BOARD OF STUDIES MEETING – 2019-20
K.S.R.M. COLLEGE OF ENGINEERING
AUTONOMOUS

Minutes of the Meeting

Date	**03.06.2019**	**Day**	**Wednesday**
Time	**11:00 AM**	**Venue**	**ME CAD CAM LAB**
Dept./SS	**MECHANICAL ENGINEERING**	**Convener**	**Dr. D.Ravikanth**

Members Present:11				**Members Absent: nil**		
S.No	**Name**	**Designation**	**Signature**	**S.No**	**Name**	**Designation**
1.	Prof. P.Venkata Ramanaiah	Prof., SV university, TIRUPATI				
2.	Prof. B.Durga prasad	Prof. JNTUA ANANTAPURAM				
3	Prof. B.Sudheer Prem Kumar	Prof. JNTUH HYDERABAD				
4	Dr. D.Ravikanth	Prof., KSRMCE				
4	Prof.K, Rajagopal	Prof., KSRMCE				
5	Sri.TVVSN Murthy	Associate Prof., KSRMCE				
6	Sri.K.Suresh Kumar	Associate Prof., KSRMCE				
7	Sri.R.Ramakrishna Reddy	Associate Prof., KSRMCE				
8	Sri.P.Sreenivas	Assistant Prof., KSRMCE				
9	Sri.J.Suresh Babu	Assistant Prof., KSRMCE				
10	Sri.U.Pradeep Kumar	Assistant Prof., KSRMCE				
11	Sri.R.Mahesh	Assistant Prof., KSRMCE				

Dr. D.Ravikanth welcomed all the members to the meeting and presented the agenda of the meeting.

The resolutions are:

	To do item	Discussion	Resolution	Coordinator/in-charge
1	To Suggest modification in the course structure of III,IV,V,VI,VII and VIII sem of UG R18 regulations	The Head of the Department has presented the course structure of III,IV,V,VI,VII and VIII sem of UG R18 regulations.	The committee has approved the course structure of III,IV,V,VI,VII and VIII sem of UG R18 regulations without modifications.	Dr. D.Ravikanth
2	To Suggest modification in the syllabus of III, IV sem of UG R18 regulations	The Head of the Department has presented the syllabus of III, IV sem of UG R18 regulations.	The committee has approved curriculum and syllabus for III & IV Sem B.Tech ME under R-18UG Regulations which also includes New Courses. The suggestions provided by the expert team are considered and modifications will be done respectively.	SRI.K. Suresh Kumar
3	To finalize and approve the syllabus for New Courses, Value Added Courses, Certificate Courses, Skill Courses, Employability	The Head of the Department has presented the syllabus designed by the faculty of ME after taking the feedback from all stakeholders and by comparing with premier institute syllabus	The committee approved the content for offering New Courses, Value Added Courses, Certificate Courses, Skill Courses, Employability Courses and Entrepreneurship courses	Dr.K.Rajagopal

The Head of the Department have proposed the Vote of thanks and concluded the meeting.

Convener

Professor & Head
Department of Mechnical Engineering
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R18-ME-UG- III SEMESTER

Course Title	BIOLOGY FOR ENGINEERS				B. Tech III Sem (R18) ME		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1823301	BSC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	--	--	3	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 andclassification of living organisms.
- Understanding what are biomolecules present in a cell, their structure function and their role in aliving 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.
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 AnimalTissue. 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 andcloning 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 itsapplication, 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 globalapproach", Pearson Education Ltd, 2018.
5. T Johnson, Biology for Engineers, CRC press, 2011 Molecular Biology and Biotechnology2nd 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 Wileyand 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 (VCHPublishers).

Course Title	NUMERICAL METHODS, PROBABILITY AND STATISTICS					B. Tech III Sem (R18) ME		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1821302	BSC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		2	0	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.

UNIT – II

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

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.

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).

Text Books:

1. Probability and statistics: Theory and applicationsby D. A. S Fraser
2. Statistics for Absolute Beginners by Theobald
3. Probability and Statistics for Engineers and Scientists by Walpole and Myers, Seventh edition, Pearson Education Asia, 2002
4. Probability: A Graduate Course 2nd ed. 2013 Edition by Allan Gut (Author)

Reference Books:

1. Higher Engineering Mathematics by Dr. B.S.Grewal, Khanna Publishers-43 edition.
2. Probability and Statistics by E. Rukmangadachari & E. Keshava Reddy, Pearson Publishers.
3. Probability and Statistics for Engineers by B. Rama Bhupal Reddy, Research India Publications.
4. Statistical Methods by S.P.Gupta, S Chand Publications
5. Statistical Intervals: A Guide for Practitioners and Researchers by William Q. Meeker, Luis A. Escobar, et al.
6. Statistical Methods for Reliability Data 1st Edition by Luis A. Escobar (Author), William Q. Meeker (Author

