

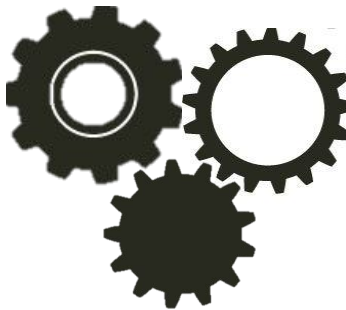
**VASAVI COLLEGE OF ENGINEERING(AUTONOMOUS)
Ibrahimbagh, Hyderabad-31**

Approved by A.I.C.T.E., New Delhi and
Affiliated to Osmania University, Hyderabad-07

**Sponsored by
VASAVI ACADEMY OF EDUCATION
Hyderabad**



**SYLLABI UNDER CBCS FOR
B.E III & IV SEMESTERS OF MECHANICAL ENGINEERING
WITH EFFECT FROM 2017-18
(For the students admitted in 2016-17)**



DEPARTMENT OF MECHANICAL ENGINEERING

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DEPARTMENT VISION

To nurture and establish global leadership in the field of mechanical engineering and develop competent human resources with values and ethics.

DEPARTMENT MISSION

To nurture an environment of research, innovation and knowledge through the latest teaching-learning practices in mechanical engineering.

VASAVI COLLEGE OF ENGINEERING(AUTONOMOUS)
DEPARTMENT OF MECHANICAL ENGINEERING

SCHEME OF INSTRUCTION AND EXAMINATION
WITH EFFECT FROM THE ACADEMIC YEAR 2017-18

Course Code	B.E III SEMESTER (CBCS)								Credits
	Course	Scheme of Instruction Hours per week				Scheme of Examination			
		L	T	D	P	Duration Hours	Max. Marks		
						SEE	CIE		
OE3XXX	Open Elective - I	2	0	0	0	3	70	30	2
MC310ME	Introduction to Entrepreneurship	1	0	0	0	2	35	15	1
MC300EH	Human Values and Professional Ethics – I	1	0	0	0	2	35	15	1
HS310EH	FS-I: Communication Skills in English - I	2	2	0	0	3	70	30	2
BS310MA	Engineering Mathematics - III	3	1	0	0	3	70	30	3
ES320ME	Thermodynamics	3	0	0	0	3	70	30	3
ES330ME	Metallurgy & Material Science	3	0	0	0	3	70	30	3
ES330CE	Mechanics of Materials	3	0	0	0	3	70	30	3
ES340ME	Machine Drawing	1	0	2	0	3	70	30	2
PC350ME	Mechanics of Fluids	3	1	0	0	3	70	30	3
LABS									
ES331ME	Metallurgy Laboratory	0	0	0	2	3	50	25	1
ES331CE	MOM Laboratory	0	0	0	2	3	50	25	1
Total		22	4	2	4		730	320	25
Marks Grand Total		32					1050		
OPEN ELECTIVES FOR OTHER DEPARTMENTS									
OE300ME	Basic Mechanical Engineering	2	0	0	0	3	70	30	2
OE310ME	Mechanical Technology	2	0	0	0	3	70	30	2

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR BE III SEMESTER
INTRODUCTION TO ENTREPRENEURSHIP

Instruction:1 Hour /week	SEE Marks :35	Course Code : MC310ME
Credits : 1	CIE Marks: 15	Duration of SEE : 2 Hours

Course objectives	Course Outcomes
The objectives of this course are to : <ul style="list-style-type: none">• inspire students and help them imbibe an entrepreneurial mind-set.• introduce key traits and the DNA of an entrepreneur• provide the information about the facilities , schemes available to start enterprise in INDIA• educate the government policies and support structure for the entrepreneur• improve the entrepreneur skills	On completion of the course, the student will be able to: <ul style="list-style-type: none">• develop awareness about entrepreneurship and successful entrepreneurs.• generate and analyse the business ideas• understand the supporting organizations available to establish the business in the country• understand the different government policies which support the entrepreneur• understand how to Prepare a business plan report

Unit-I: Entrepreneurship: Entrepreneur characteristics – Classification of Entrepreneurships – Incorporation of Business – Forms of Business organizations –Role of Entrepreneurship in economic development –Start-ups.

Unit-II: Idea Generation and Opportunity Assessment: Ideas in Entrepreneurships – Sources of New Ideas – Techniques for generating ideas – Opportunity Recognition – Steps in tapping opportunities.

Unit-III: Institutions Supporting Small Business Enterprises: Central level Institutions: NABARD, SIDBI, NIC, KVIC, NIESBUD,SIDO, DST,EDI,FICCI,CII,ASSOCHAM etc. – state level Institutions –DICs- SFC-SIDC- Other financial assistance.

Unit-IV: Government Policy and Taxation Benefits: Government Policy for SSIs- tax Incentives and Concessions –Non-tax Concessions –Rehabilitation and Investment Allowances.

Unit-V: entrepreneurial skills-design thinking, selling and communication. Project Formulation and Appraisal: Preparation of Project Report –Content; Guidelines for Report preparation, project report and pitching

Learning Resources:

1. Bruce R. Barringer and R. Duane Ireland, "Entrepreneurship: successfully launching new ventures", 3rd edition, Pearson Prentice Hall, 2009.
2. P. Denning and R. Dunham, "The Innovator's Way", MIT Press: Cambridge, Massachusetts, 2010.
3. Arya Kumar, "Entrepreneurship", Pearson Education, Delhi, 2012.
4. Michael H. Morris, D.F.Kuratko, J G Covin, "Corporate Entrepreneurship and Innovation", Cengage learning, New Delhi, 2010
5. Peter F. Drucker, "Innovation and Entrepreneurship", Routledge Classics, 2015 .
6. <https://www.wfglobal.org/initiatives/national-entrepreneurship-network>

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. III-SEMESTER
FS-I: COMMUNICATION SKILLS IN ENGLISH-I

Instruction:2+2 Hrs/ Week	SEE Marks: 70	Course Code: HS310EH
Credits: 2	CIE Marks: 30	Duration of SEE: 3 Hrs

Course Objective	Course Outcome
<ul style="list-style-type: none">• The four major skills of language learning, listening, speaking, reading and writing provide the right key to success.• The main objective of this finishing school curriculum is to involve content for all the above mentioned four skills in teaching English and to get students proficient in both receptive and productive skills	<ol style="list-style-type: none">1. Respond to questions and Engage in an informal conversation.2. Narrate a message/story/incident, both verbally and in writing.3. Describe an event/a session/ a movie/ an article.4. Respond to others while being in a casual dialogue.5. comprehend facts given and respond in an appropriate manner.6. Construct sentences in a coherent form7. Provide explanations8. Recognize and list the key points in a topic/message/article.9. Participate in group and forum discussions by providing factual information, possible solutions, and examples.10. Debate on a topic by picking up the key points from the arguments placed.11. Provide logical conclusions to the topics under discussion.12. Prepare, present, and analyze reports

UNIT I – FUNDAMENTALS OF COMMUNICATION

Competencies:

- Basic conversational ability.
- Write e-mails introducing themselves & their purpose

Topics covered

Greeting and Introductions

Small Talk

Recalling

Topic Level Details

Greeting & Introductions

Competencies:

- Greeting appropriately
- Introducing themselves, a friend
- Responding to simple statements and questions both verbally and in writing
- Seeking introduction from others about themselves or about any topic.
- Writing an email with appropriate salutation, subject lines, self introduction, and purpose of mail.

Small Talk

Competencies:

- Identifying the topic of conversation.
- Speaking a few sentences on a random list of topics
- Reading simple information like weather reports, advertisements
- Seeking clarifications.

Recalling

Competencies:

- State takeaways from a session or conversations

UNIT II : NARRATIONS AND DIALOGUES

Competencies:

- Framing proper phrases and sentences to describe in context
- Speaking fluently with clarity and discrimination
- Responding to others in the dialogue.

Topics covered

Paraphrasing

Describing

Topic Level Details

Paraphrasing

Competencies:

- Listen for main ideas and reformulating information in his/her own words
- Draw appropriate conclusions post reading a passage.
- Writing an email confirming his/her understanding about a topic

Describing

Competencies:

- Speaking, Reading, and Writing descriptive sentences and paragraphs.

UNIT-III: RATIONAL RECAP

Competencies:

- Organizing and structuring the communication
- Detailing a topic
- Summarizing a topic.

Topics Covered:

Organizing

Sequencing

Explaining

Summarizing

Topic Level Details

Organizing

Competencies:

- Organizing the communication based on the context and audience

Sequencing

Competencies:

- Structuring the content based on the type of information.

