E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai

Accredited by NAAC with 'A' Grade | Accredited by NBA (CSE, EEE, MECH)

NAGAPATTINAM – 611 002

B.E. Mechanical Engineering

Full Time Curriculum and Syllabus

Second Year – Third Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1701MA301	Engineering Mathematics III	3	2	0	4	40	60	100
1702ME301	Engineering Thermodynamics	3	2	0	4	40	60	100
1702ME302	Engineering Materials and Metallurgy	3	0	0	3	40	60	100
1702ME303	Fluid Mechanics and Machinery	3	0	0	3	40	60	100
1702ME304	Strength of Materials	3	0	2	4	50	50	100
1702ME305	Manufacturing Technology – I	3	0	0	3	40	60	100
Laboratory Course								
1702ME351	Machine Drawing	1	0	2	2	50	50	100
1702ME352	Manufacturing Technology Laboratory - I	0	0	2	1	50	50	100
1704ME353	Technical Seminar I	0	0	2	0	100	0	100
1702ME354	Fluid Mechanics and Machinery Lab	0	0	2	1	50	50	100
1704GE351	Life Skills: Soft Skills	0	0	2	0	100	0	100

L – Lecture | T – Tutorial | P – Practical | C – Credit | CA – Continuous Assessment | ES – End Semester

1701MA301	ENGINEERING MATHEMATICS III (Common to B.E - Civil, CSE, EEE, Mech B.Tech- IT Degree Programmes)	L	T	P	C
		3	2	0	4

PREREQUISITE :

1. Engineering Mathematics I
2. Engineering Mathematics II

COURSE OBJECTIVES:

1. To introduce Fourier series analysis and applications in Engineering, apart from its use in solving boundary value problems.
2. To acquaint the student with Fourier transform techniques used in wide variety of situations.
3. To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

UNIT I FOURIER SERIES **12 Hours**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic analysis – Simple Applications

UNIT II FOURIER TRANSFORMS **12 Hours**

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity

UNIT III PARTIAL DIFFERENTIAL EQUATIONS **12 Hours**

Formation of partial differential equations – Singular integrals — Solutions of standard types of first order partial differential equations – Lagrange's linear equation — Linear partial differential equations of second order with constant coefficients of homogeneous type- Applications

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS **12 Hours**

Classification of PDE – Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction.

UNIT V Z – TRANSFORMS AND DIFFERENCE EQUATIONS **12 Hours**

Z - transforms – Elementary properties – Inverse Z – transform (using partial fraction and residues) – Convolution theorem – Formation of difference equations – Solution of difference equations using Z – transform.

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Linear Algebra
2. Numerical Solution of non-homogeneous partial differential equations

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1 Use Fourier series analysis which is central to many applications in engineering
CO2 Apply Fourier transform techniques used in wide variety of situations
CO3 Compute the solution of partial differential equations
CO4 Solve boundary value problem using partial differential equation
CO5 Apply Z transform techniques for discrete time systems

REFERENCES:

1. Veerarajan. T., "Transforms and Partial Differential Equations", Second reprint, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2012
2. Grewal. B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, Delhi, 2012.
3. Bali.N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications Pvt Ltd , 2007
4. Ramana.B.V., "Higher Engineering Mathematics", Tata Mc-GrawHill Publishing Company Limited, New Delhi, 2008.
5. Narayanan.S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students" Vol. II & III, S.Viswanathan Publishers Pvt Ltd. 1998.
6. www.nptelvideos.in/2012/11/mathematics-iii.html

1701ME301	ENGINEERING THERMODYNAMICS	L	T	P	C
		3	2	0	4

PREREQUISITE :

Fundamentals of Mechanical Engineering

COURSE OBJECTIVES:

1. To study the fundamentals of thermodynamic and zeroth law.
2. To provide knowledge on first law of thermodynamics.
3. To impart knowledge on second law of thermodynamics and entropy.
4. To study the thermodynamic properties of pure substances and its phase change processes.
5. To learn thermodynamic and Psychrometric properties.

UNIT I INTRODUCTION AND ZEROTH LAW OF THERMODYNAMICS 12 Hours

Macroscopic and Microscopic approaches, Definitions and concepts- heat, work, thermodynamic equilibrium, system and types, surroundings, Properties- intensive and extensive properties, Path and point functions, Energy- macroscopic and microscopic modes of energy, Thermodynamic processes and cycle, State postulate, Zeroth law of thermodynamics- temperature scale, perfect gas scale.

