S. Y. B. Tech. Mechanical Engineering Semester –II										
Course Code	Course Title	Teaching Scheme Hours / Week			Examination Scheme				Marks	Credit
		Lecture	Tutorial	Practical	In Semester	End Semester	Oral	Practical		
BSME 2201	Engineering Mathematics - III	3	1	0	50	50	0	0	100	4
ME 2201	Strength of Material	3	1	0	50	50	0	0	100	4
ME 2202	Fluid Mechanics	3	1	0	50	50	0	0	100	4
ME 2203	Manufacturing Process - II	3	0	0	50	50	0	0	100	3
ME 2204	Rigid Body Dynamics	2	0	0	25	25	0	0	50	2
ME 2205	Materials' Technology II	1	1	0	25	25	0	0	50	2
ME 2206	Fluid Mechanics Lab	0	0	2	0	0	25	0	25	1
ME 2207	Manufacturing Process - II Lab	0	0	2	0	0	0	25	25	1
ME 2208	Rigid Body Dynamics Lab	0	0	2	0	0	25	0	25	1
ME 2209	Material's Technology II Lab	0	0	2	0	0	25	0	25	1
ME 2210	Solid Modeling Lab	0	0	2	0	0	0	25	25	1
	Total	**15**	**4**	**10**	**250**	**250**	**75**	**50**	**625**	**24**
	Grand Total	**29**			**625**				**625**	**24**

MKSSS's Cummins College of Engineering for Women
Karvenagar, Pune-411052

DEAN ACADEMICS
MKSSS's Cummins College of Engineering for Women
Karvenagar, Pune-411052

Principal
MKSSS's Cummins College of Engg. For Women, Karvenagar, Pune-52.

APPROVED BY
Governing Body Members
MKSSS's Cummins College of Engineering for Women
Karvenagar, Pune-411052

BSME 2201 – Engineering Mathematics-III

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hrs/week	In semester: 50 marks
Tutorials: 1 Hrs/week	End semester: 50 marks
	Credits: 4

Prerequisites:

1. Engineering Mathematics I
2. Engineering Mathematics II

Course Objectives:

1 Mathematics is a necessary path to scientific knowledge which opens new perspective of mental activity.

2 Our aim is to provide sound knowledge of engineering mathematics to make the students think mathematically and strengthen their thinking power to analyze and solve engineering problems in their respective areas.

Course Outcomes:

Upon completion of this course, students will be able to:

1 Solve Higher order Linear differential equations, Simultaneous Differential Equations. Mass Spring System.

2 Calculate Mean, Variance, Moments, Probability Distributions.

3 Calculate Divergence, Curl, Directional Derivatives, Solenoidal, Irrotational, Scalar Potential.

4 Find Line Integral, Green's Theorem, Stoke's Theorem, Gauss Divergence Theorem.

5 Apply Laplace Transform, Inverse L.T. Fourier Transform, Inverse F.T.

6 Solve Partial Differential Equations by F. Transforms.

Unit 1: Higher Order Linear Differential Equations and Applications (7 hrs)

Higher order Linear differential Equation with constant coefficients, Simultaneous Differential Equations, Applications in solving Engineering problems.

Unit 2: Statistics and Probability Distribution (6 hrs)

Variance, Standard deviation, Coefficient of variation, Moments, Skewness, Kurtosis, Binomial, Poisson, Normal distribution.

Unit 3: Vector Differentiation (6 hrs)

Physical interpretation of vector differentiation, vector differential operator, Gradient, Divergence, Curl, Directional derivative, Solenoidal, Irrotational and Conservative fields, Scalar potential, vector identities.

Unit 4: Vector Integration (6 hrs)

Line, Surface and Volume integrals, Work-done, Green's Lemma, Gauss's Divergence theorem, Stoke's theorem. Application to problems in Fluid Mechanics.

Unit 5: Laplace and Fourier Transforms (6 hrs)

Laplace Transform: Definition of Laplace, Inverse Laplace transform, Properties and theorems, LT of standard functions, application of LT for solving Linear Differential Equations.

