Structure of Curriculum for B.E. Degree Courses

Semester- I (Common for all)

Sl. No	Paper Code	Name of the Paper	Periods/ Week			Credits	Full Marks	Comments
			L	T	P			
Theoretical Papers:								
1	HS 101	Technical English (Non-credit paper)*	3	0	0	0	100	For all Branches
2	M 101	Engineering Mathematics-1	3	1	0	3	100	
3	CSE 101	Concept of Programming	3	1	0	3	100	
4a	ECE 101	Basic Electronics	3	1	0	3	100	For CSE, IT ,CE
5a	CH 101	Engineering Chemistry	3	0	0	3	100	
6a	PH 101	Engineering Physics	3	1	0	3	100	
4b	ME 101	Basic Mechanical Engineering	3	1	0	3	100	For ECE, AEIE, EE
5b	HS 102	Environmental Science	3	0	0	3	100	
6b	EE 101	Basic Electrical Engineering	3	1	0	3	100	
Practical/Sessional papers:								
7	CSE 151	Concepts of Programming Laboratory	0	0	3	2	100	For all Branches
8	ME 181	Engineering Drawing	0	0	3	2	100	
9a	ECE 151	Basic Electronics Laboratory	0	0	3	2	100	For CSE, IT ,CE
10a	PH 151	Engineering Physics Laboratory	0	0	3	2	100	
11a	ME 182	Workshop Practice	0	0	3	2	100	
9b	ME 151	Basic Mechanical Engineering Laboratory	0	0	3	2	100	For ECE, AEIE, EE
10b	EE 151	Basic Electrical Engineering Laboratory	0	0	3	2	100	
11b	HS 181	Professional Communication	0	0	3	2	100	
		Sub Total	**18**	**04**	**15**	**25**	**1000**	(Consider 1,2,3, 7, 8, and either 4a,5a,6a,9a,10a 11a **OR** 4b,5b,6b,9b,10b,11b)
		Total:	**37**			**25**	**1000**	

*** Marks for this paper will not be reflected in total marks for the semester**

Semester- II (Common for all)

Sl. No	Paper Code	Name of the Paper	Periods/ Week			Credits	Full Marks	Comments
			L	T	P			
Theoretical Papers:								
1	M 201	Engineering Mathematics- II	3	1	0	3	100	For all Branches
2	HS 201	Economics and Accountancy	2	1	0	2	100	
3	CSE 201	Programming and Data Structure	3	1	0	3	100	
4a	ME 201	Basic Mechanical Engineering	3	1	0	3	100	For CSE, IT ,CE
5a	HS 202	Environmental Science	3	0	0	3	100	
6a	EE 201	Basic Electrical Engineering	3	1	0	3	100	
4b	ECE 201	Basic Electronics	3	1	0	3	100	For ECE, AEIE, EE
5b	CH 201	Engineering Chemistry	3	0	0	3	100	
6b	PH 201	Engineering Physics	3	1	0	3	100	
Practical/Sessional papers:								
7	CSE 251	Programming and Data Structure Laboratory	0	0	3	2	100	For all Branches
8a	ME 251	Basic Mechanical Engineering Laboratory	0	0	3	2	100	For CSE, IT ,CE
9a	EE 251	Basic Electrical Engineering Laboratory	0	0	3	2	100	
10a	HS 281	Professional Communication	0	0	3	2	100	
8b	ECE 251	Basic Electronics Laboratory	0	0	3	2	100	For ECE, AEIE, EE
9b	PH 251	Engineering Physics Laboratory	0	0	3	2	100	
10b	ME 282	Workshop Practice	0	0	3	2	100	
		Sub Total	**17**	**05**	**12**	**25**	**1000**	(Consider 1,2,3,7 and either 4a,5a,6a, 8a, 9a,10a **OR** 4b**,** 5b,6b,8b, 9b, 10b)
		Total:	**34**			**25**	**1000**	

DETAILED SYLLABUS
Semester-I & II

Paper Name: **Engineering Physics**
Paper Code: **PH-101/PH-201**
Weekly Load: **L: 3 T: 1 P: 0**
Credit Unit: **3**
Total Marks: **100**