UNIT II FIRST LAW OF THERMODYNAMICS 12 Hours

First law of thermodynamics, I law for Closed systems - constant pressure process, constant volume process, constant temperature process, adiabatic process, polytropic process, throttling process. I law for open systems - Steady state flow processes, Steady flow energy equation (SFEE), Application of SFEE-turbines and compressors, nozzles and diffusers, throttling valves, heat exchangers.

UNIT III SECOND LAW OF THERMODYNAMICS 12 Hours

Limitations of I law of thermodynamics, Second law of thermodynamics- Kelvin - Planck and Clausius statements, Heat Engine, heat pump and refrigerator, Reversibility and irreversibility- irreversible and reversible processes, Carnot's principles, Carnot cycle, Carnot engine, Thermodynamic temperature scale, Clausius inequality, Entropy- principle of entropy increase, Availability & irreversibility – Introduction about third law of thermodynamics.

UNIT IV PROPERTIES OF PURE SUBSTANCES 12 Hours

Thermodynamic properties of fluids. Pure substance-phases - Phase change processes, Property diagrams - pressure-volume (P-v), pressure-temperature (P-T), temperature volume (T-v), temperature entropy (T-s) and enthalpy-entropy (h-s) diagrams. Steam tables - Problems on flow and non-flow processes.

UNIT V GAS MIXTURES AND PSYCHROMETRIC PROPERTIES 12 Hours

Thermodynamics of ideal gas mixture- mixture of ideal gas, mixture of perfect gases, Dalton's law of partial pressure, Amagat's law, Thermodynamics properties, Ideal gas – equation of state, Van derWaals equation and compressibility chart. Psychrometric properties and processes – Psychrometric chart.

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

Thermodynamic property relations- Maxwell relations, TDS equations, The Clapeyron equation, Joule- Thompson expansion.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1 Understand the laws, concepts and principles of thermodynamics.
CO2 Apply first law of thermodynamics to closed and open systems.
CO3 Solve problems related to cycles and cyclic devices using second law of thermodynamics.
CO4 Calculate the thermodynamic properties of pure substances and its phase change processes.
CO5 Determine properties of gas mixtures and psychrometric .

REFERENCES:

1. Y. Cengel and Boles, Thermodynamics - An Engineering Approach, Tata McGraw Hill Publishing Company Pvt. Ltd, New Delhi,2003.
2. R.K. Rajput, Engineering Thermodynamics, Laxmi Publications Pvt.Ltd., New Delhi,2011.
3. R.S. Khurmi, Steam table with Psychometric chart, S. Chand Publications, New Delhi,2009.
4. J.P. Holman, Thermodynamics, Tata McGraw Hill Publishing Company Pvt Ltd., New Delhi,2002.
5. P.K. Nag, Engineering Thermodynamics, Tata McGraw-Hill, New Delhi, 2007.
6. C.P. Arora, Thermodynamics, Tata McGraw Hill Publishing Company Pvt. Ltd., New Delhi,2003
7. https://onlinecourses.nptel.ac.in/noc18_ch03/preview

1702ME302 ENGINEERING MATERIALS AND METALLURGY L T P C
3 0 0 3

PREREQUISITE :

1. Materials Science
2. Fundamentals of Mechanical Engineering

COURSE OBJECTIVES:

1. To provide knowledge on physical metallurgy of metals through the study of phase diagrams.
2. To study the properties and applications of various metals and alloys used in engineering industries.
3. To expose various heat treatment processes of steels.
4. To study the properties and applications of polymers and ceramics.
5. To impart knowledge on mechanical properties evaluation and testing methods of engineering materials.

UNIT I PHASE DIAGRAMS AND CONSTITUTION OF ALLOYS 9 Hours

Alloys, Solid solutions - Phase diagram, phase rule, lever rule, Binary phase diagram -Isomorphous, eutectic, peritectic, eutectoid reactions - Iron-Carbon phase diagram - Metallography, microstructure.

UNIT II ENGINEERING METALS AND ALLOYS 9 Hours

Classification of Engineering materials - Ferrous metals -Plain carbon steel (low, medium and high carbon steels), microstructure/composition, properties, applications - Alloy steels, effect of alloying additions on steels - stainless steels, High Strength Low Alloy Steels (HSLA), maraging and tool steels - Cast iron - grey, white, malleable, spheroidal graphite cast iron, microstructure, properties, applications – Non-ferrous metals - Nickel, Copper, Titanium, Aluminium, Magnesium, Zinc alloys, properties and applications - Bearing materials.

