Vision of the Institution

To ignite the minds of the students through academic excellence so as to bring about social transformation and prosperity.

Mission of the Institution

- To expand the frontiers of knowledge through Quality Education.
- To provide valued added Research and Development.
- To embody a spirit of excellence in Teaching, Creativity, Scholarship and Outreach.
- To provide a platform for synergy of Academy, Industry and Community.
- To inculcate high standards of Ethical and Professional Behavior.

Vision of Mechanical Engineering Department

To foster prosperity through technological development by means of education, innovation and collaborative research.

Mission of Mechanical Engineering Department

- To produce effective and responsible graduate and post-graduate engineers for global requirements by imparting quality education.
- To improve the Department's infrastructure to facilitate research productivity and success.
- To integrate teaching and research for preservation and effective application of knowledge and skills.
- To strengthen and expand collaboration and partnerships with industry and other organizations.
- To provide consultancy to the neighborhood and inculcate a spirit of entrepreneurship.
- To serve society through innovation and excellence in teaching and research.

Program Educational Objectives(PEOs)

PEO1: Graduates apply a deep working knowledge of technical fundamentals in areas such as Design, Thermal, Production, Industrial and related fields to address needs of the customer and society.

PEO2: Graduates pursue advanced education, Research and Development in Engineering, Technology and other professional careers.

PEO3: Perform themselves in a responsible, professional and ethical manner.

PEO4: Graduates participate as leaders in their fields of specialization and in activities that contribute to service and overall economic development of society.

Program Outcomes(POs) of Mechanical Engineering Department

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSO's):

PSO1: Able to apply the knowledge learned as a part of the curriculum to provide solutions for problems related to Mechanical Engineering.

PS**O**2: Think innovatively, design and develop products with modern CAD/CAM tools and with optimized manufacturing processes.

II Year II Semester

DESIGN OF MACHINE MEMBERS – I

L	T	P	C
4	0	0	3

Course Objectives:

1. The student shall gain appreciation and understanding of the design function in mechanical engineering, the steps involved in designing and the relation of design activity with manufacturingactivity
2. Selection of proper materials to different machine elements based on their physical and mechanical properties.
3. Learn and understanding of the different types of failure modes andcriteria.
4. Procedure for the different machine elements such as fasteners, shafts, couplings, keys, axially loaded jointsetc.

UNIT – I

INTRODUCTION: General considerations in the design of Engineering Materials and their properties – selection –Manufacturing consideration in design, tolerances and fits – BIS codes of steels.

STRESSES IN MACHINE MEMBERS: Simple stresses – combined stresses – torsional and bending stresses – impact stresses – stress strain relation – various theories of failure – factor of safety – design for strength and rigidity – preferred numbers. the concept of stiffness in tension, bending, torsion and combined situations – static strength design based on fracture toughness.

UNIT – II

STRENGTH OF MACHINE ELEMENTS: Stress concentration – theoretical stress concentration factor – fatigue stress concentration factor notch sensitivity – design for fluctuating stresses – endurance limit – estimation of endurance strength – Goodman's line – Soderberg's line – modified Goodman'sline.

UNIT – III

Riveted and welded joints – design of joints with initial stresses – eccentric loading.

Bolted joints – design of bolts with pre-stresses – design of joints under eccentric loading – locking devices – both of uniform strength, differentseals.

UNIT – IV

KEYS, COTTERS AND KNUCKLE JOINTS: Design of keys-stresses in keys-cotter joints-spigot and socket, sleeve and cotter, jib and cotter joints- knuckle joints.

SHAFTS: Design of solid and hollow shafts for strength and rigidity – design of shafts for combined bending and axial loads – shaft sizes – BIS code. Use of internal and external circlips, gaskets and seals (stationary & rotary).

UNIT – V
SHAFT COUPLING: Rigid couplings – muff, split muff and flange couplings, flexible couplings – flange coupling (modified).

