Course Title	BIOLOGY FOR ENGINEERS				B. Tech. CE,ME & EEE -III Sem ECE & CSE - IV Sem			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1823301	BSC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		2	--	--	2	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs			

Course Objectives:

- Introduction to Basics of Biology which includes cell, the unit of life, Different types of cells and classification of living organisms.
- Understanding what are biomolecules present in a cell, their structure function and their role in a living organism. Application of certain bio molecules in Industry.
- Brief introduction to human physiology, which is essential for bioengineering field.
- Understanding the hereditary units, that is genes and genetic materials (DNA and RNA) present in living organisms and how they replicate and pass and preserve vital information in living organisms.
- How biology can be applied in our daily life using different technology, for production of medicines to transgenic plants and animals to designing new biotechnological products

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Define** the cells, its structure and function, and Different types of cells and basis for Classification of living organisms.
CO 2	**Explain** about biomolecules its structure and function and their role in a living organism How biomolecules are useful in Industry & explain about human physiology.
CO 3	**Demonstrate** the concept of biology and its uses in combination with different technologies for production of medicines and production of transgenic plants and animals.
CO 4	**Illustrate** about genes and genetic materials (DNA & RNA) present in living organisms and how they replicate, transfer & preserve vital information in living organisms.

UNIT-I

Introduction to Basic Biology

Cell: What is a Cell, Cell theory, Cell shapes, structure of a Cell, Cell cycle chromosomes
The Plant Cell and animal Cell, protoplasm, prokaryotic and eukaryotic Cell, Plant Tissue and Animal Tissue. Brief introduction to five kingdoms of classification.

UNIT-II

Introduction to Bio-molecules

Carbohydrates, proteins, Amino acid, nucleic acid (DNA and RNA) and their types.
Enzymes and their application in Industry. Large scale production of enzymes by Fermentation.

UNIT-III

Human Physiology

Nutrition (Classes of nutrients or food substances), Digestive systems, Respiratory system (two kinds of respiration – aerobic and anaerobic) Respiratory organs, respiratory cycle. Excretory system

UNIT-IV

Genes, Replication of DNA, And Introduction to recombinant DNA Technology:

Prokaryotic gene and Eukaryotic gene structure, gene replication, Transcription and Translation in Prokaryote and Eukaryote and synthesis of protein in Eukaryotes. Recombinant DNA technology and cloning introduction.

UNIT-V

Application of Biology

Brief introduction to Production of vaccines, Enzymes, antibodies, Cloning in microbes, plants and animals, Basics of biosensors, biochips, Bio fuels, and Biosensors. What is Tissue engineering? And its application, transgenic plants and animals, Bio engineering (production of artificial limbs, joints and other parts of body).

Text Books:

1. Cell and Molecular Biology-P.K.Gupta
2. Cell Biology-Verma and Agarwal
3. Cell Biology-Rastogi
4. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A global approach", Pearson Education Ltd, 2018.
5. T Johnson, Biology for Engineers, CRC press, 2011 Molecular Biology and Biotechnology 2nd ed. J.M. Walker and E.B. Gingold. Panima Publications. PP 434.

Reference Books:

1. AlbertsEt.Al. The molecular biology of the cell, 6/e, Garland Science, 2014
2. De Robertis EDP & EMF De Robertis. 2001. Cell and Molecular biology. Lippincott Williams &Wilkins.Bombay.
3. E. E. Conn, P. K. Stumpf, G. Bruening and R. H. Doi, "Outlines of Biochemistry", John Wiley and Sons, 2009.
4. John Enderle and Joseph Bronzino Introduction to Biomedical Engineering, 3/e, 2012 Principles of Biochemistry. 2nd ed. 1993. A.L. Lehninger, D.L.Nelson.M.Cox. Paniama Publications. PP. 1090.
5. Harper's biochemistry. 1988. R.K. Murray. D.K. Granner, P.A. Mayes. Printice Hall International.
6. Introductory Microbiology. 1995, by Trevor Gross.
7. Molecular Biology by G. Padmanabhan, K. SivaramSastry, C. Subramanyam, 1995, Mac Millan.
8. Biochemistry of Nucleic Acids.1992.11thed.R.L.P.Adams.J.T.Knowler.D.PLeader.Chapman and Hall.
9. Genetic Engineering –SandhyaMitra.
10. Molecular Biology and Biotechnology by Meyers, RA, A comprehensive Desk reference (VCH Publishers).

Course Title	NUMERICAL METHODS, PROBABILITY AND STATISTICS				B. Tech. III Sem *(Common to CE & ME Branches)*		
Course Code	**Category**	**Hours/Week**		**Credits**	**Maximum Marks**		
1821302	**BSC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		3	0	--	3	30	70	100
Mid Exam Duration: 2Hrs					**End Exam Duration: 3Hrs**			

Course Objectives:

The objective of this course is to familiarize the students with numerical methods of solving the non-linear equations, interpolation. Also to impart knowledge in basic concepts and few techniques in probability and statistics in relation to the engineering applications.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Determine** the roots of polynomial and transcendental equations by different methods. (L3)
CO 2	**Apply** discrete and continuous probability distributions.(L3)
CO 3	**Demonstrate** the components of a classical hypothesis test. (L3)
CO 4	**Infer** the statistical inferential methods based on small and large sampling tests. (L4)

UNIT I

Solution of algebraic and transcendental equations: Bisection method – False - position method – Newton - Raphson method. **Solution of System of equations:** Jacobi's iteration method – Gauss- Seidel iteration method.

Learning Outcomes:

After completion of this unit student able to

- find approximate roots of an equation by using different numerical methods
- find solution of system of equations by using different numerical methods

UNIT II

Interpolation: Finite differences - Forward differences - Backward differences - Newton's forward and backward difference formulae for interpolation - Lagrange's formula for unequal intervals- Inverse interpolation.

Learning Outcomes:

After completion of this unit student able to

- explain various discrete operators and find the relation among operators
- apply Newton's forward and backward formulas for equal intervals
- apply Lagrange's formula to find inverse interpolation

UNIT III

Probability: Explaining basic concepts of Random variables (Without Problems) - Probability distributions: Binomial - Poisson approximation to the binomial distribution and normal distribution-their properties.

Learning Outcomes:

At the end of this unit, the student will be able to

- apply Binomial and Poisson distributions for real data to compute probabilities, theoretical frequencies
- interpret the properties of normal distribution and its applications.

Unit IV

Testing of Hypothesis: Formulation of null hypothesis, critical regions, level of significance. Large sample tests. Tests based on normal distribution –z -test for means and proportions.