Fourier Transforms: Fourier integral theorem, sine and cosine integrals, Fourier transform, Fourier Sine and Cosine transform, Inverse Fourier Transform.

Unit 6: Partial Differential Equations (4 hrs)

Basic Concepts, Types of P.D.E.(Hyperbolic, Elliptic, Parabolic) ,Method of separation of variables for solving Wave equation, One and two dimensional heat flow equations . Use of Fourier Transforms for solving of P.D.E.

Text Books:

1 B.S.Grewal, 'Higher engineering Mathematics', Khanna publishers, Delhi (40th Edition),(2008)

2 B. V. Ramana,‘Higher Engineering Mathematics ’, Tata McGraw Hill Publications (2007).

Reference Books:

1 Peter V. O'neil,'Advanced Engineering Mathematics, Thomson Brooks / Cole, Singapore (5th edition) (2007).

2 Michael D. Greenberg, 'Advanced Engineering Mathematics ', Prentice hall College Div., (1998).

3 C. R.Wylie, L. C. Barrette, ‘Advanced Engineering Mathematics’, Mc Graw Hill Publications, New Delhi.(6th edition) (2003)

4 Erwin Kreyszig ,'Advanced Engineering Mathematics' Wiley Eastern Ltd.(8th Student Edition), (2004).

5 S. C. Gupta, V.K. Kapoor, 'Fundamental of Mathematical Statistics', S. Chand & Sons (10th revised edition) 2002.

6 N.P. Bali, M. Goyal,'Text book of Engineering Mathematics' Laxmi Publication (P) Ltd. (8th edition), (2011).

ME 2201 – Strength of Material

Teaching Scheme
Lecture: 3 Hrs/week
Tutorials: 1 Hrs/week

Examination Scheme
In semester: 50 marks
End semester: 50 marks
Credits: 4

Prerequisites:

1. Engineering Mechanics

Course Objectives:

1 To gain knowledge of different types of stresses, strain and deformation induced in the mechanical components due to external loads
2 To study the distribution of various stresses in the mechanical elements such as beams, shafts etc.
3 To study Effect of component dimensions and shape on stresses and deformations

Course Outcomes:

Upon completion of this course, students will be able to:

1 Demonstrate fundamental knowledge about various types of loading and stresses induced.
2 Draw SFD and BMD for different types of loads and support conditions.
3 Compute and analyze stresses induced in basic mechanical components.
4 Design cross section of beam for slope and deflection in beam.
5 Analyze buckling and bending phenomenon in columns and beams respectively.

Unit 1: Simple Stresses and Strains (7 hrs)

Concept & types of Stresses and strains, Poison's ratio, stresses and strain in simple and compound bars under axial loading, stress strain diagrams, Hooks law, elastic constants & their relationships, temperature stress & strain in simple & compound bars under axial loading.

Unit 2: Shear Force and Bending Moments (9 hrs)

Definitions, SF & BM diagrams for cantilevers, simply supported beams with or without over-hang and calculation of maximum BM & SF and the point of contra-flexure under (i) concentrated loads, (ii) uniformly distributed loads over whole span or a part of it, (iii) combination of concentrated loads and uniformly distributed loads, (iv) uniformly varying loads and (v) application of moments, relation between the rate of loading, the shear force and the bending moments.

Unit 3: Bending and Shear Stresses in Beams (6 hrs)

Bending stresses in beams with derivation & application to beams of circular, rectangular, I,T and channel sections, composite beams, shear stresses in beams with combined bending, torsion & axial loading of beams.

Unit 4: Slope and Deflection (9 hrs)

Relationship between bending moment, slope & deflection, Mohr's theorem, moment area method, method of integration, Macaulay's method, calculations for Compound slope and deflection of (i) cantilevers and (ii) simply supported beams with or without overhang under concentrated load, Uniformly distributed loads or combination of concentrated and uniformly distributed loads .