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Course Title	ENGINEERING MECHANICS				B. Tech III Sem (R18) ME		
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	Describe the centroid of composite figures, center 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 ofComposite Figures

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

UNIT - V

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

Text Books:

1. Engineering Mechanics-Statics and dynamics, A.Nelson, Tata McGraw-Hill Company
2. Mechanics of Materials by Timoshenko & Gere, CBS
3. Engineering Mechanics –Arthur P. Boresi and Richard J. Schmidt. – Brooks/Cole – Cengage Learning
4. Engineering Mechanics, Fedrinand L.Singer – B.S. Publishers.

Reference Books:

1. Mechanics Volume -1 by Ld Landau,em lifsitz.
2. Mechanics by William Foog Osgood.
3. Mechanics by G.J.Troup
4. Mechanics by Keith R Symon.
5. Engineering Mechanics, Shames & Rao – Pearson Education.
6. Engineering Mechanics, Bhavikatti and Rajasekharappa

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Course Title	MANUFACTURING PROCESS					B. Tech III Sem (R18) ME		
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 varioustypes 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, defects of casting process and 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 forpatterns, 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 waxprocess; 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 – Submergedarc 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. Manufacturing Technology, Vol I P.N. Rao, Tata Mc Graw Hill, 4th Edition,2013
2. Manufacturing Technology, Kalpakjain, Pearson education, 4th Edition,2002
3. Manufacturing Management , Priciples and Concepts, P. Gibson, G.Greenhaigh & R. Kerr
4. Manufacturing Technology by Helmi A.Youssef

Reference Books:

1. Production Technology, K.L Narayana, I.K. International Pub, 3rd Edition,2013
2. Manufacturing Process Vol. I, H.S.Shah Pearson, 2013,
3. Principles of Metal Castings, Rosenthal, Tata McGraw Hill ,2nd Edition,2001
4. Advance in Production Technology by Christian Brecher .

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Course Title	STRENGTH OF MATERIALS				B. Tech III Sem (R18) ME		
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 ofbeams for bending and bars for twisting or combination of both.
- The knowledge of this subject will help in the design & theory of machinescourses.

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

CO 1	Explain the stresses , strains ,loads ,beams and provide information required for further design
CO 2	Tabulate the Shear Force and Bending Moment diagrams for beams
CO 3	Apply the bending ,shear stress in beams and longitudinal hoop stresses in thin and thick cylinders
CO 4	Analyze components under complex loading conditions by simplifying.

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 & volumetricstrain – 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 beamssubjected 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 likerectangular, 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 includingoverhanging 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 thincylinders – Riveted boiler shells – Thin spherical shells.

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

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Text Books:

1. R.K.Bansal ,Strength of materials ,lakshmi publishers,6th edition 2018
2. S.S.Rattan ,Strength of materials ,Mc Grawhill companies 3rd edition 2017
3. Mechanics of Materials in SI units hy Russell Hibbeler,Pearson ,10 Th edition
4. A Text of the strength of materials and of stresses in structures by Thomas Williana Mather,Palala Press.

Reference Books:

1. R.K.Rajaput ,Strength of materials ,S.chand &company,6th edition.
2. Mechanics of materials , James M Gere , sixth edition,Thomson learning Inc.
3. Mechanics of materials , James M Gere and Barry J.Goodno, Cengage learning.
4. Strength of materials part ! & part 2 ,S.Timoshenko, D.Vannostrand companyInc,Newyork

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Course Title	MATERIAL SCIENCE AND ENGINEERING				B. Tech III Sem (R18) ME		
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 , how it effects on the properties of metals and alloys
CO 4	Analyse 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. Relationshipbetween 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 andproperties 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, Aluminumand its alloys, Titanium and its alloys and applications.

Text Books:

1. Introduction to Physical Metallurgy, Sidney H. Avner, US, 2nd Edition, 2007 Tata McGrawHill, Noida, 1985.
2. Essential of Materials Science and Engineering, Donald R.Askeland, USA, 3rd Edition, Cengage Publisher,2013.
3. Material Science and Metallurgy, U.C. Jindal, Pearson educations, 2011,
4. Elements of Materials Science and Engineering, Lawrance H. Van Vlack, Pearson educations, 6th Edition, 2002.