Learning Outcomes:
At the end of this unit, the student will be able to
- explain the concept of estimation, interval estimation and confidence intervals
- apply the concept of hypothesis testing for large samples

UNIT V

Small Sample Tests: t-test for one sample, two samples problem and paired t-test. F-test - Chi-square test (testing of goodness of fit and independence).

Learning Outcomes:
At the end of this unit, the student will be able to
- apply the concept of testing hypothesis for small samples to draw the inferences
- estimate the goodness of fit

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2/e, Reprint 2012.

References:

1. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2			2							1
CO2	1	2			2	2						
CO3	2	2			2							1
C04		2				2						1

Course Title	Engineering Mechanics					B. Tech. ME III Sem		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1801303	PC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs			

Course Objectives:

- The student should understand the some fundamental aspects of Engineering Mechanics.
- To apply and to solve a few basic problems in engineering mechanics like static equilibrium of particles and rigid bodies.
- To Analyze trusses and friction, Properties of surfaces and volumes, Dynamic equilibrium of particles, Dynamic equilibrium of rigid bodies.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Determine** the resultant of system of Forces
CO 2	**Identify** equilibrium conditions for static problems
CO 3	**Determine** the centroid of composite figures ,centre of gravity of bodies ,area, moment of inertia and mass moment of inertia
CO 4	**Analyze** trusses for forces in members

UNIT I

BASIC CONCEPTS: System of Forces– Moment of Forces and its Application– Couples and Resultant of Force System- Equilibrium of system of forces- Free body diagrams –Types of Supports –Support reactions for beams with different types of loading – concentrated, uniformly distributed and uniformly varying loading.

UNIT II

ANALYSIS OF PERFECT FRAMES: Types of frames – cantilever frames and simply supported frames – Analysis of frames using method of joints.

FRICTION: Introduction, Definitions, Types of friction– laws of Solid or Coulomb Friction, Angle of Repose, Equilibrium of a Body lying on a Rough Inclined Plane, Analysis of Ladder Friction.

UNIT III

CENTROID AND CENTER OF GRAVITY: Centroids of simple figures – Centroids of Composite figures – Centre of Gravity of bodies

UNIT IV

AREA MOMENT OF INERTIA - Parallel axis and perpendicular axis theorems - Moments of Inertia of Composite Figures

MASS MOMENT OF INERTIA: Moment of Inertia of Simple solids, Moment of Inertia of composite masses.(Simple problems only)

UNIT V

Kinematics: Introduction, Velocity, Acceleration, Equations of Motion in a Straight Line under uniform Acceleration, Rectilinear Motion Under Variable Accelerations.

TEXT BOOKS:

1. Dr. R. K. Bansal ,Engineering Mechanics, Laxmi Publications,2005.

2. Fedrinand L.Singer , Engineering Mechanics – B.S. Publishers 2nd Edition.

3. S.S.Bhavikatti ,Engineering Mechanics, New Age International, 2008.

REFERENCES:

1. A.Nelson, Engineering Mechanics-Statics and dynamics, , Tata McGraw-Hill Company, 2009.

2. Timoshenko & Gere, Mechanics of Materials by, CBS, Revised Fourth Edition

3. B. Bhathacharya , Engineering Mechanics - Oxford University Publications, 2014.

Course Title	Manufacturing Process					B. Tech. ME III Sem		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
1803304	**PC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		3	0	0	3	30	70	100
Mid Exam Duration: 2Hrs					**End Exam Duration: 3Hrs**			

Course Objectives:

- The student should understand the some fundamental aspects and design concepts of casting process.
- To familiarize various fabrication techniques used in engineering. To familiarize various types of bulk deformation processes .
- To familiarize about processing of plastic materials.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Describe** the right pattern for an application and proper method of moulding
CO 2	**Understand** special castings and defects of casting process to suggest suitable Remedies
CO 3	**Apply** various special welding techniques and other metal joining processes
CO 4	**Select** appropriate metal forming techniques to be used for an application.

UNIT–I

Casting Process: Casting definition, pattern materials, types of patterns, pattern allowances, color code for patterns, Molding sands, core sands, properties of moldings and its ingredients, different types of molding machines, Elements of gating systems.

UNIT–II

Special Casting Process: CO2 molding, die casting, centrifugal casting, shell molding, investment or lost wax process; Casting defects, causes and remedies. Furnaces used in foundry–cupola, pit furnace, electric arc furnaces.

UNIT- III

Fabrication Process: Fusion welding processes – Types of Gas welding – Equipments used – Flame characteristics – Filler and Flux materials - Arc welding equipments - Electrodes – Coating and specifications – Principles of Resistance welding – Spot/butt, seam welding - Gas metal arc welding – Flux cored – Submerged arc welding – Electro slag welding – TIG welding and MIG welding

UNIT- IV:

Principle and application of special welding processes - Plasma arc welding – Thermit welding – Laser, Electron beam welding – Friction welding – Diffusion welding – Flame cutting – Weld defects – Brazing and soldering process – Types of plastics, properties, applications and their processing methods.

UNIT-V:

Deformation Processes: Hot working –types and cold working of metals-types – Forging processes — Types of Forging Machine and basic operations—Rolling of metals– Types of Rolling mills–-– Principles of Extrusion — Hot and Cold extrusion –Principle of rod and wire drawing . Blanking and piercing- Bending and forming- Drawing and its types- wire drawing and tube drawing- coining and embossing - Hot and cold spinning.

TEXT BOOKS: 1. P N. Rao," Manufacturing Technology", Tata McGraw-Hill Publishing Limited, 5th edition 2019.
2. R.K Jain , Production Technology vol .1 & vol.2 ,KHANNA publishers.
3. P.C. Sharma, "A text book of production technology", S. Chand and Company,

REFERENCE BOOKS: 1. Begman, 'Manufacturing Process", John Wilely & Sons,
2. K.L. Narayana , Production Technology J.K. International Publications.
3. Rajput R.K, 'A text book of Manufacturing Technology', Lakshmi Publications
4. Kalpak jain.S, Manufacturing Engineering and Technology/ 2019,Pearson Education.

Course Title	Strength of Materials				B. Tech. ME III Sem		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1803305	PC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs		

Course Objectives:

- The objective of the subject is to learn the fundamentals concepts of stress, strain and deformation of solids with applications to bars and beams.
- The students shall understand the theory of elasticity including strain/displacement and hooks law relationship.
- To accesses stresses and deformation through the mathematical models of beams for bending and bars for twisting or combination of both.
- The knowledge of this subject will help in the design & theory of machines courses

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Determine** the stresses , strains in bars subjected to loads and temperatures
CO 2	**Draw** the Shear Force and Bending Moment diagrams for beams
CO 3	**Evaluate** the bending & shear stress in beams ,longitudinal & hoop stresses in thin and thick cylinders
CO 4	**Analyze** Torsions in shafts and deflections in various beams

UNIT – I

SIMPLE STRESSES & STRAINS : Elasticity and plasticity – Types of stresses &strains– Hooke's law– stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Elastic modulli & the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain energy – Resilience – Gradual, sudden, impact and shock loadings.

