. 3L+1T

Two dimensional force system; Resolution of forces; Moment; Varignon's theorem; Couple; Resolution of a coplanar force by its equivalent force-couple system; Resultant of forces.

4L+1T

#### Module2:

Concept and Equilibrium of forces in two dimensions; Free body concept and diagram; Equations of equilibrium.

3L+1T

Concept of Friction; Laws of Coulomb friction; Angle of Repose; Coefficient of friction.

3L+1T

#### Module3:

Distributed Force: Centroid and Centre of Gravity; Centroids of a triangle, circular sector, quadralateral, composite areas consisting of above figures. 4L+1TMoments of inertia: MI of plane figure with respect to an axis in its plane, MI of plane figure with respect to an axis perpendicular to the plane of the figure; Parallel axis theorem; Mass moment of inertia of symmetrical bodies, e.g. cylinder, sphere, cone.

Principle of virtual work with simple application.

# 3L+1T

1L+1T

#### Module 4:

Concept of simple stresses and strains: Normal stress, Shear stress, Bearing stress, Normalstrain, Shearing strain; Hooke's law; Poisson's ratio; Stress-strain diagram of ductile and brittle materials; Elastic limit; Ultimate stress; Yielding; Modulus of elasticity; Factor of safety.

2L+1T

### Module 5:

Introduction to Dynamics: Kinematics and Kinetics; Newton's laws of motion; Law of gravitation and acceleration due to gravity; Rectilinear motion of particles; determination of position, velocity and acceleration under uniform and non-uniformly accelerated rectilinear motion; construction of x-t, v-t and a-t graphs.

3L+1T

Plane curvilinear motion of particles: Rectangular components (Projectile motion); Normal and tangential components (circular motion). 2L+1T

### Module 6:

Kinetics of particles: Newton's second law; Equation of motion; D.Alembert's principle and free body diagram; Principle of work and energy; Principle of conservation of energy; Power and efficiency.

3L+2T

### **Books Recommended:**

- 1. Engineering Mechanics [Vol-I & II] by Meriam & Kraige, 5th ed. Wiley India
- 2. Engineering Mechanics: Statics & Dynamics by I.H.Shames, 4th ed. PHI
- 3. Engineering Mechanics by Timoshenko, Young and Rao, Revised 4th ed. TMH
- 4. Elements of Strength of Materials by Timoshenko & Young, 5th ed. E.W.P
- 5. Fundamentals of Engineering Mechanics by Debabrata Nag & Abhijit Chanda– Chhaya Prakashani
- 6. Engineering Mechanics by Basudeb Bhattacharyya– Oxford University Press.
- 7. Engineering Mechanics: Statics & Dynamics by Hibbeler & Gupta, 11th ed. Pearson

### **CO-PO-PSO Mapping:**

СО	PC	)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
ME 101.1	3	3	2	2	-	-	-	-	1	-	-	-	2	-	-
ME 101.2	3	3	2	2	-	-	-	-	1	-	-	1	2	1	-
ME 101.3	3	2	3	2	1	-	-	-	1	-	-	1	2	2	-
ME 101.4	3	3	3	3	-	-	-	-	1	-	1	-	2	3	-
Avg.	3	2.8	2.5	2.5	0.25				1		0.25	0.5	2	1.5	

Paper Name: Language Laboratory and Seminar Paper Code: HU191 Contact: 0L:0T: 2P Credit: 1

Prerequisites: Basic knowledge of LSRW skills.

### **Course Outcomes (COs):**

HU 191.1: Listen to and summarize, interpret and explain audio material/data in English.

**HU 191.2:** Understand and implement the basics of note taking of factual data/information in English and keep a laboratory record.

**HU 191.3:** Engage in spoken interaction using needs specific vocabulary, language function and pronunciation in conversations, role plays and group discussions.

HU 191.4: Maintain and keep a listening log and write a film review.

### Course Content

### Module 1: Introduction to the Language Lab

- a. The Need for a Language Laboratory
- b. Tasks in the Lab
- c. Writing a Laboratory Note Book

#### Module 2: Active Listening

- a. What is Active Listening?
- b. Listening Sub-Skills—Predicting, Clarifying, Inferencing, Evaluating, Note taking
- c. Contextualized Examples based on Lab Recordings

#### Module 3: Speaking

- a. Speaking (Choice of words, Speech Syntax, Pronunciation, Intonation)
- b. Language Functions/Speech Acts
- c. Speaking using Picture Prompts and Audio Visual inputs
- d. Conversational Role Plays (including Telephonic Conversation)
- e. Group Discussion: Principles and Practice

#### Module 4: Lab Project Work

- a. Keeping a Listening Log
- b. Writing a Film Review/Advertisements

#### **References:**

- 1. IT Mumbai, Preparatory Course in English syllabus
- 2. IIT Mumbai, Introduction to Linguistics syllabus
- 3. Sasikumar et al. A Course in Listening and Speaking. New Delhi: Foundation Books, 2005.
- 4. Tony Lynch, Study Listening. Cambridge: Cambridge UP, 2004.

СО	PC	)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
HU 191.1	1	-	2	-	-	2	2	1	2	2	-	2	1	-	2
HU 191.2	1	-	1	2	-	3	2	1	2	2	-	2	1	-	1
HU 191.3	1	-	2	2	-	3	2	1	2	2	-	3	1	-	2
HU 191.4	-	-	-	-	-	3	2	-	-	-	-	2	-	-	-
Avg.	1		1.6	2		2. 75	2	1	2	2		2.2 5	1		1.6

### **CO-PO-PSO Mapping:**

Paper Name: Chemistry – I Laboratory Paper Code: CH 191 Contact: 0L:0T:3P Credit: 2

Prerequisites: 10+2 science with chemistry

#### **Course Outcome:**

**CH 191.1:** Able to operate different types of instruments for estimation of small quantities chemicals used in industries and scientific and technical fields.

CH 191.2: Able to work as an individual also as an team member.

CH191.3: Able to analyse different parameters of water considering environmental issues

**CH191.4:** Able to synthesize nano and polymer materials.

CH191.5: Capable to design innovative experiments applying the fundamentals of chemistry.

### Course Content

#### List of Experiments:

- 1. To Determine the alkalinity in given water sample.
- 2. Redox titration (estimation of iron using permanganometry)
- 3. To determine calcium and magnesium hardness of a given water sample separately.
- 4. Preparation of phenol-formaldehyde resin (Bakelite).
- 5. Heterogeneous equilibrium (determination of partition coefficient of acetic acid between nbutanol and water).
- 6. Conductometric titration for determination of the strength of a given HCl solution by titration against a standard NaOH solution.
- 7. pH- metric titration for determination of strength of a given HCl solution against a standard NaOH solution.
- 8. Determination of dissolved oxygen present in a given water sample.
- 9. To determine chloride ion in a given water sample by Argentometric method (using chromate indicator solution).

Innovative experiment: Preparation of silver nano-particles.

Note: From the list of 10 (Ten) experiments a minimum of 7 (seven) experiments shall have to be performed by one student of which Sl. No. 4 (Preparation of Bakelite) has to be mandatory.

CO's	PO	's											PSC	)	
	1	2	3	4	5	6	7	8	9	10	1	12	1	2	3
											I				
CH 191.1	3	2	1	1	1	1	-	-	2	-	-	-	2	-	-
CH 191.2	-	-	-	-	-	-	-	-	3	-	-	-	2	-	-
CH 191.3	-	-	-	-	-	2	3	-	-	-	-	1	-	-	-
CH 191.4	-	-	-	-	2	1	-	-	-	-	-	-	1	-	-
CH 191.5	2	-	2	-	1	-	-	-	-	-	-	1	2	-	-
Avg.	2.	2	1	1	1.	1	3		2			2	1.7		
	5				3	•			•				5		
						3			5						

Course Name: Basic Electrical Engineering Laboratory Course Code: EE191 Contact: 0L: 0T:3P Credits: 1.5

**Prerequisite:** Basic Physics and applied physics, Basic Mathematics, Basic concept of Electric Circuit.

#### **Course Outcome:**

**CO1:** Identify and use common electrical components.

**CO2:** To develop electrical networks by physical connection of various components and analyze the circuit behavior.

CO3: Apply and analyze the operational characteristics of electrical machines.

**CO4:** Apply and analyze the equivalent parameters, Losses, efficiency of transformers.

### Course Content

#### List of Experiments:

- 1. Characteristics of Fluorescent, Tungsten and Carbon filament lamps.
- 2. Verification of Thevenin's and Norton's Theorem.
- 3. Verification of Superposition Theorem.
- 4. Calibration of Ammeter and Wattmeter.
- 5. Study of R-L-C series circuit.

- 6. Open circuit and short circuit test of a single phase Transformer.
- 7. Starting, Reversing of a and speed control of D.C shunt motor.
- 8. Test on single phase Energy Meter.
- 9. Familiarization of PMMC and MI type Meter.
- 10. Familiarization with house wiring practice.

CO's	PO	's											PSO	)	
	1	2	3	4	5	6	7	8	9	10	1	12	1	2	3
											1				
EE 191.1	3	-	-	-	-	2	-	1	1	1	-	1	1	2	2
EE 191.2	2	2	1	-	-	-	1	-	2	3	2	3	2	3	3
EE 191.3	3	3	-	1	-	-	1	1	2	2	2	2	2	3	3
EE 191.4	3	3	1	1	1	-	1	1	2	2	2	2	2	3	3
Avg.	2.	2.							1.				1.6		
	6	5	1	1	-	2	1	1	66	2	2	2	7	2.67	2.67

Paper Name: Engineering Drawing and Graphics Paper Code: ME 191 Contact: 0L:0T:3P Credit: 2

Prerequisites: Higher Secondary with Physics, Chemistry & Mathematics

Course Outcomes: Upon successful completion of this course, the student will be able to

**ME 191.1:** Learn basics of drafting and use of drafting tools which develops the fundamental skills of industrial drawings.

**ME 191.2:** Know about engineering scales, dimensioning and various geometric curves necessary to understand design of machine elements.

**ME 191.3:** Understand projection of line, surface and solids to create the knowledge base of orthographic and isometric view of structures and machine parts.

**ME 191.4:** Become familiar with computer aided drafting useful to share the design model to different section of industries as well as for research & development.

### Course Content

#### List of Experiments:

- 1. Lines, Lettering, Dimensioning, Scales (Plain scale & diagonal Scale).
- 2. Geometrical Construction and Curves Construction of Polygons, Parabola, Hyperbola & ellipse

- 3. Projection of Points, Lines and Surfaces orthographic projection- first angle and third angle projection, projection of lines and surfaces- Hexagon
- 4. Projection of Solids (Cube, Pyramid, Prism, cylinder and Cone
- 5. Sectional Views for simple sold objects
- 6. Introduction to Computer Aided Drafting using auto cad & / or similar software- Introduction to Cartesian and polar coordinate systems, absolute and relative coordinates; Basic editing commands: line, point, trace, rectangle, polygon, circle, arc, ellipse, polyline; editing methods; basic object selection methods window and crossing window, erase, move, copy, offset, fillet, chamfer, trim, extend, mirror; display command; zoom, pan, redraw, regenerate; simple dimensioning and text, simple exercises.

СО	PC	)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
ME 101.1	2	-	1	2	-	1	-	-	1	-	-	1	2	1	-
ME 101.2	3	-	2	2	-	1	-	-	1	1	-	1	3	2	1
ME 101.3	2	2	2	1	-	1	-	-	1	-	-	1	3	2	1
ME 101.4	1	-	2	2	2	1	-	-	1	1	-	1	3	3	2
Avg.	2	2	1.8	1.8	2	1			1	1		1	2.8	2	1.3

Paper Name: Extra-Curricular Activity (NSS / NCC) Paper Code: XC 181 Contact: 0L: 0T:2P Credit: 1

Course Objective: The objectives of the course are as follows

- 1. To increase student awareness about the weaker and unprivileged sections of society.
- 2. To expose students to environmental issues and ecological concerns.

3. To make students self-aware about their participatory role in sustaining society and the environment.

### Course Content

#### List of Activities:

- a) Creating awareness in social issues
- b) Participating in mass education programmes
- c) Proposal for local slum area development
- d) Waste disposal
- e) Environmental awareness
- f) Production Oriented Programmes
- g) Relief & Rehabilitation work during Natural calamities

Creating awareness in social issues:

- 1. Women's development includes health, income-generation, rights awareness.
- 2. Hospital activities Eg. writing letters for patients, guiding visitors
- 3. Old age home visiting the aging in-mates, arranging for their entertainment.
- 4. Children's Homes visiting the young in-mates, arranging for their entertainment
- 5. Linking with NGOs to work on other social issues. (Eg. Children of sex-workers)
- 6. Gender issues- Developing an awareness, to link it with Women's Cell of college

Participating in mass education programmes

- 1. Adult education
- 2. Children's education

Proposal for local slum area development

One or two slums to be identified and according to the needs, activities to be developed and proposals and reports are to be submitted.

Environmental awareness

- Resource conservation Awareness to be developed on water, energy, soil.
- Preservation of heritage monuments- Marches, poster campaigns
- Alternative energy consciousness amongst younger school-children.
- Plantation and beautification- Plantation of trees, their preservation and upkeep, developing NSS parks.
- Waste disposal- Proper methods of domestic waste disposal.

Production Oriented Programmes

- 5. Working with people and explaining and teaching improved agricultural practices
- 6. Rodent control land pest control practices;
- 7. Soil-testing, soil health care and soil conservation;
- 8. Assistance in repair of agriculture machinery;
- 9. Work for the promotion and strengthening of cooperative societies in villages;
- 10. Assistance and guidance in poultry farming, animal husbandry, care of animal health etc.;
- 11. Popularization of small savings and
- 12. Assistance in procuring bank loans

Relief & Rehabilitation work during Natural calamities

- g. Assisting the authorities in distribution of rations, medicine, clothes etc.;
- h. Assisting the health authorities in inoculation and immunization, supply of medicine etc.;

- i. Working with the local people in reconstruction of their huts, cleaning of wells, building roads etc.;
- j. Assisting and working with local authorities in relief and rescue operation; Collection of clothes and other materials, and sending the same to the affected areas;

			2nd Semester					
SI		Paper			C	onta rs/M	ct /eek	Credi t
N o.	Category	Code	Subject	L	т	P	Tota I	Point s
	•		A. THEORY					
1	BS	M 201	Mathematics – II	3	1	0	4	4
2	BS	PH 201	Physics – I	3	1	0	4	4
3	ES	EC 201	Basic Electronics Engineering	3	1	0	4	4
4	ES	CS 201	Computer Fundamentals and Principle of Computer Programming	3	1	0	4	4
5	ES	ME 201	Engineering Thermodynamics and Fluid Mechanics	3	1	0	4	4
			Total of Theory				20	20
			B. PRACTICAL					
6	ES	CS 291	Computer Fundamentals and Principle of Computer Programming Laboratory	0	0	3	3	2
7	BS	PH 291	Physics – I Laboratory	0	0	3	3	2
8	ES	EC 291	Basic Electronics Engineering Laboratory	0	0	3	3	2
9	ES	ME 292	Workshop Practice	0	0	3	3	2
			Total of Practical				12	08
			C. SESSIONAL					
1 0	MC	MC 281	Soft Skill Development	0	0	2	2	0
		-	Fotal of Theory, Practical and Sessional				34	28

Subject: Mathematics II Subject Code: M 201 Contact: 3L: 1T: 0P Credits: 4

Prerequisites: Any introductory course on calculus.

#### **Course Outcomes (COs):**

On successful completion of the learning sessions of the course, the learner will be able to:

**M 201.1:** Recall the distinctive characteristics of improper integral, Laplace Transform, ordinary differential equation, graph theory.

M 201.2: Understand the theoretical working of improper integral, Laplace Transform, ordinary differential equation, graph theory.

**M 201.3:** Apply the principles of improper integral, Laplace Transform, ordinary differential equation, graph theory.

**M 201.4:** Analyze the application of improper integral, Laplace Transform, ordinary differential equation, graph theory.

M 201.5: Evaluate the result for application to the problems on improper integral, Laplace Transform, ordinary differential equation, graph theory.

M 201.6: Design graph to solve different real life problems.

#### Module I: Ordinary differential equations (First order)

First order and first degree Exact equations, Necessary and sufficient condition of exactness of a first order and first degree ODE (statement only), Rules for finding Integrating factors, Linear equation, Bernoulli's equation, General solution of ODE of first order and higher degree (different forms with special reference to Clairaut's equation), Applications related to Engineering problems.

#### Module II: Ordinary differential equations (Higher order)

General linear ODE of order two with constant coefficients, C.F. & P.I., D-operator methods for finding P.I., Method of variation of parameters, Cauchy- Eulerequations, Solution of simultaneous linear differential equations, Applications related to Engineering problems.

#### Module III: Basic Graph Theory

Graphs, Digraphs, Weighted graph, Connected and disconnected graphs, Complement of a graph, Regular graph, Complete graph, Subgraph, Walks, Paths, Circuits, Euler Graph, Cut-sets and cut-vertices, Matrix representation of a graph, Adjacency and incidence matrices of a graph, Graph isomorphism, Bipartite graph.Tree, Binary tree, Spanning tree of a graph, Minimal spanning tree, properties of trees, Algorithms: Dijkstra's Algorithm for shortest path problem, Determination of minimal spanning tree using Kruskal's and Prim's algorithm.

**\*\*** Extra lecture hours may be taken for this module

Module IV: Laplace Transform (LT)

#### [10L]

[10L]

[10L]

#### [IOL]

### [10L]

Definition and existence of LT, LT of elementary functions, First and second shifting properties, Change of scale property; LT of t f (t), LT of f (t)/t, LT of derivatives of f (t), L.T. of f(u) du. Evaluation of improper integrals using LT, LT of periodic and step functions, Inverse LT: Definition and its properties; Convolution Theorem (statement only) and its application to the evaluation of inverse LT, Solution of linear ODE with constant coefficients (initial value problem) using LT. Applications related to Engineering problems.

### **Beyond Syllabus:**

Combinatorics: Fundamental Principles, Permutations, Combinations, Binomial Coefficients.