Explaining

Competencies:

- Explaining a technical/general topic in detail.
- Write an email giving detailed explanation/process

Summarizing

Competencies:

- Recapitulating

UNIT-IV: PROFESSIONAL DISCUSSIONS AND DEBATES

Competencies:

- Analytical and Probing Skills
- Interpersonal Skills

Topics Covered:

Discussing

Debating

Topic Level Details

Discussing

Competencies:

- Thinking
- Assimilating

Debating

Competencies:

- Comprehending key points of the debate and note decisive points including supporting details.
- Construct a logical chain of arguments and decisive points.
- Writing a review about a product by providing reasons, causes, and effects

UNIT -V: DRAWING CONCLUSIONS AND REPORTING

Competencies:

- Reasoning skills - Coherent and logical thinking
- Reporting and Analyzing skills.

Topics Covered:

Concluding

Reporting

Topic Level Details

Concluding

Competencies:

- Analyzing the points discussed.
- Connecting all points without gaps.
- Identifying clinchers.
- Communicating the decisions

Reporting

Competencies:

- Reporting an incident
- Writing/Presenting a project report

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. III-SEMESTER
HUMAN VALUES AND PROFESSIONAL VALUES-I

Instruction:1 Hour/ Week	SEE Marks: 35	Course Code: MC300EH
Credits: 1	CIE Marks: 15	Duration of SEE: 2Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to	At the end of this course the student will be able to
<ol style="list-style-type: none">1. Get a holistic perspective of value- based education.2. Grasp the meaning of basic human aspirations vis-a-vis the professional aspirations.3. Understand professionalism in harmony with self and society.4. Develop ethical human conduct and professional competence.5. Enrich their interactions with the world around, both professional and personal.	<ol style="list-style-type: none">1. Gain a world view of the self, the society and the profession.2. Make informed decisions.3. Start exploring themselves in relation to others and their work –constantly evolving into better human beings and professionals4. Inculcate Human values into their profession.5. Validate their aspirations through right understanding of human relationship and see the co-relation between the human values and prevailing problems.6. Strike a balance between physical, mental, emotional and spiritual parts their being.7. Obtain a holistic vision about value-based education and professional ethics.

UNIT-I

A. Human and Ethical values

What are they? --The Indian concept of values-- Modern approach to the study of values - Basis for Moral Judgement--- A new approach to Human Values-- freedom, creativity, love, wisdom, concern.

UNIT-II

Canons of Ethics

Virtue Ethics-- Ethics of Duty-- Ethics of Responsibility-- Factors to be considered in making Ethical Judgments.

UNIT-III

The Value of time

The importance of managing time-- Factors that hinder time management--Benefits of time management-- Using time judiciously-- practical strategies to manage time.

UNIT-IV

The Power of Positive thinking

Nature and Scope of Positive thinking-- Methods to change one's thinking---Strategies to change the cycle of one's thinking.

UNIT-V

The Value of Setting Goals

Goal setting-- Importance of setting goals for oneself—Achieving excellence through SMART goals.

Suggested Books:

1. B.L Bajpai, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.
2. A.N Tripathy, Human values, New Age International Publishers. 2003
3. EG Seebauer & Robert L. Berry, Fundamentals of Ethics for Scientists and Engineers, Oxford University Press, 2000
4. Mike Martin and Ronald Schinzinger "Ethics in Engineering "McGraw Hill
5. Charles E Haris, Micheal J Rabins, " Engineering Ethics "Cengage Learning
6. Caroline Whitback < Ethics in Engineering Practice and Research, Cambridgs University Press
7. Georgs Reynolds, Ethics in Information Technology", Cengage Learning
8. Charles D.Fleddermann, " Engineering Ethics", Pearson Education Prentice Hall, New Jersey,2004 (Indian Reprint)

Online Resources:

- Value Education website, [Http://www.universalhumanvalues.info](http://www.universalhumanvalues.info)
- UPTU webiste, [Http://www.uptu.ac.in](http://www.uptu.ac.in)
- Story of stuff, [Http://www.storyofstuff.com](http://www.storyofstuff.com)
- AlGore, As Inconvenient Truth, Paramount Classics ,USA
- Charlie Chaplin, Modern Times, United Artists, USA
- IIT Delhi, Modern Technology-The Untold story-Anand Gandhi, Right Here Right Now, Cyclewala production

DEPARTMENT OF MATHEMATICS
SYLLABUS FOR BE III SEMESTER
ENGINEERING MATHEMATICS – III

Instruction:3+1 Hrs /week	SEE Marks :70	Course Code : BS310MA
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
<i>The course will enable the students to:</i>	<i>At the end of the course students will be able to:</i>
<ol style="list-style-type: none"> 1. study the Fourier series, conditions for expansion of function and half range series 2. formulate and solve linear and nonlinear partial differential equations and apply partial differential equations to engineering problems viz., wave, heat and Laplace's equations. 3. study the methods to solve equations, apply numerical methods to interpolate, differentiate and integrate functions and to solve differential equations using numerical methods and solve systems of equations. 4. understand Random variables Probability Distributions, Statistics and their applications. 5. understand how to fit a curve to a given data, how Correlation between variables can be measured. 	<ol style="list-style-type: none"> 1. expand any function which is continuous, discontinuous, even or odd in terms of its Fourier series. 2. find the Partial differential equations by eliminating arbitrary constants and functions and solve linear, non linear Partial differential equations and also will be able solve wave, heat and Laplace's equations in engineering problems . 3. Solve algebraic and transcendental equations using Bisection method Regula-Falsi, Newton-Raphson, apply numerical methods to interpolate, differentiate functions, solve systems of equations and solve differential equations using numerical methods. 4. apply various probability distributions to solve practical problems, to estimate unknown parameters of populations and apply the tests of hypotheses. 5. solve problems on how fitting of a curve to given data using curve fitting, and also to find co-efficient of correlation and to determine regression lines and their applications.

UNIT –I

Fourier Series : Introduction to Fourier series –Dirichlet's Conditions- Euler's Formula – Functions of 2π interval – Change of Interval - Fourier series expansions of even and odd functions - Fourier Expansion of Half-range Sine and Cosine series.

UNIT –II

Partial Differential Equations and its Applications: Formation of first and second order Partial Differential Equations - Solution of First Order Equations – Linear Equation - Lagrange’s Equation, Non-linear first order equations - Charpit’s method

Applications of Partial Differential Equations: Method of Separation of Variables - Solution of One Dimensional Heat Equation - One Dimensional Wave Equation – Steady State Two Dimensional Heat Equation.

UNIT-III

Calculus of finite differences: Introduction to difference operator with equal and unequal intervals, interpolation- Newton’s Forward and Backward Interpolation Formulae - Lagrange’s Interpolation Formula - Newton’s Divided Difference Formula - Numerical Differentiation - Interpolation approach- Numerical Solutions of Ordinary Differential Equations, Euler’s Method – Taylor’s series method - Runge - Kutta Method of 4th order (without proofs).

UNIT-IV

Curve Fitting: Curve fitting by the Method of Least Squares - Fitting of Straight line – Regression - Lines of Regression - Correlation – Karl Pearson’s Co-efficient of Correlation.

UNIT-V

Probability and Statistics: Random Variables - Probability Distribution function for Discrete and Continuous Random variables - Expectation – Variance – Moments -Moment Generating Function- Normal Distributions – Testing of Hypothesis - Tests of Significance - t-test - F- test – χ^2 - test for small samples.

Learning Resources:

1. R.K. Jain & S.R.K. Iyengar, “Advanced Engineering Mathematics”, Third Edition, Narosa Publications, 2007.
2. Dr.B.S Grewal, “Higher Engineering Mathematics”, 40th Edition, Khanna Publishers.
3. Kreyszig E, “Advanced Engineering Mathematics”, 8th Edition, John Wiley & Sons Ltd, 2006.
4. N.P.Bali & Manish Goyal, “A text book of Engineering Mathematics” by, Laxmi Publication.
5. S.S.Sastry, “Numerical Analysis” –PHI Learning Ltd.,
6. Gupta & Kapoor , “Fundamentals of Mathematical Statistics”, Sultan chand & sons, New Delhi.

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. III-SEMESTER
THERMODYNAMICS

Instruction:3 Hrs /week	SEE Marks :70	Course Code : ES320ME
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
<p>The objectives of this course are to:</p> <ul style="list-style-type: none">• Acquire knowledge of the fundamentals of thermodynamics and temperature scales• Apply First law of thermodynamics to various thermal engineering devices• Explain second law of thermodynamics and concept of entropy• Explain the various properties of steam• Apply the knowledge of thermodynamics to air standard cycles, vapour power cycle and analyze the properties of gas mixtures.	<p>On completion of the course the student will be able to:</p> <ul style="list-style-type: none">• Apply the knowledge of thermodynamics to temperature scales.• Solve the practical thermodynamic problems by applying first law and steady flow energy equation• Analyze the problems on heat engines, refrigeration and entropy by applying second law of thermodynamics• Evaluate the thermodynamic properties of the steam• Evaluate the performance of air standard cycles and vapor power cycle

UNIT– I

Basics of Thermodynamics: Microscopic and Macroscopic approach of thermodynamics, system, control volume, surroundings and property, intensive and extensive properties, cycle, reversible and irreversible processes, causes of irreversibility, quasi static process, Thermodynamic Equilibrium, Measurement of temperature, Reference points, triple point, Zeroth law of thermodynamics, Temperature Scales, ideal gas and ideal gas thermometer.