UNIT – II

SHEAR FORCE AND BENDING MOMENT : Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, U.D.L., uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

FLEXURAL STRESSES : Theory of simple bending – Assumptions – Derivation of bending equation: M/ I = f/y = E/R Neutral axis –Determination bending stresses –section modulus of rectangular and circular sections (Solid and Hollow), I,T,Angle and Channel sections – Design of simple beam sections.

SHEAR STRESSES: Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T angle sections.

UNIT – IV

TORSION OF CIRCULAR SHAFTS- Theory of pure torsion- Derivation of torsion equations; $T/J=q/r=N\theta/l$ – Assumptions made in the theory of pure torsion- torsional moment of resistance- polar section modulus.

DEFLECTION OF BEAMS: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L uniformly varying load. Mohr's theorems – Moment area method – application to simple cases including overhanging beams.

UNIT – V

THIN CYLINDERS: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains –changes in diameter, and volume of thin cylinders – Riveted boiler shells – Thin spherical shells.

Thick cylinders lame's equation – cylinders subjected to inside & outside pressures –compound cylinders.

TEXT BOOKS :

1. R.K.Bansal ,Strength of materials ,lakshmi publishers,6th edition 2018
2. S.S.Bhavikatti ,Strength of materials ,lakshmi publications,3rd edition
3. S.S.Rattan ,Strength of materials ,Mc Grawhill companies 3rd edition 2017

REFERENCES :

1. Ramamrutham ,Strength of materials ,Dhanpat rai publications
2. R.K.Rajaput ,Strength of materials ,S.chand &company,6th edition.
3. Dr.Sadhu singh ,Strength of materials ,khanna publishers

Course Title	Material science and Engineering				B. Tech. ME III Sem		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1803306	PC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs		

Course Objectives:

- To impart knowledge on the structure, The student should understand fundamental properties of materials
- To familiarize of various Heat treatment process & segregation of Steels & Cast irons through Iron-Iron carbide diagram
- Testing and applications of metals and non-metallic materials so as to identify and select suitable materials for various engineering applications.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Describe** the relation between structure , properties of metals and non metallic materials
CO 2	**Explain** the mechanism of crystallization of metals
CO 3	**Determine** the grain size by using various methods for different Alloys
CO 4	**Analyze** the binary phase diagram of iron iron carbon equilibrium diagram. and (TTT) diagram for heat treatment process

UNIT I

CRYSTAL STRUCTURE OF METALS: Introduction to engineering materials and its properties and classifications, Mechanism of crystallization of metals, Recovery Recrystallization and grain growth, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size.

CONSTITUTION OF ALLOYS: introduction, Necessity of alloying, types of solid solutions, Hume Ruther's rules, intermediate alloy phases, and electron compounds.

UNIT II

EQUILIBRIUM DIAGRAMS:Construction of equilibrium diagrams, phase rule, Lever rule, Interpretations of phase diagrams, types of phase diagrams, Isomorphous alloy systems, eutectic, peritectic, eutectoid, and peritectoid systems and reactions.

Transformations in the solid state – allotropy, Study of important binary phase diagrams of iron-iron carbon (Fe-Fe_3C) equilibrium diagram, Effect on Alloying elements on (Fe-Fe_3C) system on steels. Relationship between equilibrium diagrams and properties of alloys of Cu-Ni and Al-Cu.

UNIT III

CAST IRON AND STEEL: Introduction to cast iron and steel, classification of cast irons, Structure and properties of White Cast iron, Malleable Cast iron, greycast iron, Spheriodal graphite cast iron, Alloy cast irons.

Classification of steel, structure and properties of plain carbon steel, Low alloy steel, Hadfield manganese steel, tool and die steels.

UNIT IV

HEAT TREATMENT OF ALLOYS: Importanes of Heat treatment of alloys, Heat treatment cycles, Introduction to TTT diagrams,Heat treatment processes: Annealing, normalizing, tempering, Hardening, Hardenability, surface – hardening methods, Age hardening treatment.

POWDER METALLURGY: Production of metal powder condition compaction, sintering and secondary operations, advantages, limitations and applications of powder metallurgy.

UNIT V

NON-FERROUS METALS AND ITS ALLOYS: Structure and properties of copper and its alloys, Aluminum and its alloys, Titanium and its alloys and applications.

Text Books:

1. Donald R.Askel ,Essential of Materials Science and Engineering, , USA, 3rd Edition, Cengage Publisher,2013.
2. V. Raghavan ,Material science, PHI, 5th edition
3. Sidney H. Avner ,Introduction to Physical Metallurgy, US, 2nd Edition, Tata McGraw-Hill, Noida,2007

Reference Books:

1 . R.K.Rajput, Engineering materials and Metallurgy, S chand publishers,2nd edition ,2016
2. William D. Callister ,Materials Science and Engineering, , 8th Edition, 2010
3. Agarwal ,Science of Engineering Materials, TMH.

Course Title	Thermodynamics					B. Tech. ME III Sem		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1803307	PC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs			

Course Objectives:

- To familiarize the concepts of energy in general and heat and work in particular
- To study the fundamentals of quantification and grade of energy
- To study the effect of energy transfer on properties of substances in the form of charts and diagrams
- To familiarize application of the concepts of thermodynamics in vapour power, gas power cycles and lays the foundation for subsequent courses in Fluid Mechanics, Heat Transfer, Energy Systems & Technologies and other thermal engineering Courses such as Turbo machinery, Refrigeration and Air Conditioning, Power Plant Engineering etc.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Understand** the concept of system, Control volume, thermodynamic properties ,Thermodynamic Equilibrium, work and heat
CO 2	**Apply** the Laws of Thermodynamics to thermodynamic system
CO 3	**Use** Steam tables to define properties of steam
CO 4	**Estimate** the performance of Gas Power cycles applied to prime movers

UNIT I

Basic Concepts & Definitions:

Thermodynamics and its importance, Macroscopic and Microscopic view point, Concept of Continuum, Thermodynamic System and its types, Surrounding and Boundary, Control Volume approach and Systems approach, Equilibrium – Thermal, Chemical, Mechanical and Thermodynamic, Pure substance, State, Path, Process and Cycle, Property – Intensive and Extensive, Point Function and Path function, Quasi-Static Process, Reversible and irreversible Processes, Temperature and different scales,Zeroth Law of Thermodynamics.