Unit 5: Torsion Of Circular Members (8 hrs)

Torsion of thin circular tube, Solid and hollow circular shafts, tapered shaft, stepped shaft & composite circular shafts, combined bending and torsion, equivalent torque, effect of end thrust. Numerical.

Thin Cylindrical and Spherical Shells: Cylinders and Spheres due to internal pressure. Cylindrical Shell with hemispherical end.

Unit 6: Compound Stresses and Strains (6 hrs)

Concept of surface and volumetric strains, two dimensional stress system, conjugate shear stress at a point on a plane, principle stresses & strains and principal- planes, Mohr's circle of stresses.

Text Books:

1 Strength of Materials, Subramanyam, Oxford University Press, Edition 200.
2 Mechanics of Materials, Thin Cylindrical and Spherical Shells: B.C Punmia Ashok Jain, Arun Jain, Lakshmi Publications, NewDelhi.

Reference Books:

1 Strength of Materials, Basavarajaiah and Mahadevappa Khanna Publishers, New Delhi..
2 Strength of Materials, Singer Harper and Row Publications..
3 Elements of Strength of Materials, Timoshenko and Young Affiliated East West Press.
4 Mechanics of Materials, James M. Gere (5th Edition), Thomson Learning.
5 Strength of Materials S. Ramamrutham, DhanpatRai Pvt. Ltd.
6 Mechanics of Materials S. S. Rattan, TMH Pvt. Ltd.
7 Mechanics of Structures S. B. Junnarkar, Charotar Publication.
8 Strength of Materials W. Nash, Schaum's Outline Series, McGraw Hill Publication.

ME 2202 – Fluid Mechanics

Teaching Scheme
Lecture: 3 Hrs/week
Tutorials: 1 Hrs/week

Examination Scheme
In semester: 50 marks
End semester: 50 marks
Credits: 4

Prerequisites:
1. Engineering Physics
2. Engineering Mathematics

Course Objectives:
1 Applying the mass conservation principle, to engineering problems.
2 Applying the momentum and energy equations to engineering problems.
3 Evaluating head loss in pipes and conduits.
4 Introduction to formation of boundary layer and drag and lift concepts associated with it.

Course Outcomes:
Upon completion of this course, students will be able to:
1 Apply mass conservation principle for the given system.
2 Understand the energy conservation principle for fluid flow.
3 Calculate the pressure drop for given system.
4 Explain the boundary layer formation on the flat plate.

Unit 1: Fluid Properties (6 hrs)
Applications of fluid mechanics, Basic tensor and vector calculus, Definition and characteristics of Fluids, Density, Specific Weight, Specific Gravity, Dynamic Viscosity, Kinematics Viscosity, Surface Tension, Capillarity, Compressibility, Vapor pressure. Pascal's Law, Centre of pressure, Buoyancy and flotation.

Unit 2: Fluid Kinematics (6 hrs)
Eulerian and Lagrangian fluid description, Types of flows (One , two, three dimensional , steady unsteady, uniform, non-uniform, laminar, turbulent, compressible, incompressible, rotational, Irrotational, Visualization of flow field (Stream, Path and Streak line), Fluid Acceleration and Material Derivative, vorticity in two dimensional flow, Control volume approach for solution.

Unit 3: Fluid Dynamics (8 hrs)
Flow Analysis using Control volume Approach, Continuity and Linear momentum Equation. Flow Analysis using differential Approach: Continuity and linear momentum equation. Euler equation of motion, Derivation Bernoulli's equation along and normal to Stream line, application of Bernoulli's equation to Pitot tube, Orifices and Venturi meter.

Unit 4: Internal Flow (6 hrs)
Entrance region and fully developed flow. Pressure and Shear Stress distribution for laminar flow in a pipe and plane Poiseulle flow, Fully developed Turbulent flow, Transition from laminar to turbulent, Velocity profile of Turbulent flow, Introduction to Navier – Stokes Equation and Exact Solution to Plane Poiseulle flow.