UNIT III HEAT TREATMENT OF STEELS 9 Hours

Purpose of heat treatment - Annealing (stress relief, recrystallization, spheroidizing) -Normalizing - Hardening and Tempering, Isothermal transformation diagrams (T-T-T diagrams), Cooling curves superimposed on T-T-T diagrams (martensite and bainite phase formation) -Hardenability, Jominy end quench test, Case hardening processes, carburizing, nitriding, carbontiriding, cyaniding, flame hardening, induction hardening.

UNIT IV INTRODUCTION TO POLYMERS AND ENGINEERING CERAMICS 9 Hours

Polymers - Plastics and elastomers - Thermoplasts and thermosets, properties and applications (polyethylene, polypropylene, polyurethane, polystyrene, poly vinylchloride, polymethyl methacrylate, polyethylene terapthalate, polycarbonate, polyamide, acrylonitrile butadiene styrene, polyamide, polyamideimide, polypropyleneoxide, polypropylene sulphide, polyetheretherketone, polytetrafluroethylene, urea formaldehyde, phenol formaldehyde, polyester, nylon, epoxy) – Rubber and its types - Types of Ceramics and applications.

UNIT V MECHANICAL PROPERTIES AND MATERIALS TESTING 9 Hours

Elastic and plastic deformation, slip and twinning - Tensile test, stress-strain behavior of ductile and brittle materials - Stress-strain behaviour of elastomers – Visco elasticity - Compression test – Hardness and testing methods -Impact test - Fatigue test, Stress vs number of cycles (S-N) curve, endurance limit, factors affecting fatigue - Creep test, creep curves -Types of fracture - Fracture toughness – Three crack propagation modes.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

Review on Super alloys, Shape memory alloys, Composite Materials, Case studies in Metallurgical failure analysis.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1 Understand phase diagrams of different engineering materials.
CO2 Recognize the properties and applications of various metals and alloys.
CO3 Identify appropriate heat treatment processes for the given applications.
CO4 Awareness on various non metals, its manufacturing techniques and various applications.
CO5 Test the mechanical properties of the given materials for real-time applications.

REFERENCE:

1. William D Callister Jr., Materials Science and Engineering: An Introduction, 7th Edition, John Wiley & Sons Inc., New York, 2007.
2. G. E. Dieter, Mechanical Metallurgy, McGraw Hill, 2007.
3. C.P. Sharma, Engineering Materials-Properties and Applications of Metals and Alloys, Prentice Hall of India, New Delhi, 2004.
4. V. Raghavan, Materials Science and Engineering, Prentice Hall of India, Delhi, 2009.

5. William Smith and Javed Hashemi, Foundations of Materials Science and Engineering, 5th Edition, McGraw Hill, New York, 2009.
6. G. Murray, C. White and W. Weise, Introduction to Engineering Materials, 2nd Edition, Chemical Rubber Company (CRC) Press, Taylor & Francis Group, Florida, 2007.

1702ME303	FLUID MECHANICS AND MACHINERY	L	T	P	C
		3	0	0	3

PREREQUISITE :

Fundamentals of Mechanical Engineering

COURSE OBJECTIVES:

1. To study the fluid laws, properties and measurements.
2. To expose various fluid flow measuring devices and calculate the flow losses in pipes.
3. To learn the concept of dimensional analysis and model analysis.
4. To impart knowledge on various types of hydraulic turbines and performance curves.
5. To gain knowledge on working principles and performance analysis of fluid pumps.

UNIT I INTRODUCTION TO FLUID AND FLUID MOTION 7 Hours

Fluid- Fluid mechanics -Laws of Fluid Mechanics-Properties of fluid and its Application-Types of fluid - Types of fluid Flow-Measurement of Pressure-U-tube and differential manometer- Measurement of velocity using Discharge -Flow characteristics-Momentum -continuity equation.

UNIT II FLUID DYNAMICS AND FLUID FLOW OVER CONDUITS 11 Hours

Forces acting on a fluid element- Eulers and Bernoulli theorem Application in internal and external flows measuring instruments - Major losses and Minor losses in pipes using standard charts and tables pipes in series and pipes in parallel. - Darcy Weisbach equation. Identification of laminar and turbulent flow in closed conduits, flow in circular pipe

UNIT III DIMENSIONAL AND MODEL ANALYSIS 9 Hours

Need for dimensional analysis - dimensional analysis using Buckingham pi theorem – Similitude - types of similitude - Dimensionless parameters- application of dimensionless parameters - Model analysis through Reynolds and Froudes Model law.