UNIT – VI
MECHANICAL SPRINGS:

Stresses and deflections of helical springs – extension -compression springs – springs for fatigue loading, energy storage capacity – helical torsion springs – co-axial springs, leaf springs.

Note: Design data book is NOT Permitted for, examination

Course Outcomes:

1	Understand the Design Procedure and evaluate the size of simple mechanical components (stress & strain) subjected to static loads considering theories of failure
2	Apply knowledge in designing mechanical components subjected to stress concentration and Fatigue loads
3	Design and analyse permanent joints such as riveted and welded joints under loading conditions
4	Design and analyse temporary joints such as bolted and cotter joints under loading conditions
5	Design and analyse couplings under various loading conditions
6	Design and Analyse springs for the given loading

Text Books:

1. Machine Design/V.Bandari/ TMHPublishers
2. Machine design / NC Pandya& CS Shah/Charotar Publishing House Pvt.Limited
3. Design data book of Engineers-

References Books :

4. Design of Machine Elements / V.M.Faires/McMillan
5. Machine design / Schaum Series/McGrawHillProfessional
6. Machine Design/ Shigley, J.E/McGrawHill.
7. Design data handbook/ K.Mahadevan& K. Balaveera Reddy/ CBSpublishers.

8. Design of machine elements-Spotts/PearsonPublications
9. Machine Design –Norton/ Pearsonpublishers

II Year - II Semester

INDUSTRIAL ENGINEERING AND MANAGEMENT

L	T	P	C
4	0	0	3

Course Objectives:

1. To impart fundamental knowledge and skill sets required in the Industrial Management and Engineering profession, which include the ability to apply basic knowledge of mathematics, probability and statistics, and the domain knowledge of Industrial Management andEngineering
2. To produce graduates with the ability to adopt a system approach to design, develop, implement and innovate integrated systems that include people, materials, information, equipment andenergy.
3. To enable students to understand the interactions between engineering, business, technological and environmental spheres in the modernsociety.
4. To enable students to understand their role as engineers and their impact to society at the national and globalcontext.

UNIT – I

INTRODUCTION: Definition of industrial engineering (I.E), development, applications, role of an industrial engineer, differences between production management and industrial engineering, quantitative tools of IE and productivity measurement. concepts of management, importance, functions of management, scientific management, Taylor's principles, theory X and theory Y, Fayol's principles of management.

UNIT – II

PLANT LAYOUT: Factors governing plant location, types of production layouts, advantages and disadvantages of process layout and product layout, applications, quantitative techniques for optimal design of layouts, plant maintenance, preventive and breakdown maintenance.

UNIT – III

OPERATIONS MANAGEMENT: Importance, types of production, applications, workstudy, method study and time study, work sampling, PMTS, micro-motion study, rating techniques, MTM, work factor system, principles of Ergonomics, flow process charts, string diagrams and Therbligs,

UNIT – IV

STATISTICAL QUALITY CONTROL: Quality control, its importance, SQC, attribute sampling inspection with single and double sampling, Control charts – $\bar{X}$ and R – charts $\bar{X}$ AND S charts and their applications, numerical examples.

TOTAL QUALITY MANAGEMENT: zero defect concept, quality circles, implementation, applications, ISO quality systems. six sigma – definition, basic concepts

UNIT – V

RESOURCE MANAGEMENT: Concept of human resource management, personnel management and industrial relations, functions of personnel management, Job-evaluation, its importance and types, merit rating, quantitative methods, wage incentive plans,types.

UNIT - VI

VALUE ANALYSIS: Value engineering, implementation procedure, enterprise resource planning and supply chain management.

PROJECT MANAGEMENT: PERT, CPM – differences & applications, critical path, determination of floats, importance, project crashing, smoothing and numerical examples.