Unit 5: Flow through Pipe (6 hrs)

Energy losses through pipe, Major and Minor Darcy-Weisbach equation, Moody's diagram, Dimensional Analysis-Dimensions of physical quantities, dimensional homogeneity, Buckingham pi Theorem, important dimensionless numbers, Model analysis (Reynolds, Froude and Mach).

Unit 6: External Flow (6 hrs)

Boundary layer Structure and Thickness on Flat plate, Effect of Pressure Gradient on Boundary layer, Separation of Boundary Layer and Methods of Control, Lift and Drag concepts , Drag – Pressure and Friction, Drag Coefficient, Lift - Surface pressure Distribution and Circulation.

Text Books:

1 Munson, Okiishi, Young, 'Fluid Mechanics', 7th Ed,Wiley, 2016.
2 Cengel, Cimbala, 'Fluid mechanics', Tata Mcgraw hill publishing.

Reference Books:

1 Gupta and Gupta, 'Fluid Mechanics', 3rd Ed, New Age publications, 2016.
2 Kundu, Cohen, Dowling, 'Fluid Mechanics', Elsevier India.
3 K. Muralidhar, G. Biswas, 'Advance Fluid Mechanics', 3rd Edition, Narosa Publishing House.
4 Fox, Mcdonald, 'Fluid Mechanics', 8th Edition,Wiley.

ME 2203 – Manufacturing Processes-II

Teaching Scheme
Lecture: 3 Hrs/week

Examination Scheme
In semester: 50 marks
End semester: 50 marks
Credits: 3

Prerequisites:
1. Manufacturing Processes - I

Course Objectives:
1 To familiarize with the basic concepts of machining science.
2 To acquaint with various single and multipoint cutting tools designing processes.
3 To make the students understand the economics of machining process.

Course Outcomes:
Upon completion of this course, students will be able to:
1 Understand principles and working of different forming processes such as sheet metal working, forging, rolling and extrusion.
2 Estimate cutting force, power, tool life, surface finish for machining operation.
3 Select an appropriate single or multipoint cutting tool parameter.
4 Understand features and applications of non-traditional machining process.
5 Understand use of different locating and clamping devices for jigs and fixture design.

Unit 1: Sheet metal working and forging (8 hrs)
Stress-strain relations in elastic and plastic deformation; concept of flow stress, deformation mechanisms; hot and cold working. Forging, other deformation processes related to forging; Wire and Tube drawing; Sheet metal working processes such as blanking, piercing, bending, deep drawing, coining and embossing; defects.

Unit 2: Rolling, Extrusion, shaping process for plastic (7 hrs)
Rolling, extrusion, types and analysis. Plastic: types, plastic production processes, injection molding, compression and transfer molding, blow molding and rotational molding; defects.

Unit 3: Metal Cutting Theory (7 hrs)
Orthogonal and oblique cutting, various types of chips, Mechanics of orthogonal steady state metal cutting, shear plane and shear plane angle, Merchant's circle of forces, velocity relations. Merchant's theory & modified theory of metal cutting. Concept of specific power consumption in machining. Cutting forces measurement using dynamometers.
Cutting fluids: Function of coolant, types of coolants and cooling system. Major tool material types. Tool life and machining economics: types of tool wear Taylor's tool life equation: Components of product cost, Optimum cutting velocity for minimum cost of production and maximum production rate.

Unit 4: Design of cutting tools (6 hrs)
Design of shanks, cutting tip and chip breakers for HSS. Study of machining tool Nomenclature: Various types such as flat form tool, tangential form tool, circular form tool, constructional details and fields of application. Profile design of flat and circular form tools. Nomenclatures of Broach, Drills, Reamers,: Taps and Milling cutters.

Unit 5: Unconventional machining processes (6 hrs)

Classification according to type of energy used for machining, basic principles, machines, applications of Electrical discharge machining (EDM), Electron beam machining (EBM), Plasma arc machining (PAM), Laser beam machining (LBM), Ultrasonic machining (USM), Abrasive jet machining (AJM).