### **Text Books:**

- 1. E. Kreyszig, Advanced engineering mathematics (8th Edition), John Wiley, 1999.
- 2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publications, 2009.
- 3. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, Narosa Pub. House, 2008.

### **ReferenceText Books:**

- 1. W. E. Boyce and R. DiPrima, Elementary Differential Equations (8th Edition), John Wiley, 2005.
- 2. R.K. Ghosh and K.C.Maity, An Introduction to Differential Equations, New Central Book Agency.
- 3. V. K. Balakrishnan, Graph Theory, Schaum's Outline, TMH.
- 4. J. Clark and D. A. Holton, A first course at Graph Theory, Allied Publishers LTD.
- 5. D. B. West, Introduction to Graph Theory, Prentice-Hall of India.
- 6. N. Deo, Graph Theory, Prentice-Hall of India.
- 7. J. Bird, Higher Engineering Mathematics (4th Edition, 1st India Reprint), Elsevier, 2006.
- 8. L. Rade and B. Westergen, Mathematics Handbook: for Science and Engineering (5th edition, 1st Indian Edition), Springer, 2009.
- 9. Murray R.Spiegel, Laplace Transform, Schaum's Outline Series, McGRAW-HILL.

СО	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	1 1	12	1	2	3
M 201.1	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
M201.2	3	3	2	1	-	-	-	-	-	-	-	2	-	-	-
M 201.3	3	2	3	2	-	-	-	-	-	-	-	2	3	3	-
M 201.4	2	3	2	2	-	-	-	-	-	-	-	1	1	2	-
M 201.5	3	2	2	1	-	-	-	-	-	-	-	1	1 Pag	e <b>31</b> of	19-3
M 201.6	3	2	3	2	-	-	-	-	-	-	-	2	3	-	-
Avg.	2	2	2	1								1.	2	2.5	
	•	•	•	•								6			
	8	4	2	6											

### **CO-PO-PSO Mapping:**

**Paper Name: Physics – I** Paper Code: PH 201 Contact: 3L:1T:0P Credit: 4

**PH.201.1:** Describe various types mechanical resonance and its electrical equivalence PH.201.2: Explain basic principles of Laser, Optical fibers and various types of semiconductors PH.201.3: Apply superposition to explain interference and diffraction as well as apply wave mechanics for attainment of Heisenberg's uncertainty principle

PH.201.4: Analyze importance of light as a carrier of information and examine different crystallographic structures according to their co-ordination number and packing factors PH.201.5: Justify the need of quantum mechanics as remedy to overcome limitations imposed by classical physics

#### **Course Content**

#### Module 1: **Oscillations**

- Simple harmonic motion: Concepts with examples, Superposition of SHMs in two mutually perpendicular directions: Lissajous' figures, Engineering Applications and related Numerical problems 2L
- Damped vibration: Differential equation and its solution, Logarithmic decrement, quality factor, Engineering Applications and related Numerical problems. 3L
- Forced vibration: Differential equation and solution, Amplitude and Velocity resonance, Sharpness of resonance, relevant applications including LCR circuits, Numerical problems.

3L

#### **Classical Optics** Module 2:

Interference of light: Wave nature of light (Huygen's principle), Conditions of sustained interference double slit as an example; qualitative idea of spatial and temporal coherence, conservation of energy and intensity distribution; Newton's ring (qualitative descriptions of working principles and procedures-no deduction required). Engineering applications, Numerical Problems. 3L

#### Fresnel's biprism (beyond the syllabus).

Diffraction of light: Fresnel and Fraunhofer class, Fraunhofer diffraction for plane transmission grating (elementary treatment of intensity distribution for N-slits), single slit and double slits as examples, missing order, Rayleigh criterion, resolving power of grating and microscope (Definition and formula; no deduction required). Engineering Applications, Numerical Problems. 4L

# (10L)

### 1L(ext)

# (8L)

R16 B.Tech EE

Polarization: Definition, plane of polarization, plane of vibration, Malus law, fundamental concepts of plane, circular and elliptical polarizations (only qualitative idea) with examples, Brewster's law, Double refraction: ordinary and extraordinary rays, Nicol's prism, Engineering applications, Numerical problems. 3L

2.4.2.4.

### Module 3: Quantum Physics

- Quantum Theory: Inadequacy of classical physics; Planck's quantum hypothesis-Qualitative (without deductions), particle concept of electromagnetic wave (example: photoelectric and Compton effect; qualitative discussions only), wave particle duality; phase velocity and groupvelocity; de Broglie wave; Davisson and Germer experiment. 4L
- Quantum Mechanics 1: Concept of wave function, Physical significance of wave function, Probability interpretation; wave function normalization condition and its simple numerical applications; uncertainty principle-applications, Schrödinger equation (no mathematical derivation).

### 3.3.3.3.

### Module 4: X-ray & Crystallography

- X-rays Origin of Characteristic and Continuous X-ray, Bragg's law (No derivation), Determination of lattice constant, Applications, Numerical problems. 2L
- Elementary ideas of crystal structure lattice, basis, unit cell, Fundamental types of lattices Bravais lattice, Simple cubic, fcc and bcc, hcp lattices, (use of models in the class during teaching is desirable) Miller indices and miller planes, Co-ordination number and Atomic packing factor, Applications, Numerical problems. 4L

### Module 5: Modern Optics – I

- Laser: Concepts of various emission and absorption process, working principle of laser, metastable state, Population Inversion, condition necessary for active laser action, optical resonator, ruby laser, He- Ne laser, semiconductor laser, Einstein A and B coefficients and equations, industrial and medicalapplications of laser. 5L
- Fibre optics and Applications: Principle and propagation of light in optical fibres- Numericalaperture and Acceptance angle, V number, Types of optical fibres (material, refractive index,mode), Losses in optical fibre- attenuation, dispersion, bending, Numerical problems.

3L

### **Recommended Text Books for Physics – I:**

### Oscillations:

- 1. Classical Mechanics- J. C. Upadhyay (Himalya Publishers)
- 2. Classical Mechanics-Shrivastav
- 3. Classical Mechanics-Takwal & Puranik (TMH)
- 4. Sound-N. K. Bajaj (TMH)
- 5. Advanced Acoustics-D. P. Roy Chowdhury (Chayan Publisher)
- 6. Principles of Acoustics-B.Ghosh (Sridhar Publisher)
- 7. A text book of sound-M. Ghosh (S. Chand publishers)
- 8. Electricity Magnetism-Chattopadhyay & Rakshit (New Central Book Agency)
- 9. A text book of Light- K.G. Mazumder & B.Ghoshs, ( Book & Allied Publisher)

### (**8**L)

(**6L**)

## (9L)

- 10. R.P. Singh (Physics of Oscillations and Waves)
- 11. A.B. Gupta (College Physics Vol. II)
- 12. Chattopadhya and Rakshit (Vibration, Waves and Acoustics)

### Classical Optics & Modern Optics – I:

- 13. A text book of Light- K.G. Mazumder & B.Ghoshs ( Book & Allied Publisher)
- 14. A text book of Light-Brijlal & Subhramanium, (S. Chand publishers)
- 15. Modern Optics-A. B. Gupta (Book & Allied Publisher)
- 16. Optics-Ajay Ghatak (TMH)
- 17. Optics-Hecht
- 18. Optics-R. Kar, Books Applied Publishers
- 19. Möler (Physical Optics)
- 20. E. Hecht (Optics)
- 21. E. Hecht (Schaum Series)
- 22. F.A. Jenkins and H.E White
- 23. C.R. Dasgupta (Degree Physics Vol 3)

### Quantum Physics:

- 24. Introduction to Quantum Mechanics-S. N. Ghoshal (Calcutta Book House)
- 25. Quantum Mechanics-Bagde Singh (S. Chand Publishers)
- 26. Perspective of Quantum Mechanics-S. P. Kuilla (New Central Book Agency)
- 27. Quantum Mechanics-Binayak Datta Roy (S. Chand Publishers)
- 28. Quantum Mechanics-Bransden (Pearson Education Ltd.)
- 29. Perspective of Modern Physics-A. Beiser (TMH)
- 30. Eisberg & Resnick is published by Wiley India
- 31. A.K. Ghatak and S Lokenathan
- 32. E.E. Anderson (Modern Physics)
- 33. 33 .Haliday, Resnick & Krane : Physics Volume 2 is Published by Wiley India
- 34. Binayak Dutta Roy [Elements of Quantum Mechanics]

### X-ray & Crystallography:

- 35. Solid state physics-Puri & Babbar (S. Chand publishers)
- 36. Materials Science & Engineering-Kakani Kakani
- 37. Solid state physics- S. O. Pillai
- 38. Introduction to solid state physics-Kittel (TMH)
- 39. Solid State Physics and Electronics-A. B. Gupta, Nurul Islam (Book & Allied Publisher)
- 40. S.O. Pillai (a. Solid state physics b. Problem in Solid state physics)

### General Reference:

- 1. Refresher courses in physics (Vol. 1, Vol. 2 & Vol. 3)-C. L. Arora (S. Chand Publishers)
- 2. Basic Engineering Physics-Amal Chakraborty (Chaya Prakashani Pvt. Ltd.)
- 3. Basic Engineering Physics-I -Sujoy Bhattacharya, Saumen Paul (TMH)
- 4. Engineering Physics Vol: 1-Sudipto Roy, Tanushri Ghosh, Dibyendu Biswas (S. Chand).
- 5. Engineering Physics Vol:1-S. P. Kuila (New Central)
- 6. University Physics-Sears & Zemansky (Addison-Wesley)

- 7. B. Dutta Roy (Basic Physics)
- 8. R.K. Kar (Engineering Physics)
- 9. Mani and Meheta (Modern Physics)
- 10. Arthur Baiser (Perspective & Concept of Modern Physics)

СО	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
PH.20	3	-	-	-	-	-	-	-	-	-	-	2	3	2	
1.1															
PH.20	3	-	-	-	-	-	-	-	-	-	-	2	2	3	
1.2															
PH.20	3	2	-	-	-	-	-	-	-	-	-	1	1	1	
1.3														-	
PH.20 1.4	2	3	-	-	-	-	-	-	-	-	-	1	2	3	
PH.20	1	3	-	-	-	-	-	-	-	-	-	1	1	3	
1.5															
Avg.	2	2	-	-	-	-	-	-	-	-	-	1.	1.8	2.4	
		•										4			
	4	6													

#### **Course Name: Basic Electronics Engineering**

Code: ECE 201 Contact: 3L: 0T: 0P Total Contact Hours: 36 Credit: 3

**Prerequisites:** A basic course in Electronics and Communication Engineering Progresses from the fundamentals of electricity, direct current (DC) devices and circuits, series and parallel circuits to the study of active and passive components, Ohm's Law, Kirchoff's Law i.e. KVL,KCL, Ampere's Law etc.

#### **Course Outcome: EC201**

**EC 201.1:** Understand the PN junction diode, ideal diode, diode models and its circuit analysis, Remember the application of diodes and special diodes.

**EC 201.2:** Analyze how operational amplifiers are modelled and analysed, and to design. Op-Amp circuits to perform operations such as integration differentiation on electronic signals.

EC 201.3: Assess both positive and negative feedback in electronic circuits.

**EC 201.4:** Develop the capability to analyse and design simple circuits containing non-liner elements such as transistors using the concepts of load lines, operating points and incremental analysis.

#### Course Content

#### Module – I: Basics of semiconductor

Conductors, Insulators, and Semiconductors- crystal structure, Fermi Dirac function, Fermi level, E-k and Energy band diagrams, valence band, conduction band, and band gap; intrinsic, and extrinsic (p-type and n-type) semiconductors, position of Fermi level in intrinsic and extrinsic semiconductor, drift and diffusion current – expression only ( no derivation) , mass action law , charge neutrality in semiconductor,Einstein relationship in semiconductor , Numerical problems on- Fermi level, conductivity, mass action law, drift and diffusion current .

### Module – II: P-N Junction Diode and its applications

p-n junction formation and depletion region, energy band diagram of p-n junction at equilibrium and barrier energy, built in potential at p-n junction, energy band diagram and current through p-n junction atforward and reverse bias, V-I characteristics and current expression of diode, temperature dependencies of V-I characteristics of diode, p-n junction breakdown – conditions, avalanche and Zener breakdown, Concept of Junction capacitance, Zener diode and characteristics.

Diode half wave and full wave rectifiers circuits and operation (IDC, Irms, VDc, Vrms), ripple factor without filter, efficiency, PIV, TUF; Reduction of ac ripples using filter circuit (Qualitative analysis); Design of diode clipper and clamper circuit - explanation with example, application of Zener diode in regulator circuit. Numerical problems.

### Module – III: Bipolar junction transistor(BJT)

Formation of PNP/NPN Transistors , energy band diagram, current conduction mechanism, CE,CB,CC configurations, transistor static characteristics in CE,CB and CC mode, junction biasing condition for active, saturation and cut-off modes, current gain  $\alpha$ ,  $\beta$  and  $\gamma$ , early effect.

Biasing and bias stability; biasing circuits - fixed bias; voltage divider bias; collector to base bias , D.C. load line and Quiescent point, calculation of stability factors for different biasing circuits.

BJT as an amplifier and as a switch – Graphical analysis; Numerical Problems.

### Module – IV: Field effect transistor (FET)

**4**L

### 6L

### 8L

Concept of field effect, channel width modulation Classification of FETs-JFET, MOSFET, operating principle of JFET.drain and transfer characteristics of JFET (n-channel and p-channel), CS,CG,CD configurations, Relation between JFET parameters. FET as an amplifier and as a switch– graphical analysis. E-MOSFET (n-channel and p-channel), D-MOSFET (n-channel and p-channel), NumericalProblems .

### Module – V: Feedback and Operational Amplifier

Concept of feedback with block diagram, positive and negative feedback, gain with feedback. Feedback topologies, effect of feedback on input and output impedance, distortion, concept of oscillation and Barkhausen criterion.

Operational amplifier – electrical equivalent circuit ,ideal characteristics , Non ideal characteristics of opamp – offset voltages ;bias current ;offset current; Slew rate ; CMRR and bandwidth, Configuration of inverting and non-inverting amplifier using Op-amp, closed loop voltage gain of inverting and noninverting amplifier , Concept of virtual ground, Applications op-amp – summing amplifier; differential amplifier; voltage follower ; basic differentiator and integrator .

Problems on Characteristics of Op-amp, CMRR, slew rate, amplifier and application of Op-amp to be discussed. Any other relevant problems related to topic may be discussed or assigned.

### Module – VI: Cathode Ray Oscilloscope (CRO)

Operating principle of CRO with block diagram, measurement of voltage, frequency and phase.

### Module – VII: Digital Electronics

Binary numbers and conversion, Basic Boolean algebra, Logic gates (AND,OR,NOR,NOT,NAND,XOR) and realization of functions.

### **Text Books:**

- 1. D. Chattopadhyay, P. C. Rakshit, Electronics Fundamentals and Applications, New Age International
- 2. Millman & Halkias, Integrated Electronics, Tata McGraw Hill.
- 3. Boyelstad & Nashelsky: Electronic Devices & Circuit Theory, McGraw Hill, 1976.
- 4. Sedra & Smith, Microelectronics Engineering

### **Reference Books:**

- 1. John D. Ryder, Electronic Fundamentals and Applications, PHI
- 2. J.B.Gupta, Basic Electronics, S.K. Kataria.
- 3. Malvino: Electronic Principle.
- 4. Schilling & Belove: Electronics Circuits.

### **CO-PO-PSO Mapping:**

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1	PS	PSO	PSO
									0	1	2	01	2	3

### 10L

-----

2L

EC 201. 1	3	3	2	1	-	2	2	1	1	2	2	1	1	1	2
EC 201. 2	3	2	3	2	1	1	-	1	-	2	1	1	2	2	1
EC 201. 3	3	3	3	1	1	1	-	2	-	1	2	1	1	1	1
EC 201. 4	3	3	2	1	1	2	2	1	2	-	1	-	1	2	2
Avg	3	2.75	2.5	1.25	1	1.5	2	1.25	1.33	1.66	1.33	1	1.5	1	1.5

Course Name: Computer Fundamentals & Principle of Computer Programming Code: CS 201 Total No. of Lectures: 40 Credits: 4

#### **Course Outcome:**

CS201.1 To identify the working principle of input and output devices of Computers memorize the basic terminology used in computer programming
CS201.2 To express programs in C language and use different data types for writing the programs
CS201.3 To implement programs using the dynamic behavior of memory by the use of pointers
CS201.4 To explain the difference between call by value and call by address
CS201.5 To write programs using basic data files and developing applications for real world problems

### Course Content

#### **Fundamentals of Computer:**

History of Computer, Generation of Computer, Classification of Computers

Basic structure of Computer System, Primary & Secondary Memory, Processing Unit, Input & Output devices

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(10L)

(**30L**)

Binary and Allied number systems representation of signed & unsigned numbers, BCD, ASCII, Binary number Arithmetic – Addition and Subtraction (using 1's complement and 2's complement) 2LLogic gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR - only truth tables, logic gate symbols and logic equations for gates only 1L Assembly language, high level language, machine level language, compiler and assembler (basic concepts) 1L Basic concepts of operating systems like MS DOS, MS WINDOW, UNIX 1L Problem solving-Algorithm & flow chart 2L

**C** Fundamentals:

Variable and Data Types: The C character set identifiers and keywords, data type & sizes, variable names, declaration, statements

#### C Operators & Expressions: Arithmetic operators, relational operators, logical operators, increment and decrement operators, bitwise operators, assignment operators, conditional operators, special operators - type conversion, C expressions, precedence and associativity.