UNIT IV HYDRAULIC TURBINES 9 Hours

Definition of turbine - Classification -Types of head and efficiencies of turbine-Impulse turbine - Reaction turbine-Francis turbine, Kaplan turbine - working principles and velocity triangle- Work done by water on the runner Specific speed - unit quantities performance curves.

UNIT V HYDRAULIC PUMPS 9 Hours

Definition -Centrifugal pump Classification Construction working principle and velocity Triangle Definition of heads-Losses and efficiencies-Multistage Centrifugal pump-Specific speed - Priming and cavitation effects of centrifugal pump. Reciprocating pump Classification Working Principle Coefficient of discharge and slip-Indicator diagram (Descriptive treatment only).

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

Case study simple experiments /analyzing the properties of fluid Analyzing the torcelli equation by a simple experiment

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1 Calculate flow properties and pressure head using fundamental laws of fluids.
CO2 Determine discharge and loss of energy in flow through pipes.
CO3 Understand the dimensional analysis and model analysis.
CO4 Select suitable hydraulic turbine for a given application and calculate its performance.
CO5 Select suitable hydraulic pump for given application and determine its performance.

REFERENCES:

1. R.K.Bansal, A Textbook of Fluid Mechanics and Machinery, Laxmi Publications Ltd., New Delhi, Revised Ninth edition, 2014.
2. Bruce R Munson , Donald F Young, Theodore H Okiishi and Wade W. Huebsch, Fundamentals of Fluid Mechanics, John Wiley & Sons, Sixth edition 2009.
3. Pijush K Kundu and Ira M Cohen, Fluid Machines, Academic Press, Burlington, United states of america, 2010.
4. Yunus Cengel and John Cimbala, Fluid Mechanics Fundamentals and Application, Tata McGraw Hill Publishing Company Pvt. Ltd., New Delhi 2009.
5. Robert and W Fox, Introduction to Fluid Machines, John Wiley Eastern Pvt. Ltd., New Delhi, 6th edition ,2006.
6. http://nptel.ac.in/courses/112105182/

1702ME304	STRENGTH OF MATERIALS	L	T	P	C
		3	0	2	4

PREREQUISITE :

1. Engineering Mechanics
2. Fundamentals of Mechanical Engineering

COURSE OBJECTIVES:

1. To study and estimate the mechanical properties of materials and its deformations under different loading conditions through experiments.
2. To learn two dimensional stress systems and stresses in thin cylinders and spherical shells.
3. To gain knowledge on shear force and bending stress distribution in different beams under various loads.
4. To impart knowledge on finding slope and deflection of beams and buckling of columns for various boundary conditions.
5. To learn the deformation of shaft under torsion and deflection of closed helical springs.

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS 6 Hours

Introduction to material properties. Stresses and strains due to axial force, shear force, impact force and thermal effect-stepped and composite bars-uniformly varying cross section. Stress-strain curve for ductile and brittle materials Hooke-law - Factor of safety Poisson-ratio. Elastic constants and their relationship.

UNIT II ANALYSIS OF STRESSES IN TWO DIMENSIONS 6 Hours

State of stresses at a point- Normal and shear stresses on inclined planes - Principal planes and stresses Plane of maximum shear stress - Mohrs -circle for biaxial stress with shear stress. Hoop and longitudinal stresses in thin cylindrical and spherical shells - Changes in dimensions and volume.

UNIT III LOADS AND STRESSES IN BEAMS 6 Hours

Types of beams- Supports and Loads, Shear force and Bending Moment in beams, Cantilever, simply supported and overhanging beams - Point of contra flexure. Theory of simple bending - bending and shear stress - stress variation along the length and section of the beam, Section modulus.

UNIT IV DEFLECTION OF BEAMS AND COLUMNS 6 Hours

Slope and Deflection of cantilever, simply supported, Double integration method and Macaulay's method. Columns- types- Equivalent length Euler and Rankine formulae- Slenderness.

UNIT V TORSION IN SHAFT AND HELICAL SPRING 6 Hours

Analysis of torsion of circular solid and hollow shafts-stepped shaft-compound shaft- Shear stress distribution, angle of twist and torsional stiffness. Closed coil helical spring- stresses and deflection under axial load- Maximum shear stress in spring section.