UNIT– II

First law of Thermodynamics: Joule’s experiment, Statement of First Law, Heat and work interactions, Thermodynamics work and Internal energy, Energy as property of system, First Law applicable to Closed system, Thermodynamic processes and calculation of work, Heat transfer, and internal energy, Heat as Path Function, First law applicable to open system, steady flow energy equation, PMM-1, limitations of first law.

UNIT– III

Second Law of Thermodynamics: PMM-2, Heat engine, Heat pump and Refrigerator, Physical description of second law, Kelvin– Planck and Clausius statements of Second Law of thermodynamics, Equivalence of Kelvin– Planck and Clausius statements, Carnot Theorems, Carnot cycle and its limitations, Clausius Inequality, Calculation of entropy change during various thermodynamic processes, principle of Entropy increase, T– S diagrams, Concept of exergy and anergy, Helmholtz and Gibb's functions.

UNIT– IV

Thermodynamic properties of Steam: Properties of pure substances, Concept of phase change, Graphical representation of pressure, Volume and Temperature, (PVT), T and H diagrams, Properties of steam, Use of steam Tables and Mollier diagram, Thermodynamic relations involving entropy, Enthalpy, Internal Energy, Maxwell relations and Clapeyron equation.

UNIT– V

Power cycles: Otto, Diesel, Dual Combustion Cycles and their comparison, Brayton Cycle, Simple Rankine cycle –Description and representation on P- V, and T- S diagrams, Thermal efficiency of the cycle.

Mixture of Gases: Mole fraction and mass fraction, Partial pressure and Dalton's Law, Amagat-leduc Law of partial volumes, Relation between partial pressure, mole fraction and volume fraction; Gas constant, molecular mass and specific heats of the gas mixtures; relation between volumetric and gravimetric analysis.

Learning Resources:

1. P.K.Nag, "Engineering Thermodynamics", 5th Edition, McGraw Hill Education, , 2014.
2. Y.Cengel & Boles, "Thermodynamics an Engineering approach", 7th Edition, McGraw Hill, , 2011.
3. E Rathakrishnan, "Fundamentals of Engineering Thermodynamics", Second Edition, PHI, 2013.
4. Y.V.C.Rao, "An Introduction to Thermodynamics", 2nd Edition, University Press, , 2010.
5. PL Ballaney, "Thermal Engineering", Khanna Publishers, New Delhi, 2010.
6. D.S. Kumar, "Engineering Thermodynamics", First Edition, S K Kataria and Sons, 2013.
7. ISI Steam Tables in SI units, Indian Standards Institution, New Delhi, SP:26-1983.

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. III-SEMESTER
METALLURGY AND MATERIAL SCIENCE

Instruction:3 Hrs /week	SEE Marks :70	Course Code : ES330ME
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
<p>The objectives of this course are to:</p> <ul style="list-style-type: none">• describe various crystal defects that occur in metals• identify various types of loading and failures of metals• construct phase diagrams from the given data for various binary alloys• identify and Apply different heat treatment processes to metals• describe the methods of extracting metals	<p>On completion of the course the student will be able to:</p> <ul style="list-style-type: none">• describe the relationship between crystal defects and mechanical properties• estimate the behavior of metals under different loading conditions• explain property changes in metals and alloys using phase diagrams• assess property changes in metals due to different heat treatment processes• apply different methods to extract metals

UNIT – I

Defects in crystals, point, line, surface and volume defects. Mechanisms of plastic deformation: slip and twinning, Effect of dislocations on plastic deformation, Critical resolved shear stress, Hall– Petch equation, cold working and hot working, strain Hardening and Bauchinger effect. Recovery, Recrystallisation, Grain growth and its effect on mechanical properties of metals.

Fracture: Types of fracture in metals, Ductile and brittle fracture, Griffith theory of brittle fracture, crack propagation, modes of fracture, ductile-brittle transition.

UNIT – II

Fatigue: Types of fatigue loading, Experimental determination of fatigue strength (RR– Moore Test), S–N Curve, Structure of fatigue fractured specimen, Effect of metallurgical variables on fatigue of metal, Low cycle fatigue, Cumulative fatigue damage, Factors to be considered for the improvement for the fatigue life.

Creep: Creep Test, Creep curve, Creep strength, Creep deformation mechanisms, difference between creep curve and stress-rupture curve.

Diffusion: Fick’s laws of diffusion, Application of diffusion theory in Mechanical Engineering.

UNIT – III

Structure of Alloys: Construction and interpretation of Thermal equilibrium diagram of binary nonferrous alloys, Study of Eutectic, Eutectoid, Peritectic, Peritectoid and monotectic reactions. Iron– Iron Carbide Equilibrium diagram, Construction and interpretation.

Plain Carbon Steels: types, properties and applications

Cast Irons: types, properties and applications.

UNIT –IV

Heat Treatment: Purpose of heat treatment, Annealing, Normalising, Hardening, Tempering, Construction and interpretation of T.T.T curve. Austempering and Martempering. Case Hardening: Carburising, Nitriding, Carbo–nitriding, Flame Hardening, Induction Hardening, brief introduction of Age Hardening.

UNIT – V

Introduction to Extractive Metallurgy: Method of production of pig Iron by blast furnace, Cast Iron by Cupola furnace, Method of production of steel by Bessemer Converter, L.D. Process, Electric Arc process. Modern steel making process by Electric slag refining, method of production of copper and aluminium.

Alloy Steels: Effects of alloying elements like Nickel, Chromium, Manganese, Silicon and Tungsten and Titanium. Study about Stainless steels, HSS, Maraging steels, Hadfield steel, Brass, Bronze, Invar, Duralumin and Ti Alloy (Ti– 6Al– 4V) – their composition and properties.

Brief introduction to powder metallurgy.

Definition and applications of composite materials.

Learning Resources:

1. V. Raghavan, "Material Science and Engineering", 4th Edition, Prentice Hall of India Ltd., , 1994.
2. S.H. Avner, "Introduction to Physical Metallurgy", 2nd Edition, Tata McGraw Hill, , 1997.
3. William D. Callister and David G. Rethwisch, "Materials Science and Engineering: An Introduction", 9th Edition, John Wiley and Sons Ltd, , 2014
4. S.P. Nayak, "Engineering Metallurgy and Material Science", 6th Edition, Charotar Publishing House, 1995.
5. E. Dieter, "Mechanical Metallurgy", 3rd Edn., Tata McGraw Hill, , 1997
6. William F Smith, Javad Hashemi, Ravi Prakash, "Material Science and Engineering", 5th Edition, McGraw Hill Education, 2014

DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS FOR B.E. III-SEMESTER
MECHANICS OF MATERIALS
(for MECHANICAL ENGINEERING)

Instruction: 3 Hrs /week	SEE Marks : 70	Course Code : ES330CE
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
<p>In this subject the students will</p> <ul style="list-style-type: none">• examine and interpret basic concepts of strength of materials and analyze statically determinate and indeterminate structures to compute axial stresses, strains and deformations.• analyze simple beams subjected to various types of loading and plot shear force and bending moment diagrams analytically and graphically and compute bending stresses.• define and analyze shear stresses in beams and plot shear stress distribution across cross section of beams• define and analyze problem of columns subjected to direct and bending stresses and predict the effect of eccentricity of loading on stresses by solution of numerical examples• investigate the behaviour of thin and thick cylinders subjected to internal and external pressure and apply the concepts to the solution of example problems	<p>Upon the completion of this course students will be able to:</p> <ul style="list-style-type: none">• express his understanding of the basic concepts and principles of strength of materials and solve problems of composite sections for axial stresses and strains and thermal effects and problems of statically determinate and indeterminate structures.• construct shear force and bending moment diagrams for beams subjected to various types of loading (analytically and graphically) and compute stresses and strains in bending and shear in the cross section of beams subjected to transverse loading.• compute direct and bending stresses in columns and beams subjected to eccentric loading.• compute internal forces in space trusses by method of tension coefficients• compute stresses in thin cylinders and thick cylinders subjected to internal and external pressure.

UNIT-I :

Stresses and Strains: Definitions, types of stresses and strains. Elasticity and plasticity. Hooke's law. stress-strain diagrams for engineering materials. Modulus of elasticity. Poisson's ratio. Relationship between elastic constants. Linear and volumetric strains. Bars of uniform strength. Temperature stresses. Compound bars.

UNIT-II :

Shear Force and Bending Moment: Bending moment and shear force diagrams for cantilever, simply supported beams and beams with overhangs carrying point and uniformly distributed loads. Relationship between intensity of loading, shear force and bending moment. Simple theory of bending. Moment of resistance. Modulus of section.