Module	Detailed Description	Lecture / Tutorial Period
1	**Introduction to vector calculus:** Gradient, Divergence and Curl; Line Integral, surface integral and volume integral; Divergence theorem and Stokes theorem. **Electromagnetics:** Gauss's Law of electrostatics and its differential form; continuity equation. Ampere's circuital law and its differential form. Faraday's law of electro-magnetic induction and its differential form. Displacement current density Maxwell's field equations. E-M wave equation and its solution. Transverse nature of E-M wave. Boundary conditions of Electric and magnetic fields across an interface. Reflection & Refraction of EM waves.	10L+3T
2	**Forced Vibration and Resonance** (Amplitude, Velocity and Power resonance), Sharpness of Resonance and Quality factor. Superposition of Harmonic Oscillations: Linear superposition principle, Lissajous figures (Graphical method). Standing waves; Group Velocity and Phase velocity. **Lasers** Spontaneous and Stimulated emission of radiation; Principles, Einstein A, B coefficients. The basic requirement of a laser; Gas, Lasers and Solid state lasers, Semiconductor lasers, Applications.	8L+3T
3	**Quantum Theory** De Broglie waves, Wave particle Duality and Uncertainty Principle; Double slit experiment; concept of wave function and probability density; Time Dependent/Independent Schrödinger equation for free particle and for a particle in a potential well. Stationary states; Postulates of quantum mechanics, Energy Eigen values of a particle in box. Potential well and steps Degenerate states, Introduction to nano-physics. **Interference of light waves**: Overview of classical experiments of interference (Young's Double slit, Fresnel's Biprism & Lloyd's mirror). Stokes law, thin film interference: wedge-shaped film interference, fringes of equal inclination and equal thickness. Newton's ring (Lens.in contact with a plate), Interferometer principles (Michelson's interferometry), multiple internal reflections (Fabry–Pérot interferometer).	13L+4T
4	**Diffraction of light waves**: Nature of Light waves; Wave front; Classification of wave front, Huygens Principle Definition and its difference with interference; Classification– Fresnel and Fraunhoffer diffraction, Fraunhoffer diffraction: - Single Slit experiment; Plane Transmission Grating; intensity and width of the principle maxima and secondary maxima and minima. **Polarisation of light**: Types of polarisation (plane, circular, elliptical), linear polarisers; Malus' Law of Polarization, Brewster's law; Double refraction: Ordinary and Extraordinary rays. Nichol prism, Polaroid, wave plates, Babinet compensator, Optical activity, Polarimeter.	11L+4T
	Total:	**42L+14T**
	Total Week Required:	**14**
	No. Of Week Reserved:	**01**

Text Books/ Reference Books:

1. The Physics of Waves and Oscillations,N. K. Bajaj,Tata McGraw-Hill Education
2. Electricity And Magnetism,D Chattopadhyay, New Central Book Agency (P) Limited
3. Optics, Ajay Ghatak, Tata McGraw-Hill Education
4. Geometrical and Physical Optics Paperback, P. K. Chakrabarti, New Central Book Agency
5. Solid State Physics, S. O. Pillai, New Age International
6. Solid State Physics, P. K. Palanisamy, Scitech Publication (India) Pvt. Ltd.
7. Quantum Mechanics,V. K. Thankappan, New Age International
8. Fundamentals of Quantum Mechanics, Statistical Mechanics & Solid State Physics, S. P. Kuila, Books And Allied (P) Ltd.
9. A Text Book of Optics, N. Subrahmanyam, Brij Lal and M. N. Avadhanulu, S. Chand Limited
10. F K Ritchmayer, E H Kenuard & T Lauritsen: Introduction to Modern Physics, McGraw Hill
11. Theory and Problems of Vector Analysis: And an Introduction to Tensor Analysis, Murray R. Spiegel, McGraw-Hill
12. A Beiser: Perspective in Modern Physics, McGraw Hill

Paper Name: **Engineering Physics Laboratory-I/II**
Paper Code: **PH-151/PH-251**
Weekly Load: **L: 0 T: 0 P: 3**
Credit Unit: **2**
Total Marks: **100**

List of Experiments;

1. Determination of the Specific Resistance of the material of a wire by a Meter Bridge.

2. Measurement of current flowing in a circuit by measuring the potential drop across a resistance using a potentiometer.

3. Determination of the variation of the Magnetic Induction Vector B with respect to distance x from the center along the axis of the Solenoid i.e., B vs. x curve.

4. Determination of Refractive Index of the material of a Prism by Spectrometer using Minimum Deviation method.

5. Determination of the unknown wavelength of a Monochromatic Light by the Newton's Ring Method.

6. Determination of the wavelength of an unknown line with a plane Transmission Grating.

7. Experiment to draw B-H loop of a ferromagnetic material.

8. To compare e.m.f. of two cells by Rayleigh Potentiometer.

9. To determine the wave length of laser light (Red light) using Grating.

10. To study the properties of He/Ne Laser.

11. To Verify Malus' Law of Polarization using laser source.

Books:

[1] An Advanced Course in Practical Physics, D. Chattopadhyay, P. C. Rakshit, New Central Book Agency.
[2] Physics Laboratory Experiments, Jerry D. Wilson, Cecilia A. Hernández-Hall Cengage Learning,
[3] B.Sc Practical Physics, C.L.Arora, S. Chand Limited

Paper Name: Workshop Practice
Paper Code: ME 182/ME282
Weekly Load: (L: 0, T: 0, P:2)
Credit Point: 02
Total Marks: 100

Sheet Metal
Theory: Definition of Sheet Metal and its use in present days, Tools and Machines used in Training Institutes and in Industries, Concept of development, Making out of Metal Sheets, Joining methods of Metal Sheets
Practice: Making out of metal Sheets cutting by snips, Sheet metal joints, Wiring of Sheet- edges
Safety: General warnings needed in the shop floor