EXPERIMENT 1	Find the hardness of the material using Rockwell hardness tester.	**2 Hours**
EXPERIMENT 2	Calculate the hardness of the material using Brinell hardness tester.	**2 Hours**
EXPERIMENT 3	Experimentally calculate the strain energy of a material subjected to impact loading (Izod testing)	**2 Hours**
EXPERIMENT 4	Experimental analysis of an axial bar under tension to obtain the stress strain curve and the strength.	**4 Hours**
EXPERIMENT 5	Determine the Young-modulus and stiffness of a metal beam through load deflection curve.	**2 Hours**
EXPERIMENT 6	Experimentally calculate the compressive strength of the materials.	**4 Hours**
EXPERIMENT 7	Experimentally calculate the double shear strength of the materials.	**2 Hours**
EXPERIMENT 8	Experimentally calculate the strain energy of a material subjected to impact loading (charpy testing).	**4 Hours**
EXPERIMENT 9	Determination of spring constant through load vs deflection curve.	**4 Hours**
EXPERIMENT 10	Experimental analysis of a bar under torsion to obtain stiffness and angle of twist.	**4 Hours**

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

Fatigue, shear flow, shear center, thick wall pressure vessels and bending of curved beams. Open coil spring -stresses and deflection.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1 Determine the mechanical properties of various materials.
CO2 Calculate the stresses in two dimensional systems and thin cylinders.
CO3 Determine the deformation behaviour of various beams under different loading conditions.
CO4 Evaluate slope and deflection of beams and buckling of columns for various boundary conditions.

CO5 Estimate the deformation of shaft under torsion and deflection of closed helical springs.

REFERENCES:

1. Egor P. Popov, Engineering Mechanics of Solids, Prentice Hall of India Learning Pvt. Ltd, New Delhi, 2010.
2. S.S. Rattan, Strength of Materials, Tata McGraw Hill, Delhi, Second Edition, 2011.
3. D. K. Singh, Mechanics of Solids, Pearson Education New Delhi, 2006.
4. F. P. Beer and R. Johnston, Mechanics of Materials, Tata McGraw Hill Publishing Company Pvt Ltd., New Delhi, Third edition,2002.
5. B. K. Sarkar, Strength of Materials, Tata McGraw Hill Publishing Company Pvt. Ltd, New Delhi, Second Reprint, 2007.
6. http://www.nptel.ac.in/courses/Webcourse-contents/IIT-ROORKEE/strength%20of%20materials/homepage. htm

1702ME305	MANUFACTURING TECHNOLOGY – I	L	T	P	C
		3	0	0	3

PREREQUISITE :

Fundamentals of Mechanical Engineering

COURSE OBJECTIVES:

1. To study the sand casting and few special casting processes.
2. To learn various metal joining processes.
3. To provide the knowledge on various bulk deformation processes.
4. To expose knowledge on sheet metal and special forming processes.
5. To learn the various moulding and forming processes of plastics.

UNIT I CASTING PROCESSES 9 Hours

Introduction to production processes and its classifications - Pattern - Types, Materials and Allowances. Moulding sand - Types, Properties and Testing. Moulding machines and its types. Melting furnaces - Cupola and Induction. Fettling and cleaning. Sand casting defects. Special casting processes - Shell moulding, Die casting, Centrifugal casting and Investment casting.

UNIT II METAL JOINING PROCESSES 9 Hours

Introduction to welding processes and its classifications - Principle of Gas welding and its flames - Principle of arc welding - Electrodes, Fluxes and filler materials. Principle of Resistance welding - Spot, butt and seam. Principle of Gas metal arc welding, Submerged arc welding, Tungsten Inert Gas welding, Plasma arc welding, Thermit welding, Electron beam welding and Friction welding - Weld defects - Brazing and soldering.

UNIT III BULK DEFORMATION PROCESSES 9 Hours

Introduction - Hot and cold working of metals - Forging processes - Open and close die forging, Forging equipment and operations. Rolling - Types of Rolling mills, shape rolling operations, Tube piercing and Defects. Principle of Extrusion and its types. Principle of rod and wire drawing.

UNIT IV SHEET METAL FORMING AND SPECIAL FORMING PROCESSES 9 Hours

Introduction - Shearing, bending and drawing operations - Stretch forming operations - Principle of special forming processes - Hydro forming, Rubber pad forming, Metal spinning, Explosive forming, Magnetic pulse forming, Peen forming and Super plastic forming.