Input and Output: Standard input and output, formatted output - printf, formatted input scanf, bit fields

**Branching and Loop Statements:** Statement and blocks, if - else, switch, goto and labels, Loops - while, for, do while, break and continue

### Fundamentals and Program Structures:

auto, external, static and register variables

Functions, function types, function prototypes, functions returning values, functions not returning values, scope rules, recursion, C preprocessor and macro

6L

3L

### Arrays, Strings and Pointers:

One dimensional arrays, Two-dimensional arrays, Multidimensional arrays. Passing an array to a function Character array and string, array of strings, Passing a string to a function, String related functions

Page 39 of 193

3L

6L

Pointers, Pointer and Array, Pointer and String, Pointer and functions, Dynamic memory allocation

#### Files handling with C:

formatted and unformatted files, Command line arguments, fopen, fclose, fgetc, fputc, fprintf, fscanf function

4L

### Structures and Unions:

Basic of structures, arrays of structures, structures and pointers, structures and functions

3L

#### **Text Book:**

- 1. Kerninghan B.W. & Ritchie D.M. The C Programming Language
- 2. Gottfried Programming with C Schaum
- 3. Kanetkar Y. Let us C Balaguruswamy Programming in C

### **Recommended Reference Books:**

- 1. Pohl and Kelly A Book on C
- 2. Kerninghan, B.W. The Elements of Programming Style
- 3. Schied F.S. Theory and Problems of Computers and Programming Rajaraman V. Fundamental of Computers
- 4. M.M.Oka Computer Fundamentals, EPH Leon Introduction to Computers, Vikas
- 5. Leon- Fundamental of Information Technology, Vikas Ram B. Computer Fundamentals, New Age International
- 6. Ravichandran D. Programming in C, New Age International
- 7. Xavier C. Introduction to Computers, New Age International

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CS201. 1	3	3	3	3	2	1	2	1	1	1	2	3	2	3	3	
CS201. 2	2	2	3	2	3	-	3	1	1	1	-	3	2	2	3	
CS201. 3	2	3	2	2	2	-	1	-	1	1	-	3	2	3	2	
CS201. 4	3	2	2	2	3	-	1	1	-	1	-	2	2	2	2	
CS201. 5	2	2	2	2	1	1	2	1	1	2	2	3	3	3	3	

### **CO-PO-PSO Mapping:**

Page 40 of 193

Avg.	2	2	2	2	2	0	1	0	0	1	0	2.	2.2	2.6	2.6
	•	•	•		•	•	•	•	•	•	•	8			
	4	4	4	2	2	4	8	8	8	2	8				

### **Course Name: Engineering Thermodynamics & Fluid Mechanics ME 201**

#### **Course Outcomes (COs):**

On successful completion of the learning sessions of the course, the learner will be able to:

- **ME 201.1:** Know about thermodynamic equilibrium, heat & work transfer, First law and its application.
- **ME 201.2:** Understand the basic concepts of Heat Engine, Entropy from Second law of thermodynamics.
- **ME 201.3:** Know the thermodynamic characteristics of a pure substance and its application in power cycles (Simple Rankine cycles, Air Standard cycles)
- **ME 201.4:** Knowledge of basic principles of fluid mechanics, and ability to analyze fluid flow problems with the application of the momentum and energy equations

#### Course Content

#### Module 1:

### Basic Concepts of Thermodynamics:

Introduction: Microscopic and Macroscopic viewpoints

Definition of Thermodynamic systems: closed, open and isolated systems Concept of Thermodynamics state; state postulate.

Definition of properties: intensive, extensive & specific properties. Thermodynamic equilibrium

Thermodynamic processes; quasi-static, reversible & irreversible processes; Thermodynamic cycles.Zeroth law of thermodynamics.Concept of empirical temperature.

### Heat and Work:

Definition & units of thermodynamic work.

Examples of different forms of thermodynamic works; example of electricity flow as work. Work done during expansion of a compressible simple system

Definition of Heat; unit of Heat

Similarities & Dissimilarities between Heat & Work

### Ideal Equation of State, processes; Real Gas:

Definition of Ideal Gas; Ideal Gas Equations of State.

Thermodynamic Processes for Ideal Gas; P-V plots; work done, heat transferred for isothermal, isobaric, isochoric, isentropic & polytropic processes.

Equations of State of Real Gases: Van der Waal's equation; Virial equation of state.

#### **Properties of Pure Substances:**

p-v, T-s & h-s diagrams of pure substance like H2O

### 8L+3T
Introduction to steam table with respect to steam generation process; definition of saturation, wet & superheated status.

Definition of dryness fraction of steam, degree of superheat of steam.

#### Module 2:

#### 1st Law of Thermodynamics:

Definition of Stored Energy & Internal Energy 1st Law of Thermodynamics for cyclic processes Non Flow Energy Equation.

Flow Energy & Definition of Enthalpy.

Conditions for Steady State Steady flow: Steady State Steady Flow Energy Equation.

#### Module 3:

#### 2nd Law of Thermodynamics:

Definition of Sink, Source Reservoir of Heat.

Heat Engine, heat Pump & Refrigerator; Thermal efficiency of Heat Engines & co-efficient of performance of Refrigerators

Kelvin - Planck & Clausius statements of 2nd Law of Thermodynamics Absolute or Thermodynamic scale of temperature, Clausius Integral Entropy

Entropy change calculation for ideal gas processes. Carnot Cycle & Carnot efficiency PMM-2; definition & its impossibility

#### Module 4:

#### Air standard Cycles for IC engines:

Otto cycle; plot on P-V, T-S planes; Thermal efficiency Diesel cycle; plot on P-V, T-S planes; Thermal efficiency

### Rankine cycle of steam

Chart of steam (Mollier's Chart)

Simple Rankine cycle plot on P-V, T-S, h-s planes Rankine cycle efficiency with & without pump work (Problems are to solved for each module)

#### Module 5:

**Properties & Classification of Fluids:** Ideal & Real fluids Newton's law of viscosity; Newtonian and Non-Newtonian fluids Compressible and Incompressible fluids Fluid Statics: Pressure at a point Measurement of Fluid Pressure: Manometers: simple & differential U-tube Inclined tube Fluid Kinematics: Stream line Laminar & turbulent flow external& internal flow Continuity equation

#### R16 B.Tech EE

6L+3T

### 9L+3T

#### 4L+3T

6L+3T

### Dynamics of ideal fluids:

Bernoulli's equation Total head; Velocity head; Pressure head Application of Bernoulli's equation

### Measurement of Flow rate:

Basic principles Venturimeter, Pilot tube, Orificemeter

### (Problems are to be solved for each module)

### **Engineering Thermodynamics**

Text:

1. Engineering Thermodynamics - P K Nag, 4th edn, TMH.

### **References:**

- 1. "Fundamentals of Thermodynamics" 6e by Sonntag & Van Wylin published by Wiley India.
- 2. Engineering Thermodynamics Russel & Adeliyi (Indian edition), OUP
- 3. Engineering Thermodynamics Onkar Singhh, New Age International Publishers Ltd.
- 4. Basic Engineering Thermodynamics R Joel, 5th Ed., Pearson

### Fluid Mechanics

### Text:

1. Fluid Mechanics and Hydraulic Machines - R Bansal

### **References:**

- 1. Introduction to Fluid Mechanics and Fluid Machines S.K.Som and G.Biswas. 2nd edn, TMH
- 2. Fluid Mechanics by A.K.Jain.

### **CO-PO-PSO Mapping:**

СО	PO	'O PSO													
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
ME 201.1	3	3	2	2	-	1	1	1	1	-	1	2	2	1	-
ME201.2	3	3	2	2	-	1	2	-	1	-	1	2	2	1	-
ME 201.3	2	2	1	1	-	2	1	-	-	-	-	1	3	2	-
ME 201.4	3	3	2	2	-	1	1	-	-	-	1	1	2	1	-
Avg.	2.8	2.8	1.8	1.8		1.3	1.3	0.3	0.5		0.8	1.5	2.25	1.3	

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Paper Name: Computer Fundamentals & Principle of Computer Programming Lab Paper Code: CS291 Total Contact Hours: 36 Credit: 2

#### **Prerequisites:**

Basic Computer Knowledge

#### **Course Outcome:**

- CS291.1. To identify the working of different operating systems like DOS, Windows, Linux
- **CS291.2**. To express programs in C language
- CS291.3. To implement programs connecting decision structures, loops
- CS291.4. To experiment with user defined functions to solve real time problems
- **CS291.5.** To write C programs using Pointers to access arrays, strings, functions, structures and files

#### Experiment should include but not limited to the following:

- 1. Some basic commands of DOS, Windows and Linux Operating System, File handling and Directory structures, file permissions, creating and editing simple C program, compilation and execution of C program.
- 2. Writing C Programs on variable, expression, operator and type-casting.
- 3. Writing C Programs using different structures of if-else statement and switch-case statement.
- 4. Writing C Programs demonstrating use of loop (for loop, while loop and do-while loop) concept and use of break and continue statement.
- 5. Writing C Programs demonstrating concept of Single & Multidimensional arrays.
- 6. Writing C Programs demonstrating concept of Function and Recursion.
- 7. Writing C Programs demonstrating concept of Pointers, address of operator, declaring pointers and operations on pointers.
- 8. Writing C Programs demonstrating concept of structures, union and pointer to structure.
- 9. Writing C Programs demonstrating concept of String and command line arguments.
- 10. Writing C Programs demonstrating concept of dynamic memory allocation.
- 11. Writing C Programs demonstrating concept of File Programming.

### **CO-PO-PSO Mapping:**

СО	PO's	8											PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CS201. 1	3	3	3	3	2	1	2	1	1	1	2	3	2	3	3
CS201. 2	2	2	3	2	3	-	3	1	1	1	-	3	2	2	3
CS201. 3	2	3	2	2	2	-	1	-	1	1	-	3	2	3	2
CS201. 4	3	2	2	2	3	-	1	1	-	1	-	2	2	2	2
CS201. 5	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2	2	2	2	2	1	1	0	0	1	2	2. 7	2	2.5	2.5
	4	5	5	2 5	5		7 5	7 5	7 5			5			

Paper Name: Physics – ILaboratory Paper Code: PH 291 Contact: 0L:0T:3P Credit: 2

Prerequisites: Knowledge of Physics upto 12th standard.

#### **Course Outcomes:**

At the end of the course students' should have the

PH 291.1 :Demonstrate experiments allied to their theoretical concepts

PH 291.2 :Conduct experiments using LASER, Optical fiber, Torsional pendulum, Spctrometer

**PH 291.3** :Participate as an individual, and as a member or leader in groups in laboratory sessions actively

**PH 291.4** :Analyzeexperimental data from graphical representations , and tocommunicate effectivelythem in Laboratory reports including innovative experiments

### General idea about Measurements and Errors (One Mandatory):

- i) Error estimation using Slide calipers/ Screw-gauge/travelling microscope for one experiment.
- ii) Proportional error calculation using Carrey Foster Bridge.

#### Any 7 to be performed from the following experiments

#### Experiments on Oscillations & Elasticity:

- 1. Study of Torsional oscillation of Torsional pendulum & determination of time period using various load of the oscillator.
- 2. Experiments on Lissajous figure (using CRO).
- 3. Experiments on LCR circuit.
- 4. Determination of elastic modulii of different materials (Young's modulus and Rigidity modulus)

#### **Experiments on Optics:**

- 5. Determination of wavelength of light by Newton's ring method.
- 6. Determination of wavelength of light by Laser diffraction method.
- 7. Determination of numerical aperture and the energy losses related to optical fiber experiment
- 8. Measurement of specific rotation of an optically active solution by polarimeter.

#### **Experiments on Quantum Physics:**

- 9. Determination of Planck's constant using photoelectric cell.
- 10. Verification of Bohr's atomic orbital theory through Frank-Hertz experiment.

\*\*In addition it is recommended that each student should carry out at least one experiment beyond the syllabus/one experiment as Innovative experiment.

#### Probable experiments beyond the syllabus:

- 1. Determination of wavelength of light by Fresnel's bi-prism method (beyond the syllabus).
- 2. Study of half-wave, quarter-wave plate (beyond the syllabus)
- 3. Study of dispersive power of material of a prism.
- 4. Study of viscosity using Poyseullie's caplillary flow method/using Stoke's law.
- 5. Measurement of nodal and antinodal points along transmission wire and measurement of wave length.
- 6. Any other experiment related to the theory.

СО	PO'	S											PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
РН	2												2	1	1
291.1															
РН				3									1	1	2
291.2															
PH									3				2	1	3
291.3															
РН										1			2	2	2
291.4															
AVG													1.75	1.25	2

#### **CO-PO-PSO Mapping:**

Paper Name: Basic Electronics Engineering Laboratory Paper Code: EC 291 Contact: 0L:0T:3P Credit: 2

**Prerequisites:** A basic course in electronics and Communication engineering Progresses from the fundamentals ofelectricity, active and passive components, basic electronics laws like Ohm's law, Ampere's law

### **Course Outcome:**

**EC 291.1.** Knowledge of Electronic components such as Resistors, Capacitors, Diodes, Transistors measuring equipment like DC power supply, Multimeter, CRO, Signal generator, DC power supply. **EC 291.2.** Analyze the characteristics of Junction Diode, Zener Diode, BJT & FET and different types of Rectifier Circuits.

**EC 291.3**. Determination of input-offset voltage, input bias current and Slew rate, Common- mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.

EC 291.4. Able to know the application of Diode, BJT & OPAMP.

EC 291.5. Familiarization and basic knowledge of Integrated Circuits

### Course Contents

#### List of Experiments:

- 1. Familiarization with passive and active electronic components such as Resistors, Inductors, Capacitors, Diodes, Transistors (BJT) and electronic equipment like DC power supplies, millimeters etc.
- 2. Familiarization with measuring and testing equipment like CRO, Signal generators etc.
- 3. Study of I-V characteristics of Junction diodes.
- 4. Study of I-V characteristics of Zener diodes.
- 5. Study of Half and Full wave rectifiers with Regulation and Ripple factors.
- 6. Study of I-V characteristics of BJTs.
- 7. Study of I-V characteristics of Field Effect Transistors.
- 8. Determination of input-offset voltage, input bias current and Slew rate of OPAMPs.
- 9. Determination of Common-mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.
- 10. Study of OPAMP circuits: Inverting and Non-inverting amplifiers, Adders, Integrators and Differentiators.
- 11. Study of Logic Gates and realization of Boolean functions using Logic Gates.
- 12. Study of Characteristic curves for CB, CE and CC mode transistors.
- 13. Innovative Experiment

#### **CO-PO-PSO-** Mapping:

СО	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
EC 291.1	3	3	-	-	-	-	-	-	-	-	-	-	1	2	2
EC 291.2	2	3	-	-	-	-	-	-	1	1	-	1	2	2	3
EC 291.3	1	3	3	-	-	-	-	-	-	2	-	-	2	3	3
EC 291.4	1	2	3	-	-	-	-	-	-	1	-	1	2	3	2
EC 291.5	3	1	2	-	-	-	-	-	-	-	-	-	1	1	2
AVG	2	2	2	-	-	-	-	-	1	1	-	1	1.6	2.2	2.4
		•	•							•					
		4	6							3					
			7							4					

Workshop Practice Code: ME 292 Contact: 0L: 1T: 3P Total Contact Hours: 36 Credit: 3

Prerequisites: Higher Secondary with Physics, Chemistry & Mathematics

### **Course Outcomes (COs):**

On successful completion of the learning sessions of the course, the learner will be able to: **ME 292.1:** Gain basic knowledge of Workshop Practice and Safety useful for our daily living.

**ME 292.2:** Identify Instruments of a pattern shop like Hand Saw, Jack Plain, Chisels etc and performing operations like such as Marking, Cutting etc used in manufacturing processes.

**ME 292.3:** Gain knowledge of the various operations in the Fitting Shop using Hack Saw, various files, Scriber, etc to understand the concept of tolerances applicable in all

kind of manufacturing.

**ME 292.4:** Get hands on practice of in Welding and various machining processes which give a lot of confidence to manufacture physical prototypes in project works.

### Course Content

### List of Activities:

Sl. No.	Syllabus	Contact Hrs
Module 1	Pattern Making	6
Module 2	Sheet Metal Work	6
Module 3	Fitting	9
Module 4	Machining in Lathe	9
Module 5	Welding	6

### Module – 1: Pattern Making



### Module – 3: Fitting Shop



OR



Module – 4: Machining In Lathe and Shaping M/C



## Module – 5: Welding



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### **CO-PO-PSO Mapping:**

СО	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
ME 291.1	3	-	-	-	-	2	-	1	-	-	1	-	3	2	-
ME291.2	3	-	-	-	-	1	-	2	-	-	-	-	2	2	1
ME 291.3	2	-	-	-	-	1	-	1	-	-	-	-	2	3	1
ME 291.4	3	-	-	-	1	3	-	3	-	-	-	1	3	3	2
ME 291 CO	2.8				1	1.8		1.8			1	1	2.5	2.5	1.3

### Paper Name: Soft Skill Development Paper Code: MC 281 Contact: 0L:0T:2P

**Course Objective:** The objectives of this course are as follows:

- 1. To expose the students to different aspects of corporate life and workplace behavior To introduce workplace behavioral norms, etiquettes and standards
- 2. To equip students to face interviews, presentations and other professional interactions

Module	Content
One	Communication Training
Two	Communication Training (Accent Neutralization)
Three	Business Etiquette
Four	CV / Resume Writing
Five	Corporate Life and Protocols
Six	Group Discussion

Seven	Leadership Skill
Eight	Team Work
Nine	Public Speaking and Interview Basics
Ten	Business Telephone Etiquette
Eleven	Reading skill

#### Module 1: **Communication Training**

- 1. Organisational Communication and Structure.
- 2. Vocabulary related to Corporate Operation.
- 3. Modes of Communication (Telephone, Conference Call, Team Huddle, Public Relation etc.
- Communication with Clients, Customers, Suppliers etc. 4.
- 5. Verbal and Non-Verbal Communication, Proxemics and Para Language.
- 6. Vocabulary Building (Synonym / Antonym / One word Substitution etc.)

#### Module 2: (2L)**Communication Training (Accent Neutralisation)**

- Mother Tongue Influence 7.
- 8. Vowel Sounds and Consonantal Sounds
- 9. Pronunciation and Neutral Accent.
- 10. Intonation.
- 11. Rate of Speech, Pausing, Pitch Variation and Tone.

Module 3:	<b>Business Etiquette</b>	(2L
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- 12. Presenting oneself in the Business Environment.
- Corporate Dressing and Mannerism. 13.
- Table Etiquette (Corporate Acculturation, Office parties, Client/Customer invitations etc.) 14.
- 15. Multi Cultural Etiquette.
- 16. Cultural Difference.
- 17. E-mail Etiquette.