Electric Arc Welding
Theory: Advantages of Arc Welding over the other metal joining method, Different types of Electric welding machines and their working Principles, Details about Flux Coated Electrode and other electrodes, Details about metallic Arc welding, Making understand the use of Tools
Practice: Formation Of Arc with the Flux coated MS Electrode, Making Straight Beads in the Flat position, Making Butt joints in the flat position
Safety: General warnings needed in the shop floor

Electrical Wiring:
Theory: Description of various types of wires and insulations, Necessity of joining, Use of electric soldering iron and blow lamp
Practice: Various types of wire joints, soldering use of flux, Cleat wiring system, PVC casing and capping, Batten and conduit wiring system
Safety: IE Rules & regulations, IS specifications followed by various types of wiring, Safety rules, Testing of Installations

Fitting:
Theory: Types of chisels, Use of chisels & grinding of chisels, Different types of Files, Filing by different files, Uses of marking tools, surface plates, V blocks, marking gauges etc, Different types of saws and Use of Saws, Description of drills, their uses, care and maintenance, Uses of drilling machines, setting of drill, chuck, sizes of drills and holding of jobs for drilling, Practical use of taps and dies, Coolant for different jobs, Uses of precision tools and gauges, Uses of sine bar and filler gauges, Uses of GO & NOT GO gauges, Finishing of Jobs
Practice: Chipping and filing on a given job, Sawing, Drilling, Taping
Safety: General warnings needed in the shop floor

Carpentry:
Theory: Various timber available in India, Different types of hand tools, saws, chisels used in carpentry, Use of marking gauges, Use of glue and its application, Elementary practical knowledge of operation of circular saw, band saw, wood turning lathe and grinder
Practice: Sawing and planning, Halying and Dovetailed joint, framing joint
Safety: General warnings needed in the shop floor

Text Books/ Reference Books:

1. Elements of Workshop Technology (Vol I & II) By S K Hazra ,Choudhury Media Promoters & Publisher Pvt. Limited
2. A Course In Workshop Technology (Vol I & II) By B S Raghuwanshi, Dhanpat Rai & Comp.
3. Workshop Practice By Swaran Singh, S K Kataria & Sons
4. Manufacturing Practice By Swaran Singh, S K Kataria & Sons

Paper Name: Engineering Drawing
Paper Code: ME 181
Weekly Load: L: 0, T: 0, P:3
Credit Point: 02
Total Marks: 100

Introduction and Sheet Layout
Basic s of Engineering Drawing, Requirement of Engineering Drawing for the engineers, Drawing Instruments and their uses, Drawing sheet size, layout, margin, title block, Scale of drawing, Symbol of projection

Lines, Lettering and Dimensioning
Different types of lines, Use of different types of pencils, Application of different types of lines
Lettering: Single-stroke letters, Upper case and Lower case letters, Gothic letters
Use of dimensioning, General rules of dimensioning

Scales
Concept of scale in engineering drawing, Representative fraction, Plane scale, Diagonal scale, Comparative Scale, Vernier scale, Scale of chords

Geometrical Construction and Curves
Drawing lines of different relation among them, Dividing lines and angles in equal sectors, Lengths of arcs, Lines and circles in contact, Construction of polygons in different methods Generation of Conic sections, Different methods of drawing Ellipse, Parabola, Hyperbola, Cycloid, Involute and Archemedian Spiral, Tangents and normals to conics

Projection
Projection of Points: Concept of projection, First angle and Third angle projection, Projection of points situated in different quadrants
Projection of Straight Lines: Lines contained and parallel to principal planes, Lines inclined to one and both the planes, Trace of a Straight lines, Determination of true length and true inclinations, other illustrative problems
Projection of Planes: Types of planes, Different types of planes (circle, polygons) contained and parallel to principal planes, Different types of planes inclined to one and both the planes, Trace of a Plane
Projection of Solids: Types of Solids, Projection of different types of solids inclined to one and both the planes, different illustrative problems

Isometric view and Isometric projection
Isometric axis, Isometric Scale, Isometric graph, Isometric drawing of planes, Isometric drawing of solids

Development of Surfaces
Introduction, Developments of lateral surfaces of right solids (cube, prism, cylinder, pyramids), Developments of lateral surfaces of cone and sphere (Zone and Lune method), Developments of lateral surfaces of truncated solids

Text Books/ Reference Books:

1. Engineering Drawing By N D Bhatt and V M Panchal.,Charotar Publications.
2. Engineering Drawing By K Venugopal & V Prabhu Raja., NewAge International Publishers.
3. Engineering Drawing By S C Bera & B Bhattacharyy, I.K.International
4. Engineering Drawing and Graphics + AutoCAD By K Venugopal, NewAge International Publishers
5. Engineering Drawing By P S Gill,Katson Publications
6. Engineering Graphics & Drafting By P S Gill,Katson Publishers.