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Reference Books:

1. Material Science and Metallurgy, kodgire V.D, 12th Edition, Everest Publishing House, 2002.
2. Engineering Mechanics of Composite Materials- Isaac and M Daniel, Oxford University Press, 1994, 2nd Edition 2013
3. Mechanics of Composite Materials, R. M. Jones, McGraw Hill Company, New York, 1975.
4. Science of Engineering Materials, Agarwal, TMH.
5. Materials Science and Engineering, William D. Callister, 8th Edition, 2010
6. Elements of Material science, V. Rahghavan, PHI, 5th Edition
7. Engineering Materials and Their Applications – R. A Flinn and P K Trojan, Jaico Books
8. Engineering materials and metallurgy, R.K.Rajput, S.Chand, 1st Editon,2008

Course Title	THERMODYNAMICS					B. Tech III Sem (R18) ME		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1821307	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	Determine application of the laws of thermodynamics to wide range of systems
CO 3	Define the properties of the steam by using steam tables and Mollier diagram
CO 4	Analyse various air standard cycles applied in 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.

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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. Fundamentals of Thermodynamics – Sonntag, Borgnakke and van wylen, John Wiley & sons (ASIA) Pte Ltd, 7th Edition,2009
2. Thermodynamics – An Engineering Approach – YunusCengel& Boles, TMH,7th Edition 2011.
3. Thermodynamics – J.P.Holman, McGrawHill, 2nd Edition company New York 1975.
4. Engineering Thermodynamics – J.B. Jones & R.E.Dugan, PHI ,1st Edition, 2009.

Reference Books:

1. Engineering Thermodynamics by P. Chattopadhyam, Oxford, 1st Revised, 2011
2. An introduction to Thermodynamics, YVC Rao, Universities press, 2009 Revised Edition,
3. Thermodynamics an engineering approach, Yunus Cengal and Boles,TMH,7 th edition
4. Engineering Thermodynamics, P.K Nag, TMH Publishers, New Delhi, 5th Edition, 2013.

Course Title	MATERIAL SCIENCE, MECHANICS OF SOLIDS LAB				B. Tech III Sem (R18) ME			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1803308	PC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		0	0	3	1	50	50	100
						End Exam Duration: 3Hrs		

Course Objectives:

- The student should understand the preparation of materials for the testing
- To familiarize various micro structures of materials are determined
- The student to determine the hardness of materials by using of heat treatment process
- To impart knowledge on the structure, properties, treatment, 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	Justify the metal specimen and trace the microstructure at different magnifications.
CO 2	Determine and check the hardness of the given Steel specimen before and after annealing and normalizing operations.
CO 3	Develop the behavior of material under tensile load and draw stress strain diagram.
CO 4	Analyze hardness test on mild steel , brass and copper.

MATERIAL SCIENCE LAB: (ANY FIVE EXPERIMENTS)

1. Preparation and study of the Micro Structure of pure metals like, Cu and Al & stain les steels.
2. Preparation and study of the Microstructure of low carbon steels, medium Carbon Steels & high Carbonsteels.
3. Study of the Micro Structures of white, malleable and grey Cast Irons.
4. Study of the Micro Structures of Non-Ferrous alloys.
5. Study of the Micro structures of Heat treated steels.
6. Hardeneability of steels by Jiminy End Quench Test
7. To find out the hardness of various treated and untreated steels.

MECHNICS OF SOLIDS LAB: (ANY FIVE EXPERIMENTS)

1. Tensile strength test 2. Bending test 3. Torsion test 4. Brinell hardness test
5. Test on springs 6. Compression test on cube 7. Impact test
8. Punch shear test

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Course Title	MANUFACTURING TECHNOLOGY LAB				B. Tech III Sem (R18) ME			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1803309	PC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		0	0	3	1	50	50	100
						End Exam Duration: 3Hrs		

Course Objectives:

- The student should understand the some fundamental aspects and design concepts of manufacturing pattern and pattern makings for the casting process,
- To determine the sand strengths and permeability of a sand materials and moisture percentages of green sand.
- To Know techniques adopted in welding processes like arc, gas, spot, plasma and brazing processes and also deep drawing process for making a small size parts with the help of blanking,piercing operations
- To make extrusion operations, bending and processing of plastics like injection molding and blow molding. The student should be prepared to continue the study and analysis ofthe production machine parts.