Heat and Work Transfer:

Work Transfer, Displacement Work, PdV Work in various Quasi-Static Processes, Some Typical Work Forms other than PdV Work, Free Expansion Work, Net Work Done by the System, Heat Transfer, Adiabatic Process, Specific Heat, Latent Heat, Salient Features of Heat and Work Transfer.

UNIT II

First Law of Thermodynamics for a Closed System undergoing a Process, First Law of Thermodynamics for a Cyclic process, Internal Energy – a Property of the System, Enthalpy- a Property of the System, Applications of First Law of Thermodynamics to Non Flow processes, First law of Thermodynamics applied to an Open System like Steam Nozzle, Boiler, Steam Turbine, Pump, Heat Exchanger, Throttling Process, Perpetual Motion Machine of First Kind.

UNIT III

Second Law Of Thermodynamics:

Limitations of First Law of Thermodynamics, Thermal Reservoir – Source and Sink, Concept of Heat Engine, Heat Pump and Refrigerator, Second Law of Thermodynamics - Kelvin Planck and Clausius Statements, Equivalence of Kelvin Planck and Clausius Statements, Reversible and Irreversible Process, Causes of **Irreversibility**, PMM-II, Carnot theorem and its Corollaries, Thermodynamic Temperature Scale.

Entropy:

Clausius Inequality, Clausius Theorem, Concept of Entropy, Entropy – a Property of a System, Isentropic Process, Temperature Entropy plot and its relationship with heat interactions, Principle of increase in Entropy, Change of entropy of typical Processes.

Third Law of Thermodynamics, Absolute entropy

UNIT IV

Properties of Gases and Gas Mixtures:

Ideal Gas, Relation among the specific heats, internal energy, Enthalpy, Analysis of Isochoric, Isobaric, Isothermal, Isentropic, isenthalpic processes, Representation of the above processes on P-V, T-s Planes, Determination of Work, Heat, Entropy and Enthalpy changes during the above processes

Gas Power Cycles:

Assumptions of Air Standard Cycle, Otto Cycle, Diesel Cycle and Dual Cycle, Comparison of Otto, Diesel and Dual Combustion Cycle, Brayton cycle and Atkinson Cycle

UNIT V

Properties of Pure Substance:

Pure substance, Phase Change Processes of pure substance, Property diagrams for Phase Change Process(T-V, T-S and P-H diagrams), Triple and Critical Points, Properties of Steam, Quality of Steam, Its determination Using Throttling and Separating-Throttling Calorimeters, Steam Processes, Expressions for the change in internal energy, enthalpy, work, heat, entropy in various processes, Mollier Chart

Steam Power Cycle:

Rankine Cycle analysis, Concept of Mean Temperature of Heat Addition, Methods to improve the cycle performance- Regeneration- Reheating

Text Books:

1. P.K. Nag, Engineering Thermodynamics, Sixth Edition 2017, TMH, New Delhi
2. Claus Borgnakke & Richard E Sonntag, Fundamentals of Thermodynamics, Seventh Edition, Willey Eastern, New Delhi
3. Yunus A. Cengel & Michale A Boles, Thermodynamics: An Engineering Approach, Eighth Edition, McGraw Hill

Reference Books:

1. P. Chattopadhyay, Engineering Thermodynamics,2nd edition, 2016,Oxford University Press India
2. Y.V.C. Rao, Engineering Thermodynamics through Examples, Revised Edition, Universities Press (India) Pvt. Ltd.
3. J.P Holman, Thermodynamics, McGraw Hill & Co

Course Title	APPLIED THERMODYNAMICS				B. Tech. ME IV Sem			
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
1803401	**PC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		3	-	0	3	30	70	100
Mid Exam Duration: 2Hrs					**End Exam Duration: 3Hrs**			

Course Objectives:

- To develop the student's ability to apply the principles of thermodynamics to predict the performance of the basic energy conversion systems like I.C Engines, air compressors, Boilers, Steam Nozzles, Steam condensers and Steam Turbines
- . To develop the student's ability to use the property tables and charts for the analysis of energy conversion systems in the course of their operation

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Understand the concept and working of I.C Engines, Steam Turbines and Steam condensers etc
CO 2	Describe the operation of air compressors, Steam Generators, Steam Turbines and Steam condensers.
CO 3	Apply thermodynamics laws in engineering applications like IC Engines, Air Compressors, Steam Nozzles etc
CO 4	Evaluate the performance of IC Engines, Air Compressors, Steam Nozzles and Steam turbines etc.

UNIT – I

I.C. ENGINES: Definition of Heat Engine, I.C Engine Classification – Parts of I.C.Engines, Working of I.C. Engines, Two Stroke & Four Stroke I.C.Engines SI & CI Engines,
Valve and Port Timing Diagrams, Cooling & Lubrication Systems, Ignition
System-Battery Ignition System, Magneto Ignition system, Brake Power , Frictional Power , Indicated Power and Related efficiencies.

UNIT – II

Air Compressors : Reciprocating Compressors- Effect of Clearance volume in Compressors, Volumetric Efficiency, Single Stage and Multi Stage Compressors, Effect of Inter cooling and Pressure Drop in Multi - Stage Compressors. Rotary Compressors- Working principles of Roots blower, Vane type Blower, Centrifugal Compressor - Axial Flow compressors **(**Problems Related to Reciprocating Compressors only)

UNIT – III

Boilers: Classification based on Working principles & Pressures of operation –Low Pressure & High Pressure .Boilers – Mountings and Accessories – Boiler horse power, equivalent evaporation, efficiency and heat balance.

UNIT – IV

Steam Nozzles: Function of nozzle – applications - types, Flow through nozzles, thermodynamic analysis – assumptions -velocity of nozzle at exit-Ideal and actual expansion in nozzle, velocity coefficient, condition for maximum discharge, critical pressure ratio. Super saturated flow, its effects

Steam Condensers: Requirements of steam condensing plant, rare fraction – Classification of condensers – working principle of different types – vacuum efficiency and condenser efficiency – air leakage, sources and its effects.

UNIT – V

Steam Turbines
Impulse turbine; Mechanical details – Velocity diagram – effect of friction – power developed, axial thrust, blade or diagram efficiency – condition for maximum efficiency, De-Laval Turbine - its features. -Velocity compounding and pressure compounding, governing of turbine

Reaction Turbine: Mechanical details – principle of operation, degree of reaction –velocity diagram – Parson's reaction turbine – condition for maximum efficiency, governing of turbines.