Paper Name: Basic Mechanical Engineering laboratory.
Paper Code: ME 151
Weekly Load: L: 0, T: 0, P:3
Credit Point: 02
Total Marks: 100

List of Experiments:

Graphical analysis of problems on statics
Experiments based on principles of statics and dynamics Experiments on Simple lifting machines

Computer Aided Drafting:

Introduction: AutoCAD, Concepts of coordinates system, Applications of CAD, Benefits of CAD, Limitations of CAD, Different CAD software/Solid works

AutoCAD: Units, Title Block and Layout, Concepts of Layers, Different Drawing tools and editing tools, Block, display and setting menu, Drawing and Editing Commands, Text and Dimensioning, Object selection methods, 2D and 3D figures, Illustrative problems, Printing and Plotting.

Text Books/ Reference Books:

1) Engineering Mechanics By R S Khurmi, S.Chand Publications
2) Engineering Drawing and Graphics + AutoCAD by K Venugopal, NewAge International Publishers
3) Engineering Mechanics By A R Basu, Dhanpat Rai Publications.
4) Engineering Mechanics Practical By A K Sharma, University Science Press

Paper Name: Basic Mechanical Engineering.
Paper Code: ME 101/ME201
Weekly Load: L: 3, T: 0, P:0
Credit Point: 03
Total Marks: 100

Module	Detailed Description	Lecture / Tutorial Period
1	**Introduction to Engineering Mechanics** Statics: Fundamental idealization: Particle and Rigid body concept, vector and scalar quantities, Definition of force and force as vector, System of forces, Resultant of a system of forces, Transmissibility of a force, Resolution of forces, Free body diagram, Condition of equilibrium and related problems, Lami's theorem , Concept of moment, Varignon's principle of moment, Concept of couple. **Introduction to Vector Algebra** Vector operations, Parallelogram law, Free vector, Linearly dependent and independent vector, Bound vector, Representation of forces and moments in terms of i,j,k, Cross product and Dot product and their applications. **Friction** Concept of friction, law's of friction, Coefficient of friction, Angle of friction. Limiting angle of friction, Angle of repose, Cone of friction, Problems involving friction.	9L
2	**Analysis of structure** Simple trusses and frames, Assumptions made in case of simple truss, Tension and Compression member, Analysis of trusses by Method of Joints and Method of Sections, Simple problems on plane trusses. **Virtual work** Principle of virtual work, Positive and Negative work, Problems on applications of principle of virtual work. **Distributed forces** Centre of gravity, Centroids of areas and lines, First moment of area, Second moment of area, Polar moment of inertia, Radius of gyration of an area, Parallel axis theorem, Mass moment of inertia of symmetrical bodies e.g cylinder, sphere rod etc.	10L

3	**Introduction to Dynamics** Kinetics of particles: Path, Velocity, Acceleration, Rectilinear motion of particles, Determination of position, Velocity and Acceleration (under uniform and non uniform accelerated rectilinear motion), Relative motion, Construction of x-t, v-t, a-t graphs (simple problems) Plane curvilinear motion of particles: Projectiles: simple problems. **Kinematics of Rigid bodies** Translation, Rotation about a fixed axis, Motion in general plane. **Kinetics of Particles and Rigid bodies** Newton's laws of motion, Dynamic equilibrium, D'Alembert's principle, linear momentum, Angular momentum, Principle of Work Energy and Impulse Momentum, Principle of Conservation of energy, power, Simple problems.	11L
4	**Mechanics of simple machines** Simple machines, M.A,V.R and efficiency, Effect of friction, law of machine, Screw jack. **Transmission of power through Belt** Velocity ratio, Simple and Compound belt drive, Slip of belt, length of belt for an Open and Cross belt drive, Power transmission, Ratio of tension, Centrifugal tension and its effects, Maximum stress developed, Condition for maximum power transmission and the corresponding belt speed, Initial tension. **Introduction to Mechanics of Deformable bodies** Engineering Materials and their selection, Mechanical properties of materials, Concept of stress and strain, stress- strain diagram for ductile and brittle material, Elastic limit, Hooke's law, Modulus of elasticity, Poisson's ratio, Working Stress, Yield Point stress, Ultimate stress, Factor of safety, Shear stress and strain, Modulus of rigidity. Simple problems on composite bars, relation between different elastic constants, thermal stresses and strains. Solving one dimensional bar problem using Finite Element Method	12L
	Total:	**42L**
	Total Week Required:	**14**
	No. Of Week Reserved:	**02**

Text Books/ Reference Books:

1 Engineering Mechanics By S Timoshenko & D H Young,Mc Graw Hill Publications.
2 Engineering Mechanics Statics & Dynamics By L H Shames.New Jersey:Prentice hall
3 Engineering Mechanics By S S Bhavikatti & K G Rajashekarappa,New Age International Publication.
4 Applied Mechanics Statics & Dynamics By I B Prasad,Khanna Publiction
5 Engineering Mechanics By Meriam & Kraige. (Vol I & II)Wiley Publication.
5 Element Of Strength of Materials By Timoshenko & Young., Mc Graw Hill Publications.
6 Strength Of Material By R K Rajput.S.,Chand Publications.
7 Strength Of Material By R S Khurmi.,S.Chand Publications