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

CO 1	Examine a pattern with allowances
CO 2	Test the properties of the moulding sand and prepare a casting
CO 3	Develop a model using arc welding ,spot welding and soldering

I. Metal Casting lab:

1. Pattern Design and Making : Single piece pattern and Split pattern
2. Sand Properties Testing : Exercise-Strength and Permeability.
3. Casting

II. WELDING LAB

1. Arc Welding (Lap joint, Butt Joint & T- Joint)
2. Spot welding
3. Soldering of thin sheets

III. MECHANICAL PRESS WORKING

1. Hydraulic Press
2. Pipe Bending.

IV. PROCESSING OF PLASTICS

1. Injection Molding
2. Blow Molding.

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R18-ME-UG- IV SEMESTER

Course Title	APPLIED THERMODYNAMICS				B. Tech IV Sem (R18) ME		
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, IgnitionSystem-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, Vanetype 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, efficiencyand 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'sreaction turbine – condition for maximum efficiency, governing of turbines.

Text Books:

1. Fundamentals of Thermodynamics – Sonntag, Borgnakke and van wylen, John Wiley & sons, 7th Edition, 2009.
2. Thermodynamics – An Engineering Approach – YunusCengel& Boles, TMH,7th Edition 2011.
3. Thermodynamics – J.P.Holman, McGrawHill, 2nd Edition company New York 1975.
4. Engineering Thermodynamics – J.B. Jones & R.E.Dugan, PHI ,1st Edition, 2009.

Reference Books:

1. Engineering Thermodynamics by P. Chattopadhyam, Oxford, 1st Revised, 2011
2. An introduction to Thermodynamics, YVC Rao, Universities press, 2009 Revised Edition,
3. Thermodynamics an engineering approach, Yunus Cengal and Boles,TMH,7 th edition
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Course Title	FLUID MECHANICS					B. Tech IV Sem (R18) ME		
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 differentialmanometers

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 flowalong 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 – dragon 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. Hydraulics, fluid mechanics including hydraulic machines by Modi and Seth, Standard Publishers, 19th Edition,2013
2. Fluid Mechanics and Fluid Power Engineering by D. S. Kumar, Kotaria& Sons, 7th Edition, 2011
3. Introduction to fluid mechanics & fluid machines by sk som,third edition.
4. Engineering fluid mechanics by R.J garde & A.G mirajgoker

Reference Books:

1. Fluid Mechanics and hydraulic Machines by R.K. Bansal, Laxmi Publications,9th Edition,2010
2. Fluid mechanics by Frank M White.
3. Fluid Mechanics by John M Cimbala
4. Fluid Mechanics by john F.Douglas,Janusz M. Gasiorek, 5th edition.

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Course Title	KINEMATICS OF MACHINERY				B. Tech IV Sem (R18) ME		
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 ofquadric 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 steeringgear.

UNT - 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.

UNT - 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 maximumacceleration during outward and return strokes and Drawing of cam profiles.

UNT - 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 gearfor an automobile.

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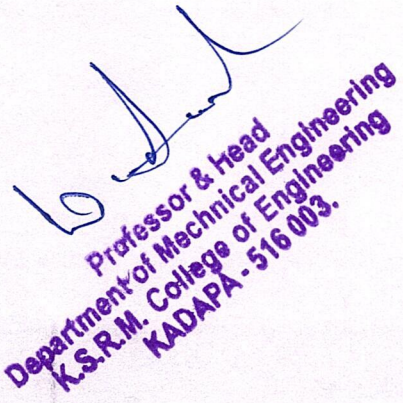
Text Books:

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. Theory of machines and Mechanisms, J.J Uicker, G.R.Pennock & J.E. Shigley – Oxford publishers.4th Edition, 2015
4. The Kinematics of Machinery: Outlines of a Theory of Machines by Franz Reuleaux, Eugene S. Ferguson Published December 19th 2012 by Dover Publications.

Reference Books:

1. Theory of Machines by Sadhu Singh & Pearson (P).
2. R.L Norton , Kinematics and dynamics of machinery, Tata McGraw Hill Publishers,2012
3. Mechanisms and Dynamics of Machinery Hardcover – Import, 11 by Hamilton H. Mabie F. Reinholtz (Author) February 1987
4. Kinematics and Dynamics of Machines by G. H. Martin (Author) 1 May 2002



Course Title	BASICS OF ELECTRONICS ENGINEERING					B. Tech IV Sem (R18) ME		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1814404	PC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	1	0	4	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	Understand the functionalities of the diodes.
CO 2	Analyze the performance of rectifiers.
CO 3	Use the transistors in various applications.
CO 4	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, Relationbetween 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. Electrical Engineering Fundamentals By S,BOBBY ROUF.
2. Electrical Engineering Reference Book By M.A.LAUGHTON,D.F.WARNE.
3. An Introduction to Electrical Science By ADRIAN WAYGOOD.
4. Fundamentals of Electrical Engineering and Technology by William D. Stanley, John R. Hackworth, Richard L Jones – Thomson Learning.