UNIT-III :

Shear Stresses in Beams: Distribution of shear stresses in rectangular, I- and T-, standard steel and hollow sections. Compound stresses, principal stresses and strains. Mohr's circle of stress.

UNIT-IV :

Deflections: Slope and deflections by the method of double integration in cantilever, simply supported beams and beams with overhangs subjected to point loads and uniformly distributed loads.

Torsion: Derivation of torsion formula for circular sections. Torsional stresses, angle of twist, power transmission, effect of combined bending and torsion. Close coiled and laminated springs.

UNIT-V :

Cylinders: Stresses in thin and thick cylinders with internal and external pressures. Hoop and longitudinal stresses. Stresses in compound cylinders.

Direct and bending stresses; Core of rectangular, circular, I- and T-sections.

Columns and Struts: Euler and Rankine formulae for axial load applications. Secant and Perry formulae for eccentrically loaded columns.

Learning Resources :

1. Ferdinand P. Beer, E. Russell Johnston, John T. Dewolf, *Mechanics of Materials*, 2017.
2. Ramamrutham S., Narayanan R., *Strength of Materials*, Dhanpat Rai Publishing Company, 2011.
3. Bansal R.K., *A text book of Strength of Materials*, Laxmi Publications, 2010.

References Books:

1. Rajput R.K., *"Strength of Materials"*, S.Chand Publications, 2006.
2. Junnarkar S.B., *"Mechanics of Structures (Vol-I & II)"*, Charotar Publishing House, Anand, 2002.
3. Pytel and Singer F.L., *"Strength of Materials"*, Harper & Row, New York, 1998.
4. Subramanian R., *"Strength of Materials"*, Oxford University Press, 2010.
5. Hibbeler.R., *"Mechanics of Materials"*, Pearson Publishers, 2017
6. Bhavikatti.S.S, *"Strength of Materials"*, Vikas Publishers, 2013
7. Ferdinand P Beer et. Al., *"Mechanics of Materials"*, McGraw Hill, 2008

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. III-SEMESTER
MACHINE DRAWING

Instruction: 1+2 Hrs /week	SEE Marks :70	Course Code : ES340ME
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
The objectives of this course are to learn: <ul style="list-style-type: none">• Drawing Fundamentals.• Orthographic Projections of machine components.• Geometric proportions of Machine elements.• Preparation of Assembly Drawings	On completion of the course the student will be able to: <ul style="list-style-type: none">• interpret the conventions used in machine drawing and conversion of pictorial views into orthographic views.• sketch the machine elements with suitable proportions.• prepare the assembly drawings from the detailed drawings.

UNIT-I

INTRODUCTION:

Format of drawing sheet, title block and part list, conventions of drawing lines and dimensions, First and third angles projections, scales as per ISO standards, convention for sectional views. Orthographic projections including sectional views of simple machine elements.

UNIT-II

DRAWING OF VARIOUS VIEWS of:

Fastners: Screw threads, metric and BSW threads, square threads and multi start threads. Nuts, bolts, washers, set screws, lock nuts and foundation bolts.

Rivited Joints: Forms and proportions of rivet-heads, different views of riveted lap and butt joints.

Shaft joints: Cotter joint and knuckle joint.

Keys and shaft couplings: Muff, flanged, flexible, universal and oldhams coupling.

Shaft bearing: Solid and bush bearing, plummer block, foot step bearing.

Pipe joints: Flanged joint, socket and spigot joint.

UNIT-III

ASSEMBLY DRAWINGS OF:

Engine parts: Piston, stuffing box, cross head for vertical and horizontal engine, connecting rod, eccentric.

Machine elements: Lathe tail stock, machine vice, single tool post.

Valves: Steam stop valves, safety valves, screw jack.

Learning Resources:

1. N.D. Bhatt, "Machine Drawing", 28th edition, Charotar Publishing house, Anand, New Delhi, 1994.
2. N. Siddeshwar, "Machine Drawing", 5th edition, Tata McGraw Hill Publishing Co. Ltd., 1994
3. K.L. Narayana, P.Kannaiah, K.Venkat Reddy, "Machine Drawing", 2nd edition, New Age International (P) Ltd., 1999.
4. K.C. John, "Text book of Machine Drawing", PHI Learning, 2010.
5. Ajeet Singh, "Machine Drawing includes Autocad", 2nd Edition, McGraw Hill Education, 2014

With effect from the Academic Year 2017-18

DEPARTMENT OF MECHANICAL ENGINEERING SYLLABUS FOR B.E. III-SEMESTER MECHANICS OF FLUIDS

Instruction: 3+1 Hrs /week	SEE Marks :70	Course Code : PC350ME
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
<p>The objectives of this course are to:</p> <ul style="list-style-type: none">• understand properties of fluids and measurement of pressure.• understand the importance of various types of fluid flows• know the dynamics of fluid flows and to underline the principles of conservation equations as applied to fluid motions.• study laminar and turbulent flows through pipes.• study the concepts of boundary layer and possibility of flow separation on different bodies.	<p>On completion of the course the student will be able to:</p> <ul style="list-style-type: none">• calculate the properties of fluid and pressure.• apply mathematical knowledge to predict the characteristics of a fluid flow• analyze fluid flow problems with the use of the momentum and energy equations in engineering applications.• compute pressure gradient in pipe flows.• determine flow rates, pressure changes, minor and major head losses for flows through pipes.

UNIT-I

Properties of fluids: Introduction to Fluid mechanics, definition of fluid and concept of continuum. Fluid properties: mass density specific gravity, specific weight, specific volume, dynamic and kinematic viscosity, problems. Introduction to Non Newtonian fluids, Ideal fluids and real fluids; Vapour pressure, compressibility and elasticity. Surface tension: pressure intensity inside a droplet, soap bubble and liquid jet. Capillarity in circular tubes, problems.

Fluid Statics: Fluid pressure at a point, Pascal law, simple problems. Atmospheric pressure, absolute, gauge and vacuum pressure, measurement of pressure: Manometers-simple manometers: piezometer, U-tube manometer, single column manometer. Differential manometers: Inverted U tube manometer, U tube differential manometer, micro-manometer, problems.

UNIT-II

Fluid Kinematics: Description of fluid flow: Lagrangian approach and Eulerian approach; Dimensions of flow: one, two and three dimensional flow, Classification of fluid flow: steady and unsteady, uniform and non-uniform flow. Velocity of fluid particles, Acceleration in a fluid flow: Local acceleration, convective acceleration and total acceleration, problems. Description of the flow pattern: Stream line, equation of stream line, stream surface, stream tube, path line, equation of path line, definition of streak line, problems. Rotational and irrotational motions: Linear translation, Linear deformation, angular deformation pure rotation, problems. velocity potential, Laplace equation, stream function, Poissons equation, problems. Equipotential line and definition of flow net.

UNIT-III

Fluid Dynamics: Basics of fluid flow: principle of conservation of mass, momentum and energy. continuity equation, derivation of continuity equation in Cartesian co ordinates. Continuity equation in two and one dimensional flows, problems. Introduction to forces acting in fluid motion. Derivation of Eulers equation of motion in Cartesian coordiante system. Introduction to Bernoullies equation. Derivation of Bernoullies equation from Eulers equation. Applications of Bernoullies equation: Venturiemeter, Orificemeter and pitot tube. Principle of Impulse momentum equation, Application of impulse momentum equation: forces on a pipe bend.

UNIT-IV :

Laminar Flow in Pipes : Introduction, Definition of laminar and turbulent flow. Reynolds experiment, Reynold's number and its significance, Upper and

lower critical values of Reynold's numbers; Relation between shear and pressure gradient in laminar flow. Steady laminar flow in circular pipes, Derivation of Hagen-poiseuille law, problems.

Turbulent flow in pipes:

Introduction to turbulent flow, Loss head due to Friction in Pipe Flow – Darcy Equation; Characteristics of Turbulent Flow.

UNIT-V :

Flow through pipes : Introduction, Loss of energy in pipes, Major energy losses in pipe - Darcy Weisbach equation. Estimation of Darcy's friction factor. Empirical formulae and Moody's chart; Minor losses in pipes and equations, problems. Hydraulic grade line and energy grade line, problems.

Boundary layer: Introduction to boundary layer, Boundary layer along a thin flat plate and its characteristics. Derivation of boundary layer thickness, momentum thickness and energy thickness, problems. Boundary layer separation and effect of pressure gradient. Flow around a cylinder at rest, Methods of controlling boundary layer. Fluid flow over an aerofoil, lift and drag forces and coefficients.