Paper Name: Professional Communication
Paper Code: HS181/HS281
Weekly Load: L:0, T: 0, P:2
Credit Point: 02
Total Marks: 100

1. **Communication Skills**

Importance of Communication
Process of Communication**:**
(i) Verbal
(ii) Non-verbal
Levels Of Communications,
The Flow Of Communication

2. Listening and Speaking: Its importance & Barriers
(i) Active Listening
(ii)Effective Speaking
(ii) Conversational and Dialouges
(iii) Formal Presentation

3.Speaking English in Formal Situations
(i) Interview
(ii) At the Bank
(iii) At the Airport
(iv) At the police station
(v) Customer Care
(vi) At the Embassy
(vii) Greetings
(viii) Making a Telephone Call
(ix) Making apology
(x) At college
(xi) At the Doctor's
(xii) Outside the class
(xiii) Introducing self and other

4.Speaking English in informal Situations
(i) At a dinner party
(ii) Booking a room at a hotel
(iii) At a travel agency
(iv) At the hospital
(v) Ask for a opinion

5.Effective Reading Skills

6. Phonetics:
(i) Sound of English (Vowels, short, Vowels, Long Vowels & consonants)
(ii) Phonetic chart, Syllables, Stress, Accent , Rythm, Pitch & Intonation,

Books:

1.Technical Communication Principles and Practice By Meenakshi Raman & Sangeeta Sharma ,Oxford University Press
2.Personality Development and Soft skills By Barun K. Mitra, Oxford University Press.
3.Fundamental Of Technical Communication By Meenakshi Raman & Sangeeta Sharma ,Oxford University Press

Paper Name : Environmental Science
Paper Code : HS 102/HS 202
Weekly Load : L: 3, T: 0, P: 0
Credit Point : 03
Total Marks : 100

Module	Detailed Description	Lecture/ Tutorial Period

1	**General concepts of ecosystem and environment:** Concepts of Environmental Science and engineering, structure and functions in ecosystem, Energy flow in ecosystem in context of first law and second law of thermodynamics, Impact of anthropogenic activities on environment, Pollution as undesirable by product of development	7L
2	**Environmental physics:** Greenhouse gases and global warming, climate change mechanism due to greenhouse gases, Global warming potential, Energy-source and distribution in India, renewable and non-renewable energy resources, conventional vs nonconventional energy, nuclear power and solar energy, noise pollution –source , effects, types, measuring instruments and control methods **Environmental chemistry:** Chemical composition air, water and soil, water quality analysis in context of BOD and COD. Environmental monitoring: brief idea on air and water, soil quality parameters and their estimation.	11L
3	**Environmental modelling:** Air pollution modelling –Gaussian pollution model for estimation of GLC, numerical problem related to it. Streeter-Phelps simulation and first order BOD rate equation. **Environmental technology and management:** Solid waste management, radioactive waste –its treatment and management, Waste water treatment procedure, Air pollution (Both particulate and gaseous) management by technological innovation. ISO :14001	12L
4	**Environmental Biology:** Bioaccumulation and biomagnifications of toxic discharges, Threats to biodiversity. Bioremediation and phyto -remediation in reducing toxic contamination. **Disaster management:** Remote sensing and GIS as tool of disaster management. **Environmental Impact analysis:** Definition, need, objectives, methods, preparation of EIA report.	12L
	Total:	**42L**
	Total week required:	**14**
	No. of week reserved:	**02**

Text/Reference Books:

1. Water Supply, Waste Disposal and Environmental Engineering by A.K. Chatterjee, Khanna Publishers, Delhi.
2. Waste Water Engineering by Metcafe & Eddy.
3. Fundamentals of Environment and Ecology by Debapriya De and Debasish De S Chand & Company Ltd
4. Basic Environmental Engineering and elemental biology by Patra and Singha Aryan Pub. House

Paper Name: Technical English
Paper Code: HS 101
Weekly Load: L: 3, T: 0, P:0
Credit Point: 00
Total Marks: 100

Module	Detailed Description	Lecture / Tutorial Period
1	Grammer and Vocabulary Development: Word formation: Prefix and Suffixes Verbs: Auxiliaries, Finite & Non Finites, Concord (Verb Agreement) ,Time and Tense, Active & Passive Voice, Conditional Sentences, Adjectives and Degrees of Comparison, Adverbs, Conjunctions, Prepositions, Articles, Narration, Parts of speech Basic Grammar - Structural Pattern	10L
2	Common Error, Comparison Synonyms, Antonyms, Idioms, Confusables, One word Substitute, Editing ,Homonyms, Eponyms, Phrasal Verbs, Nouns, Gerunds, Infinitives, Sentence, Building (Vocabulary)	10L
3	Précis, Essay, Story. Paragraph Writing & Comprehension	10L
4	Official Correspondence, Memorandum, Official letter writing and Email, Technical Proposal & Report writing ,Writing a Book Review, Resume	12L
	Total:	42L
	Total Week Required:	**14**
	No. Of Week Reserved:	**02**