Unit 6: Basic Construction of Jig & Fixture (6 hrs)

Degrees of freedom, redundant location, fool proofing, nesting, Material used. Locators: types and their functions; locating & clamping Devices: Position, types of mechanisms and their functions. Component distortion under clamping and cutting forces. Design of simple Jig and Fixtures.

Text Books:

1 Fundamentals of modern manufacturing, Fifth Edition, Mikell P. Groover, Wiley Publication.
2 Fundamentals of Metal Machining and Machine Tools, Third Edition by Winston A. Knight, Geoffrey Boothroyd, CRC press Taylor and Francis group.

Reference Books:

1 Metal Cutting Principles (2nd Edition), by Milton Clayton Shaw, Oxford University Press.
2 Cutting Tools, by P. H. Joshi, A. H. Wheeler Publishing Co. Ltd.
3 ASM Handbook, Vol. 16: Machining (9th Edition), by Joseph R. Davis, ASM International.
4 Metal Cutting Theory and Cutting Tool Design, by V. Arshinov and G. Alekseev, Mir publishers, Moscow, Mir Publishers.
5 Production Technology by HMT.
6 Jig and Fixture Design Manual, Erik K. Henriksen, Industrial Press.

ME 2204 – Rigid Body Dynamics

Teaching Scheme
Lecture: 2 Hrs/week

Examination Scheme
In semester: 25 marks
End semester: 25 marks
Credits: 2

Prerequisites:
1. Engineering Mathematics.
2. Engineering Mechanics.
3. Physics

Course Objectives:

1	To present the basic principles of rigid body dynamics.
2	To help develop proficiency in applying these principles to formulate and solve dynamics problems.

Course Outcomes:
Upon completion of this course, students will be able to:

1	Apply impulse/momentum methods to kinetics problems of particles, rigid bodies, and systems.
2	Analyze dependent motion of particles.
3	Analyze planar rigid body kinematics problems.
4	Apply Newton/Euler methods to kinetics problems.
5	Apply work/energy methods to kinetics problems of rigid bodies.

Unit 1: Kinetics of a Particle: Dependant Motion, Impulse and Momentum (4 hrs)
System of Particles - Dependent Motion, Principle of Linear Impulse and Momentum, Principle of Linear Impulse and Momentum for a System of Particles, Conservation of Linear Momentum, Central Impact.

Unit 2: Planar Kinematics of a Rigid Body (8 hrs)
Planar Rigid-Body Motion, Translation, Rotation about a Fixed Axis, Absolute Motion Analysis, Relative-Motion Analysis: Velocity, Instantaneous Centre of Zero Velocity, Relative-Motion Analysis: Acceleration, Relative-Motion Analysis using Rotating Axes (Coriolis Component of Acceleration).

Unit 3: Planar Kinetics of a Rigid Body: Force and Acceleration (5 hrs)
Moment of Inertia, Planar Kinetic Equations of Motion, Equations of Motion: Translation, Equations of Motion: Rotation about a Fixed Axis, Equations of Motion: General Plane Motion.

Unit 4: Planar Kinetics of a Rigid Body: Work and Energy (5 hrs)
Kinetic Energy, Work of a Force, Work of a Couple, Principle of Work and Energy, Conservation of Energy

Unit 5: Planar Kinetics of a Rigid Body: Impulse and Momentum (6 hrs)
Angular Momentum, Relation Between Moment of a Force and Angular Momentum, Principle of Angular Impulse and Momentum, Linear and Angular Momentum, Principle of Impulse and Momentum, Conservation of Momentum, Eccentric Impact.

Text Books:

1 Engineering Mechanics – Dynamics, R. C. Hibbeler, 12th Edition, Pearson publication.

Reference Books:

1 Engineering Mechanics – Statics and Dynamics, A Nelson, Mc Graw Hill Education.
2 Vector Mechanics for Engineers-Dynamics, Beer and Johnson, Mc Graw Hill Education.
3 Engineering Mechanics- S. Timosenko. DPT.young & J.V.Rao- Tata Mc Graw hill education pvt. Ltd. New Delhi.