Learning Resources:

1. Modi P.N. and Seth S.M., "*Hydraulics and Fluid Mechanics including Hydraulics Machines*", Standard Book House, Delhi, 2015.
2. Dr. D.S. Kumar, "*Fluid Mechanics and Fluid Power Engineering*" S.K. Kataria & Sons, Re-print 2014
3. Frank M White, "*Fluid Mechanics*", Tata McGraw-Hill, 7th Edition, 2012
4. Robert W. Fox, Philip J. Pritchard, Alan T. McDonald "*Introduction to Fluid Mechanics*", Wiley India Edition. (Wiley Student Edition Seventh 2011).
5. Bansal R.K., "*Fluid Mechanics and Hydraulic Machines*", Lakshmi Publications, 2010.

Web Resources:

1. <http://nptel.ac.in/courses/112105171/>
2. <http://nptel.ac.in/courses/112106190/>
3. <http://nptel.ac.in/video.php?subjectId=105101082>
4. <http://web.mit.edu/hml/ncfmf.html>
5. http://ocw.uci.edu/courses/engineering_mae_130a_intro_to_fluid_mechanics.html

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. III-SEMESTER
METALLURGY LABORATORY

Instruction: 2 Hrs /week	SEE Marks :50	Course Code : ES331ME
Credits : 1	CIE Marks: 25	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
<p>The course will enable the students to:</p> <ul style="list-style-type: none">• outline the general procedure followed for preparation of the metallographic samples• prepare metallographic samples for observation• identify micro structures of various samples of metals• conduct heat treatment for steel samples• examine micro structures using metal analyzer	<p>At the end of the course students should be able to:</p> <ul style="list-style-type: none">• describe the relationship between microstructure and properties of various metals• assess property changes in steels due to different heat treatment processes

List of Experiments:

1. Study of General Procedure for Specimen preparation and Metallurgical Microscope.
2. Preparation of Mounted samples with the help of mounting press
3. Metallographic study and analysis of Low Carbon Steel
4. Metallographic study and analysis of Medium Carbon Steel
5. Metallographic study and analysis of High Carbon Steel
6. Metallographic study and analysis of Gray Cast Iron
7. Metallographic study and analysis of Spheroidal cast iron
8. Metallographic study and analysis of Stainless steel
9. Metallographic study and analysis of α - Brass
10. •Metallographic study and analysis of α - β - Brass
11. Metallographic study and analysis of Bronze
12. Study of effect on Hardness of plain carbon steel before and after the following Processes: Annealing and Normalizing
13. Study of effect on Hardness of plain carbon steel before and after the following Processes: Hardening, Hardening and Tempering
14. Measurement of hardenability using Jominy End Quench Test
15. Study of Microstructure characteristic by Image Analyzer.

Note: Minimum 12 experiments to be conducted

DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS FOR B.E. III-SEMESTER
MECHANICS OF MATERIALS LAB

Instruction: 2 Hrs /week	SEE Marks :50	Course Code : ES331CE
Credits : 1	CIE Marks: 25	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
In this subject the students will <ul style="list-style-type: none">determine the properties of materials under the action of various loads.learn the ability to work in a team and make effective presentations.	Upon the completion of this course students will be able to: <ul style="list-style-type: none">determine young's modulus of materials of beams by conducting deflection test.assess the quality of materials by conducting hardness test and impact test.learn the operation of universal testing machine (UTM).determining modulus of rigidity of materials by conducting torsion test and spring test.practice working as a team member and make effective presentations.

1. Determination of Young's modulus by conducting Deflection test on cantilever beam
2. Determination of Young's modulus by conducting Deflection test on simply supported beam
3. Izod Impact test
4. Direct tension test on metal rods
5. Brinell's and Rockwell's hardness tests
6. Compression test on brittle and ductile materials
7. Determination of modulus of rigidity by conducting tension test on a helical spring
8. Determination of modulus of rigidity by conducting compression test on a helical spring
9. Determination of modulus of rigidity by conducting torsion test
10. Determination of modulus of elasticity by conducting deflection test on fixed beam
11. Determination of modulus of elasticity by conducting deflection test on continuous beam
12. Bend test on metal rod

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. III SEMESTER
BASIC MECHANICAL ENGINEERING (Open Elective)
(for other Departments)

Instruction : 2 Hours/week	SEE Marks : 70	Course Code : : OE300ME
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The course will enable the students to: <ul style="list-style-type: none">Learn the basic principles of Mechanical Engineering in the areas of Heat transfer, Refrigeration, power generating, transmission systems and Manufacturing processes.	At the end of the course students should be able to: <ul style="list-style-type: none">understand the modes of heat transfer and different types heat exchangers.know the principles of refrigeration and psychrometry.study the basic manufacturing processes.learn the principles of power generation and transmission systems.

UNIT– I

Heat Transfer: Basic modes of heat transfer, Fourier’s law of conduction, Newton’s Law of cooling, Stefan– Boltzman Law of radiation and one dimensional steady state conduction heat transfer through plane walls without heat generation.

Heat Exchangers: classification and applications of heat exchangers in industry, derivation of LMTD in parallel and counter– flow heat exchangers and problems.

UNIT– II

IC Engines: Working of Four Stroke and Two Stroke Petrol and Diesel Engine with p– V diagrams, Valve timing diagram, Calculation of Indicated power, Brake power, Specific Fuel Consumption, Mechanical and Thermal efficiencies.

Gas Turbines: Classification, calculation of efficiency of simple open gas turbine cycle (Joule cycle/Brayton cycle) and applications.

UNIT– III

Refrigeration: Types of Refrigeration systems–Air Refrigeration system, vapor compression system, COP and representation of cycle on T-S and p-h diagrams, Types and properties of refrigerants, eco– friendly refrigerants, Introduction to Psychrometry and Psychrometry processes.

UNIT– IV

Manufacturing Processes: Welding, Brazing, Soldering, brief description of process and parameters, associated principles of gas welding, arc welding.

Principles and Applications of basic Machine Processes: Turning, Drilling and Shaping.

Introduction to Additive Manufacturing and its applications.

UNIT– V

Gears: Classification of gears, nomenclature, **Gear Trains:** Simple, compound, inverted and epi– cycle gear trains.

Belt and Rope drives: Open and crossed belt drives, Length of belt, Ratio of tensions of flat belt-simple numerical problems.

Learning Resources:

1. RK Rajput, "Thermal Engineering", Laxmi Publications, 2005
2. C. Sachdeva, "Fundamentals of Engineering heat and mass transfer", Wiley Eastern Ltd., 2004.
3. PN Rao, "Manufacturing Technology, Vol. 1 & 2", Tata McGraw hill Publishing Co., 2010.
4. Thomas Bevan, "Theory of Machines", CBS Publishers, 1995.
5. V K Manglik, "Elements of Mechanical Engineering", PHI Learning Pvt Ltd, 2013
6. Chua CK, Leong K.F, "Rapid Prototyping Principles – Principles and applications in Manufacturing", 3rd Edition, Cambridge University Press India Private Limited, 2000

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. III SEMESTER
MECHANICAL TECHNOLOGY (Open Elective)
(for other Departments)

Instruction : 2 Hours/week	SEE Marks : 70	Course Code : : OE310ME
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The objective of this course are to: <ul style="list-style-type: none">• learn the basic principles of excavating equipment, conveying equipment hoisting equipment, concrete producing equipment and pneumatic equipment	On completion of the course the student will be able to: <ul style="list-style-type: none">• demonstrate the applications of earth moving equipments .• determine the working principles and applications of conveying equipment & hoisting equipment.• determine the mechanism involved in concrete producing equipments and pneumatic equipment.

UNIT-I

Excavating Equipment: General description, operation, maintenance and selection of the following: Earth moving and Excavating Equipment: Shovels, Dragline, Clamshell, Cable excavator, Bucket wheel excavator, Tractor, Bulldozer, Scraper, Trenchers, Grader, Earth Compactors.

UNIT-II

Conveying Equipment: Belt conveyor, Screw Conveyor, Bucket Conveyor, Apron Conveyor, Aerial Ropeway.

UNIT-III

Hoisting Equipment: Hoist winch. Differential and Worm geared chain hoists. Fork lift trucks, Guyed and stiffly derricks, swing and non– swing mobile crane, whirler crane, Construction elevator, passenger lift and Bucket elevators.

UNIT– IV

Aggregate and Concrete Producing Equipment: Crushers – Jaw, Gyratory, Hammer and Roll Crushers, Screens – Stationary, Shaking and Vibrating screens. Concrete mixers and Concrete pumps.

UNIT-V

Pneumatic Equipment: Reciprocating air– compressor, construction pneumatic tools; jack hammer, paving breaker, Rock drill, concrete vibrator.