Text Books:

1. English Grammar- N.D. Turton, ABC of Common Grammatical Error for learners & Teachers, Macmillan Education
2. A handbook of English Grammar and usage- Dr. D. Thakur, Bharati Bhawan publishers
3. English Grammar ,Business Communication - Dr. K.K. Ramchandran et.al.,
4. Technical English- Sharon j Gerson and Steven M Gerson, Prentice Hall
5. Angela Burt, Quick Solutions to common Error in English, Little, Brown Book Group.
6. W. Foulsham, The Complete letter writer, Macmillam Publishers India
7. John East wood- Oxford guide to English Grammar, Oxford University Press
8. Personality Development and Soft skills By Barun K. Mitra, Oxford University Press
9. Technical Communication Principles and Practice By Meenakshi Raman & Sangeeta Sharma ,Oxford University Press
10. Fundamental Of Technical Communication By Meenakshi Raman & Sangeeta Sharma ,Oxford University Press

Suggested Readings:

1. Communication in English for Technical Student- Orient Longman.
2. G. Nagroj, English Language Teaching.
3. N. Saraswati, English language Teaching; Principles & Practices.
4. English for Engineers- Orient Blackswan

Paper Name : Economics and Accountancy
Paper Code : HS-201
Weekly Load : L: 3 T:0 P:0
Credit Point : 03
Total Marks : 100

Module	Detailed Description	Lecture / Tutorial Period
1	**Definition of Economics** Concept of economic activities and economic agents, the concept of market as an institution, distinction between micro and macro theory, the basic concept of price. **The concept of consumption and demand** Marshallian and indifference curve theory -- basic concepts-- derivation of law of demand- demand function, market demand curve – elasticity of demand – different form of elasticity of demand – relation between elasticity, expenditure, ARSMR	8L
2	**The theory of production** Isoquant and isocost function – AP, MP, AC, MC curves. Their relationship – concept of short run and long run cost curves – law of variable proportions and returns to scale. **Concept of product pricing** Profit maximization objective – short run long run equilibrium conditions of firm and industry, the industry supply curve and its relation with externalities, price determination, Monopoly, equilibrium condition, concept of monopoly power, oligopoly : basic concept of non callusive forms. **Objective of the firm:** Profit maximization, sales maximization and Behavioural theory of the firm	11L
3	**National income and accounting analysis** Concept of GDP, GNP and NNP, Methods of measuring national income. Consumption and saving function, investment, determination of equilibrium national income, concept of multiplier and accelerator**.** Concept of inflationary gap, demand pull and cost push inflation : anti- inflationary policies, basic idea Principles of banking, Central bank, Commercial Banks and other financial institutions: basic concepts and functions	12L
4	**Basic accounting concepts & Recording of the primary books** Fundamental concepts of accountancy, Golden Rules of Accounts, Principle of double entry, financial statements and their nature. Different types of the primary books, recording of transactions, preparation of the case books and journal proper. Ledger and Trial Balance, Final Account, Cash Book, Depreciation Methods, Bank reconciliation statement **Management Accounting(Elementary Treatment)** Financial Ratio Analysis, Cash flow analysis, Funds flow analysis, Comparative financial statements - Analysis & Interpretation of financial statements. Concepts Of Investments : Risks and return evaluation of investment decision, Average rate of return , Payback Period , Net Present Value, Internal rate of return	11L
	Total:	**42L**
	Total Week Required:	**14**
	No. of Week Reserved:	**02**

Text Books/ Reference Books:

1) Samuelson: Economics, McGraw Hill
2) R. Lipsey and Chrystal: An introduction to positive economics, Oxford University press
3) A. Kautsayanis: Modern Economics Theory, Palgrave Macmillan

4) D. C. Rowan: Output , Inflation and growth, Palgrave Macmillan
5) R.L. Gupta and V.K.Gupta : Principles and practice of accounting, Sultan chand and sons.
6) Mankiw Gregory N.(2002), Principles of Economics, Thompson Asia
7) V. Mote, S. Paul, G. Gupta(2004), Managerial Economics, Tata McGraw Hill
8) Mishra, S.K. and Puri (2009), Indian Economy, Himalaya
9) Pareek Saroj (2003), Textbook of Business Economics, Sunrise Publishers.
10) I.M. Pandey :Financial Management, New Age Interntional(P) Limited

Paper Name: Engineering Chemistry
Paper Code: CH-101/CH201
Weekly Load: L: 3 T:0 P:0
Credit Unit: 3
Total Marks: 100