#### Module 4: Job Application And CV / Video Resume

- 18. Format (Chronological, Skill Oriented, Functional etc.)
- 19. Style and Appearance.
- 20. Writing Tips and Video Content Presentation tips.
- Types of Cover Letter or Job Application Letter. 21.

#### Module 5: **Introduction To Corporate Life And Protocols**

- 22. Introduction of Companies (Domain Specific)
- Opportunities and Growth Plan. 23.
- 24. Performance and Corporate Behaviour.
- 25. Service Level Agreement and Corporate Jargon.
- 26. Networking and Adapting to Culture, Technology and Environment.

Module 6:	Group Discussion
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27. Introduction, Definition and Purpose.

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### (2L)

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(2L)

(2L)

(2L)

- 28. Types of Group Discussion.
- 29. Strategies and Protocols of Group Discussion.
- 30. Skills and Parameters of Evaluation.
- 31. Practice Session and Video Viewing Task.

### Module 7: Leadership Skill

- 32. Leadership Theories.
- 33. Traits and Skills of the Leader.
- 34. Roles, Duties and Responsibilities.
- 35. Case Study of Leaders.
- 36. Interpersonal relationship with Team.

#### Module 8: Team Work

- 37. Concept of Team Culture.
- 38. Stages of Team Development (Forming, Storming, Norming, Performing, Adjourning)
- 39. Team Working Agreement (Participation, Decision Making, Problem Solving.
- 40. Conflict Management, Flexibility, Negotiation Skill.
- 41. Team Building (Assess, Plan, Execute and Evaluate)

### Module 9: Public Speaking and Interview Basics

- 42. Extempore.
- 43. JAM.
- 44. Interview Skill
- 45. Interview over Telephone, Video Conference Interview etc.

### Module 10: Business Telephone Etiquette

- 46. Five Phases of a Business Call.
- 47. Pitch, inflection, Courtesy and Tone.
- 48. Understanding, Rate of Speech, Enunciation.
- 49. Hold Procedure.
- 50. Cold and Hot Transfer protocols.
- 51. Dealing with Different Types of Customers (Irate, Talkative, Turnaround etc.)

### Module 11: Reading Skill

52. Vocabulary from context, speed reading, skimming, inferring, comprehension test etc.

ASS	ASSESSMENT									
1.	Viva	10								
2.	Personal Skill Enhancement Log	25								
3.	Movie Making: Video Resume	25								
4.	Term End Project	40								

#### List of Reference:

1. Effective Communication and Soft-Skills: Strategies for Success, Nitin Bhatnagar and Mamta Bhatnagar, Pearson, 2012.

(2L)

(2L)

(2L)

(2L)

- 2. Soft Skills: Know yourself and know the World, Dr. K.Alex, S Chand, 2009.
- 3. Soft Skills at Work: Technology for Career Success, Beverly Amer, Course Technology, 2009.
- 4. The Pronunciation of English, Daniel Jones, Cambridge University Press, 1998.
- 5. Global Business Etiquette: A Guide to International Communication and Customs, Jeanette S. Martin and Lillian H. Chaney, Praeger, 2012.
- 6. The CV Book: Your Definitive Guide to Writing the Perfect CV, James Innes, Pearson.
- 7. Understanding American Business Jargon: A Dictionary, W. Davis Folsom, Greenwood Press, 2005.
- 8. Navigating Corporate Life, Stanley Tyo.
- 9. Group Discussion: A Practical Guide to Participation and Leadership, Kathryn Sue Young, Julia T. Wood, Gerald M. Phillips and Douglas J. Pedersen, Waveland Press Inc., 2007.
- 10. The Leadership Skills Handbook, Jo Owen, KoganPage, 2006.
- 11. Teamwork Training, Sharon Boller, ASTD Press, 2005.
- 12. Public Speaking for Success, Dale Carnegie, Penguin, 2005.
- 13. Effective Interviewing Skills, Tracey A. Swift and Ivan T. Robertson, BPS Books, 2000.
- 14. Telephone Etiquette: Making Lasting First Impressions, Theo Gilbert-Jamison, Performance Solutions, 2013.
- 15. Reading Comprehension Strategies: Theories, Interventions and Technologies, Danielle S. McNamara, Lawrence Earlbaum Associates, 2007.
- 16. www.mindtools.com.

# Syllabus of 1<sup>st</sup> Year

(to be effective from 2016-17 admission batch)

## Autonomy Curriculum and Syllabus of B.Tech FT/CSE/IT Programme Implemented from the Academic Year 2016

THE	ORY						
l No	Paper Code	Theory	Conta	act Hour	s /Week		Credit Points
			L	Т	Р	Total	
1	M 101	Mathematics -I	3	1	0	4	4
2	PH 101	Physics - I	3	1	0	4	4
3	EC 101	Basic Electronics Engineering	3	1	0	4	4
4	HU 101	Communicative English	2	0	0	2	2
5	ME 101	Engineering	3	1	0	4	4
		Mechanics					
Tota	l no. of Theory					18	18
PRA	CTICAL						
6	HU191	Language Lab and Seminar Presentation	0	0	2	2	1
7	PH191	Physics -I Lab	0	0	3	3	2
8	EC 191	Basic Electronics Engineering Lab	0	0	3	3	2
9	ME192	Workshop Practice	0	0	3	3	2
C. SI	ESSIONAL						
10	XC181	Extra Curricular Activity (NSS/ NCC)	0	0	2	2	1
Tota	l no. of Practical	& Sessional				13	08

### First Year First Semester

THEO	RY						
Sl No	Paper Code	Theory	Co /W	ntact eek	Hou	°S	Credit Points
			L	Т	Р	Total	
1	M 201	Mathematics -II	3	1	0	4	4
2	CH 201	Chemistry	3	1	0	4	4
3	EE 201	Basic Electrical Engineering	3	1	0	4	4
4	CS 201	Computer Fundamentals & Principle of Computer Programming	3	1	0	4	4
5	ME 201	Engineering Thermodynamics & Fluid Mechanics	3	1	0	4	4
Total o	f Theory					20	20
PRAC	ΓICAL						
6	CS291	Computer Fundamentals & Principle of Computer Programming Lab	0	0	3	3	2
7	CH 291	Chemistry Lab	0	0	3	3	2
8	EE 291	Basic Electrical Engineering Lab	0	0	3	3	2
9	ME 291	Engg Drawing & Graphics	0	0	3	3	2
Total o	f Practical					12	08
C.SESS	SIONAL						
10	MC 281	Soft Skill Development	0	0	2	2	0

### First Year Second Semester

# 1<sup>st</sup> year 1<sup>st</sup> Sem

## **Curriculum:**

TH	EORY								
l No	Paper Code	Theory	Co /W	ntact eek	Hour	s	Credit Points		
			L	Т	Р	Total			
1	M 101	Mathematics -I	3	1	0	4	4		
2	PH 101	Physics - I	3	1	0	4	4		
3	EC 101	Basic Electronics Engineering	3	1	0	4	4		
4	HU 101	Communicative English	2	0	0	2	2		
5	ME 101	Engineering Mechanics	3	1	0	4	4		
Tota	al no. of Th	eory				18	18		
PRA	ACTICAL								
6	HU191	Language Lab and Seminar Presentation	0	0	2	2	1		
7	PH191	Physics -I Lab	0	0	3	3	2		
8	EC 191	Basic Electronics Engineering Lab	0	0	3	3	2		
9	ME192	Workshop Practice	0	0	3	3	2		
C. S	SESSIONAL	L							
10	XC181	Extra Curricular Activity (NSS/ NCC)	0	0	2	2	1		
Tota	al no. of Pra	actical & Sessional				13	08		

### **Syllabus:**

Theory

Paper Name: Mathematics –I Paper Code: M101 Total Contact Hours: 40 Credit: 4

Prerequisite: Any introductory course on matrix algebra, calculus, geometry.

**Course Objective:** The purpose of this course is to provide fundamental concepts matrix algebra, Calculus of Single and Several Variables and Vector Analysis.

### **Course outcome:**

On successful completion of the learning sessions of the course, the learner will be able to:

M 101.1:	Recall the distinctive characteristics of matrix algebra, differential calculus, integral calculus and vector analysis.
M 101.2:	Understand the theoretical working of matrix algebra, differential calculus, integral calculus and vector analysis.
M 101.3:	Apply the principles matrix algebra, differential calculus, integral calculus and vector analysis for the solutions of the problems.
M 101.4:	Analyze the application of matrixalgebra, differential calculus, integral calculus and vector analysis.
M 101.5:	Evaluate the result for application to the problems on matrixalgebra, differential calculus, integral calculus and vector analysis.

### **Course contents:**

#### MODULE I [10L]

**Matrix Algebra:** Elementary row and column operations on a matrix, Rank of matrix, Normal form, Inverse of a matrix using elementary operations, Consistency and solutions of systems of linear equations using elementary operations, Linear dependence and independence of vectors, Concept & Properties of different matrices (unitary, orthogonal, symmetric, skew-symmetric, hermitian, skew-hermitian), Eigen values and Eigen vectors of a square matrix (of order 2 or 3), Characteristic polynomials, Caley-Hamilton theorem and its applications, Reduction to diagonal form (upto 3<sup>rd</sup> order).

#### MODULE II [10L]

**Calculus-I** (Functions of single variable): Rolle's theorem, Mean value theorem- Lagrange & Cauchy, Taylor's and Maclaurin's theorems, Expansion of simple functions by Taylor's and Maclaurin's Theorems, Fundamental theorem of integral calculus, Evaluation of plane areas, volume and surface area of a solid of revolution and lengths, Convergence of Improper integrals, Beta and Gamma Integrals - Elementary properties and the Inter relations.

#### MODULE III [12L]

**Calculus-II** (Functions of several variables): Introduction to functions of several variables with examples, Knowledge of limit and continuity, Partial derivatives, Total Differentiation, Derivatives of composite and implicit functions, Euler's theorem on homogeneous functions, Chain rule, Maxima and minima of functions of two variables – Lagrange's method of Multipliers, Change of variables-Jacobians (up to three variables), Double and triple integrals.

#### MODULE IV [8L]

Vector Calculus: Scalar and vector triple products, Scalar and Vector fields, Vector Differentiation, Level surfaces, Directional derivative, Gradient of scalar field, Divergence and Curl of a vector field and their physical significance, Line, surface and volume integrals, Green's theorem in plane, Gauss Divergence theorem, Stokes' theorem, Applications related to Engineering problems.

### **Text Books:**

- 1. E. Kreyszig, Advanced engineering mathematics (8th Edition), John Wiley, 1999.
- 2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publications, 2009.
- 3. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, Narosa Pub. House, 2008.
- 4. H. Anton, Elementary linear algebra with applications (8th Edition), John Wiley, 1995.
- 5. G. Strang, Linear algebra and its applications (4th Edition), Thomson, 2006.

### **Reference Books:**

- 1. S. Kumaresan, Linear algebra A Geometric approach, Prentice Hall of India, 2000.
- 2. M. Apostol, Calculus, Volumes 1 and 2 (2nd Edition), Wiley Eastern, 1980.
- 3. TG. B. Thomas and R. L. Finney, Calculus and Analytic Geometry (9th Edition), ISE Reprint, Addison-Wesley, 1998.
- 4. Hughes-Hallett et al., Calculus Single and Multivariable (3rd Edition), John-Wiley and Sons, 2003.
- 5. J. Stewart, Calculus (5th Edition), Thomson, 2003.
- 6. J. Bird, Higher Engineering Mathematics (4th Edition, 1st India Reprint), Elsevier, 2006.
- 7. L.Rade and B.Westergen, Mathematics Handbook: for Science and Engineering (5th edition, 1st Indian Edition), Springer, 2009.
- 8. Murray R Spiegel and Seymour Lipschutz, Schaum's Outline of Vector Analysis.
- 9. Richard Bronson, Schaum's Outline of Matrix Operations.

#### COURSE OUTCOMES VS POs/PSOs MAPPING: (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

СО							PO						PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
M 101.1	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	
M 101.2	3	3	2	1	-	-	-	-	-	-	-	2	-	-	-	
M 101.3	3	2	3	2	-	-	-	-	-	-	-	2	3	-	-	
M 101.4	2	3	2	2	-	-	-	-	-	-	-	1	1	-	2	
M 101.5	3	2	2	1	-	-	-	-	-	-	-	1	-	-	-	
Overall CO mapping	2.8	2.4	2	1.5								1.5	2		2	

Paper Name: Physics -I Paper Code: PH 101 Total Contact Hours: 41 Credit: 4

Pre requisites: Knowledge of Physics upto 12th standard.

#### **Course Objective:**

The aim of courses in Physics is to provide an adequate exposure and develop insight about the basic physics principles along with the possible applications. The acquaintance of basic principles of physics would help engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches. It can also create awareness of the vital role played by science and engineering in the development of new technologies. It also gives necessary exposure to the practical aspects, which is an essential component for learning sciences.

### **Course Outcome:**

At the end of the course students' should have the

CO1: Describe various types mechanical resonance and its electrical equivalence

CO2: Explain basic principles of Laser, Optical fibers and various types of semiconductors

**CO3:** Apply superposition to explain interference and diffraction as well as apply wave mechanics for attainment of Heisenberg's uncertainty principle

**CO4:** Analyze importance of light as a carrier of information and examine different crystallographic structures according to their co-ordination number and packing factors

**CO5:** Justify the need of quantum mechanics as remedy to overcome limitations imposed by classical physics

### **Course contents**

Module 1 (8L):-

Oscillations

**1.1 Simple harmonic motion:** Concepts with examples, Superposition of SHMs in two mutually perpendicular directions: Lissajous' figures, Engineering Applications and related Numerical problems 2L

**Damped vibration:** Differential equation and its solution, Logarithmic decrement, quality factor,Engineering Applications and related Numerical problems. 3L

**Forced vibration**: Differential equation and solution, Amplitude and Velocity resonance, Sharpness of resonance, relevant applications including LCR circuits, Numerical problems

3L

Module 2 (10L):-Classical Optics:

**Interference of light:** Wave nature of light (Huygen's principle), Conditions of sustained interference double slit as an example; qualitative idea of spatial and temporal coherence, conservation of energy and intensity distribution; Newton's ring (qualitative descriptions of working principles and procedures-no deduction required). Engineering applications, Numerical Problems. 3L

Fresnel's biprism (beyond the syllabus ). 1L(ext)

**Diffraction of light:** Fresnel and Fraunhofer class, Fraunhofer diffraction for plane transmission grating (elementary treatment of intensity distribution for N-slits), single slit and double slits as examples, missing order, Rayleigh criterion, resolving power of grating and microscope (Definition and formula; no deduction required). Engineering Applications, Numerical Problems. 4L

**Polarization:** Definition, plane of polarization, plane of vibration, Malus law, fundamental concepts of plane, circular and elliptical polarizations (only qualitative idea) with examples, Brewster's law, Double refraction: ordinary and extraordinary rays, Nicol's prism, Engineering applications, Numerical problems. 3L

#### Module 3 (9L):-Quantum Physics:

**Quantum Theory**: Inadequacy of classical physics; Planck's quantum hypothesis-Qualitative (without deductions), particle concept of electromagnetic wave (example: photoelectric and Compton effect; qualitative discussions only), wave particle duality; phase velocity and group velocity; de Broglie wave; Davisson and Germer experiment. 4L

**Quantum Mechanics 1:** Concept of wave function, Physical significance of wave function, Probability interpretation; wave function normalization condition and its simple numerical applications; uncertainty principle- applications, Schrödinger equation (no mathematical derivation).

#### Module 4 (6L): X-ray & Crystallography

X-rays – Origin of Characteristic and Continuous X-ray, Bragg's law (No derivation), Determination of lattice constant, Applications, Numerical problems. 2L

**Elementary ideas of crystal structure** - lattice, basis, unit cell, Fundamental types of lattices – Bravais lattice, Simple cubic, fcc and bcc, **hcp** lattices, (use of models in the class during teaching is desirable) Miller indices and miller planes, Co-ordination number and Atomic packing factor, Applications, Numerical problems. 4L

Module 5 (8L): Modern Optics-I:

#### R16 B.TECH FT/CSE/IT

**Laser:** Concepts of various emission and absorption process, working principle of laser, metastable state, Population Inversion, condition necessary for active laser action, optical resonator, ruby laser, He-Ne laser,

semiconductor laser, Einstein A and B coefficients and equations, industrial and medical applications of laser.