Learning Resources:

1. R.L. Peurifoy, "Construction Planning Equipment and Methods", 7th Ed., McGraw-Hill Publishers, 1956
2. Mahesh Varma, "Construction Equipment and its planning and application", Metropolitan books Co, Delhi, 2004
3. Goodes Spence, "Building and Civil Engineering Plant", Crosby Lock Wood, 1995

VASAVI COLLEGE OF ENGINEERING(AUTONOMOUS)
DEPARTMENT OF MECHANICAL ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATION
WITH EFFECT FROM THE ACADEMIC YEAR 2017-18

Course Code	B.E IV SEMESTER (CBCS)									Credits
	Course	Scheme of Instruction Hours per week				Scheme of Examination				
		L	T	D	P	Duration Hours	Max. Marks			
						SEE	CIE			
OE4xxxx	Open Elective - II	1	0	0	0	2	35	15	1	
OE4xxxx	Open Elective - III	2	0	0	0	3	70	30	2	
HS410EH	FS-II : Communication Skills in English-II	2	2	0	0	3	70	30	2	
BS410MA	Engineering Mathematics - IV	3	1	0	0	3	70	30	3	
MC320CE	Environmental Science (Civil, CSE, Mech)	2	1	0	0	3	70	30	2	
ES410EE	Basics of Electrical and Electronics Engg.	2	1	0	0	3	70	30	2	
PC410ME	Applied Thermodynamics	3	0	0	0	3	70	30	3	
PC420ME	Kinematics of Machines	3	1	0	0	3	70	30	3	
PC430ME	Design of Machine Elements	3	1	0	0	3	70	30	3	
LABS										
PC411ME	Applied Thermodynamics Lab	0	0	0	2	3	50	25	1	
ES411EE	Electrical and Electronics Engg. Lab	0	0	0	2	3	50	25	1	
Total		21	7	0	4	-	695	305	23	
Marks Grand Total		32					1000			
OPEN ELECTIVES FOR OTHER DEPARTMENTS										
OE400ME	Cooling of Computers and Electronic Equipment	2	0	0	0	3	70	30	2	
OE410ME	Value Engineering and Analysis	2	0	0	0	3	70	30	2	

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
FS-II: COMMUNICATION SKILLS IN ENGLISH-II
SYLLABUS FOR B.E. IV-SEMESTER

Instruction: 2+2 Hrs/ Week	SEE Marks: 70	Course Code: HS410EH
Credits: 2	CIE Marks: 30	Duration of SEE: 3 Hrs

Course Objective	Course Outcomes
<ol style="list-style-type: none">1. identify the various features and functions of human language and communication.2. develop the habit of listening effectively so as to analyze the speaker's tone and tenor.3. choose appropriate words so as to speak and write accurately.4. read various types of texts and sift information correctly.5. study organizational structures and behavioral patterns and adapt appropriately.	<ol style="list-style-type: none">1. Participate in group and forum discussions by providing factual information, possible solutions, and examples.2. Debate on a topic by picking up the key points from the arguments placed.3. Provide logical conclusions to the topics under discussion.2. Prepare, present, and analyze reports.3. choose appropriate words and tone to present accurate, specific, and factual reports.4. Compose a summary of beginning high level reading text that identifies the thesis and key supporting details.5. Summarize with 70% comprehension..6. Apply reading skills, including how to approach different types of literature.

UNIT I: PROFESSIONAL DISCUSSIONS AND DEBATES

Competencies:

- Analytical and Probing Skills
- Interpersonal Skills

Topics Covered:

Discussing

Debating

Topic Level Details

Discussing

Competencies:

- Thinking
- Assimilating

Debating

Competencies:

- Comprehending key points of the debate and note decisive points including supporting details.

- Construct a logical chain of arguments and decisive points.
- Writing a review about a product by providing reasons, causes, and effects

UNIT II: DRAWING CONCLUSIONS

Competencies:

- Reasoning skills - Coherent and logical thinking
- Reporting and Analyzing skills.

Topics Covered:

How to draw conclusions

Importance of Logic

Topic Level Details:

Drawing conclusions

Competencies:

- Analyzing the points discussed.
- Connecting all points without gaps.
- Identifying clinchers.
- Communicating the decisions

UNIT III - REPORTING

Competencies:

- Reporting an incident
- Writing/Presenting a project report

UNIT IV - READING FOR CONTEXT

Competencies

Develop metacognitive strategies

Topics covered

Develop critical reading skills:

- Recognition of author's purpose
- Awareness of stylistic differences
- Discernment of fact and opinion
- Evaluation of fact and opinion
- Recognition of propaganda techniques
- Present vocabulary building methods
- Use comprehension and vocabulary strategies to raise reading rate.

UNIT V- SOFT-SKILLS

1. Professional integrity
2. Managing time
3. Coping with stress
4. Organizational skills

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF MATHEMATICS
SYLLABUS FOR B.E. IV-SEMESTER
ENGINEERING MATHEMATICS – IV

Instruction: 3+1 Hrs/week	SEE Marks :70	Course Code : BS410MA
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
<i>The course will enable the students to:</i>	<i>At the end of the course students will be able to:</i>
<ol style="list-style-type: none"> 1. understand the Definition of Laplace and inverse Laplace Transforms-Shifting Properties and various theorems and how to apply them in solving Differential Equations. 2. analyze the characteristics and properties of Z-transforms and solve the Difference Equations. 3. study the concept of Fourier and inverse Fourier Transform of a function and various properties. 4. understand the Analytic functions, to evaluate a line integral of a function of a complex variable using Cauchy's integral formula, to evaluate real integrals using complex integration and how to evaluate Laurent Series and residues. 	<ol style="list-style-type: none"> 1. evaluate Laplace transforms and inverse Laplace transforms of functions. Apply Laplace transforms to solve ordinary differential equations arising in engineering problems. 2. apply Z-transform in the analysis of continuous time and discrete time systems and also solve the Difference Equations using Z-transform. 3. determine Fourier transform, Fourier sine and cosine transform of a function. 4. know the condition(s) for a complex variable function to be analytic and/or harmonic and state and prove the Cauchy Riemann Equation and use it to show that a function is analytic and to define singularities of a function, know the different types of singularities, evaluate contour integrals using the Cauchy Integral Theorem and the Cauchy Integral Formula and will be able to determine transformation in a complex space.

UNIT- I

Laplace Transforms: Introduction to Integral Transformation- Laplace transforms - Inverse Laplace transform - Sufficient Condition for Existence of Laplace Transform - Laplace Transform of Derivatives - Laplace Transform of Integrals –Translation theorems-First shifting theorem – Unit step function- Second shifting theorem – Differentiation of Laplace transform – Integration of Laplace transform - Convolution Theorem - Application of Laplace transforms to Initial value problems.

UNIT –II

Fourier Transforms: Fourier Integral Theorem(without proof) - Fourier Transforms – Inverse Fourier Transform - Properties of Fourier Transform –Fourier Cosine & Sine Transforms - Convolution Theorem.

UNIT-III

Z-Transforms: Introduction - Z-transforms of Standard sequences - Linearity Property – Scaling Property - Shifting Properties- Initial and Final value theorems – Differentiation of Z-transform - Inverse Z-Transforms-Convolution Theorem – Application of Z-Transforms to solve Difference Equations.

UNIT-IV

Functions of Complex Variables: Limits and Continuity of function - Differentiability and Analyticity - Necessary & Sufficient Condition for a Function to be Analytic - Cauchy-Riemann Equations in Cartesian & Polar Form - Milne-Thomson's method - Harmonic Functions - Complex Integration - Cauchy's Theorem - Extension of Cauchy's Theorem for multiply connected regions- Cauchy's Integral Formula.

UNIT-V

Power series - Taylor's Series - Laurent's Series (without proofs) - Zeros and Singularities –Residues – Cauchy's Residue Theorem -Evaluation of Real Definite Integrals Involving Trigonometric functions and improper integrals of the form $\int_{-\infty}^{\infty} f(x) dx$ using Residue Theorem .

Text Books:

1. R.K.Jain & S.R.K.Iyengar, "Advanced Engineering Mathematics" - 3rd Edition, Narosa Publications
2. Dr.B.S Grewal , "Higher Engineering Mathematics", 40th Edition, Khanna Publishers.
3. Goyal & Gupta, "Laplace's and Fourier transforms", Pragati prakashan

Reference books:

1. Kreyszig E, "Advanced Engineering Mathematics", 8 th Edition, John Wiley & Sons Ltd, 2006.
2. N.P.Bali & Manish Goyal, "A text book of Engineering Mathematics" Laxmi Publication.
3. H.K. Dass, Er.Rajnish Verma, "Higher Engineering Mathematics", S.Chand & company Ltd, 2011
4. R.V. Churchill, "Complex Variables & its Applications".Mc Graw-Hill Book Company, INC.

**DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS FOR BE IV SEMESTER
ENVIRONMENTAL SCIENCE**

Instruction: 2+1 Hrs /week	SEE Marks :70	Course Code : MC320CE
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
<i>The objective of this course is to</i>	<i>Upon the completion of this course students will be able to</i>
<ul style="list-style-type: none"> • Describe various types of natural resources available on the earth surface. • Explain the concepts of an ecosystem and the biotic and abiotic components of various aquatic ecosystems. • Identify the values, threats of biodiversity, endangered and endemic species of India along with the conservation of biodiversity. • Explain the causes, effects and control measures of various types of environmental pollutions. • Describe the methods for water conservation, the causes, effects of global warming, climate change, acid rain, ozone layer depletion, various types of disasters and their mitigation measures. 	<ol style="list-style-type: none"> 1. Describe the various types of natural resources. 2. Differentiate between various biotic and abiotic components of ecosystem. 3. Examine the values, threats of biodiversity, the methods of conservation, endangered and endemic species of India. 4. Illustrate causes, effects, control measures of various types of environmental pollutions. 5. Explain the methods of water conservation, causes, effects of climate change, global warming, acid rain and ozone layer depletion, various types of disasters and their mitigation measures.

UNIT-I

Environmental Studies: Definition, importance of environmental studies. Natural resources: Water resources; floods, drought, conflicts over water, dams-benefits and problems. Food resources; Effects of modern agriculture, fertilizer-pesticide problems, water logging salinity. Energy resources: Renewable and non-renewable energy resources. Land Resources, soil erosion and desertification.

UNIT-II

Ecosystems: Structure and function of an ecosystem, producers, consumers and decomposers, food chains, food webs, ecological pyramids, aquatic ecosystem (ponds, oceans, estuaries).

UNIT-III

Biodiversity: Genetic species and ecosystem diversity. Values of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

UNIT-IV

Environmental Pollution: Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution and solid waste & e-waste management.

UNIT-V

Social Aspects and the Environment: Water conservation, Climate change, global warming, acid rain, ozone layer depletion. Environmental Impact Assessment, population explosion.

Suggested Books:

1. Deswal S. and Deswal A., "A Basic Course on Environmental studies", Dhanpat Rai & Co Pvt. Ltd. 2013.
2. Benny Joseph, "Environmental Studies", Tata McGraw-Hill, 2006.
3. Suresh K. Dhameja, "Environmental Studies", S.K. Kataria & Sons, 2010.

References Books:

1. De A.K., "Environmental Chemistry", New Age International, 2003.
2. Odum E.P., "Fundamentals of Ecology", W.B. Saunders Co., USA, 2004.
3. Sharma V.K., "Disaster Management", National Centre for Disaster Management, IPE, Delhi, 2013.
4. Rajagopalan R., "Environmental Studies", Second Edition, Oxford University Press, 2013.

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. IV-SEMESTER
BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Instruction: 2+1 Hrs /week	SEE Marks :70	Course Code : ES410EE
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objective	Course Outcomes
The aim of this course is to provide an understanding of Electronic Devices, Linear and Digital circuits, enhancing the ability to solve the problems using fundamental concepts of AC circuits, three phase connections, principle of operation of Transformers, DC machines and AC machines.	At the end of the course, the student will be able to: <ol style="list-style-type: none">1. apply the fundamental concepts to solve the problems in single phase and 3 phase AC circuits.2. analyze the behaviour of transformer and demonstrate the principle of operation and performance characteristics of DC Machines.3. select suitable three phase induction motor and also interpret speed control method for different applications.4. understand the Electronic devices, Operational Amplifier Fundamentals & OP-AMP Linear Applications.5. understand the number system, different codes, and code conversion and Design different combinational circuits.

Unit – I Electric Circuits:

Ohm's law, KCL, KVL, single phase AC circuit fundamentals, power, power factor, 3 phase AC circuits – star and delta Connection.

Unit – II DC & AC Machines:

DC motor: construction and principle of operation, classification, back emf, torque equation, speed torque characteristics, losses and efficiency, speed control of DC motor, applications.

3 – ϕ Induction Motor: construction, principle of operation, torque equation, speed torque characteristics.

1- ϕ Induction Motor: operating principle of split phase induction motor.

Single phase Transformers: Types of transformer, construction and working principle.

Unit – III Electronic Devices and Circuits:

Operation and V–I characteristics of PN junction diode, BJT, MOSFET and

SCR, applications.

Half wave and full wave uncontrolled rectifier, basic filters.

Unit – IV Linear Integrated Circuits:

Operational amplifiers, ideal op – amp characteristics, inverting and non-inverting amplifier. Op – amp applications: adder, subtractor, integrator, differentiator, comparator, zero crossing detector, 555 Timer IC – astable mode.

Unit – V Digital Electronics:

Number systems, logic gates, half adder, full adder, parallel adder/subtractor, flip flops – RS, JK, T and D.

Suggested Reading:

1. Mehta.V.K and Rohit Mehta, "Principles of Electrical Engineering and Electronics", S.Chand & Co. Limited., New Delhi, 2006.
2. Muthusubramanian.R, Salivahanan.S and Muraleedharan.K.A, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw-Hill Publishers, 2006.
3. Murugesk Kumar.K, "Basic Electrical Science and Technology", Vikas Publishing Limited, 2011.
4. Roy Choudhury and Shail Jain, "Linear Integrated Circuits", New Age International Limited, 2003.
5. Leach.D. P, Malvino.A.P and Goutam Saha, "Digital Principles and Applications", Tata McGraw – Hill, 2008.

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. IV-SEMESTER
APPLIED THERMODYNAMICS

Instruction: 3Hrs /week	SEE Marks :70	Course Code : PC410ME
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
<p>The objectives of this course are to:</p> <ul style="list-style-type: none">• Describe the types and working principle of reciprocating air compressors• Explain the construction and working principles of internal combustion engines and discuss the combustion phenomenon in petrol and diesel engines• Classify and explain the working principles of steam boilers and condensers• Analyze vapour power cycles and steam nozzles.	<p>On completion of the course the student will be able to:</p> <ul style="list-style-type: none">• Analyze the performance of air compressors and solve numericals related to the performance of single stage and multi stage air compressors• Describe the various cooling, lubrication, ignition & fuel supply systems and evaluate the performance parameters of internal combustion engines• Discuss various stages of combustion phenomena in I.C. Engines• Explain the working principles of different boilers and condensers• Analyze the performance of vapour power cycles cycle and steam nozzles

UNIT – I

Reciprocating Air Compressors: Uses of compressed air, Classification of compressors-single stage and multistage compressors, Derivation of work done with and without clearance volume, Work done of multistage compressors-effect of clearance volume on work done -Inter-cooling and After-cooling

UNIT-II

Internal Combustion Engines : Classification of IC engines, working principle of 2 stroke, 4 stroke SI and CI engines, Valve and Port-timing diagrams, Deviation of actual cycles from air standard cycles,

Engine systems: Battery and Magneto ignition systems, working principle of simple carburettor and its limitations, Multipoint fuel injection system, Lubrication systems, cooling systems.

Performance of I.C Engines: Determination of Indicated power, brake power, frictional power, brake thermal efficiency, mechanical efficiency, indicated thermal efficiency, relative efficiency, volumetric efficiency, specific fuel consumption based on brake power and indicated power, Heat balance sheet.

UNIT-III

Combustion in I.C. Engines: Normal and abnormal Combustion phenomena in spark ignition engines and compression ignition engines, Effect of engine variables on stages of combustion and knocking, Fuel requirements and fuel rating- Anti-knock additives: merits and demerits, Types of combustion chambers in spark ignition and compression ignition engines, Air pollution from IC engines- Effects and control of exhaust from engines.

UNIT – IV

Steam Boilers: Classification of boilers-Fire tube boilers- Cochran boiler, Water tube boilers-Babcock and Wilcox boiler, super critical boilers-Benson, Fluidized bed combustion boilers, Boiler mountings and accessories. Boiler performance, boiler draught, Types of condensers Jet and Surface condensers, introduction to cooling towers.

UNIT-V

Steam power plant: Working of Carnot and Rankine cycles, cycle analysis, Modified Rankine cycle, Cycle efficiency improvement methods: Reheating and Regeneration; Cogeneration.

Steam nozzles: Types of nozzles, Nozzle efficiency, Velocity of steam flowing through the nozzle. Mass of steam discharged from the nozzle, Condition for maximum discharge, Critical pressure ratio. Diameters of nozzle throat and exit for maximum discharge.

Learning Resources:

1. Eastop. T.D.,Mc Conkey. A, " Applied Thermodynamics for Engineering Technologists", Pearson Education, New Delhi, 2004.
2. Heywood. J.B, "*Internal Combustion Engine Fundamentals* ", Tata McGraw Education Pvt. Ltd., New Delhi 2011.
3. Ganeshan.V, "*Internal Combustion Engines*", Tata McGraw- Hill Education Pvt. Ltd., New Delhi, 2010.
4. Ballaney. P.L, "*Thermal Engineering*", Khanna Publishers, New Delhi, 2010.
5. Rajput. R. K, "*Thermal Engineering*"Laxmi Publishers, New Delhi, 2004.
6. Mahesh M Rathor, "*Thermal Engineering*"Tata McGraw Education Pvt. Ltd., New Delhi 2010.
7. ISI Steam Tables in SI units, Indian Standards Institution, New Delhi, SP:26-1983.