TEXT BOOKS:
1. V. Ganesan, Internal Combustion Engines - TMH, 4th Edition
2. P.K. Nag , Basic and Applied Thermodynamics, TMH
3. R.Yadav , Thermodynamics and Heat Engines, Central Book Depot

REFERENCES:
1. M.L.Mathur & Mehta, Jain bros,Thermal Engineering-
2. Mathur& Sharma ,IC Engines — DhanpathRai& Sons, 2010
3. Heywood , I.C. Engines fundamentals, McGrawHill, ,2011

Course Title	FLUID MECHANICS				B. Tech. ME IVSem		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
1803402	**PC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		3	-	0	3	30	70	100
Mid Exam Duration: 2Hrs					**End Exam Duration: 3Hrs**		

Course Objectives:

- To introduce and explain fundamentals of Fluid Mechanics, which is used in the applications of Aerodynamics, Hydraulics etc.
- To give fundamental knowledge of fluid, its properties and behavior under various conditions of internal and external flows.
- To develop understanding about hydrostatic law, principle of buoyancy and stability of a floating body and application of mass, momentum and energy equation in fluid flow.
- To inculcate the importance of fluid flow measurement and its applications in Industries.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Employ the basic knowledge of fluid properties.
CO 2	Analyze Hydraulic machines by developing mathematical models to study characteristics of various flows.
CO 3	understand the mathematical techniques of practical flow problems.
CO 4	Understand the boundary layer theory and forces on submerged bodies

UNIT I

FLUID STATICS: Dimensions and units, physical properties of fluids –mass density, specific weight, specific gravity, viscosity, surface tension, vapor pressure, compressibility, elasticity and their influence on fluid motion – atmospheric, gauge and vacuum pressure, measurement of pressure – piezometer, U-tube and differential manometers

UNIT II

FLUID KINEMATICS: Introduction – velocity and acceleration - Stream line, path line and streak line - stream tube - classification of flows – equation of continuity for one dimensional flow and three dimensional flow – circulation and vorticity – velocity potential and stream function –flow net.

FLUID DYNAMICS: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

UNIT III

PIPE FLOW: Reynold's experiment – types of flow - Darcy Weisbach equation – Hagen Poiseuille equation Minor losses in pipes – pipes in series and pipes in parallel – total energy line hydraulic gradient line

MEASUREMENT OF FLOW: Velocity measurement - Pitot tube, venturi meter, and orifice meter, Flow nozzle, Turbine flow meter

UNIT IV

Boundary Layer Theory: Boundary gap layer – definition – growth over a flat plate – boundary layer thickness – nominal, displacement, momentum and energy thickness – laminar sub layer – Momentum integral equation of boundary layer - separation of boundary layer- methods of controlling the boundary layer

UNIT V

FORCES ON SUBMERGED BODIES: Introduction – types of drag – drag on a sphere – drag on a cylinder – drag on flat plate – drag on airfoil – effect of compressibility on drag – development of lift on circular cylinder – Magnus effect – lift on an airfoil.

Text Books:

1. Modi and Seth, Hydraulics, fluid mechanics including hydraulic machines, Standard Publishers
2.D. S. Kumar, Fluid Mechanics and Fluid Power Engineering, Kotaria& Sons, 7th Edition, 2012
3. R.K. Bansal ,Fluid Mechanics and hydraulic Machines , Laxmi Publications,2018

Reference Books:

1. R.K. Rajput, Fluid Mechanics and Hydraulic Machines, S.Chand,6th Edition,2013
2. D. Rama Durgaiah, Fluid Mechanics and Machinery ,New Age International, 1st Edition
3. Banga& Sharma , Hydraulic Machines , Khanna Publishers, 7th Edition,2007

Course Title	KINEMATICS OF MACHINERY				B. Tech. ME IV Sem		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
1803403	**PC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		3	-	0	3	30	70	100
Mid Exam Duration: 2Hrs					**End Exam Duration: 3Hrs**		

Course Objectives:

- To understand the terms, types, and design related to mechanisms.
- To perform kinematic analysis on various mechanisms.
- To draw the cam profile to study about types of cams and cam terminologies.
- To know kinematics of gears.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Design a suitable mechanism depending on application
CO 2	understand the working principles of common mechanisms
CO 3	Analyze mechanism for finding its displacement, velocity, acceleration,
CO 4	understand different types of motions and various configurations of followers, by drawing

UNIT – I

MECHANISMS AND MACHINES:

Elements or Links – Classification – Rigid Link, flexible and fluid link. Types of kinematic pairs -sliding, turning, rolling, screw and spherical pairs , lower and higher pairs , closed and open pairs .Constrained motion – completely, partially or successfully constrained and incompletely constrained. Mechanisms and machines: classification of mechanisms and machines, kinematic chain, inversion of Mechanisms: inversions of quadric cycle chain, single and double slider crank chain. Mobility of mechanisms

UNIT II

STRAIGHT LINE MOTION MECHANISMS:

Exact and approximate, copiers and generated types –Peaucellier, Hart and Scott Russel – Grasshopper, Watt, Tchebicheff and Robert Mechanisms. Pantograph

STEERING MECHANISMS: Conditions for correct steering – Davis Steering gear, Ackermanns steering gear.

UNIT III

KINEMATICS:

Velocity and Acceleration Diagrams- Velocity and acceleration – Motion of link in machine – Determination of Velocity and acceleration – Graphical method – Application of relative velocity method – Slider crank mechanism, four bar mechanism. Acceleration diagrams for simple mechanisms, Coriolis acceleration, and determination of Coriolis component of acceleration. Kleins construction. Analysis of slider crank mechanism for displacement, velocity and acceleration of slider using analytical method

INSTANTANEOUS CENTRE METHOD: Instantaneous centre of rotation, three centres in-line theorem – locating instantaneous centres for simple mechanisms and determination of angular velocity of points and links.

UNIT IV
CAMS:

Definitions of cam and follower – uses – Types of followers and cams – Terminology. Types of follower motion - Uniform velocity – Simple harmonic motion and uniform acceleration. Maximum velocity and maximum acceleration during outward and return strokes and Drawing of cam profiles .

UNIT V
GEARS:

Higher pairs, friction wheels and toothed gears types, law of gearing, condition for constant velocity ratio for transmission of motion, Forms of tooth: cycloidal and involute profiles, Velocity of sliding, phenomena of interference.