5L

**Fibre optics and Applications:** Principle and propagation of light in optical fibres- Numerical aperture and Acceptance angle, V number, Types of optical fibres (material, refractive index, mode), Losses in optical fibre- attenuation, dispersion, bending, Numerical problems. 3L

#### **Recommended Text Books for Physics I (PH101//201):**

#### **Oscillations:**

- 1. Classical Mechanics- J. C. Upadhyay (Himalya Publishers)
- 2. Classical Mechanics-Shrivastav
- 3. Classical Mechanics-Takwal & Puranik (TMH)
- 4. Sound-N. K. Bajaj (TMH)
- 5. Advanced Acoustics-D. P. Roy Chowdhury (Chayan Publisher)
- 6. Principles of Acoustics-B.Ghosh (Sridhar Publisher)
- 7. A text book of sound-M. Ghosh (S. Chand publishers)
- 8. Electricity Magnetism-Chattopadhyay & Rakshit (New Central Book Agency)
- 9. A text book of Light- K.G. Mazumder & B.Ghoshs, (Book & Allied Publisher)
- 10. R.P. Singh ( Physics of Oscillations and Waves)
- 11. A.B. Gupta (College Physics Vol. II)
- 12. Chattopadhya and Rakshit (Vibration, Waves and Acoustics)

#### Classical Optics & Modern Optics-I:

- 13. A text book of Light- K.G. Mazumder & B.Ghoshs (Book & Allied Publisher)
- 14. A text book of Light-Brijlal & Subhramanium, (S. Chand publishers)
- 15. Modern Optics-A. B. Gupta (Book & Allied Publisher)
- 16. Optics-Ajay Ghatak (TMH)
- 17. Optics-Hecht
- 18. Optics-R. Kar, Books Applied Publishers
- 19. Möler (Physical Optics)
- 20. E. Hecht (Optics)
- 21. E. Hecht (Schaum Series)
- 22. F.A. Jenkins and H.E White
- 23. C.R. Dasgupta (Degree Physics Vol 3)

### **Quantum Physics**

- 24. Introduction to Quantum Mechanics-S. N. Ghoshal (Calcutta Book House)
- 25. Quantum Mechanics-Bagde Singh (S. Chand Publishers)
- 26. Perspective of Quantum Mechanics-S. P. Kuilla (New Central Book Agency)
- 27. Quantum Mechanics-Binayak Datta Roy (S. Chand Publishers)
- 28. Quantum Mechanics-Bransden (Pearson Education Ltd.)
- 29. Perspective of Modern Physics-A. Beiser (TMH)
- 30. Eisberg & Resnick is published by Wiley India
- 31. A.K. Ghatak and S Lokenathan
- 32. E.E. Anderson (Modern Physics)
- 33 .Haliday, Resnick & Krane : Physics Volume 2 is Published by Wiley India
- 34. Binayak Dutta Roy [Elements of Quantum Mechanics]

### X-ray & Crystallography

- 35. Solid state physics-Puri & Babbar (S. Chand publishers)
- 36. Materials Science & Engineering-Kakani Kakani
- 37. Solid state physics- S. O. Pillai
- 38. Introduction to solid state physics-Kittel (TMH)
- 39. Solid State Physics and Electronics-A. B. Gupta, Nurul Islam (Book & Allied Publisher)
- 40. S.O. Pillai (a. Solid state physics b. Problem in Solid state physics)

#### **General Reference:**

- 1. Refresher courses in physics (Vol. 1, Vol. 2 & Vol. 3)-C. L. Arora (S. Chand Publishers)
- 2. Basic Engineering Physics-Amal Chakraborty (Chaya Prakashani Pvt. Ltd.)
- 3. Basic Engineering Physics-I Sujoy Bhattacharya, Saumen Paul (TMH)
- 4. Engineering Physics Vol: 1-Sudipto Roy, Tanushri Ghosh, Dibyendu Biswas (S. Chand).
- 5. Engineering Physics Vol:1-S. P. Kuila (New Central)
- 4. University Physics-Sears & Zemansky (Addison-Wesley)
- 5.B. Dutta Roy (Basic Physics)
- 6. R.K. Kar (Engineering Physics)
- 7. Mani and Meheta (Modern Physics)
- 8. Arthur Baiser (Perspective & Concept of Modern Physics)

#### **CO-PO-PSO Mapping:**

СО	PO	PO	PO	PO	PO	PO	PO	РО	PO	PO1	PO1	PO1	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	0	1	2	1	2	3
CO1	3											2	3	3	
CO2	3											2	3	2	
CO3	3	2										1	1		
CO4	2	3										1	2	3	
CO5	1	3										1			
Overall	2.4	2.67										1.4	2.25	2.67	
СО															
mappin															
g															

Paper Name: Basic Electronics Engineering Paper code: EC101 Total Contact Hours: 40 Credits: 4

### **Prerequisites**

A basic course in Electronics and Communication Engineering Progresses from the fundamentals of electricity, direct current (DC) devices and circuits, series and parallel circuits to the study of active and passive components, Ohm's Law, Kirchoff's Law i.e. KVL, KCL, Ampere's Law etc.

## **Course objectives:**

Students will be able to Analyze the behaviour of semiconductor diodes in Forward and Reverse bias . To design a half wave and full wave rectifiers , Explore V-I characteristics of Bipolar Junction Transistor n CB, CE & CC configurations. To acquire the basic engineering technique and ability to design and analyze the circuits of Op- Amps. Students will be able to explain feedback concept and different oscillators . They will also be familiar with the analysis of digital logic basics and measuring Electronic devices. Students will have knowledge about characteristics of FET.

### **Course Outcomes:**

**CO1**: Understand the PN junction diode, ideal diode, diode models and its circuit analysis, Remember the application of diodes and special diodes.

**CO2:** Analyse how operational amplifiers are modelled and analysed, and to design Op-Amp circuits to perform operations such as integration differentiation on electronic signals.

CO3: Assess both positive and negative feedback in electronic circuits.

**CO4:** Develop the capability to analyse and design simple circuits containing non-liner elements such as transistors using the concepts of load lines, operating points and incremental analysis.

### **Course contents**

#### Module-I: Basics of semiconductor

Conductors, Insulators, and Semiconductors- crystal structure, Fermi Dirac function, Fermi level, E-k and Energy band diagrams, valence band, conduction band, and band gap; intrinsic, and extrinsic ( p-type and n-type) semiconductors, position of Fermi level in intrinsic and extrinsic semiconductor, drift and diffusion current – expression only ( no derivation), mass action law, charge neutrality in semiconductor, Einstein relationship in semiconductor, Numerical problems on-Fermi level, conductivity, mass action law, drift and diffusion current.

6L

#### Module-II: P-N Junction Diode and its applications

p-n junction formation and depletion region, energy band diagram of p-n junction at equilibrium and barrier energy , built in potential at p-n junction, energy band diagram and current through p-n junction at forward and reverse bias, V-I characteristics and current expression of diode, temperature dependencies of V-I characteristics of diode , p-n junction breakdown – conditions, avalanche and Zener breakdown, Concept of Junction capacitance, Zener diode and characteristics.

Diode half wave and full wave rectifiers circuits and operation ( $I_{DC}$ ,  $I_{rms}$ ,  $V_{Dc}$ ,  $V_{rms}$ ), ripple factor without filter, efficiency ,PIV,TUF; Reduction of ac ripples using filter circuit (Qualitative analysis); Design of diode clipper and clamper circuit - explanation with example, application of Zener diode in regulator circuit. Numerical problems.

#### Module-III: Bipolar junction transistor(BJT)

Formation of PNP/NPN Transistors ,energy band diagram, current conduction mechanism , CE ,CB,CC configurations , transistor static characteristics in CE ,CB and CC mode, junction biasing condition for active, saturation and cut-off modes ,current gain  $\alpha$ ,  $\beta$  and  $\gamma$ , early effect.

Biasing and bias stability; biasing circuits - fixed bias; voltage divider bias; collector to base bias, D.C. load line and Quiescent point, calculation of stability factors for different biasing circuits.

BJT as an amplifier and as a switch – Graphical analysis; Numerical Problems.

#### Module-IV: Field effect transistor (FET)

Concept of field effect, channel width modulation Classification of FETs-JFET, MOSFET, operating principle of JFET. drain and transfer characteristics of JFET (n-channel and p-channel), CS,CG,CD configurations, Relation between JFET parameters. FET as an amplifier and as a switch– graphical analysis. E-MOSFET (n-channel and p-channel), D-MOSFET (n-channel and p-channel), Numerical Problems .

#### **Module-V: Feedback and Operational Amplifier**

Concept of feedback with block diagram, positive and negative feedback, gain with feedback. Feedback topologies, effect of feedback on input and output impedance, distortion, concept of oscillation and Barkhausen criterion. Operational amplifier – electrical equivalent circuit, ideal characteristics, Non ideal characteristics of op-amp – offset voltages ;bias current ;offset current; Slew rate ; CMRR and bandwidth, Configuration of inverting and non-inverting amplifier using Op-amp, closed loop voltage gain of inverting and non-inverting amplifier , Concept of virtual ground, Applications op-amp – summing amplifier; differential amplifier; voltage follower ; basic differentiator and integrator

Problems on Characteristics of Op-amp, CMRR, slew rate, amplifier and application of Op-amp to be discussed. Any other relevant problems related to topic may be discussed or assigned.

#### Module-VI: Cathode Ray Oscilloscope (CRO)

Operating principle of CRO with block diagram, measurement of voltage, frequency and phase.

#### **Module-VII: Digital Electronics**

Binary numbers and conversion, Basic Boolean algebra, Logic gates (AND,OR,NOR,NOT,NAND,XOR) and realization of functions.

**8**L

6L

**4I** 

10L

2L

**4**L

#### **Text Books:**

- 1. D. Chattopadhyay, P. C. Rakshit, Electronics Fundamentals and Applications, New Age International
- 2. Millman & Halkias, Integrated Electronics, Tata McGraw Hill.
- 3. Boyelstad & Nashelsky: Electronic Devices & Circuit Theory, McGraw Hill, 1976.
- 4. Sedra & Smith, Microelectronics Engineering

#### **Reference Books:**

- 1. John D. Ryder, Electronic Fundamentals and Applications, PHI
- 2. J.B.Gupta, Basic Electronics, S.K. Kataria.
- 3. Malvino: Electronic Principle.
- 4. Schilling & Belove: Electronics Circuits.

#### **CO-PO-PSO Mapping:-**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO2	PSO3
CO1	3	3	2	1	-	2	2	1	1	2	2	1	1	1	2
CO2	3	2	2	2	1	-	-	1	1	2	1	1	2	1	2
CO3	3	3	3	1	1	1	1	-	-	1	2	1	2	1	1
CO4	3	3	2	1	1	2	2	1	2	-	1	-	1	1	2
Over all CO map ping	3	2.75	2.25	1.25	1	1.66	1.66	1	1.33	1.66	1.5	1	1.5	1	1.75

Paper Name: Communicative English Paper Code: HU101 Total Contact Hours: 26 Credits: 2

### **Pre requisites:**

Basic knowledge of high school English.

### **Course Objectives:**

Designed to meet the basic survival needs of communication in the globalized workplace, including knowledge of and competency in the use of macro-skills in reading and writing proficiency, functional grammar and usage.

### **Course Outcomes:**

At the end of this course, students will be

HU101. 1. Able to define, identify and describe the basics of communication theory and its application.

HU101.2. Able to recognize, recall and make use of English vocabulary and its varied usage

HU101. 3. Able to develop and apply reading and writing skills in an academic and global business context

HU101. 4. Able to identify, explain and use the grammatical structures and forms in English.

HU101. 5. Able to analyse, classify and elaborate on the forms and formats of business writing.

### **Course Content:**

The proposed revised syllabus is as follows:

Module 1: Communication: Interface in a Globalized World [5L]

- a .Definition of Communication& Scope of Communication
- b. Process of Communication-Models and Types
- c. Verbal-Non-Verbal Communication, Channels of Communication
- d. Barriers to Communication & surmounting them
- [to be delivered through case studies involving intercultural communication]

- Module 2: Vocabulary and Reading [5L]
- a. Word origin-Roots, Prefixes and Suffixes, Word Families, Homonyms and Homophones
- b. Antonyms and Synonyms, One-word substitution
- c. Reading-Purposes and Skills
- d. Reading Sub-Skills-Skimming, Scanning, Intensive Reading
- e. Comprehension Practice (Fiction and Non fictional Prose/Poetry)
- Texts:
- (i)Isaac Asimov, I Robot (-Robbie OR -Little Lost Robot)
- (ii)George Orwell, -Shooting an Elephant
- (iii) Ruskin Bond, —The Cherry Tree OR —The Night Train at Deoli
- (iv) Robert Frost, -Stopping by the Woods on a Snowy Evening.
- f. Precis Writing
- (Use of daily newspapers for reading practice is recommended)
- Module 3: Functional Grammar and Usage [6L]
- a. Articles, Prepositions, Verbs
- b. Verb-Subject Agreement
- c. Comparison of Adjectives
- d. Tenses and their Use
- e. Transformation of Sentences (Singular-Plural, Active-Passive, Direct-Indirect, Degrees of Comparison)
- f. Error Correction
- Module 4: Business writing [10L]
- a. Business Communication in the Present-day scenario
- b. Business Letters (Letters of Inquiry, Sales Letters, Complaint and Adjustment Letters, Job Application Letters)
- c. Drafting of a CV and Résumé
- d. Memo, Notice, Advertisement, Agenda, Minutes of Meetings
- e. E-mails (format, types, jargons, conventions)

## **References:**

- 1. Raymond Murphy. English Grammar in Use. 3rd Edn. CUP, 2001.
- 2. Seidl & McMordie. English Idioms & How to Use Them. Oxford: OUP, 1978.
- 3. Michael Swan. Practical English Usage. Oxford:OUP, 1980.
- 4. Simeon Potter. Our Language. Oxford:OUP, 1950.
- 5. Pickett, Laster and Staples. *Technical English: Writing, Reading & Speaking*. 8<sup>th</sup> ed. London: Longman, 2001.
- 6. IIT Kanpur, English Language & Communication Skills (ENG 112 C) syllabus.

### **CO-PO-PSO Mapping:**

	PO	PO	PO	<b>PO1</b>	<b>PO1</b>	<b>PO1</b>	PSO	PSO	PSO						
	1	2	3	4	5	6	7	8	9	0	1	2	1	2	3
HU101	-	-	-	-	-		1	-	2	3	-	2	-	-	3
HU101 .2	-	-	-	-	-		1	-	2	3	-	3	-	-	3
HU101 .3	-	-	-	-	-	3	3	3	2	3	2	3	-	-	3
HU101 .4	-	-	-	-	-	3	3	2	-	3	-	3	-	-	3
HU101 .5	-	-	-	-	-	3	3	3	-	3	2	3	-	-	3
Overall CO mappin g	-	-	-	-	-	3	2.2	2.6 7	2	3	2	2.8	-	-	3

### **Paper Name: Engineering Mechanics**

Paper Code: ME101 Total Contacts Hours: 45 Credit: 4

Pre requisites: Higher Secondary with Physics, Chemistry & Mathematics.

### **Course Objective:**

- 1. Understand the vector and scalar representation of forces and moments.
- 2. Describe static equilibrium of particles and rigid bodies in two dimensions and three dimensions including the effect of Friction
- 3. Analyze the properties of surfaces & solids in relation to moment of inertia.
- 4. Illustrate the laws of motion, kinematics of motion and their interrelationship.
- 5. Study the concepts of engineering mechanics on deformable materials under applied loads.

### **Course Outcome:**

Upon successful completion of the course, student should be able to:

- **CO1:** Construct free body diagram and calculate the reactions necessary to ensure static equilibrium.
- CO2: Study the effect of friction in static and dynamic conditions.
- **CO3:** Understand the different surface properties, property of masses and material properties.
- CO4: Analyze and solve different problems of kinematics and kinetics.

### **Course Content:**

**Module1:** Importance of Mechanics in engineering; Introduction to Statics; Concept of Particle and Rigid Body; Types of forces: collinear, concurrent, parallel, concentrated, distributed; Vector and scalar quantities; Force is a vector; Transmissibility of a force (sliding vector). 2L

Introduction to Vector Algebra; Parallelogram law; Addition and subtraction of vectors; Lami's theorem; Free vector; Bound vector; Representation of forces in terms of i,j,k; Cross product and Dot product and their applications. 3L+1T

Two dimensional force system; Resolution of forces; Moment; Varignon's theorem; Couple; Resolution of a coplanar force by its equivalent force-couple system; Resultant of forces

4L+1T

Module2: Concept and Equilibrium of forces in two dimensions; Free body concept and diagram; Equations of equilibrium. 3L+1T

Concept of Friction; Laws of Coulomb friction; Angle of Repose; Coefficient of friction.

Module3: Distributed Force: Centroid and Centre of Gravity; Centroids of a triangle, circular sector, 25ocusing25eral, composite areas consisting of above figures. 4L+1TMoments of inertia: MI of plane figure with respect to an axis in its plane, MI of plane figure with respect to an axis perpendicular to the plane of the figure; Parallel axis theorem; Mass moment of inertia of symmetrical bodies, e.g. cylinder, sphere, cone. 3L+1T

Principle of virtual work with simple application.

Module4: Concept of simple stresses and strains: Normal stress, Shear stress, Bearing stress, Normal strain, Shearing strain; Hooke's law; Poisson's ratio; Stress-strain diagram of ductile and brittle materials; Elastic limit; Ultimate stress; Yielding; Modulus of elasticity; Factor of safety.

2L+1T

1L+1T

3L+1T

Module5: Introduction to Dynamics: Kinematics and Kinetics; Newton's laws of motion; Law of gravitation & acceleration due to gravity; Rectilinear motion of particles; determination of position, velocity and acceleration under uniform and non-uniformly accelerated rectilinear motion; construction of x-t, v-t 3L+1T and a-t graphs.

Plane curvilinear motion of particles: Rectangular components (Projectile motion); Normal and tangential components (circular motion). 2L+1T

Module6: Kinetics of particles: Newton's second law; Equation of motion; D.Alembert's principle and free body diagram; Principle of work and energy; Principle of conservation of energy; Power and efficiency.

3L+2T

### **Books Recommended**

- Engineering Mechanics [Vol-I & II]by Meriam & Kraige, 5<sup>th</sup> ed. Wiley India
  Engineering Mechanics: Statics & Dynamics by I.H.Shames, 4<sup>th</sup> ed. PHI
  Engineering Mechanics by Timoshenko, Young and Rao, Revised 4<sup>th</sup> ed. TMH

- 4. Elements of Strength of Materials by Timoshenko & Young, 5<sup>th</sup> ed. E.W.P
- Fundamentals of Engineering Mechanics by Debabrata Nag & Abhijit Chanda- Chhaya 5. Prakashani
- Engineering Mechanics by Basudeb Bhattacharyya– Oxford University Press. 6.
- 7. Engineering Mechanics: Statics & Dynamics by Hibbeler & Gupta, 11<sup>th</sup> ed. Pearson

### **CO-PO-PSO Mapping:**

СО						PO	)							PSO				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3			
ME 101.1	3	3	2	2	-	-	-	-	1	-	-	-	3	1	2			
ME 101.2	3	3	2	2	-	-	-	-	1	-	-	1	2	1	2			
ME 101.3	3	2	3	2	1	-	-	-	1	-	-	1	3	3	3			
ME 101.4	3	3	3	3	-	-	-	-	1	-	1	-	3	3	3			
Overall CO mapping	3	2.8	2.5	2.3	1				1		1	1	2.8	2	2.5			

### **Practical**

## Paper Name: Lang. Lab. And Seminar Presentation Paper Code: HU191 Total Contact Hours: 26 Credit: 1

Pre requisites: Basic knowledge of LSRW skills.