TEXT BOOKS:

1. Industrial Engineering and management / O.P Khanna/KhannaPublishers.
2. Industrial Engineering and Production Management/MartandTelsang/S.Chand& Company Ltd. New Delhi

Reference Books:

1. Industrial Management / Bhattacharya DK/Vikaspublishers
2. Operations Management / J.G Monks/McGrawHill Publishers.
3. Industrial Engineering and Management Science/ T. R. Banga, S. C. Sharma, N. K. Agarwal/Khanna Publishers
4. Principles of Management /Koontz O' Donnel/McGraw HillPublishers.
5. Statistical Quality Control /Gupta/KhannaPublishers
6. Industrial Engineering and Management /NVS Raju/CengagePublishers

Course outcome:

Upon successful completion of this course you should be able to:

1	Contribute to the success of companies through effective problem solving
2	Design, develop, implement, and improve integrated systems that include people, materials, information, equipment, and environments
3	Effectively manage business operations and project management teams
4	To meet the challenges for contemporary professional practice; be able to adapt and solve the increasingly complex problems faced by industry
5	Continue to develop holistically, including the personal and professional skills necessary to adapt to our changing societal, technological, and global environments
6	Graduates are continue to develop holistically as a learner to become leaders of tomorrow

II Year II Semester

KINEMATICS OF MACHINERY

L	T	P	C
4	0	0	3

Objective: The students completing this course are expected to understand the nature and role of the kinematics of machinery, the mechanisms and machines. The course includes velocity and acceleration diagrams, analysis of mechanisms joints, Cams and their applications. It exposes the students to various kinds of power transmission devices like belt, rope , chain and gear drives and

their working principles and their merits and demerits.

UNIT – I

Objective: The objective of this unit is to make student understand the purpose of kinematics, Kinematic joint and mechanism and to study the relative motion of parts in a machine without taking into consideration the forces involved.

MECHANISMS : Elements or Links – Classification – Rigid Link, flexible and fluid link – Types of kinematic pairs – sliding, turning, rolling, screw and spherical pairs – lower and higher pairs – closed and open pairs – constrained motion – completely, partially or successfully constrained and incompletely constrained .

Grublerscriterion ,Grashoff's law , Degrees of freedom, Kutzbach criterion for planar mechanisms, Mechanism and machines – classification of machines – kinematic chain – inversion of mechanism – inversion of mechanism inversions of quadric cycle, chain – single and double slider crankchains.

UNIT – II

Objective: The objective of this unit is to make student understand various mechanisms for straight line motion and their applications including steering mechanism.

LOWER PAIR MECHANISM: Exact and approximate copiers and generated types – Peaucellier, Hart and Scott Russel – Grasshopper – Watt T. Chebicheff and Robert Mechanisms and straight line motion, Pantograph. Conditions for correct steering – Davis Steering gear, Ackermans steering gear – velocity ratio; Hooke's Joint: Single and double – Universal coupling–application–problems.

UNIT – III

Objective : The objective of this unit is to make student understand the velocity and acceleration concepts and the methodology using graphical methods and principles and application of four bar chain. To understand the application of slider crank mechanism etc. and study of plane motion of the body

KINEMATICS: Velocity and acceleration – Motion of a link in machine – Determination of Velocity and acceleration diagrams – Graphical method – Application of relative velocity method four bar chain. Velocity and acceleration analysis of for a given mechanism, Kleins construction, Coriolis acceleration, determination of Coriolis component of acceleration.

Plane motion of body: Instantaneous centre of rotation, centroids and axodes – relative motion between two bodies – Three centres in line theorem – Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links

UNIT – IV

Objective: The objective of this unit is to make student understand the theories involved in cams. Further the students are exposed to the applications of cams and their working principles.

CAMS

Definitions of cam and followers – their uses – Types of followers and cams – Terminology –Types of follower motion: Uniform velocity, Simple harmonic motion and uniform acceleration and retardation. Maximum velocity and maximum acceleration during outward and return strokes in the above 3 cases. Analysis of motion of followers: Roller follower – circular cam with straight, concave and convex flanks.

UNIT – V

Objective: The objective of this unit is to make student understand gears, power transmission through different types of gears including gear profiles and its efficiency.