GEAR TRAINS: Introduction – Types – Simple – compound and reverted gear trains – Epicyclic gear train. Methods of finding train value or velocity ratio of Epicyclic gear trains. Selection of gear box - Differential gear for an automobile

TEXT BOOKS:

1. S.S. Rattan , Theory of Machines , Tata McGraw Hill Publishers, 4th Edition, 2015.
2. Thomas Bevan, Theory of Machines, Pearson (P) 3rd Edition, 2012
3. J.J Uicker, G.R.Pennock & J.E. Shigley, Theory of machines and Mechanisms – Oxford publishers.4th Edition, 2015

REFERENCE BOOKS:

1. R.L Norton , Kinematics and dynamics of machinery, Tata McGraw Hill Publishers,2012

2. Sadhu Singh ,Theory of Machines by Pearson (P).

3. A.Ghosh & A.K.Malik ,Theory of Mechanisms and machines – East West Press Pvt. Ltd.

Course Title	Basics of Electronics Engineering				B. Tech. ME IV Sem			
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
1814404	**PC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		3	1	0	3	30	70	100
Mid Exam Duration: 2Hrs					**End Exam Duration: 3Hrs**			

Course Objectives:

- To learn the working of various Diodes and its circuits.
- To teach Transistors and its applications.
- To know the working and applications of CRO

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	CO1: Understand the functionalities of the diodes.
CO 2	CO2: Analyze the performance of rectifiers.
CO 3	CO3: Use the transistors in various applications.
CO 4	CO4: Understand the working of voltmeters and CROs.

UNIT-I

DIODE AND ITS CHARACTERISTICS: PN Junction diode, Symbol, V-I characteristics, Diode Applications, Rectifiers-Half Wave, Full Wave and Bridge Rectifiers, Zener diode, photo diode, LED.

UNIT-II

BJT: Bipolar Junction Transistor (BJT) – Types of Transistors, Operation of NPN and PNP Transistors, Input- Output Characteristics of BJT- CB, CE and CC Configurations, Relation between I_C, I_B and I_E. Transistor Biasing- Fixed Bias, Voltage Divider Bias, Transistor Applications-Transistor as an Amplifier, Transistor as a Switch, Single Stage CE Amplifier, Frequency Response of CE Amplifier.

UNIT-III

Junction Field Effect Transistor: Theory and Operation of JFET, Output Characteristics, Transfer Characteristics, Configurations of JFET- CD, CS and CG Configurations, JFET Applications- JFET as an Amplifier, JFET as a Switch, Comparison of BJT and JFET.

UNIT-IV

Oscillators: Concepts of Feedback Amplifier, Necessary conditions for Oscillators, RC phase shift Oscillator, Colpitts Oscillator, Hartley Oscillator and Crystal Oscillator.

UNIT-V

ELECTRONIC INSTRUMENTATION: Electronic Multi meter and Digital Voltmeter, Integrating Volt meter, Successive approximation DVM, Principles of CRT (Cathode Ray Tube), Deflection Sensitivity, Electrostatic and Magnetic Deflection, Applications of CRO -Voltage, Current and Frequency Measurements

TEXT BOOKS:

1. R.L.Boylestad and Louis Nashelsky, "Electronic devices and circuits", 9th Edition, 2006, PHI.

2. S.Salivahanan – "Electronic Devices and Circuits" – TMH

3. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PHI, 5th Edition, 2002.

REFERENCE BOOKS:

- Millman‟s Electronic Devices and Circuits-J.Millman and C.C.Halkias, Satyabratajit, 2nd Edition, 1998, TMH.
- Electronic Devices and Circuits-K.Lal Kishore, 2nd Edition, 2005, BSP. 3 .G.K.Mittal, "Industrial Electronics".

Course Title	INSTRUMENTATION AND CONTROL SYSTEMS				B. Tech. ME IV Sem		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
1803405	**PC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		3	-	0	3	30	70	100
Mid Exam Duration: 2Hrs					**End Exam Duration: 3Hrs**		

Course Objectives:

- To enable the students to understand the fundamentals of instrumentation and control available for monitoring/measuring in domestic / industrial applications.
- To learn fundamentals of various types of Transducers.
- To acquire basic understanding of principle & working of Transducers

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	select appropriate device for the measurement of parameters like temperature, pressure, speed, stress, humidity, flow velocity etc., and justify its use through characteristics and
CO 2	Analyze the fundamentals of various types of Transducers.
CO 3	Implement various principles & working of Transducers
CO 4	understand the methods to analyze the stability of systems from transfer function forms.

UNIT-I

INTRODUCTION

Definition - Basic principles of measurement - Measurement systems, generalized configuration and functional descriptions of measuring instruments - examples. Dynamic performance characteristics sources of error, Classification and elimination of error.

UNIT-II

MEASUREMENT OF DISPLACEMENT:

Theory and construction of various transducers to measure displacement - Piezo electric, Inductive, capacitance, resistance, calibration procedures

MEASUREMENT OF TEMPERATURE: Classification - Ranges - Various Principles of measurement - Expansion, Electrical Resistance - Thermistor - Thermocouple - Pyrometers - Temperature Indicators.

MEASUREMENT OF PRESSURE: Units - classification - different principles usedManometers, Piston, Bourdon pressure gauges, Bellows - Diaphragm gauges. Low pressure measurement - Mcleod pressure gauge

UNIT -III MEASUREMENT OF LEVEL: Direct method - Indirect methods - capacitative, ultrasonic, magnetic, cryogenic fuel level indicators - Bubler level indicators. FLOW MEASUREMENT:

Rotameter, magnetic, Ultrasonic, Turbine flow meter, Hot - wire anemometer Laser Doppler Anemometer (LDA).

MEASUREMENT OF SPEED: Mechanical Tachometers - Electrical tachometers - Stroboscope, Noncontact type of tachometer. Measurement of Acceleration and Vibration: Different simple instruments - Principles of Seismic instruments - Vibrometer and accelerometer.

UNIT -IV

MEASUREMENT OF STRESS & STRAIN: Various types - electrical strain gauge – gauge factor - method of usage of resistance strain gauge for bending, compressive and tensile strains - usage for measuring torque.

UNIT - V

MEASUREMENT OF HUMIDITY - Moisture content in the gases, sling psychrometer, Absorption psychrometer, Dew point meter

MEASUREMENT OF FORCE, TORQUE AND POWER- Elastic force meters, load cells, Torsion meters, Dynamometers.