**Course Objectives:** To train the students in acquiring interpersonal communication skills by 27ocusing on skill acquisition techniques and error feedback.

## **Course Outcome:**

HU191.1: Able to understand advanced skills of Technical Communication in English through Language Laboratory.

HU191.2: Able to apply listening, speaking, reading and writing skills in societal and professional life.

HU191.3: Able to demonstrate the skills necessary to be a competent Interpersonal communicator.

HU191.4: Able to analyze communication behaviours.

HU191.5: Able to adapt to multifarious socio-economical and professional arenas with the help of effective communication and interpersonal skills.

### **Course Contents:**

#### Module 1: Introduction to the Language Lab

- a. The Need for a Language Laboratory
- b. Tasks in the Lab
- c. Writing a Laboratory Note Book

#### Module 2: Active Listening

- a. What is Active Listening?
- b. Listening Sub-Skills-Predicting, Clarifying, Inferencing, Evaluating, Note taking
- c. Contextualized Examples based on Lab Recordings

#### **Module 3: Speaking**

- a. Speaking (Choice of words, Speech Syntax, Pronunciation, Intonation)
- b. Language Functions/Speech Acts
- c. Speaking using Picture Prompts and Audio Visual inputs
- c. Conversational Role Plays (including Telephonic Conversation)
- d. Group Discussion: Principles and Practice

#### Module 4: Lab Project Work

- a. Keeping a Listening Log
- b. Writing a Film Review/Advertisements

#### **References:**

- 1. IT Mumbai, Preparatory Course in English syllabus
- 2. IIT Mumbai, Introduction to Linguistics syllabus
- Sasikumar et al. *A Course in Listening and Speaking*. New Delhi: Foundation Books, 2005.
  Tony Lynch, *Study Listening*. Cambridge: Cambridge UP, 2004.

	PO1	PO 2	P 0 3	PO4	PO 5	PO 6	PO 7	PO 8	PO9	PO1 0	PO1 1	PO1 2	PSO 1	PSO2	PSO 3
HU191.1	-	-	2	-	-	1	1	-	2	3	-	2	1	-	3
HU191.2	-	-	2	2	-	3	3	-	2	3	-	3	-	1	3
HU191.3	-	-	2	2	-	3	3	2	2	3	-	3	-	2	3
HU191.4	-	-	-	-	-	3	3	2	2	3	-	3	-	2	3
HU191.5	-	-	2	2	-	3	3	2	2	3	-	3		2	3
Overall CO mapping	-	-	2	2	-	2.6	2.6	2	2	3	-	2.8	1	1.75	3

### **CO-PO-PSO Mapping:**
# Paper Name: Physics I Lab Paper Code: PH 191 Total Contact Hours: 40 Credit: 4

Pre requisites: Knowledge of Physics upto 12th standard.

# **Course Outcome of Physics-I practical (PH 191)**

### At the end of the course students' should have the

CO1 : Demonstrate experiments allied to their theoretical concepts

CO2: Conduct experiments using LASER, Optical fiber, Torsional pendulum, Spctrometer.

CO3 : Participate as an individual, and as a member or leader in groups in laboratory sessions actively

**CO4 :** Analyze experimental data from graphical representations , and to communicate effectively them in Laboratory reports including innovative experiments

#### General idea about Measurements and Errors (One Mandatory):

i) Error estimation using Slide 29ybridiza/ Screw-gauge/travelling microscope for one experiment.ii) Proportional error calculation using Carrey Foster Bridge.

#### Any 7 to be performed from the following experiments

#### **Experiments on Oscillations & Elasticity:**

1. Study of Torsional oscillation of Torsional pendulum & determination of time period using various load of the oscillator.

- 2. Experiments on Lissajous figure (using CRO).
- 3. Experiments on LCR circuit.
- 4. Determination of elastic modulii of different materials (Young's modulus and Rigidity modulus)

#### **Experiments on Optics:**

- 5. Determination of wavelength of light by Newton's ring method.
- 6. Determination of wavelength of light by Laser diffraction method.
- 7. Determination of numerical aperture and the energy losses related to optical fiber experiment
- 8. Measurement of specific rotation of an optically active solution by polarimeter.

#### **Experiments on Quantum Physics:**

- 11. Determination of Planck's constant using photoelectric cell.
- 12. Verification of Bohr's atomic orbital theory through Frank-Hertz experiment.

\*\*In addition it is **recommended** that each student should carry out at least one experiment beyond the syllabus/one experiment as Innovative experiment.

#### Probable experiments beyond the syllabus:

- 1. Determination of wavelength of light by Fresnel's bi-prism method (beyond the syllabus).
- 2. Study of half-wave, quarter-wave plate (beyond the syllabus)
- 3. Study of dispersive power of material of a prism.
- 4. Study of viscosity using Poyseullie's caplillary flow method/using Stoke's law.
- 5. Measurement of nodal and antinodal points along transmission wire and measurement of wave length.
- 6. Any other experiment related to the theory.

### **CO-PO-PSO Mapping:**

СО	РО	PO	РО	РО	РО	РО	РО	PO	РО	<b>PO1</b>	<b>PO1</b>	<b>PO1</b>	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	0	1	2	1	2	3
РН	2												1	1	2
191.1															
PH				3									1	1	1
191.2															
РН									3				2	1	1
191.3															
РН										1			1	2	3
191.4															
Overal	2			3					3	1			1.25	1.25	1.5
1 CO															
mappi															
ng															

# Paper Name: Basic Electronics Engineering Lab Paper Code: EC191 Total Contact Hours: 36 Credit: 2

# **Prerequisites**

A basic course in electronics and Communication engineering Progresses from the fundamentals of electricity, active and passive components, basic electronics laws like Ohm's law, Ampere's law

# **Course objectives:**

Students will become familiar with the circuit design using semiconductor diodes in Forward and Reverse bias, They will also be able to design rectifiers like half-wave, full-wave rectifiers etc. using diodes. The ability of circuitdesign with Bipolar Junction Transistor in CB, CE & CC configurations will be improved. The students will acquire basic engineering technique and ability to design and analyze the circuits of Op-Amp. Basic concepts and Circuit design with logic gates will be developed in the students. The students will be able design circuit using FET

# **Course Outcomes:**

**CO1**: Knowledge of Electronic components such as Resistors, Capacitors, Diodes, Transistors measuring equipment like DC power supply, Multimeter, CRO, Signal generator, DC power supply.

**CO2**: Analyse the characteristics of Junction Diode, Zener Diode, BJT & FET and different types of Rectifier Circuits.

**CO3**: Determination of input-offset voltage, input bias current and Slew rate, Common- mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.

**CO4**: Able to know the application of Diode, BJT & OPAMP.

# **Course contents:**

# **List of Experiments:**

1. Familiarization with passive and active electronic components such as Resistors, Inductors, Capacitors, Diodes, Transistors (BJT) and electronic equipment like DC power supplies, millimeters etc.

2. Familiarization with measuring and testing equipment like CRO, Signal generators etc.

3. Study of I-V characteristics of Junction diodes.

- 4. Study of I-V characteristics of Zener diodes.
- 5. Study of Half and Full wave rectifiers with Regulation and Ripple factors.
- 6. Study of I-V characteristics of BJTs.
- 7. Study of I-V characteristics of Field Effect Transistors.
- 8. Determination of input-offset voltage, input bias current and Slew rate of OPAMPs.
- 9. Determination of Common-mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.

10. Study of OPAMP circuits: Inverting and Non-inverting amplifiers, Adders, Integrators and Differentiators.

11. Study of Logic Gates and realization of Boolean functions using Logic Gates.

- 12. Study of Characteristic curves for CB, CE and CC mode transistors.
- 13. Innovative Experiment

# **CO-PO-PSO Mapping:-**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO 1	PSO2	PSO3
CO1	3	3	2	1	-	2	2	1	1	2	2	1	1	1	2
CO2	3	2	2	2	1	-	-	1	1	2	1	1	2	1	1
CO3	3	3	3	1	1	1	1	-	-	1	2	1	2	1	1
CO4	3	3	2	1	1	2	2	1	2	2	1	1	1	-	2
Ove rall CO map ping	3	2.75	2.25	1.25	1	1.66	1.66	1	1.33	1.75	1.5	1	1.5	1	1.5

Paper Name: Workshop Practice Paper Code: ME192 Total Contact Hours: 36 Credit: 2

Pre requisites: Higher Secondary with Physics, Chemistry & Mathematics

# **Course Objective:**

- 1. To understand the basic knowledge of Workshop Practice and Safety.
- 2. To identify and use of different hand tools and other instruments like Hand Saw, Jack Plane, Chisels etc and operations like such as Marking, Cutting etc used in manufacturing processes.
- 3. To get hands on practice in various machining metal joining processes such as Welding, Brazing, Soldering, etc.

# **Course Outcome:**

Upon successful completion of this course, the student will be able to:

- **CO1:** Gain basic knowledge of Workshop Practice and Safety useful for our daily living.
- **CO2:** Identify Instruments of a pattern shop like Hand Saw, Jack Plain, Chisels etc and performing operations like such as Marking, Cutting etc used in manufacturing processes.
- **CO 3:** Gain knowledge of the various operations in the Fitting Shop using Hack Saw, various files, Scriber, etc to understand the concept of tolerances applicable in all kind of manufacturing.
- **CO4:** Get hands on practice of in Welding and various machining processes which give a lot of confidence to manufacture physical prototypes in project works.

# **Course contents**

### List of Activities:

Sl. No.	Syllabus	Contact Hrs
Module 1	Pattern Making	6
Module 2	Sheet Metal Work	6
Module 3	Fitting	9
Module 4	Machining in Lathe	9
Module 5	Welding	6



MODULE 1 – PATTERN MAKING.

MODULE 3- FITTING SHOP.



OR



### MODULE 4 – MACHINING IN LATHE & SHAPING M/C

#### R16 B.TECH FT/CSE/IT



### MODULE 5 – WELDING



# **CO-PO-PSO Mapping:**

СО							PO							PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
ME192.1	3	-	-	-	-	2	-	1	-	-	1	-	2	1	1
ME192.2	3	-	-	-	-	1	-	2	-	-	-	-	3	2	2
ME192.3	2	-	-	-	-	1	-	1	-	-	-	-	3	2	2
ME192.4	3	-	-	-	1	3	-	3	-	-	-	1	3	2	2
Overall CO mapping	2.8				1	1.8		1.8			1	1	2.8	1.8	1.8

### Sessional

# Paper Name: Extra Curricular Activity (NSS/ NCC) Paper Code: XC 181 Total Contact hours: 20 Credit: 1

**Course Objectives**: The objectives of the course are as follows:

- To increase student awareness about the weaker and unprivileged sections of society
- To expose students to environmental issues and ecological concerns
- To make students self aware about their participatory role in sustaining society and the environment

# **Course contents**

### List of Activities:

- a) Creating awareness in social issues
- b) Participating in mass education programmes
- c) Proposal for local slum area development
- d) Waste disposal
- e) Environmental awareness ``
- f) Production Oriented Programmes
- g) Relief & Rehabilitation work during Natural calamities
- Creating awareness in social issues:
- 1. Women's development includes health, income-generation, rights awareness.
- 2. Hospital activities Eg. Writing letters for patients, guiding visitors
- 3. Old age home visiting the aging in-mates, arranging for their entertainment.
- 4. Children's Homes visiting the young in-mates, arranging for their entertainment
- 5. Linking with NGOs to work on other social issues. (Eg. Children of sex-workers)
- 6. Gender issues- Developing an awareness, to link it with Women's Cell of college
- Participating in mass education programmes
- 1. Adult education
- 2. Children's education
- Proposal for local slum area development

One or two slums to be identified and according to the needs, activities to be developed and proposals and reports are to be submitted.

Environmental awareness

- Resource conservation Awareness to be developed on water, energy, soil.
- Preservation of heritage monuments- Marches, poster campaigns
- Alternative energy consciousness amongst younger school-children.
- Plantation and beautification- Plantation of trees, their preservation and upkeep, developing NSS parks.
- Waste disposal- Proper methods of domestic waste disposal.

### Production Oriented Programmes

- 5. Working with people and explaining and teaching improved agricultural practices
- 6. Rodent control land pest control practices;
- 7. Soil-testing, soil health care and soil conservation;
- 8. Assistance in repair of agriculture machinery;
- 9. Work for the promotion and strengthening of cooperative societies in villages;
- 10. Assistance and guidance in poultry farming, animal husbandry, care of animal health etc.;
- 11. Popularization of small savings and
- 12. Assistance in procuring bank loans

Relief & Rehabilitation work during Natural calamities

- g) Assisting the authorities in distribution of rations, medicine, clothes etc.;
- h) Assisting the health authorities in inoculation and immunization, supply of medicine etc.;
- i) Working with the local people in reconstruction of their huts, cleaning of wells, building roads etc.;
- j) Assisting and working with local authorities in relief and rescue operation; Collection of clothes and other materials, and sending the same to the affected areas;

THEO	RY						
Sl No	Paper Code	Theory	Co /W	ntact eek	Hou	°S	Credit Points
			L	Т	Р	Total	
1	M 201	Mathematics –II	3	1	0	4	4
2	CH 201	Chemistry	3	1	0	4	4
3	EE 201	Basic Electrical Engineering	3	1	0	4	4
4	CS 201	Computer Fundamentals & Principle of Computer Programming	3	1	0	4	4
5	ME 201	Engineering Thermodynamics & Fluid Mechanics	3	1	0	4	4
Total o	f Theory					20	20
PRAC	ΓICAL						
6	CS291	Computer Fundamentals & Principle of Computer Programming Lab	0	0	3	3	2
7	CH 291	Chemistry Lab	0	0	3	3	2
8	EE 291	Basic Electrical Engineering Lab	0	0	3	3	2
9	ME 291	Engg Drawing & Graphics	0	0	3	3	2
Total o	f Practical					12	08
C.SES	SIONAL						
10	MC 281	Soft Skill Development	0	0	2	2	0

# First Year Second Semester

**Syllabus** 

# Theory

# Paper Name: Mathematics-II Paper Code: M 201 Total Contact Hours: 40 Credit: 4

**Prerequisite:** Any introductory course on calculus.

**Course Objective:** The purpose of this course is to provide fundamental concepts Ordinary Differential Equations, Graph Theory and Laplace Transform.

### **Course outcome:**

On successful completion of the learning sessions of the course, the learner will be able to:

# **Course contents:**

M 201.1:	Recall the distinctive characteristics of improper integral, Laplace Transform, ordinary differential equation, graph theory.
M 201.2:	Understand the theoretical working of improper integral, Laplace Transform, ordinary differential equation, graph theory.
M 201.3:	Apply the principles of improper integral, Laplace Transform, ordinary differential equation, graph theory.
M 201.4:	Analyze the application of improper integral, Laplace Transform, ordinary differential equation, graph theory.
M 201.5:	Evaluate the result for application to the problems on improper integral, Laplace Transform, ordinary differential equation, graph theory.
M 201.6:	Design graph to solve different real life problems

### Module I

#### [10L]

**Ordinary differential equations (First order**): First order and first degree Exact equations, Necessary and sufficient condition of exactness of a first order and first degree ODE (statement only), Rules for finding Integrating factors, Linear equation, Bernoulli's equation, General solution of ODE of first order and higher degree (different forms with special reference to Clairaut's equation), Applications related to Engineering problems.

### Module II [10L]

**Ordinary differential equations (Higher order):** General linear ODE of order two with constant coefficients, C.F. & P.I., D-operator methods for finding P.I., Method of variation of parameters, Cauchy-Eulerequations, Solution of simultaneous linear differential equations, Applications related to Engineering problems.

### Module III [10L]

**Basic Graph Theory**: Graphs, Digraphs, Weighted graph, Connected and disconnected graphs, Complement of a graph, Regular graph, Complete graph, Subgraph, Walks, Paths, Circuits, Euler Graph, Cut-sets and cut-vertices, Matrix representation of a graph, Adjacency and incidence matrices of a graph, Graph isomorphism, Bipartite graph. Tree, Binary tree, Spanning tree of a graph, Minimal spanning tree, properties of trees, Algorithms: Dijkstra's Algorithm for shortest path problem, Determination of minimal spanning tree using Kruskal's and Prim's algorithm.

\*\* Extra lecture hours may be taken for this module

### MODULE IV: [10L]

**Laplace Transform (LT):** Definition and existence of LT, LT of elementary functions, First and second shifting properties, Change of scale property; LT of t f (t), LT of f (t)/t, LT of derivatives of f (t), L.T. of f(u) du. Evaluation of improper integrals using LT, LT of periodic and step functions, Inverse LT: Definition and its properties; Convolution Theorem (statement only) and its application to the evaluation of inverse LT, Solution of linear ODE with constant coefficients (initial value problem) using LT. Applications related to Engineering problems.

#### **Beyond Syllabus:**

Combinatorics: Fundamental Principles, Permutations, Combinations, Binomial Coefficients.

#### **Text Books**:

- 1. E. Kreyszig, Advanced engineering mathematics (8<sup>th</sup> Edition), John Wiley, 1999.
- 2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publications, 2009.
- 3. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, Narosa Pub. House, 2008.

#### **ReferenceText Books:**

- 4. W. E. Boyce and R. DiPrima, Elementary Differential Equations (8<sup>th</sup> Edition), John Wiley, 2005.
- 5. R.K. Ghosh and K.C.Maity, An Introduction to Differential Equations, New Central Book Agency.
- 6. V. K. Balakrishnan, Graph Theory, Schaum's Outline, TMH.

- 7. J. Clark and D. A. Holton, A first course at Graph Theory, Allied Publishers LTD.
- 8. D. B. West, Introduction to Graph Theory, Prentice-Hall of India.
- 9. N. Deo, Graph Theory, Prentice-Hall of India.
- 10. J. Bird, Higher Engineering Mathematics (4<sup>th</sup> Edition, 1<sup>st</sup> India Reprint), Elsevier, 2006.
- L. Rade and B. Westergen, Mathematics Handbook: for Science and Engineering (5<sup>th</sup> edition, 1<sup>st</sup> Indian Edition), Springer, 2009.
- 12. Murray R.Spiegel, Laplace Transform, Schaum's Outline Series, McGRAW-HILL.