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. IV-SEMESTER
KINEMATICS OF MACHINES

Instruction: 3+1Hrs /week	SEE Marks :70	Course Code : PC420ME
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
The course will enable the students to: <ul style="list-style-type: none">• learn the graphical and analytical methods to perform kinematic analysis of planar mechanisms and to analyze the motion transmission between elements using lower and higher pairs.	At the end of the course students shall be able to: <ul style="list-style-type: none">• recognize the mobility of mechanisms• perform kinematic analysis of planar mechanisms• design the cam profile for given required motion of the follower.• Analyze the motion transmission by using belt drive.• Analyze the motion transmission by using gear drive.

UNIT– I

Definitions: Kinematic link, pair, chain, mechanism and machine. Classification of links, pairs. Degrees of freedom of mechanisms, coupler curves and their properties.

Inversions: Quadric cycle chain, single and double slider crank chains.

Steering gear mechanisms: Davis and Ackerman.

UNIT– II

Analysis of Mechanisms: Velocity analysis: Graphical Relative velocity and Instantaneous centre methods.

Acceleration analysis: Graphical method for different mechanisms including coriolis component of acceleration

Kinematic analysis of four bar and slider crank mechanisms using analytical method

Synthesis: Four bar mechanism using Freudenstein's method.

UNIT– III

Cams: Types of Cams and followers, Nomenclature of cam. Displacement diagrams for followers: uniform velocity, parabolic, simple Harmonic and cycloidal motions. Layout of cam profiles for translating motion - knife edge, flat and roller followers and for oscillating motion - roller follower.

UNIT– IV

Belt drives: Flat, V-belt and rope: Open and cross belt drives, Length of belt, Ratio of tensions, Effect of Centrifugal tension and initial tension over power transmission, Conditions for maximum power.

Chain drives: classification, length, velocity ratio.

UNIT– V

Gears: Classification of gears.

Spur Gears: Nomenclature, Law of gear tooth action.

Form of teeth: cycloidal and involute profiles. Expressions for velocity of sliding between teeth, arc of contact and contact ratio. Interference of involute gears, minimum number of teeth to avoid interference.

Gear trains: Simple, Compound, Reverted and epi-cyclic Gear Trains.

Learning Resources:

1. Thomas Bevan, "Theory of Machines", 3rd Ed, CBS Publishers, 2005.
2. R.L.Norton, "Kinematics and Dynamics of machinery", 1st Ed., Tata McGraw -Hill, 2009
3. J.E.Shigley, "Theory of Machines", 4th Ed., Oxford University press, 2015.
4. S.S. Ratan, "Theory of Machines", 3rd Ed., Tata McGraw-Hill, 2014.
5. Amitabha Ghosh and Asok Kumar Mallik, "Theory of Machines", 3rd Ed. East West Press, 2006

Web resources:

1. www.journals.elsevier.com/mechanism-and-machine-theory
2. www.nptel.ac.in

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. IV-SEMESTER
DESIGN OF MACHINE ELEMENTS

Instruction: 3+1 Hrs /week	SEE Marks :70	Course Code : PC430ME
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course objectives	Course Out comes
<p>The objectives of this course are to :</p> <ul style="list-style-type: none">• understand the stresses in machine members due to various types of loads and failure of components according to theories of failures.• analyze the components under variable loading for infinite and finite life.• design of machine elements under torsion, bending, axial loads and a combination of these.• design of various joints for a given load.	<p>On completion of the course the student will be able to:</p> <ul style="list-style-type: none">• select the proper material for the machine component based on theories of failure and estimate the factor of safety.• determine the sizes under different types of fatigue loads and estimate the life of the components.• calculate the size of machine elements for transmitting torque, bending moment and axial loads.• identify the type of joints and fasteners required for a given application.• predict the type of failure and estimate the efficiency of various joints.

UNIT-I

Design considerations of Machine Elements. Materials used in machine design and their specifications according to Indian Standards. Codes and standards used in design. Important mechanical properties of materials used in design. Preferred numbers. Manufacturing considerations in design. Review of types of loads and simple stresses. Stresses due to Bi-axial and Tri-axial loads. Factor of safety. Theories of failures. Design of components subjected to impact loading.

UNIT-II

Design for Fatigue: Fluctuating stresses, fatigue strength and endurance limit Stress concentration factor and Notch sensitivity. Factors affecting fatigue strength. S-N diagram, Soderberg and Modified Goodman's diagrams for fatigue design. Cumulative fatigue - Miner's rule.

UNIT-III

Design of shafts: solid, hollow and splined shafts under torsion and bending loads. ASME code for design of shafts. Design of keys. Design of couplings - Muff, Split muff, Flange, Flexible, Marine type couplings. Design of pulleys and chain drives.

UNIT-IV

Design of Bolts and nuts, locking devices for nuts, bolts of uniform strength, bolted joints under eccentric loads.
Design of Cotter and Knuckle joints.

UNIT-V

Design of Screws: Design of power Screws and screw jack. Differential and Compound Screws.
Design of rivetted and welded joints under direct and eccentric loads.

Note: Use of Design Data book is permitted.

Learning Resources:

1. M.F. Spotts, "*Design of Machine Elements*", 7th Ed., Pearson Education, 2003.
2. V. B. Bhandari, "*Design of Machine Elements*", 3rd Ed., Tata McGraw-Hill, 2010.
3. P.C. Sharma & D.K. Aggarwal, "*Machine Design*", 10th Ed., S.K. Kataria & Sons, 2003.
4. J.E. Shigley & Charles R. Mischke "*Mechanical Engineering Design*", 6th Ed., Tata McGraw-Hill, 2010.
5. N.C. Pandya and C.S. Shah, "*Machine Design*", Charotar publishing House, 2006.

Design Data Book:

S.Md.Jalaludeen, "Design data Hand Book", Anuradha publications.

Online Resources:

<http://nptel.ac.in/courses/112105124>

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. IV-SEMESTER
APPLIED THERMODYNAMICS LABORATORY

Instruction: 2Hrs /week	SEE Marks :50	Course Code : PC411ME
Credits : 1	CIE Marks: 25	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
<p>The objectives of this course are to:</p> <ul style="list-style-type: none">• perform experiments on various types of I.C. Engines and two stage air compressor.• conduct experiments on Viscometer and flash and fire point apparatus	<p>On completion of the course the student will be able to:</p> <ul style="list-style-type: none">• determine volumetric efficiency and isothermal efficiency of a two stage air compressor.• draw port timing diagram of two stroke engine valve timing diagram of four stroke engine• evaluate the performance of internal combustion engines• prepare heat balance sheet of internal combustion engine• determine absolute and kinematic viscosity of a given lubricating oil using Viscometer

List of Experiments:

1. To determine volumetric efficiency, isothermal efficiency and mass flow rate of a two stage reciprocating air compressor.
2. To determine valve/ port timing diagram of a Petrol/Diesel engine.
3. To conduct performance test on single cylinder Diesel engine.
4. To conduct heat balance test on a Diesel engine.
5. To conduct performance test on multi cylinder Petrol engine.
6. To conduct performance test on a two-stroke Petrol engine.
7. To conduct performance test on twin cylinder Diesel engine.
8. To study the performance of a Petrol engine under different compression ratios.
9. To conduct Morse test on multi cylinder Petrol engine.
10. Exhaust gas analysis of Petrol engine for carbon-monoxide and unburnt hydrocarbons.
11. Exhaust gas analysis of Diesel engine for carbon deposits using smoke meter.
12. Determination of viscosity of lubricating oil.
13. Determination of flash and fire points of a fuel

Note: Minimum 12 experiments to be conducted

**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
SYLLABUS FOR B.E. IV-SEMESTER**

**BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING
LABORATORY**

Instruction: 2Hrs /week	SEE Marks :50	Course Code : ES411EE
Credits : 1	CIE Marks: 25	Duration of SEE : 3 Hrs

Course Objective	Course outcomes
1. Introduce to students the basics of Electrical and Electronic circuits, electrical machines.	On completion of the course, the student will be able to: 1. familiarize with the basic experiments on electrical and electronic fundamentals and machines. 2. design the circuits related to opamps and digital IC's. 3. able to apply the concepts of electrical and electronics circuits to engineering applications.

List of Experiments:

1. Verification of Ohm's law and Kirchoff's laws.
2. Measurement of power and power factor in single phase R – L – C circuit.
3. Mechanical characteristics of DC shunt and compound motor
4. Load test on 3 – phase induction motor.
5. Speed control of DC shunt motor.
6. Load test on single phase transformer.
7. V – I characteristics of BJT and MOSFET.
8. Study of half wave and full wave rectifiers with and without filters.
9. Applications of operational amplifier: Adder, subtractor, integrator and differentiator.
10. Study of logic gates
11. Implementation of binary half adder and full adder/subtractor.
12. Generation of triangular, sine and square wave using IC's