GEARS

Higher pairs, friction wheels and toothed gears–types – law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute profiles. Velocity of sliding – phenomena of interferences – Methods of interference.Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact – Introduction to Helical, Bevel and worm gearing.

UNIT – VI

Objective: The objective of this unit is to make student understand various power transmission mechanisms and methodologies and working principles. Students are exposed to merits and demerits of each drive.

Power Transmissions : Introduction, Belt and rope drives, selection of belt drive- types of belt drives,V-belts, materials used for belt and rope drives, velocity ratio of belt drives, slip of belt, creep of belt, tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt, Chains- length, angular speed ratio, classification of chains.

Introduction to gear Trains, Train value, Types – Simple and reverted wheel train – Epicyclic gear Train. Methods of finding train value or velocity ratio – Epicyclic gear trains. Selection of gear box- Differential gear for anautomobile.

Course Outcomes:

1	Realize the role of kinematics in understanding various mechanisms and their applications in machinery
2	Mathematical understanding of the approximate and exact straight line motion mechanisms and appreciate their applications in engineering.
3	Analyze and compute the velocity and acceleration of kinematic links in various mechanisms by graphical methods and relative velocity methods
4	Study of the relative motion between the various cams and followers and draw the cam profiles.
5	Analysis of power transmission through the design of toothed gearing.
6	Mathematical study of the power transmission drives such as Belt, rope, chain drives and gear trains.

Text Books:

1. Mechanism and Machine Theory by Ashok G. Ambekar, PHIPublishers
2. Theory of Machines – S. S Rattan-TMH
3. Theory of machines and Mechanisms – J.J Uicker, G.R.Pennock&J.E.Shigley - Oxfordpublishers

References Books :

1. Theory of Machines Sadhu Singh, PearsonsEdn
2. Theory of machines and Machinery /Vickers /Oxford.
3. Theory of Machines by Thomas Bevan/CBS
4. Kinematics of Machinery through Hyper Works – J.S. Rao – SpringerPubl
5. Theory of Mechanisms and machines – A.Ghosh&A.K.Malik – East West Press Pvt.Ltd.

II Year II Semester

MACHINE DRAWING

L T P C

3 3 0 3

Course Objective: The student will acquire knowledge of fastening arrangements such as welding, riveting the different styles of attachment for shaft. The student also is enabled to prepare the assembly of various machine or engine components and miscellaneous machine components.

Machine Drawing Conventions:

Need for drawing conventions – introduction to IS conventions

a) Conventional representation of materials, common machine elements and parts such asscrews, nuts, bolts, keys, gears, webs,ribs.

b) Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usuallysectioned.

c) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and taperedfeatures.

d) Title boxes, their size, location and details - common abbreviations & their liberalusage

e) Types of Drawings – working drawings for machineparts.

PART-A

I. Drawing of Machine Elements and simpleparts

Objective: To provide basic understanding and drawing practice of various joint, simple mechanical parts

Selection of Views, additional views for the following machine elements and parts with every drawing proportions.

a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, setscrews.

b) Keys, cotter joints and knucklejoint.

c) Riveted joints forplates

d) Shaft coupling, spigot and socket pipe joint.

e) Journal, pivot and collar and foot stepbearings.

PART-B

II. AssemblyDrawings:

Objective: The student will be able to draw the assembly from the individual part drawing.

Drawings of assembled views for the part drawings of the following using conventions and easy

drawing proportions.

a) Engine parts –Gear pump, Fuel pump Petrol Engine connecting rod, pistonassembly.

b) Other machine parts - Screws jacks, Machine Vices Plummer block,Tailstock.

c) Valves: spring loaded safety valve, feed check valve and air cock, Controlvalves

NOTE : First angle projection to be adopted. The student should be able to provide working drawings of actual parts. End semester examination for 70 Marks, Part A- 20 Marks (Answer two questions out of Three), Part B- 50 Marks (Assembly Drawing).