#### COURSE OUTCOMES VS POs/PSOs MAPPING: (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

СО							РО							PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
M 201.1	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
M201.2	3	3	2	1	-	-	-	-	-	-	-	2	-	-	-
M 201.3	3	2	3	2	-	-	-	-	-	-	-	2	3	-	-
M 201.4	2	3	2	2	-	-	-	-	-	-	-	1	1	-	2
M 201.5	3	2	2	1	-	-	-	-	-	-	-	1	1	-	-
M 201.6	3	2	3	2	-	-	-	-	-	-	-	2	-	-	-
Overall CO mapping	2.8	2.4	2.2	1.6								1.6	1.6		2

Paper Name: Chemistry Paper Code: CH 201 Total Contact Hours: 40 Credit: 4

### Pre requisites: 10+2 science with chemistry

# **Course Objective**

Understanding of the fundamental theories and applications of thermodynamics, electrochemical principles in modern electrochemical cells and to get an insight into electronic structure of crystals and nanomaterials. Learning about the Synthesis, properties and applications of polymers, fuels and alternative energy sources & their significance in petrochemical industries. Analyzing water quality for its various parameters & its significance in industries

# **Course Outcome**

CO1: Able to remember fundamental concepts of Engineering Chemistry and define relevant terminologies.

CO2: Able to understand the principles of thermodynamics, kinetics and physical properties of molecules.

**CO3:** Able to apply the basic concept of Organic Chemistry and knowledge of chemical reactions to industries and technical fields.

**CO4:** Able to analyze and explain the defects in crystalline solids and protective measures of corrosion of metals in the industries.

**CO5:** Able to assess qualitative and quantitative parameters of applied and industrial chemistry.

# **Course contents**

Module 1 [8L]

#### **Chemical Thermodynamics –I**

**1.1 Concept of Thermodynamic system**: Definition with example of diathermal wall, adiabatic wall, isolated system, closed system, open system, extensive property, intensive property.

Introduction to first law of thermodynamics: Different statements, mathematical form.

**Internal energy**: Definition, Example, Characteristics, Physical significance, Mathematical expression for change in internal Energy, Expression for change in internal energy for ideal gas.

#### 2L

**Enthalpy**: Definition, Characteristics, Physical significance, Mathematical expression for change in Enthalpy, Expression for change in enthalpy for ideal gas.

**Heat Capacity**: Definition, Classification of Heat Capacity (Cp and CV): Definition and General expression of Cp - CV. Expression of Cp - CV for ideal gas.

**Reversible and Irreversible processes:** Definition, Work done in Isothermal Reversible and Isothermal Irreversible process for Ideal gas, Adiabatic changes: Work done in adiabatic process, Interrelation between thermodynamic parameters (P, V and T), slope of P-V curve in adiabatic and isothermal process.

Application of first law of thermodynamics to chemical processes: exothermic, endothermic processes, law of Lavoisier and Laplace, Hess's law of constant heat summation. 3L

2<sup>nd</sup> law of thermodynamics: Statement, Mathematical form of 2<sup>nd</sup> law of thermodynamics (Carnot cycle). Joule Thomson and throttling processes; Joule Thomson coefficient for Ideal gas, Concept of inversion temperature (brief).

Evaluation of entropy: characteristics and expression, physical significance. Work function and free energy: Definition, characteristics, physical significance, mathematical expression of  $\Delta A$  and  $\Delta G$  for ideal gas, standard free energy and chemical potential, Condition of spontaneity and equilibrium reaction.

**3**L

### Module 2 [7L]

#### **Reaction Dynamics**

Reaction laws: rate and order; molecularity; zero and first order kinetics, second order kinetics (same reactant concentration), Pseudounimolecular reaction, Arrhenius equation. **3**L

Mechanism and theories of reaction rates (Content beyond the syllabus)

### Solid state Chemistry

Introduction to stoichiometric defects (Schottky & Frenkel) and non - stoichiometric defects (Metal excess and metal deficiency).

Role of silicon and germanium in the field of semiconductor, n-type, p-type semiconductor, photo voltaic cell, fabrication of integrated circuits. **4**L

#### Module 3 [8L]

#### **Electrochemistry**

#### Conductance

Conductance of electrolytic solutions, specific conductance, equivalent conductance, molar conductance and ion conductance, effect of temperature and concentration (Strong and Weak electrolyte).

#### 1L

#### **Electrochemical cell**

Cell EMF and its Thermodynamic derivation of the EMF of a Galvanic cell (Nernst equation), single electrode potentials, hydrogen half cell, calomel half cell (representation, cell reaction, expression of potential, Discussion, Application). 3L

### **Concept** of battery

Battery and Commercial electrochemical cell: Dry cell, acid storage cell, alkaline storage cell, fuel cell (construction, representation, cell reaction, expression of potential, discussion, application).

#### **Corrosion and its control**

Introduction, cause and effect of corrosion, types of corrosion: dry, wet and other: Electrochemical corrosion, galvanic corrosion, passivation and protective measure. 2L

### Module 4 [12L]

### Structure and reactivity of Organic molecule

Electronegativity, electron affinity, 43ybridization, Inductive effect, resonance, hyperconjugation, electromeric effect, carbocation, carbanion and free radicals. Brief study of some addition, eliminations 3L and substitution reactions.

#### **Polymers**

# 2L

Concepts, classifications and industrial applications. Polymer molecular weight (number avg. weight avg.: Theory and mathematical expression only), Poly dispersity index (PDI).

Polymerization processes: addition and condensation polymerization (mechanism not required), degree of polymerization, Copolymerization, stereo-regularity of polymer, crystallinity (concept of Tm) and amorphicity (Concept of Tg) of polymer.

Preparation, structure and use of some common polymers: plastic (HDPE, LDPE, PVC, PP, PMMA, Polyester, PTFE, Bakelite), rubber (natural rubber, SBR), fibre (nylon 6, nylon 6,6), Vulcanization of rubber, Conducting polymers and bio-polymers. **7L** 

### Nano material

Basic principles of nano science and technology, classification, preparation, properties and application of nano material. **2L** 

### Module 5 [ 5L]

Industrial Chemistry Fuels

Solid Fuel: Coal, Classification of coal, constituents of coal, carbonization of coal (HTC and LTC), Proximate analysis of coal, Calorific value.

Liquid fuel: Petroleum, classification of petroleum, Refining, Octane number, Cetane number, Aviation Fuel (Aviation Gasoline, Jet Gasoline), Biodiesel.

Gaseous fuels: Natural gas, water gas, Coal gas, bio gas, CNG, LPG **3L** *Water* 

Introduction, source of water, water quality parameter, specification for drinking water (BIS and WHO standards), Chlorination of Water, Types of hardness- Units, Brief Softening methods.

**2**L

### Short overview of water treatment plants (Content beyond the syllabus)

### **Reference Books**

- 1. Engineering Chemistry: Bandyopadhyay and Hazra
- 2. Physical Chemistry: P.C. Rakshit
- 3. Organic Chemistry: Finar, vol-1
- 4. Engineering Chemistry: B.Sivasankar, Tata Mc Graw Hill, 2008
- 5. A Text book of Engineering Chemistry: S.S.Dara, 10<sup>th</sup> Edition, S.Chand & Company Ltd., New Delhi, 2003.
- 6. Engineering Chemistry Simplified: S. Nandi and R. Bhattacharyya, Chayya Prakashani Pvt. Ltd.

	PO1	PO2	PO3	PO4	PO5	PO6	<b>PO7</b>	PO8	PO9	P10	P11	P12	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-	1	1	-
CO3	-	-	2	-	2	-	-	-	-	-	-	1	1	1	-
CO4	2	-	1	-	2	-	-	-	-	-	-	-	-	-	-
CO5	2	-	-	-	-	-	2	-	-	-	-	1	1	-	-
Over all CO map ping	2.5	1.5	1.33	-	2	-	2	-	-	-	-	1	1.25	1	-

### **CO-PO-PSO** matrices of courses CH201

Paper Name: Basic Electrical Engineering Paper Code: EE 201 Total Contact Hours: 41 Credit: 4

### Pre requisite: Basic 12st standard Physics and Mathematics

### **Course Objective:**

Basic electrical engineering is an introductory course in electrical engineering. Students are introduced to simple applied electrical circuits, theories and practice to impart skill set to have visualization of electrical engineering applications. It is a course suitable for students pursuing electrical engineering as well as other related engineering disciplines.

### **Course Outcomes:**

At the end of this course, students will able

CO1. Understand Basic Electrical circuits, Power distribution and Safety measures.

CO2. Analyze an apply DC network theorems.

CO3. Analyze and apply concept of AC circuits of single-phase and three-phase.

CO4. Understand basic principles of Transformers and Rotating Machines.

# **Course Contents:**

#### DC CIRCUITS (7L)

Definition of electric circuit, linear circuit, non-linear circuit, bilateral circuit, unilateral circuit, Dependent source, node, branch, active and passive elements, Kirchhoff's laws, Source equivalence and conversion, Network Theorems-Superposition Theorem, Theorem, Norton Theorem, Maximum Power Transfer Theorem, Star-Delta Conversions.

#### **MAGNETIC CIRCUITS (3L)**

Concept of Magnetic circuit, B-H curve, Analogous quantities in magnetic and electric circuits, Faraday's law, iron losses, self and mutual inductance, Energy stored in magnetic field.

#### AC SINGLE PHASE CIRCUITS (8L)

Sinusoidal quantities, Average and RMS values, peak factor, Form factor, Phase and Phase difference, concept of phasor diagram, V-I Relationship in R,L,C circuit, Combination R,L,C in AC series , parallel and series parallel circuits with phasor diagrams, impedance and admittance, Power factor, Power in AC circuit, Resonance in RLC series and parallel circuit, Q factor, band width of resonant circuit.

### THREE PHASE CIRCUITS (3L)

Voltages of three balanced phase system, delta and star connection, relationship between line and phase quantities, phasor diagrams. Power measurement by two watt meters method.

#### DC MACHINES (6L)

Construction, Basic concepts of winding (Lap and wave). DC generator: Principle of operation, EMF equation, characteristics (open circuit, load) DC motors: Principle of operation, Torque Equation, Speed Torque Characteristics (shunt and series machine), starting (by 3 point starter), speed control (armature voltage and field control).

#### SINGLE PHASE TRANSFORMER (5L)

Constructional parts, Types of transformers, Emf equation, No Load no load and on load operation, phasor diagram and equivalent circuit, losses of a transformer, open and short circuit tests, regulation and efficiency calculation.

#### THREE PHASE INDUCTION MOTOR (6L)

Types, Construction, production of rotating field, principle of operation, Slip and Frequency ,rotor emf and current, Equivalent circuit and phasor diagram, Torque Slip characteristics torque-speed characteristics Starting of induction motor by star delta starter and( DOL starter). Speed Control of Three phase induction motor by variation of supply frequency, supply voltage and number of poles.

#### GENERAL STRUCTURE OF ELECTRICAL POWER SYSTEM (3L)

Power generation to distribution through overhead lines and underground cables with single line diagram, Earthing of Electrical Equipment, Electrical Wiring Practice

### **Text books**

- 1. V. Mittle & Arvind Mittal, Basic Electrical Engineering, TMH.
- 2. Ashfaq Hussain, Basic Electrical Engineering, S. Chand Publication
- 3. Chakrabarti, Nath & Chanda, Basic Electrical Engineering, TMH
- 4. C.L. Wadhwa, Basic Electrical Engineering, Pearson Education

### **Reference books**

- 1. H. Cotton, Willey Press
- 2. J.B. Gupta, Basic Electrical Engineering, Kataria & Sons.
- 3. Kothari & Nagrath, Basic Electrical Engineering, TMH

# **CO-PO-PSO mapping:**

COs	PO1	PO2	PO 2	PO	PO5	PO	<b>PO7</b>	PO	PO9	PO10	PO11	PO	PSO	PSO	PSO
			3	4		0		o				12	1	2	3
CO1	3	3	2	1	-	1	-	1	1	-	-	3	3	3	2
CO2	2	3	3	3	-	-	2	-	3	-	1	2	3	-	1
CO3	2	3	1	3	-	-	1	Ι	1	-	-	2	3	-	2
CO4	3	3	2	2	-	2	2	2	3	2	3	3	3	2	2
Over all CO map ping	2.5	; 3	2	2.25	-	1.5	167	1.5	2	2	2	2.5	3	2.5	1.75

# Computer Fundamentals & Principle of Computer Programming Code: CS 201 Total No. of Lectures: 40 Credits: 4

# **Prerequisites:**

- 1. Number system
- 2. Boolean Algebra

# **Course Objective(s)**

- 1. To develop the programming skills of students
- 2. To know the principles of designing structured programs
- 3. To write basic C programs using
  - i) Selection statements
  - ii) Repetitive statements
  - iii) Functions
  - iv) Pointers
  - v) Arrays
  - vi) Strings

# **Course Outcome:**

**CS201.1:**Understands the concept of anatomy of computer and differentiate among different programming languages for problem solving.

**CS201.2:** Apply the concept of conditional and iterative statements to write C programs.

**CS201.3:** Analyse real life problems and design algorithm.

CS201.4: Execute arrays, functions, pointers, structures and apply these concepts to solve real time problems.

CS201.5: Create a significant project using the concept of C programming.

Use different data structures and create / manipulate basic data files and developing applications for real world problems.

# **Course content**

### Fundamentals of Computer: (10 L)

History of Computer, Generation of Computer, Classification of Computers 1L

Basic structure of Computer System, Primary & Secondary Memory, Processing Unit, Input & Output devices 2L

Binary and Allied number systems representation of signed & unsigned numbers, BCD, ASCII, Binary number Arithmetic – Addition and Subtraction (using 1's complement and 2's complement) 2L

Logic gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR - only truth tables, logic gate symbols and logic equations for gates only

Assembly language, high level language, machine level language, compiler and assembler (basic concepts) 1L

Basic concepts of operating systems like MS DOS, MS WINDOW, UNIX

Problem solving-Algorithm & flow chart

#### C Fundamentals: (30 L)

#### Variable and Data Types:

The C character set identifiers and keywords, data type & sizes, variable names, declaration, statements 3L

#### **C** Operators & Expressions:

Arithmetic operators, relational operators, logical operators, increment and decrement operators, bitwise operators, assignment operators, conditional operators, special operators - type conversion, C expressions, precedence and associativity.

Input and Output: Standard input and output, formatted output - printf, formatted input scanf, bit fields 5L

**Branching and Loop Statements:** Statement and blocks, if - else, switch, goto and labels, Loops - while, for, do while, break and continue 3L

#### **Fundamentals and Program Structures:**

auto, external, static and register variables Functions, function types, function prototypes, functions returning values, functions not returning values,

scope rules, recursion, C preprocessor and macro

6L

#### Arrays, Strings and Pointers:

One dimensional arrays, Two-dimensional arrays, Multidimensional arrays. Passing an array to a function Character array and string, array of strings, Passing a string to a function, String related functions

1L

1L

2L

3L

Pointers, Pointer and Array, Pointer and String, Pointer and functions, Dynamic memory allocation 6L

#### Files handling with C:

formatted and unformatted files, Command line arguments, fopen, fclose, fgetc, fputc, fprintf, fscanf function 4L

#### **Structures and Unions:**

Basic of structures, arrays of structures, structures and pointers, structures and functions

**Text book:** 

Kerninghan B.W. & Ritchie D.M. - The C Programming Language

Gottfried - Programming with C Schaum

Kanetkar Y. - Let us C

Balaguruswamy - Programming in

# **Reference Books:**

Pohl and Kelly - A Book on C

Kerninghan, B.W. - The Elements of Programming Style
Schied F.S. Theory and Problems of Computers and Programming
Rajaraman V. Fundamental of Computers
M.M.Oka Computer Fundamentals, EPH
Leon Introduction to Computers, Vikas
Leon- Fundamental of Information Technology, Vikas
Ram B. Computer Fundamentals, New Age International
Ravichandran D. Programming in C, New Age International
Xavier C. Introduction to Computers, New Age International

# **CO- PO-PSO Mapping:**

СО							PO							PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CS 201.1	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CS 201.2	3	3	2	1	-	-	-	-	-	-	-	2	-	-	-
CS 201.3	3	2	3	2	-	-	-	-	-	-	-	2	3	-	-
CS 201.4	2	3	2	2	-	-	-	-	-	-	-	1	1	-	2
CS 201 .5	2	3	2	1	-	-	-	-	-	-	-	1	1	-	1
Overall CO mapping	2.6	2.6	2	1.5	-	-	-	-	-	-	-	1.5	1.7	-	1.5

# Paper Name: Engineering Thermodynamics & Fluid Mechanics Paper Code: ME 201 Total Contact Hours: 48 Credits: 4

Pre requisites: Higher Secondary with Physics, Chemistry & Mathematics.

# **Course Objective:**

- 1. To understand the basic principles of thermodynamics, heat and work transfer.
- 2. To acquire the knowledge of basic concepts of Heat Engine, Entropy from Second law of thermodynamics.
- 3. To get the knowledge of thermodynamic properties of a pure substance and inter-relationships between key properties of a system or state possessed by the substance.
- 4. To understand the basic principles of fluid mechanics, and ability to analyze fluid flow problems with the application of the momentum and energy equations.

# **Course Outcome:**

Upon successful completion of this course, the student will be able to:

#### COURSE OUTCOMES VS POs/PSOs MAPPING: (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

- **CO1:** Know about thermodynamic equilibrium, heat & work transfer, First law and its application.
- **CO2:** Understand the basic concepts of Heat Engine, Entropy from Second law of thermodynamics.
- **CO 3:** Know the thermodynamic characteristics of a pure substance and its application in power cycles (Simple Rankine cycles, Air Standard cycles)
- **CO4:** Knowledge of basic principles of fluid mechanics, and ability to analyze fluid flow problems with the application of the momentum and energy equations

# **Course content**

### Module 1:

#### **Basic Concepts of Thermodynamics**

Introduction: Microscopic and Macroscopic viewpoints

Definition of Thermodynamic systems: closed, open and isolated systems Concept of Thermodynamics state; state postulate.