ME 2205 – Materials' Technology II

Teaching Scheme
Lecture: 1 Hrs/week
Tutorial: 1 Hrs/week

Examination Scheme
In semester: 25 marks
End semester: 25 marks
Credits: 2

Prerequisites:
1 Materials Technology I

Course Objectives:
1 To develop an understanding on modification of material properties.
2 To do material selection.

Course Outcomes:
Upon completion of this course, students will be able to:
1 Read binary phase diagram, predict and quantify phase transformation using phase diagrams.
2 Select method for modification of properties.
3 Analyze and translate performance requirements of a component into required mechanical properties of material reaching conclusions using first principles of engineering sciences.
4 Apply available methods for selection of material for a given application.

Unit 1: Phase diagrams (5 hrs)
Phase diagrams, cooling curves, plotting of phase diagrams, Iron-iron carbide equilibrium diagram. Non equilibrium cooling and its effects.

Unit 2: Modification of properties (5 hrs)
Strengthening mechanisms; Alloying, cold working, heat treatment methods.

Unit 3: Selection of Materials (5 hrs)
Translation of performance requirements into properties, selection of material for given application, material indices, material selection and specification.

Text Books:

1 "Callister's Material Science and Engineering", W.D. Callister, D.G.Rethwisch, Wiley, 2016,Second edition.

Reference Books:

1 "Material Science & Engineering." Raghvan V., Prentice Hall of India, New Delhi. 2003.
2 "Properties of Engineering materials", R.A. Higgins, ELBS, Edward Arnold, 1988.
3 "Engineering Metallurgy", Higgins R. A., Viva books Pvt. Ltd., 2004).
4 "Mechanical Metallurgy", Dieter, G.E., McGraw-Hill, 1988
5 "Introduction to Physical Metallurgy", Avner, S.H., Tata McGraw-Hill, 1997
6 "Material selection in mechanical design', Michael Ashby, Butterworth-Heinemann, 3/e, 2005.

ME 2206 – Fluid Mechanics Lab

Teaching Scheme
Practical: 2 Hrs/week

Examination Scheme
Oral Examination: 25 marks
Credits: 1

Prerequisites:
1. Engineering Physics

Course Objectives:
1 Introduction to the basics of experimental techniques in fluid mechanics.
2 To present the result in graphical form.
3 To measure pressure drop in a pipe and determine friction factor.
4 To calibrate a flow meter.

Course Outcomes:
Upon completion of this course, students will be able to:
1 Understand the basic experimental techniques in fluid mechanics.
2 Present the results in graphical form.
3 Measure the pressure drop in a pipe determine friction factor.
4 Understand the process of calibration of flow meters.

Lab work to be accomplished
1. Measurement of Viscosity and Sp. Gravity
2. Measurement of Pressure and velocity
3. Measurement of coefficient of orifice
4. Verification of Bernoulli's theorem
5. Calibration of Venturi/Orifice meter
6. Flow visualization using Reynolds Apparatus
7. Measurement of coefficient of friction in pipe
8. Verification of momentum equation.

Text Books:

1. Instrumentation, Measurements, and Experiments in Fluids, E. Rathakrishnan , CRC Press
2. Fluid Mechanics Measurements Taylor & Francis Inc, Richard J. Goldstein, Taylor & Francis Inc.
3. Springer Handbook of Experimental Fluid Mechanics, by Cameron Tropea (Editor), Alexander Yarin (Editor), John F. Foss (Editor).

ME 2207 – Manufacturing Processes-II Lab

Teaching Scheme
Practical: 2 Hrs/week

Examination Scheme
Practical Examination: 25 marks
Credits: 1

Course Objectives:

1 To practice machining of flat surfaces on shaping and grinding machines.
2 To practice milling, boring and thread cutting operations.

Course Outcomes:

Upon completion of this course, students will be able to:

1 Assemble different manufactured components using machine tools like lathe machine, drilling machine, milling machine etc.
2 Analyze and estimate machining time for lathe machine, drilling machine, milling machine etc.
3 Understand plastic molding.
4 Understand machining of non-metals.