Course Outcomes:

1	To understand the conventional representation of various machine components and materials
2	To understand and draw the various screw threads, Bolt & nuts and Riveted joints as per standards
3	To understand and draw the various keys, Cotter joints, Shaft Couplings and Bearings as per standards
4	Able to differentiate between Assembly drawings, Part drawings and Production drawings.
5	Understand the representation of sectional and semi-sectional views.
6	Able to draw the assembly drawings for the given components.

Text Books:

1. Machine Drawing – N.Siddeswar, K.Kannaiah&V.V.S.Sastry -TMH
2. Machine Drawing –K.L.Narayana, P.Kannaiah& K. Venkata Reddy / New Age/Publishers

References Books :

3. Machine Drawing –P.S.Gill,
4. Machine Drawing –Luzzader
5. Machine Drawing –Rajput
6. Machine Drawing – N.D. Junnarkar,Pearson
7. Machine Drawing – Ajeeth Singh, McGrawHill
8. Machine Drawing – KC John,PHI
9. Machine Drawing – B Battacharya,Oxford
10. Machine Drawing – Gowtham and Gowtham,Pearson

II Year II Semester

PRODUCTION TECHNOLOGY

L	T	P	C
4	0	0	3

Course Objective:

To impart basic knowledge and understanding about the primary manufacturing processes such as casting, joining, bulk forming, sheet metal forming and powder metallurgy and their relevance in current manufacturing industry; To introduce processing methods ofplastics.

UNIT – I

CASTING : Steps involved in making a casting – Advantage of casting and its applications. – Patterns and Pattern making – Types of patterns – Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems

UNIT – II

Methods of melting and types of furnaces, Solidification of castings, Solidification of pure metals and alloys, short & long freezing range alloys. Risers – Types, function and design, casting design considerations, Basic principles and applications of Centrifugal casting, Die casting and Investmentcasting.

UNIT – III

Welding : Classification of welding processes, types of welded joints and their characteristics, Gas welding, Different types of flames and uses, Oxy – Acetylene Gas cutting. Basic principles of Arc welding, Manual metal arc welding, Submerged arc welding, Inert Gas welding- TIG & MIG welding.

UNIT – IV

Resistance welding, Solid state welding processes- Friction welding, Friction stir welding, Forge welding, Explosive welding; Thermit welding, Plasma welding, Laser welding, electron beam welding, Soldering & Brazing.

Heat affected zones in welding; pre & post heating, Weldability of metals, welding defects – causes and remedies
– destructive and non destructive testing of welds, Design of weldedjoints.

UNIT – V

Plastic deformation in metals and alloys, Hot working and Cold working, Strain hardening and Annealing. Bulk forming processes: Forging - Types Forging, Smith forging, Drop Forging, Roll forging, Forging hammers, Rotary forging, forging defects; Rolling – fundamentals, types of rolling mills and products, Forces in rolling and power requirements. Extrusion and its characteristics.Types of extrusion, Impact extrusion, Hydrostatic extrusion; Wire drawing and Tubedrawing.

Introduction to powder metallurgy – compaction and sintering, advantages and applications

UNIT – VI

Sheet metal forming - Blanking and piercing, Forces and power requirement in these operations, Deep drawing, Stretch forming, Bending, Spring back and its remedies, Coining, Spinning, Types of presses

and press tools.

High energy rate forming processes: Principles of explosive forming, electromagnetic forming, Electro hydraulic forming, rubber pad forming, advantages and limitations.

Processing of Plastics: Types of Plastics, Properties, Applications and their processing methods, Blow and Injection moulding.