Definition of properties: intensive, extensive & specific properties. Thermodynamic equilibrium Thermodynamic processes; quasi-static, reversible & irreversible processes; Thermodynamic cycles. Zeroth law of thermodynamics. Concept of empirical temperature.

#### **Heat and Work**

Definition & units of thermodynamic work. Examples of different forms of thermodynamic works; example of electricity flow as work. Work done during expansion of a compressible simple system Definition of Heat; unit of Heat Similarities & Dissimilarities between Heat & Work

### 8L+3T

### Ideal Equation of State, processes; Real Gas

Definition of Ideal Gas; Ideal Gas Equations of State.

Thermodynamic Processes for Ideal Gas; P-V plots; work done, heat transferred for isothermal, isobaric, isochoric, isentropic & polytropic processes.

Equations of State of Real Gases: Van der Waal's equation; Virial equation of state.

### **Properties of Pure Substances**

p-v, T-s & h-s diagrams of pure substance like H<sub>2</sub>O

Introduction to steam table with respect to steam generation process; definition of saturation, wet & superheated status.

Definition of dryness fraction of steam, degree of superheat of steam.

#### Module 2:

#### **1st Law of Thermodynamics**

Definition of Stored Energy & Internal Energy 1st Law of Thermodynamics for cyclic processes Non Flow Energy Equation. Flow Energy & Definition of Enthalpy.

Conditions for Steady State Steady flow: Steady State Steady Flow Energy Equation.

Module 3: 2nd Law of Thermodynamics

Definition of Sink, Source Reservoir of Heat.

Heat Engine, heat Pump & Refrigerator; Thermal efficiency of Heat Engines & co-efficient of performance of Refrigerators Kelvin – Planck & Clausius statements of 2nd Law of Thermodynamics Absolute or Thermodynamic

scale of temperature, Clausius Integral Entropy

Entropy change calculation for ideal gas processes. Carnot Cycle & Carnot efficiency PMM-2; definition & its impossibility

Module 4: Air standard Cycles for IC engines Otto cycle; plot on P-V, T-S planes; Thermal efficiency Diesel cycle; plot on P-V, T-S planes; Thermal efficiency

#### **Rankine cycle of steam**

Chart of steam (Mollier's Chart) Simple Rankine cycle plot on P-V, T-S, h-s planes Rankine cycle efficiency with & without pump work (Problems are to solved for each module)

#### Module 5:

#### **Properties & Classification of Fluids**

Ideal & Real fluids Newton's law of viscosity; Newtonian and Non-Newtonian fluids Compressible and Incompressible fluids

#### **Fluid Statics**

Pressure at a point Measurement of Fluid Pressure Manometers: simple & differential U-tube Inclined tube

9L+3T

4L+3T

6L+3T

6L+3T

### Fluid Kinematics

Stream line Laminar & turbulent flow external & internal flow Continuity equation

### Dynamics of ideal fluids

Bernoulli's equation Total head; Velocity head; Pressure head Application of Bernoulli's equation

Measurement of Flow rate: Basic principles Venturimeter, Pilot tube, Orificemeter (Problems are to be solved for each module)

### **Engineering Thermodynamics**

Text:

1 Engineering Thermodynamics - P K Nag, 4<sup>th</sup> edn, TMH. <u>References:</u>

- 1 "Fundamentals of Thermodynamics" 6e by Sonntag & Van Wylin published by Wiley India.
- 2 Engineering Thermodynamics Russel & Adeliyi (Indian edition), OUP
- 3 Engineering Thermodynamics Onkar Singhh, New Age International Publishers Ltd.
- 4 Basic Engineering Thermodynamics R Joel, 5<sup>th</sup> Ed., Pearson

### **Fluid Mechanics**

### Text:

1 Fluid Mechanics and Hydraulic Machines - R Bansal

### References:

- 1 Introduction to Fluid Mechanics and Fluid Machines S.K.Som and G.Biswas. 2<sup>nd</sup> edn, TMH
- 2 Fluid Mechanics by A.K.Jain.

# **CO-PO-PSO Mapping:**

СО							PO							PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
ME201.1	3	3	2	2	-	1	1	1	1	-	1	2	3	2	3
ME201.2	3	3	2	2	-	1	2	-	1	-	1	2	3	2	3
ME201.3	2	2	1	1	-	2	1	-	-	-	-	1	3	3	3
ME201.4	3	3	2	2	-	1	1	-	-	-	1	1	3	2	2
Overall CO mapping	2.8	2.8	1.8	1.8		1.3	1.3	1	1		1	1.5	3	2.3	2.8

# **Practical**

# Paper Name: Computer Fundamentals & Principle of Computer Programming Lab Paper Code: CS291 Total Contact Hours: 36 Credit: 2

### **Prerequisites:**

3. Basic Computer Knowledge

### **Course Objective(s):**

- 1. To develop an understanding of the design, implementation, and compilation of a C program
- 2. To gain the knowledge about pointers, a fundamental for understanding data structure issues
- 3. To understand the usage of user defined data type for application development

# **Course Outcome:**

- CS291.1. Understanding the working of different operating systems like DOS, Windows, Linux.
- CS291.2. Write, Compile and Debug programs in C language.
- CS291.3. Design programs connecting decision structures, loops.
- CS291.4. Exercise user defined functions to solve real time problems.
- **CS291.5**. Inscribe C programs using Pointers to access arrays, strings, functions, structures and files.

# **Experiment should include but not limited to the following:**

- Some basic commands of DOS, Windows and Linux Operating System, File handling and Directory structures, file permissions, creating and editing simple C program, compilation and execution of C program.
- Writing C Programs on variable, expression, operator and type-casting.
- Writing C Programs using different structures of if-else statement and switch-case statement.

- Writing C Programs demonstrating use of loop (for loop, while loop and do-while loop) concept and use of break and continue statement.
- Writing C Programs demonstrating concept of Single & Multidimensional arrays.
- Writing C Programs demonstrating concept of Function and Recursion.
- Writing C Programs demonstrating concept of Pointers, address of operator, declaring pointers and operations on pointers.
- Writing C Programs demonstrating concept of structures, union and pointer to structure.
- Writing C Programs demonstrating concept of String and command line arguments.
- Writing C Programs demonstrating concept of dynamic memory allocation.
- Writing C Programs demonstrating concept of File Programming.

# **CO-PO-PSO Mapping:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3O3
CS291.1	3	3											1	2	3
CS291.2		2											-	-	-
CS291.3	3	3											-	-	-
CS291.4													3	-	-
CS291.5	3		3	3	3								1	-	2
Overall	3	2.6	3	3	3	-	-	-	-	-	-	-	1.7	2	2.5
CO															

Paper Name: Chemistry Lab Paper Code: CH 291 Total Contact Hours: 36 Credit: 2

### Pre requisites: 10+2 science with chemistry

# **Course Objective**

Acquiring knowledge on Standard solutions and the various reactions in homogeneous and heterogenous medium. Understanding the basic principles of pH meter and conductivity meter for different applications and analyzing water for its various parameters. Synthesis of Polymeric materials and Nanomaterials.

# **Course Outcome**

CO1: Able to operate different types of instruments for estimation of small quantities chemicals used in industries and scientific and technical fields.

CO2: Able to work as an individual also as an team member

CO3: Able to analyse different parameters of water considering environmental issues

CO4: Able to synthesize nano and polymer materials.

CO5: Capable to design innovative experiments applying the fundamentals of chemistry

# **Course contents**

#### List of Experiments:

1. To Determine the alkalinity in given water sample.

- 2. Redox titration (estimation of iron using permanganometry)
- 3. To determine calcium and magnesium hardness of a given water sample separately.
- 4. Preparation of phenol-formaldehyde resin (Bakelite).

5. Heterogeneous equilibrium (determination of partition coefficient of acetic acid between n-butanol and water).

7. Conductometric titration for determination of the strength of a given HCl solution by titration against a standard NaOH solution.

8. pH- metric titration for determination of strength of a given HCl solution against a standard NaOH solution.

9. Determination of dissolved oxygen present in a given water sample.

10. To determine chloride ion in a given water sample by Argentometric method (using chromate indicator solution).

#### Innovative experiment:

Preparation of silver nano-particles.

**Note:** From the list of 10 (Ten) experiments a minimum of 7 (seven) experiments shall have to be performed by one student of which Sl. No. 4 (Preparation of Bakelite) has to be mandatory.

	PO 1	PO 2	PO 2	PO 4	PO 5	PO 6	PO 7	PO e	PO o	P1	P1	P1	PSO 1	PSO	PSO 3
	1	2	3	4	5	U	/	0	9	U		2	1	4	3
CO1	3	2	1	1	1	1	-	-	2	-	-	-	2	1	-
CO2	-	-	-	-	-	-	-	-	3	-	-	-	1	-	-
CO3	-	-	-	-	-	2	3	-	-	-	-	1	-	1	-
CO4	-	-	-	-	2	1	-	-	-	-	-	-	1	-	-
CO5	2	-	2	-	1	-	-	-	-	-	-	1	2	1	-
Overall CO mappin g	2.5	2	1.5	1	1.33	1.33	3	-	2.5	-	-	1	1.5	1	-

# **CO-PO-PSO matrices of courses CH291**

Paper Name: Basic Electrical Engineering LAB Paper Code: EE 291 Total Contact Hours: 36 Credit: 2

# **Pre requisites:**

- 1. Basic Physics and applied physics.
- 2. Basic Mathematics.
- 3. Basic concept of Electric Circuit

# **Course Objective:**

- 1. Provide knowledge for the analysis of basic electrical circuit.
- 2. To introduce electrical appliances, machines with their respective characteristics.

# **Course Outcome:**

- **CO1.** Identify and use common electrical components.
- **CO2.** Develop electrical networks by physical connection of various components and analyze the circuit behaviour.
- CO3. Apply and analyze the operational characteristics of electrical machines.
- CO4. Apply and analyze the equivalent parameters, Losses, efficiency of transformers

# **Course contents**

#### LIST OF EXPERIMENTS

- 1. Characteristics of Fluorescent ,Tungsten and Carbon filament lamps
- 2. Verification of Thevenin's and Norton's Theorem
- 3. Verification of Superposition Theorem
- 4. Calibration of Ammeter and Wattmeter
- 5. Study of R-L-C series circuit
- 6. Open circuit and short circuit test of a single phase Transformer
- 7. Starting, Reversing of a and speed control of D.C shunt motor
- 8. Test on single phase Energy Meter
- 9. Familiarization of PMMC and MI type Meter

10. Familiarization with house wiring practice

# **CO-PO-PSO mapping:**

COs	<b>PO1</b>	PO2	PO3	PO4	PO5	<b>PO6</b>	<b>PO7</b>	PO8	PO9	PO10	PO	PO	PO	PSO	PSO	PSO
											11	12	12	1	2	3
CO1	3	-	-	-	-	2	-	1	1	1	-	1	1	3	3	1
CO2	2	2	1	-	-	-	1	-	2	3	2	3	2	3	2	-
CO3	3	3	-	1	-	-	1	1	2	2	2	2	2	1	2	3
CO4	3	3	1	1	1	-	1	1	2	2	2	2	2	1	2	3
Overall CO mapping	2.75	2.67	1	1	1	2	1	1	1.75	2	2	2	1.75	2	2.25	2.75

# Paper Name: Engineering Drawing & Graphics Paper Code: ME 291 Total Contact Hours: 36 Credit: 2

Pre requisites: Higher Secondary with Physics, Chemistry & Mathematics

# **Course Objective:**

To learn basics of drafting and use of drafting tools.

To know about engineering scales, dimensioning and various geometric curves.

To Understand projection of line, surface and solids to create the knowledge base of orthographic and isometric view of structures and machine parts.

To acquire the knowledge of Computer Aided drafting using design software.

# **Course Outcomes:**

Upon successful completion of this course, the student will be able to:

- **CO1:** Learn basics of drafting and use of drafting tools which develops the fundamental skills of industrial drawings.
- **CO2:** Know about engineering scales, dimensioning and various geometric curves necessary to understand design of machine elements.
- **CO3:** Understand projection of line, surface and solids to create the knowledge base of orthographic and isometric view of structures and machine parts.
- **CO4**: Become familiar with computer aided drafting useful to share the design model to different section of industries as well as for research & development.

# **Course contents:**

### List of Experiments:

1. Lines, Lettering, Dimensioning, Scales (Plain scale & diagonal Scale).

2. Geometrical Construction and Curves - Construction of Polygons, Parabola, Hyperbola & ellipse

3. Projection of Points, Lines and Surfaces – orthographic projection- first angle and third angle projection, projection of lines and surfaces- Hexagon

4. Projection of Solids - (Cube, Pyramid, Prism, cylinder and Cone

5. Sectional Views - for simple sold objects

6. Introduction to Computer Aided Drafting – using auto cad & / or similar software- Introduction to Cartesian and polar coordinate systems, absolute and relative coordinates; Basic editing commands: line, point, trace, rectangle, polygon, circle, arc, ellipse, polyline; editing methods; basic object selection methods – window and crossing window, erase, move, copy, offset, fillet, chamfer, trim, extend, mirror; display command; zoom, pan, redraw, regenerate; simple dimensioning and text, simple exercises.

СО	РО													PSO				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3			
ME291.1	2	-	1	2	-	1	-	-	1	-	-	1	2	1	1			
ME291.2	3	-	2	2	-	1	-	-	1	1	-	1	3	2	2			
ME291.3	2	2	2	1	-	1	-	-	1	-	-	1	3	3	3			
ME291.4	1	-	2	2	2	1	-	-	1	1	-	1	3	3	3			
Overall CO mapping	2	2	1.8	1.8	2	1			1	1		1	2.8	2.3	2.3			

# COURSE OUTCOMES VS POs/PSOs MAPPING: (DETAILED; HIGH:3; MEDIUM:2; LOW:1):
# **SESSIONAL**

# Paper Name: Soft Skills Development Paper Code: MC-281 Total Contact hours: 26

## **Course Objectives:**

The objectives of this course are as follows:

- To expose the students to different aspects of corporate life and workplace behavior
- To introduce workplace behavioral norms, etiquettes and standards
- To equip students to face interviews, presentations and other professional interactions

MODULE	CONTENT
One	Communication Training
Two	Communication Training (Accent Neutralization)
Three	Business Etiquette
Four	CV / Resume Writing
Five	Corporate Life and Protocols
Six	Group Discussion
Seven	Leadership Skill
Eight	Team Work
Nine	Public Speaking and Interview Basics
Ten	Business Telephone Etiquette
Eleven	Reading skill

## MODULE ONE - COMMUNICATION TRAINING (2L)

- 1. Organisational Communication and Structure.
- 2. Vocabulary related to Corporate Operation.
- 3. Modes of Communication (Telephone, Conference Call, Team Huddle, Public Relation etc.
- 4. Communication with Clients, Customers, Suppliers etc.
- 5. Verbal and Non-Verbal Communication, Proxemics and Para Language.
- 6. Vocabulary Building (Synonym / Antonym / One word Substitution etc.)

## MODULE TWO- COMMUNICATION TRAINING (ACCENT NEUTRALISATION) (2L)

- 7. Mother Tongue Influence
- 8. Vowel Sounds and Consonantal Sounds
- 9. Pronunciation and Neutral Accent.
- 10. Intonation.
- 11. Rate of Speech, Pausing, Pitch Variation and Tone.

## **MODULE THREE – BUSINESS ETIQUETTE (2L)**

- 12. Presenting oneself in the Business Environment.
- 13. Corporate Dressing and Mannerism.
- 14. Table Etiquette (Corporate Acculturation, Office parties, Client/Customer invitations etc.)
- 15. Multi Cultural Etiquette.
- 16. Cultural Difference.
- 17. E-mail Etiquette.

## MODULE FOUR – JOB APPLICATION AND CV / VIDEO RESUME (2L)

- 18. Format (Chronological, Skill Oriented, Functional etc.)
- 19. Style and Appearance.
- 20. Writing Tips and Video Content Presentation tips.
- 21. Types of Cover Letter or Job Application Letter.

## MODULE FIVE - INTRODUCTION TO CORPORATE LIFE AND PROTOCOLS (2L)

- 22. Introduction of Companies (Domain Specific)
- 23. Opportunities and Growth Plan.
- 24. Performance and Corporate Behaviour.
- 25. Service Level Agreement and Corporate Jargon.
- 26. Networking and Adapting to Culture, Technology and Environment.

## MODULE SIX - GROUP DISCUSSION (2L)

27. Introduction, Definition and Purpose.

- 28. Types of Group Discussion.
- 29. Strategies and Protocols of Group Discussion.
- 30. Skills and Parameters of Evaluation.
- 31. Practice Session and Video Viewing Task.

#### MODULE SEVEN – LEADERSHIP SKILL (2L)

- 32. Leadership Theories.
- 33. Traits and Skills of the Leader.
- 34. Roles, Duties and Responsibilities.
- 35. Case Study of Leaders.
- 36. Interpersonal relationship with Team.

#### MODULE EIGHT – TEAM WORK (2L)

- 37. Concept of Team Culture.
- 38. Stages of Team Development (Forming, Storming, Norming, Performing, Adjourning)
- 39. Team Working Agreement (Participation, Decision Making, Problem Solving.
- 40. Conflict Management, Flexibility, Negotiation Skill.
- 41. Team Building (Assess, Plan, Execute and Evaluate)

#### MODULE NINE – PUBLIC SPEAKING AND INTERVIEW BASICS (2L)

- 42. Extempore.
- 43. JAM.
- 44. Interview Skill
- 45. Interview over Telephone, Video Conference Interview etc.

#### **MODULE TEN – BUSINESS TELEPHONE ETIQUETTE (2L)**

- 46. Five Phases of a Business Call.
- 47. Pitch, inflection, Courtesy and Tone.
- 48. Understanding, Rate of Speech, Enunciation.
- 49. Hold Procedure.
- 50. Cold and Hot Transfer protocols.
- 51. Dealing with Different Types of Customers (Irate, Talkative, Turnaround etc.)

#### MODULE ELEVEN- READING SKILL

52. Vocabulary from context, speed reading, skimming, inferring, comprehension test etc.

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