Module	Detailed Description	Lecture / Tutorial Period
1	**Thermodynamics:** Concept of Thermodynamic system, Internal energy, Enthalpy, Heat Capacity, Reversible and Irreversible processes, different laws of thermodynamics, Joule Thomson effect, Entropy, Work function and free energy, Maxwell's Expression, Gibbs, Helmholtz equation. **Electrochemistry**: Ionic conductivity and its measurements. Conductivity of electrolytes, Kohlrauschs law. Galvanic cell, electrode potential, Nernst equation, galvanic series, Fuel cells. **Surface Chemistry:** Adsorption and Absorption, Mechanism of Adsorption, Types of Adsorption, Catalysis. Colloid state, Sols, Gels, Micelles **Chemical kinetics:** Reaction rates, order of reaction, molecular of reaction, first and second order reaction, pseudo order reaction. Reversible reaction, consecutive reactions and parallel reaction. Homogeneous and heterogeneous catalysts and its applications in chemical industries.	14L
2	**Solid State:** Space lattice, Unit cell, Lattice energy, radius ratio rule, Bragg's equation. Crystal defects, band theory, Semiconductor, Role of silicon and germanium in the field of semiconductor. **Chemical bonding** Ionic bonding, Factors which governs ionic bonding. Lattice energy, Born-Haber cycle. Covalent bond Hybridisation, VSPER theory, bond order, bonding in coordination compounds .Molecular orbital theory of homo- and hetero-nuclear diatomic molecules. Bonding in coordination compound, Ligand field theory and crystal field theory.	8L

3	**Structure and reactivity of Organic molecule:** Hybridisation, Inductive effect, resonance, hyperconjugation, electromeric effect, carbocation, carbanion and free radicals. Brief study of some addition, eliminations and substitution reactions with stereochemistry. **Instrumental Techniques:** Fundamentals of Spectroscopy; Principles and applications of UV-visible, IR & NMR. **Polymerization:** Concepts, classifications and industrial applications. Polymer molecular weight (number avg. weight avg. viscosity avg.: Theory and mathematical expression only), Poly dispersity index (PDI). Polymerization processes (addition and condensation polymerization), degree of polymerization, Copolymerization, Preparation, structure and use of some common polymers: plastic (PE: HDPE, LDPE, LLDPE, UHMWPE), rubber (natural rubber, SBR), fibre (nylon 6.6). Vulcanization, Biodegradable polymers.	9L
4	**Fuel:** Coal, Classification of coal, constituents of coal, carbonization of coal (HTC and LTC), Petroleum, classification of petroleum, Refining, Petroleum distillation, Thermal cracking, Octane number, Cetane number. **Corrosion and corrosion control:** Corrosion, Factors Influencing the Rate of Corrosion, types of corrosion, corrosion control. **Water treatment:** Hardness of water, units of water, disadvantage of hard water, scale and sludge formation in boilers, caustic- embrittlement , boiler corrosion. Priming and foaming in boilers, softening methods. Desalination of Brackish water. **Dye & Pigments:** Colour and constitution, Classification of Dyes, Nitro Dyes, Nitroso Dyes, Azo Dyes, Acridine dyes, Quinoline Dyes, Vat dyes, Fluorescent brightening agent. **Green chemistry:** Introduction, Significance, utilities.	11L
	Total:	**42L**
	Total Week Required:	**14**
	No. Of Week Reserved:	**02**

Text/Reference Books:

1. Water Supply, Waste Disposal and Environmental Engineering by A.K. Chatterjee, Khanna Publishers, Delhi.
2. Waste Water Engineering by Metcafe & Eddy.
3. Engineering Chemistry By O P Aggarwal, Khanna Publishers
4. Engineering Chemistry By P C Jain & M Jain,Dhanpat Rai Publishing Company
5. A Text Book Of Engineering Chemistry By Dr Sunita Rattan, S K Kataria & Sons.
6. A Text Book Of Engineering Chemistry By Shasai Chawla, Dhanpat Rai Publishing Company
7. Physical Chemistry By P. C. Rakshit, Sarat Book House
8. Fuels and Combustion By S. Sarkar, Taylor & Francis
9. Polymer Science and Technology By Joel R. Fried, Pearson Education

Organic Chemistry By L. Finar, Addison Wesley Longman, Inc

Paper Name: Engineering Mathematics-I
Paper Code: M 101
Weekly Load: L: 3 T: 1 P: 0
Credit Unit: 3
Total Marks: 100