UNIT V MOULDING AND FORMING OF PLASTICS 9 Hours

Introduction to plastics - Moulding of Thermoplastics - Principle and applications of Injection moulding and its types, Blow moulding, Rotational moulding, Thermoforming and Extrusion. Moulding of Thermosets - Principle and applications of Compression moulding and Transfer moulding Bonding of Thermoplastics - Fusion and solvent methods.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

Automation in moulding - Underwater welding - Sequence of operations for producing a fan blade - Production of thermoplastic film, Inspection methods.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1 Understand sand casting and special casting processes and produce castings.
CO2 Select the suitable metal joining process for the given materials and its applications.
CO3 Select the suitable bulk deformation processes for the given materials and its applications.
CO4 Understand the sheet metal and special forming processes and prepare simple sheet metal components.
CO5 Identify the suitable moulding and forming processes of plastics for the given applications.

REFERENCES

1. P. N. Rao, Manufacturing Technology vol. I, Tata McGraw-Hill Publishing Company rivate Limited, New Delhi, 2010.
2. Serope Kalpakjian, Steven R. Schmid, Manufacturing Engineering and Technology, Pearson Education Limited, New Delhi, 2013
3. J. P. Kaushish, Manufacturing Processes, Prentice Hall of India Learning Private Limited, New Delhi, 2013
4. P.C. Sharma, Manufacturing Technology - I, S Chand and Company Private Limited, New Delhi, 2010
5. S K Hajra Choudhury, Elements of Workshop Technology - Vol. I, Media Promoters & Publishers Private Limited, Mumbai,2013.
6. http://nptel.ac.in/courses/112107144/1.

1702ME351	MACHINE DRAWING	L	T	P	C
		1	0	2	2

PREREQUISITE :

Engineering Graphics

COURSE OBJECTIVES:

1. To impart knowledge on limits, fits and tolerances.
2. To learn different sectional views.
3. To impart knowledge on standard machine elements.
4. To learn the procedure to draw assembly drawing.
5. To learn the procedure to draw detailed drawing of the given components

EXERCISE 1 LIMITS, FITS AND TOLERANCES 5 Hours

Limit System- Tolerance, Limits, Deviation, Actual Deviation, Upper Deviation, Lower Deviation, Allowance, Basic Size, Design Size, Actual Size. Fits- Types, Tolerances of Form and Position- Form and Position Variation, Geometrical Tolerance, Tolerance Zone, Indicating Geometrical Tolerances. Indication of Surface Roughness, Standard Abbreviations and Symbols used in industries.

EXERCISE 2 SECTIONAL VIEWS 5 Hours

Sections- Hatching of Sections, Cutting Planes, Revolved or Removed Section, Sectional Views- Full Section, Half Sections and Auxiliary Sections- Conventional Representation-One-view, Two-view and three view Drawings.

EXERCISE 3 INTRODUCTION TO MACHINE ELEMENT DRAWINGS 5 Hours

Drawing standards and Designation of Bolts, nuts, screws, keys, pins, Rivets, Welded Joints- Dimensioning of Welds, Belt Driven Pulleys, Chain and Gears Drives.

EXERCISE 4 ASSEMBLY DRAWINGS AND SECTIONAL VIEWS 8 Hours

Preparation of manual parts drawing and assembled sectional views from orthographic part drawings, Automobile components - stuffing box, Machine Tool Parts – plummer block, Joints – knuckle joints, Couplings – Protected type flanged coupling, Bearings – swivel bearing, Preparation of Bill of materials and tolerance data sheet.

EXERCISE 5 REAL PRODUCTS TO MACHINE DRAWING CONVERSION 7 Hours

preparation of manual parts drawing and assembled sectional views from real time products- Internal combustion engine parts - connecting rod, couplings – universal coupling, machine tool parts – tailstock, Automobile components – screw jack, stuffing box - Commercial products - Preparation of Bill of materials and tolerance data sheet.

TOTAL: 30 HOURS

ADDITIONAL EXPERIMENTS / INNOVATIVE EXPERIMENTS:

1. 2 D drawing for Gib and Cotter joint
2. 3 D modeling for screw jack

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1 Use limits, fits and tolerances in real world problems.
CO2 Apply different sectional views in drawings.
CO3 Recognize the drawing notations of standard machine elements.
CO4 Draw the assembly drawing.
CO5 Draw the detailed drawing of given components.