Reference Books:

1. Fundamentals of Electrical Engineering by CHARLES A. GROSS.THADDEUS A.ROPPEL.
2. Electrical Engineering Concepts and Applications by MARKO SILVER.
3. Basic Electrical Engineering by Kothari and Nagarath, TMH Publications, 2nd Edition.
4. Principles of Electrical and Electronics Engineering by V. K. Mehta, S. Chand & Co.

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Course Title	INSTRUMENTATION AND CONTROL SYSTEMS				B. Tech IV Sem (R18) ME			
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 used Manometers, 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 - methodof 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, Absorptionpsychrometer, 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 closedsystems.

Text Books:

1. Doeblin O. etaI., Measurement systems: Application and design, , TMH 6th edition.
2. Beckwith, Marangoni, Linehard ,Mechanical Measurements , PHI, PE.
3. B.C.Nakra & K.KChoudhary, Instrumentation, Measurement & Analysis, TMH, 2nd edition2004
4. R.K. Jain ,Mechanical and Industrial Measurements , Khanna Publishers.
5. Instrumentation and Control Systems 1st Edition - June 3, 2004 Author: William Bolton

Reference Books:

1. Instrumentation and Control Systems 2nd Edition - August 5, 2015
2. Instrumentation and Control Systems William Bolton
3. Fundamentals of Industrial Instrumentation and Process Control, Second Edition 2nd edition by William Dunn.
4. Instrumentation and Control Systems 3rd edition by William Bolton

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Course Title	COMPUTER AIDED MACHINE DRAWING				B. Tech IV Sem (R18) ME			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1803406	PC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		1	0	2	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 - I

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

UNIT - II

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

UNIT - III

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 - IV

Sectional views

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

UNIT - V

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 drawingsand prepare production drawing with dimensional and geometric tolerances.

Text Books:

1. CADM/CAM, A Zimmers & P.Groover, PE, PHI
2. CADM/CAM-Principles and applications, P.N. Rao, TMH, 3rd edition, 2010
3. CADM/CAM By Ibrahim Zeid ,R.siva subramanyam , Mcgraw Higher Ed
4. Procedural Elements of Computer Graphics: Rogers

Reference Books:

1.Computer Graphics : Plastock Schaum Series.

2. Interactive Computer Graphics: Newman & Sproul.
3. Computer Graphics: Steven Hamington.
4.CADM/CAM: Groover
5. Automation, Production System & CIM: M.P. Groover
6. Mathematical Elements of Computer Graphics: Rogers and Adam

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Course Title	BASIC ELECTRONICS AND FLUID MECHANICS LAB				B. Tech IV Sem (R18) ME			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1803407	ESC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		-	-	3	1.5	50	50	100
					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	Utilize knowledge of computing CRO, diodes and rectifiers.
CO 2	Perform experiments on common emitter and amplifier.
CO 3	Calibration of venturimeter, Orificemeter and Mouth piece.
CO 4	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.

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Course Title	ENVIRONMENTAL SCIENCE					B. Tech IV Sem (R18) ME		
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.

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) .

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.

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

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 growth: impacts on environment, human health and welfares.
Environmental movements: Chipko, silent valley.

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

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.BS Publication Text book of Environmental Studies for Undergraduate Courses by ErachBharucha for University GrantsCommission, 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.

Reference Books:

1. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of IndiaPrivate 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.

Professor & Head
Department of Mechnical Engineering
K.S.R.M. College of Engineering
KADAPA - 516 003.

Course Title	SEMINAR				B. Tech IV Sem (R18) ME		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1803408	PC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		-	-	1	1	100	--	100
Internal Assessment							

Course Outcomes: At the end of the course:

- Students will learn to survey the relevant literature such as books, national/international refereed journals and contact Faculty for the selected topic of seminar.
- Students will be able to use different experimental techniques.
- Students will learn to write technical reports.
- 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.

Professor & Head
Department of Mechnical Engineering
K.S.R.M. College of Engineering
KADAPA - 516 003.

Course Title	ADVANCED ENGLISH COMMUNICATION SKILLS LAB				B. Tech IV Sem (R18) ME			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1824409	HMSC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		-	-	3	1.5	50	50	100
Mid Exam Duration: 2Hrs					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 situationsand 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, idiomsand 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 ofprops, 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 andEnglish 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 digitalstereo-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 ofthe 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 BarrettWhitener, 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.