Module	Detailed Description	Lecture / Tutorial Period
1	**Three Dimensional coordinate geometry:** Direction cosines, Equation of planes, Equation of straight lines, shortest distance and its equation; Equation of sphere, Cone, Cylinder; Standard equation of conicoids (Paraboloid, Ellipsoid, Hyperboloid)	7L+2T
2	**Vector Algebra and Calculus:** Derivatives of vector, Directional derivatives, Gradient, Divergence, Curl, Laplacian; Geometrical and physical interpretation of the vector operators. Applications to the geometry and engineering mechanics; Differentiation of integrals with variable limits; Rectification, Multiple integrals; Line Integral, Surface integral, Volume integral, Applications, Change of variables in double integrals, Jacobian of transformations, Integrals dependent on parameters, Applications; Theorems of Green, Gauss and Stokes' and their Applications	14 L+5T
3	**Differential and Integral Calculus and Applications:** Successive Derivatives, Leibnitz's Theorem, Rolle's Theorem, Cauchy's Mean Value Theorem, Geometrical interpretations, Taylor's and Maclaurin's Theorems with remainders, Points of inflexion, Concavity and Convexity, Curvature and Asymptotes; Fundamental theorem of integral calculus, Mean value theorem, Simple reduction formulae, Convergence of Improper Integrals, Tests of convergence, Beta and Gamma functions, Elementary properties, Application of definite integral to find area, volume, surface area, curve length, moment of inertia and centre of gravity of a body bounded by surface of revolution	13L+4T
4	**Multivariate analysis:** Limit, Continuity and Differentiability of functions of several variables, Partial Derivatives and their geometrical interpretation, increments and differentials, derivatives of composite and implicit functions, Derivatives of higher orders and their commutativity, Euler's Theorem on homogeneous functions, Jacobian, Taylor's and Maclaurin's expansion, Maxima and Minima, Lagrange's method of multipliers.	8L+3T
	Total:	**42L+14T**
	Total Week Required:	**14**
	No. Of Week Reserved:	**02**

Text Books/ Reference Books:

1. Analytical Geometry- M.C.Chaki, Calcutta Publishers,1986
2. Complex Variables- Spiegel, McGraw-Hill *Publishing* Co., 1974
3. Mathematical Analysis- S. C. *Malik* , Savita *Arora,* New Age *Publishers*.
4. Integral Calculus- Shanti Narayan, S Chand & Co Ltd, 35th edition, 2005
5. Differential Calculus- Shanti Narayan, S Chand & Co Ltd, 2005

Paper Name: Engineering Mathematics-II
Paper Code: M-201
Weekly Load: (L=3, T=1, P=0)
Credit Unit: 03
Total Marks: 100

Module	Detailed Description	Lecture/ Tutorial Period

1	Introduction to ordinary differential equations, Exact, Linear and Bernoulli's form, Second order non-homogeneous linear differential equations with constant coefficients, Euler's equations, System of differential equations, Applications to physical and technical problems Linearly independent solutions of ODE, Solutions of second and higher order linear differential equations with variable coefficients; Series solution of ODE, Introduction to Bessel and Legendre polynomials. Solution of partial differential equations of first and second order, Classification and Canonical forms; Applications, Solution of Laplace equation, Heat equation and Wave equation by variable separation method.	13L+4T
2	Series with constant terms; infinite series, Definition of convergence and divergence of infinite series, Various tests of convergence of infinite series like D'Alembert's ratio test, Cauchy's root test, Raabe's Test, Gauss's test, Integral test; Alternating series, Leibnitz Theorem, Absolute and conditional convergence. **Solution of system of linear equations:** Consistency, Gauss elimination method for finding general solution of a system of linear equations, Cramer's rule and its use to find solution of a system of linear equations, solution by matrix inverse method. Applications of linear equations and matrices to electrical circuits, Markov Chains, linear economic models.	10L+4T
3	Fourier series and applications; Fourier integral formula, Fourier transform, Fourier sine and cosine transforms, Linearity, Scaling, Frequency shifting and time shifting properties, Convolution theorem, Application to boundary value problems, Brief introduction of Fast Fourier Transform, Wavelet Transform. **Laplace Transform (L.T.):** Definition, Linearity property, Condition of existence of L.T., First and second shifting properties, Unit step functions, L.T. of derivatives and integrals; Convolution theorem, inversion, L.T. of periodic functions, Evaluation of integrals by L.T.; Solution of boundary value problems	7L+2T
4	**Eigen values and Eigen vectors:** Definition, Matrix polynomial, Cayley-Hamilton theorem and its application to evaluate the inverse of a non-singular matrix, Applications of Eigen values and Eigen vectors to the Fibonacci sequence, differential equations, dynamical systems, quadratic forms, conic sections, quadratic surfaces **Vector Space:** Definition, Basis of vector space and elementary properties, Subspace, Linearly dependent and independent vectors, Basis and Dimension, definition of rank as the no. of linearly independent vectors, Linear operators, nullity and Kernel of an operator	12L+4T
	Total:	**42L**
	Total Week Required:	**14**
	No. Of Week Reserved:	**02**

Text Books/ Reference Books:

1. Higher *Algebra*: *Abstract And Linear* (revised Ninth Edition), *S.K. Mapa*, Sarat Book House
2. Advanced Higher Algebra- J. G. Chakravorty and P. R. *GhoshPublisher*: U. N. Dhur & Sons Pvt. Ltd.; 12th edition (1987)
3. Differential equations with special functions- J N *Sharma* and R K *Gupta*,. 20thEdition, Krishna Prakashan Mandir, 1991.
4. Ordinary Differential equations- Garrett *Birkhoff* , John Wiley & Sons; 4 edition (1989)
5. Engineering Mathematics- N P *Bali* & Manish *Goyal* Laxmi Publications; Ninth edition (2016).