REFERENCES:

1. N.D. Bhatt, Machine Drawing, Charotar Publishing House Pvt. Ltd., 2014.
2. P.S. Gill, A Textbook of Machine Drawing, Katson books, 2013.
3. R.K. Dhawan, A Textbook of Machine Drawing, S. Chand,2012.
4. K.C. John, Textbook of Machine Drawing, PHI Learning Pvt. Ltd.,2009.
5. http://nptel.ac.in/syllabus/112106075/

1702ME352 MANUFACTURING TECHNOLOGY LAB - I

L	T	P	C
0	0	2	1

PREREQUISITE :

Fundamentals of Mechanical Engineering

COURSE OBJECTIVES:

1. To provide exposure to the students with hands on experience of centre lathe and Capstan lathe.
2. To provide exposure to the students with hands on experience of various taper, thread cutting and eccentric operations.
3. To provide exposure to the students with hands on experience of various fit, (push, pull, clearance) operations and measurement of cutting forces.

LIST OF EXPERIMENTS:

1. Taper Turning using Tailstock set over method
2. Taper Turning using Compound rest method
3. External Thread cutting
4. Internal Thread Cutting
5. Eccentric Turning
6. Knurling
7. Push fit
8. Clearance fit
9. Force fit
10. Measurement of cutting forces in turning process
11. Simple turning using capstan lathe.

TOTAL: 30 HOURS

ADDITIONAL EXPERIMENTS / INNOVATIVE EXPERIMENTS:

1. Drilling and tapping
2. Grooving operation

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: Use lathe machine to manufacturing taper turning, thread cutting and eccentric turning operations.

CO2: Use various different machine tools for finishing operations of simple step turning in capstan lathe.

CO3: Experience on various fits.

CO4: Lathe tool dynamometer for measuring the cutting forces.

REFERENCES:

1. P. N. Rao, Manufacturing Technology vol. I, Tata McGraw-Hill Publishing Company rivate Limited, New Delhi, 2010.
2. Serope Kalpakjian, Steven R. Schmid, Manufacturing Engineering and Technology, Pearson Education Limited, New Delhi, 2013.
3. J. P. Kaushish, Manufacturing Processes, Prentice Hall of India Learning Private Limited, New Delhi, 2013.
4. P.C. Sharma, Manufacturing Technology - I, S Chand and Company Private Limited, New Delhi, 2010.
5. S K Hajra Choudhury, Elements of Workshop Technology - Vol. I, Media Promoters & Publishers Private Limited, Mumbai,2013.
6. http://nptel.ac.in/courses/112107144/1.

1704ME353	**TECHNICAL SEMINAR I**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**0**

PREREQUISITE :

COURSE OBJECTIVES:

1. To develop self-learning skills of utilizing various technical resources to make a technical presentation.
2. To promote the technical presentation and communication skills.
3. To impart the knowledge on intonation, word and sentence stress for improving communicative competence, identifying and overcoming problem sounds.
4. To promote the ability for Interacting and sharing attitude.
5. To encourage the commitment-attitude to complete tasks.

The students are expected to make two presentations on advanced topics (recent trends) related to II year/ III semester subjects. A faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also. Students are encouraged to use various teaching aids such as power point presentation and demonstrative models.

TOTAL: 30 HOURS

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1 Identify and utilize various technical resources available from multiple fields.
CO2 Improve the technical presentation and communication skills.
CO3 Improve communicative competence.
CO4 Interact and share their technical knowledge.
CO5 Understand and adhere to deadlines and commitment to complete the assignments.

EVALUATION SCHEME:

Continuous Assessment (100 Marks)

Distribution of Marks for Continuous Assessment	**Marks**
Presentation I	40
Report	10
Presentation II	40
Report	10
Total	**100**

1702ME354	FLUID MECHANICS AND MACHINERY LAB	L	T	P	C
		0	0	2	1

PREREQUISITE :

Fundamentals of Mechanical Engineering

COURSE OBJECTIVES:

1. To demonstrate the principles of fluid mechanics
2. To measure the energy losses in a pipe flow.
3. To perform characteristic study on impulse, reaction and axial flow turbines.
4. To perform characteristic study on positive displacement pumps.
5. To perform characteristic study on non-positive displacement pumps

LIST OF EXPERIMENTS:

1. Experimental verification of Bernoulli's theorem in a pipe flow.
2. Measurement of flow rate using venturimeter and calculate the coefficient of discharge
3. Measurement of flow rate using orificemeter and calculate the coefficient of Discharge.
4. Performance test on tangiantial flow impulse (Pelton wheel) turbine against constant head
5. Performance test on Francis turbine against constant head.
6. Performance test on reaction (Kaplan) turbine against constant head.
7. Performance characteristics of a reciprocating pump
8. Performance characteristics of a gear pump
9. Performance test on centrifugal pump
10. Performance test on submersible pump
11. Determination of loss of head in different pipes (major loss) and fittings (minor loss) for various flow rates.