ELEMENTS OF CONTROL SYSTEMS: Introduction, Importance - Classification – Open and closed systems

TEXT BOOKS:

1. D.S Kumar , Mechanical measurement and control Systems,5th revised enlarged edition ,2012
2. Doeblin O. etaI., Measurement systems: Application and design, , TMH 6th edition.
3. Beckwith, Marangoni, Linehard ,Mechanical Measurements , PHI, PE

REFERENCES:

1. B.C.Nakra & K.KChoudhary, Instrumentation, Measurement & Analysis, TMH,2nd edition2004

2. R.K. Jain ,Mechanical and Industrial Measurements , Khanna Publishers.

3. AK. Tayal , Instrumentation & Mechanical Measurements, Galgotia Publ.

Course Title	Computer Aided Machine Drawing				B. Tech. ME IV Sem		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
1803406	**PC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		1	2	0	2	50	50	100
Mid Exam Duration: 2Hrs					**End Exam Duration: 3Hrs**			

Course Objectives:

- Introduce conventional representations of material and machine components.
- Train to use software for 2D and 3D modeling.
- Familiarize with thread profiles, riveted, welded and key joints.
- Teach solid modeling of machine parts and their sections.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Demonstrate the conventional representations of materials and machine components.
CO 2	Create solid models and sectional views of machine components.
CO 3	Design 3D assemblies into 2D drawings.
CO 4	Create manufacturing drawing with dimensional and geometric tolerances

The following contents are to be done by any 2D software package

Conventional representation of materials and components:

UNIT-1

Detachable joints: Drawing of thread profiles, hexagonal and square-headed bolts and nuts, bolted joint, bolted joint with washer and locknut, stud joint, screw joint.

UNIT-2

Riveted joints: Drawing of rivet, lap joint, butt joint with single strap, single riveted , double riveted double strap joints.

UNIT-3

Welded joints: Lap joint and T joint with fillet, butt joint with conventions.

Keys: Taper key, sunk taper key, round key, saddle key, feather key, woodruff key.

Shaft coupling, bushed pin-type flange coupling, universal coupling, Oldhams' coupling.

The following contents to be done by any 3D software package

UNIT-4

Sectional views

Creating solid models of complex machine parts and create sectional views.

UNIT-5

Assembly drawings: (Any four of the following using solid model software)

Lathe tool post, tool head of shaping machine, tail stock, machine vice, gate valve, carburettor, piston, connecting rod, eccentric, screw jack, plumber block, axle bearing, pipe vice, clamping device, Geneva cam, universal coupling,

production drawing:

Representation of limits, fits and tolerances for mating parts. Use any four parts of above assembly drawings and prepare production drawing with dimensional and geometric tolerances.

Text Books:

1. K.L.Narayana, P.Kannaiah ,Machine Drawing ,New age international Publications, sixth Edition 2019
2. Dr.R.K Dahwan ,A Text Book of Machine Drawing ,s.chand Publications,2018
3. N.D.Bhatt ,Machine Drawing , charotar publications 2018

Reference Books:

1. Cecil Jensen, Jay Helsel and Donald D.Voisinet, Computer Aided Engineering Drawing, Tata Mcgraw-Hill, NY, 2016
2. James Barclay, Brain Griffiths, Engineering Drawing for Manufacture, Kogan Page Science, 2016.
3. B.Bhattacharya, Machine Drawing, oxford publications 2017.

Course Title	BASIC ELECTRONICS AND FLUID MECHANICS LAB				B. Tech. ME IV Sem		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
1803407	**PC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		-	-	3	2	50	50	100
Mid Exam Duration: 2Hrs					**End Exam Duration: 3Hrs**		

Course Objectives:

- The objective of the subject is to learn the fundamentals concepts of study of CRO ,diodes and Rectifiers
- The students shall understand the characteristics of Emitters and Amplifiers
- The Student gain knowledge in the experiments on impact of jet on vanes, calibration of venturimeter and orificemeter
- The student is able to determine friction factor and discharge coefficient.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	CO1: Utilize knowledge of computing CRO, diodes and rectifiers.
CO 2	CO2: Perform experiments on common emitter and amplifier
CO 3	CO3: calibration of venturimeter, Orificemeter and Mouth piece
CO 4	CO4: Employ the basic knowledge of hydraulics and performance parameters of pumps

LIST OF EXPERIMENTS

PART-A

BASIC ELECTRONICS LAB

1. Study of CRO (Measurement of voltage, frequency and phase of periodic signals)
2. V-I Characteristics of PN junction Diode.
3. Half Wave Rectifier with and without capacitive filter.
4. Full Wave Rectifier with and without capacitive filter
5. Input and output characteristics of Common Emitter (CE) configuration.
6. Frequency response of a single stage CE amplifier.

PART-B

FLUID MECHANICS LAB

1. Calibration of Venturimeter
2. Calibration of Orifice meter.
3. Determination of friction factor for a given pipe line.
4. Calibration of mouthpiece/Orifice
5. Impact of jets on Vanes.

B.Tech –IV Sem

L	T	P	C
0	0	1	1

Seminar
(1803408)

Course Outcomes:

At the end of the course:

1. Students will learn to survey the relevant literature such as books, national/international refereed journals and contact Faculty for the selected topic of seminar.
2. Students will be able to use different experimental techniques.
3. Students will learn to write technical reports.
4. Students will develop skills to present and defend their Report in front of audience.

Syllabus Contents: Students can take up small topic in the field of mechanical engineering as seminar Topic.. It can be related to solution to an engineering problem, verification and analysis of experimental data available, conducting experiments on various engineering subjects, material characterization, studying a software tool for the solution of an engineering problem etc. The Seminar Topic Must present in presence of Concerned Faculty and co students.

Course Title	Advanced English Communication Skills Lab				B. Tech. ME IV Sem		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1824409	Humanities and social sciences	L	T	P	C	Internal Assessment	External Exams	Total
		--	--	3	2	50	50	100
						End Exam Duration: 3Hrs		

Course Objectives:

- To focus on improving the student's proficiency in English at all levels.
- To train students to use language effectively to participate in group discussions,
- To help them face interviews and sharpen public speaking skills
- To enhance the confidence of the student by exposing him/her to various situations and contexts which he/she would face in his/her career.
- To make students industry-ready.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Describe** Speaking and listening skills
CO 2	**Understand** various kinds of reports and present them schematically
CO 3	**Analyze** Behavioural skills
CO 4	**Illustrate** various employability skills required for the employment
CO 5	**Classify** the verbal and non-verbal communication

1. Syllabus:

The following course content is prescribed for the Advanced Communication Skills Lab:

Reading Comprehension -- Reading for facts, guessing meanings from context, speed reading, scanning, skimming for building vocabulary (synonyms and antonyms, one word substitutes, prefixes and suffixes, idioms and phrases.)

Listening Comprehension ---Listening for understanding, so as to respond relevantly and appropriately to people of different backgrounds and dialects in various personal and professional situations.

Technical Report Writing --- Types of formats and styles, subject matter, organization, clarity, coherence and style, data-collection, tools, analysis

Resume' Writing --- Structure, format and style, planning, defining the career, objective, projecting one's strengths, and skills, creative self marketing, cover letter

Group Discussion--- Communicating views and opinions, discussing, intervening. Providing solutions on any given topic across a cross-section of individuals, (keeping an eye on modulation of voice, clarity, body language, relevance, fluency and coherence) in personal and professional lives.