Lab work to be accomplished

1. One composite job consisting of minimum four parts, employing operations on lathe, precision turning, screw cutting, boring etc. and involving the use of milling and grinding operations.
2. Demo of injection molding of plastic component.
3. Demo on machining of Glass Fiber Reinforcement Plastic (GFRP) composite material, Drilling and edge milling operation are to be studied (Any of the commercial available GFRP/Epoxy plates are to be used).

Text Books:

1. Elements of Workshop Technology, Hazra Chaudhary Vol I, II.
2. Principles of Modern Manufacturing, Mikell P. Groover, Wiley.
3. Manufacturing, Engineering and Technology SI, Serope Kalpakjian, Steven R. Schmid, Prentice Hall.

ME 2208 – Rigid Body Dynamics Lab

Teaching Scheme
Practical: 2 Hrs/week

Examination Scheme
Oral Examination: 25 marks
Credits: 1

Course Objectives:

1 To present the basic principles of rigid body dynamics.
2 To help develop proficiency in applying these principles to formulate and solve dynamics problems.

Course Outcomes:

Upon completion of this course, students will be able to:

1 Apply impulse/momentum methods to kinetics problems of particles, rigid bodies, and systems.
2 Apply work/energy methods to kinetics problems of rigid bodies.

Lab work to be accomplished

1. Impact on rigid body
2. Moment of Inertia
3. Conservation of Momentum
4. Conservation of Energy

Lab of Assignments:

1. Three to five assignments based on the theory topics will be given during the semester.

ME 2209 – Materials' Technology-II Lab

Teaching Scheme
Practical: 2 Hrs/week

Examination Scheme
Oral Examination: 25 marks
Credits: 1

Course Objectives:

1 To provide first-hand experience of facilities for materials property testing and treating.
2 To provide an understanding of structures in material and their relation to properties.

Course Outcomes:

Upon completion of this course, students will be able to:

1 Identify the phases and measure grain size of the material using metallography.
2 Provide interpretation of microstructures and prepare a laboratory report.
3 Apply correlation of science, mathematics and engineering principles to material processing and modify properties of steel by modifying microstructure using different heat treatments.
4 Understand and use methods utilized for selection of materials.

Lab work to be accomplished

1. Metallurgical microscope and metallographic preparation of specimen.
2. Study and draw microstructure of steel.
3. Study and draw microstructure of Cast iron.
4. Study and draw microstructure of Non ferrous metal and alloys.
5. Task based activity to measure, predict and achieve a certain set of mechanical properties in a material. This will involve conducting test, working on feasibilities, planning heat treatment and achieving results.
6. Study of material selection methods.

ME 2210 – Solid Modelling Lab

Teaching Scheme
Practical: 2 Hrs/week

Examination Scheme
Practical Examination: 25 marks
Credits: 1

Course Objectives:

1 To develop an ability to create a 3D solid model of machine components.
2 To develop an ability to create 3D assembly model of mechanical system.
3 To demonstrate the rapid prototyping..

Course Outcomes:

Upon completion of this course, students will be able to:

1 Create 3D machine components by using a solid modeling software package.
2 Create 3D assemblies of mechanical systems.
3 Create manufacturing drawing with required tolerances.
4 Create parametric solid model of a machine component.

Lab work to be accomplished

1. Assignment on Solid modeling of simple and intricate machine and automobile components.
2. Assignment on parametric solid modelling of a machine component using various commands and features of software.
3. Assignment on assembly modeling.
4. Generation of production drawing of the parts and assembly with appropriate tolerances.
5. Assignment on rapid prototyping.

Text Books:

1. N. D. Junnarkar Machine Drawing 1st print Pearson Education.
2. N. D. Bhatt, Machine Drawing. Charotor Publication House, Bombay.
3. Gill P. S., "A Text book of Machine Drawing", Revised Edition K. Kataria and Sons, New Delhi, 2008, ISBN 81-85749-79-5.