TOTAL: 30 HOURS

ADDITIONAL EXPERIMENTS / INNOVATIVE EXPERIMENTS:

1. Measurement of coefficient of friction in flow through pipes
2. Metacentric height

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1 Understand the applicability of principles of fluid mechanics in real world problems.
CO2 Measure the major and minor losses associated in a pipe flow.
CO3 Perform the characteristic study on impulse, reaction and axial flow turbine.
CO4 Perform the characteristic study on positive displacement pumps.
CO5 Perform the characteristic study on non-positive displacement pumps..

REFERENCES:

1. R.K.Bansal, A Textbook of Fluid Mechanics and Machinery, Laxmi Publications Ltd., New Delhi, Revised Ninth edition, 2014.
2. Bruce R Munson , Donald F Young, Theodore H Okiishi and Wade W. Huebsch, Fundamentals of Fluid Mechanics, John Wiley & Sons, Sixth edition 2009.
3. Pijush K Kundu and Ira M Cohen, Fluid Machines, Academic Press, Burlington, United states of america, 2010.
4. Yunus Cengel and John Cimbala, Fluid Mechanics Fundamentals and Application, Tata McGraw Hill Publishing Company Pvt. Ltd., New Delhi 2009.
5. Robert and W Fox, Introduction to Fluid Machines, John Wiley Eastern Pvt. Ltd., New Delhi, 6th edition ,2006.
6. http://nptel.ac.in/courses/112105182/

1704GE351	LIFE SKILLS : SOFT SKILLS	L	T	P	C
	(Common to all B.E / B.Tech Degree Programmes)	0	0	2	0

PREREQUISITE :

1. Technical English
2. Communicative English

COURSE OBJECTIVES:

1. To develop the students basic soft skills and enable them to get a job.
2. To develop the students' interpersonal skills and to enable them to respond effectively.
3. To develop the students selling skills and to enable them to apply in their interview process.
4. To develop the students' Corporate Etiquettes and enable them to respond effectively.
5. To develop the students' learning by practice of giving different situations.

UNIT I INTRODUCTION TO SOFT SKILLS 6 Hours

Soft Skills an Overview - Basics of Communication – Body Language – Positive attitude –Improving Perception and forming values – Communicating with others.

UNIT II TEAM Vs TRUST 6 Hours

Interpersonal skills – Understanding others – Art of Listening - Group Dynamics – Networking - Individual and group presentations - Group interactions – Improved work Relationship .

UNIT III SELLING ONESELF 6 Hours

How to brand oneself – social media – job hunting – Resume writing – Group Discussion – Mock G.D - .Interview skills – Mock Interview

UNIT IV CORPORATE ETIQUETTES 6 Hours

What is Etiquette – Key Factors – Greetings – Meeting etiquettes – Telephone etiquettes – email etiquettes – Dining etiquettes – Dressing etiquettes – Rest room etiquettes – Life etiquettes.

UNIT V LEARNING BY PRACTICE 6 Hours

1. My family. Myself. 2. Meeting people. Making Contacts. 3. A city. Getting about town. 4. Our flat. Home life.5. Travelling. Going abroad. 6. Going through Customs. 7. At a hotel. 8. Shopping. 9. Eating out. 10. Making a phone call. 11. A modern office.12 Discussing business.

TOTAL: 30 HOURS

ASSSESSMENT PATTERN

1. Two assignments (2 x 25 marks = 50 marks)
2. Pragmatic assessment (50 marks)

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1 Communicate effectively in their business environment.
CO2 Improve their interpersonal skills which are mandatory in a corporate world.
CO3 Brand themselves to acquire a job.
CO4 Involve in corporate etiquettes.
CO5 Survive in the different situations.

REFERENCES:

1. Dr.K.Alex, 'Soft Skills' Third Edition, S.Chand & Publishing Pvt Limited, 2009
2. Aruna Koneru, 'Professional Communication' Second Edition, Tata McGraw-Hill Education, 2008
3. D.K.Sarma, 'You & Your Career' First Edition, Wheeler Publishing & Co Ltd, 1999
4. Shiv Khera 'You Can Win' Third Edition, Mac Millan Publisher India Pvt Limited, 2005