Interview Skills --- Concept and process, pre-interview plannig, mannerisms, body language, organizing, answering strategies, interview through tele and video-conferencing.

Technical Presentations (Oral) --- Collection of data, planning, preparation, type, style and format, use of props, attracting audience, voice modulation, clarity, body language, asking queries.

2. Minimum Requirements

The English Language Lab shall have two parts:

The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.

The Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a TV, A digital stereo-audio and video system, Camcorder etc.

System Requirement (Hardware Component):

Computer network with LAN with a minimum of 60 multimedia systems with the following specifications:

P-IV Processor, Speed-2.8 GHz, RAM_512 MB minimum, Hard Disk-80 GB, Headphones

Prescribed Software: Walden and K-Van Solutions.

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book wich are loaded on the systems):

1. **Technical writing and professional communication, Huckin and Olsen** Tata Mc Graw-Hil 2009.
2. **Speaking about Science,** A Manual for Creating Clear Presentations **by Scott Morgan and Barrett Whitener, Cambridge University press, 2006**.
3. **Handbook for Technical Writing** by David A McMurrey & Joanne Buckely CENGAGE Learomg 2008.
4. **Technical Communication**by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
5. **The ACE of Soft Skills** by Gopal Ramesh and Mahadevan Ramesh, Pearson Education, 2010.
6. **Cambridge English for Job-Hunting** by Colm Downes, Cambridge Unicversity Press, 2008.
7. **Resume's and Interviews** by M. Ashraf Rizvi, Tata Mc Graw-Hill, 2008.

8. **From Campus To Corporate** by KK Ramachandran and KK Karthick, Macmillan Publishers India Ltd, 2010.
9. **English Language Communication: A Reader cum Lab Manual** Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.
10. **Managing Soft Skills** by K R Lakshminarayan and T. Muruguvel, Sci-Tech Publications, 2010.
11. **Business Communication** by John X Wang, CRC Press, Spepcial Indian Edition, 2008.

Course Title	ENVIRONMENTAL SCIENCE (CE, ME,EEE-IV SEM)				B. Tech. ME IVSem			
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
18994M1	**PC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		2	-	0	0	30		30
Mid Exam Duration: 2Hrs					**End Exam Duration: 3Hrs**			

Course Objectives:

- To make the students to get awareness on importance of environment in our life.
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Gain a higher level of personal involvement and interest in understanding and solving environmental problems.
CO 2	Understand the interconnection of human dependence on this ecosystem.
CO 3	Influence their society in proper utilization of Natural resources.
CO 4	Increases critical thinking and helps in analyzing the impact of developmental activities on environment
CO 5	Learn the management of environmental hazards and disasters and have a clear understanding on environmental concerns and follow sustainable developmental

UNIT I: Introduction to Environmental Studies- Natural Resources (10 lectures)

Multidisciplinary nature of environmental studies. Scope and Importance.

Natural resources and associated problems – Renewable and non renewable Resources

(a) Forest resources –Deforestation: Causes and impacts due to mining, dams – benefits and problems

(b) Water resources – Use and over utilization of surface and ground water – Floods, drought, and conflicts over water

(c) Energy resources –Renewable and Non Renewable energy resources, use of alternate energy resource

(d) Land resources -Soil erosion and desertification, Land degradation.

Role of an individual in conservation of natural resources.

Learning Outcomes: At the end of this unit, student will be able to

*to understand the multidisciplinary nature of the environment

*understand the importance of natural resources

*analyze the problems associated with excess usages of natural resources

*understand role of individual in protection of environment

UNIT II: ECOSYSTEMS (6 lectures)

Ecosystem- Definition–Structure and function of an ecosystem– Energy flow in the ecosystem –Food chains, food webs, Ecological succession.

Introduction, types, characteristic features of the following ecosystem:

(a)Forest ecosystem,(b)Grassland ecosystem,(c)Desert ecosystem,(d)Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Learning Outcomes: At the end of this unit, student will be able to

*articulate the basic structure and functions of ecosystem

*provides knowledge on interrelationship of one organism with other organism

*get awareness on different types of ecosystems present in our surroundings and their importance.

UNIT III: BIODIVERSITY AND ITS CONSERVATION (8 lectures)

Levels of Biodiversity: genetic, species and ecosystem diversity – Bio-geographical classification of India – Hotspots .Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – India as a mega-diversity nation – Endangered and endemic species. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Learning Outcomes: At the end of this unit,student will be able to

* explains the concept of genetic diversity

*explain endangered and endemic species of India.
* identify the threats to biodiversity due to human involvement
*Provides knowledge on conservation of biodiversity.

UNIT IV: ENVIRONMENTAL POLLUTION (8 lectures)

Definition, Cause, effects and control measures of (a) Air Pollution,(b)Water pollution,(c)Soil pollution (d)Noise pollution. Nuclear hazards –Risks to human health .Solid waste management: Control measures of urban and industrial wastes. Pollution case studies.Global Warming, Ozone layer depletion, acid rains and impacts on human communities and environment.Disaster management: floods, earthquakes, cyclones

Learning Outcomes: At the end of this unit student will be able to

* understand Cause, effects and control measures of air pollution.
* understand soil, noise & water pollution.
*get awareness on impact of global warming and acid rains on humans and environment.
*get knowledge on management of solid waste.
*explain disaster management cycle in India.

UNIT V:

Environmental policies (5 lectures)

Environment Protection Act – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act .International agreements: Montreal and Kyoto protocols and conservation on Biological Diversity (CBD).

Human communities and Environment (5lectures)

Human population and growth: impacts on environment, human health and welfares.

Environmental movements: Chipko, silent valley.

Environmental Ethics: Role of individual in environmental conservation. Public awareness.

Learning Outcomes: At the end of this unit student will be able to

* explain the enforcement of Environmental legislation
*get awareness on punishments associated with destruction of environment

*Understand the impact of growing population on welfare of society

*get knowledge on how to increase public awareness on protection of environment.

FIELD WORK: Visit to a local area to document environmental assets River/forestgrassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, birds – Study of simple ecosystems-pond, river, hill slopes, etc..

Text Books:

1. Text book of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission, Universities Press.
2. Environmental studies by Benny Joseph, Mc, Graw Hill Publications.
3. Principles and a basic course of Environmental science for under graduate course by Kousic,KouShic.
4. Text book of Environmental science and Technology by M. AnjiReddy,BS Publication.

Reference Books:

1. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited.
2. Environmental Studies by AninditaBasak – Pearson education.

3. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.