Course Outcomes:

1	Understand about the primary manufacturing processes such as casting, joining and forming processes.
2	Learn the working principles of different types of furnaces.
3	Understand the principles and learn the applications of various advanced welding processes
4	Understand the steps involved in the process of Powder Metallurgy and its applications
5	Learn the various bulk deformation processes and sheet metal forming processes.
6	Learn the properties, processing and applications of various plastics

Text Books:

1. Manufacturing Processes for Engineering Materials - Kalpakjain S and Steven R Schmid-Pearson Publ , 5thEdn.
2. Manufacturing Technology -Vol I- P.N. Rao-TMH

References Books :

3. Manufacturing Science – A.Ghosh&A.K.Malik – East West Press Pvt.Ltd
4. Process and materials of manufacture- Lindberg-PHI
5. Production Technology- R.K. Jain-Khanna
6. Production Technology-P C Sharma-S.Chand

7. Manufacturing Processes- H.S. Shaun-Pearson
8. Manufacturing Processes- J.P. Kaushish-PHI
9. Workshop Technology /WAJ Chapman/CBS Publishers & DistributorsPvt.Ltd.
10. I.C. Engines - J.B.Heywood /McGrawHIll.
11. Thermal Engineering – R.S.Khurmi&J.S.Gupta- S.chandPubl
12. Thermal Engineering / PL Ballaney, KhannaPublishers

II Year II Semester

THERMAL ENGINEERING – I

L	T	P	C
4	0	0	3

Objectives: To make the student learn and understand the reasons and affects of various losses that occur in the actual engine operation.

UNIT – I

Actual Cycles and their Analysis: Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blowdown-Loss due to Gas exchange process, Volumetric Efficiency. Loss due to Rubbing Friction, Actual and Fuel-Air Cycles of CIEngines.

UNIT – II

Objectives: To familiarize the student with the various engine systems along with their function and necessity.

I. C. ENGINES : Classification - Working principles, Valve and Port Timing Diagrams, - Engine systems – Fuel, Carburettor, Fuel Injection System, Ignition, Cooling and Lubrication, principle of wankle engine, principles of supercharging and turbocharging.

UNIT – III

Objectives: To learn about normal combustion phenomenon and knocking in S.I. and C.I. Engines and to find the several engine operating parameters that affect the smooth engine operation.

Combustion in S.I. Engines : Normal Combustion and abnormal combustion – Importance of flame speed and effect of engine variables – Types of Abnormal combustion, pre-ignition and knocking (explanation of) – Fuel requirements and fuel rating, anti knock additives – combustion chamber – requirements, types.

Combustion in C.I. Engines : Four stages of combustion – Delay period and its importance – Effect of engine variables – Diesel Knock– Need for air movement, suction, compression and combustion induced turbulence – open and divided combustion chambers and nozzles used – fuel requirements and fuel rating.

UNIT – IV

Objectives: To make the student learn to perform testing on S.I and C.I Engines for the calculations of performance and emission parameters.

Measurement, Testing and Performance: Parameters of performance - measurement of cylinder pressure, fuel consumption, air intake, exhaust gas composition, Brake power – Determination of frictional losses and indicated power – Performance test – Heat balance sheet and chart.

UNIT – V

Objectives: To make students learn about different types of compressors and to calculate power and efficiency of reciprocating compressors.

COMPRESSORS – Classification –positive displacement and roto dynamic machinery – Power producing and power absorbing machines, fan, blower and compressor – positive displacement and dynamic types – reciprocating and rotary types.

Reciprocating: Principle of operation, work required, Isothermal efficiency, volumetric efficiency and effect of clearance, multi stage compression, undercooling, saving of work, minimum work condition for two stage compression.

UNIT VI

Objectives: To make students learn mechanical details, and to calculate power and efficiency of rotary compressors

Rotary (Positive displacement type) : Roots Blower, vane sealed compressor, Lysholm compressor – mechanical details and principle of working – efficiency considerations.

Dynamic Compressors: Centrifugal compressors: Mechanical details and principle of operation – velocity and pressure variation. Energy transfer-impeller blade shape-losses, slip factor, power input factor, pressure coefficient and adiabatic coefficient – velocity diagrams – power.

Axial Flow Compressors: Mechanical details and principle of operation – velocity triangles and energy transfer per stage degree of reaction, work done factor - isentropic efficiency- pressure rise calculations – Polytropic efficiency.

Course Outcomes:

1	Students are able to differentiate Air standard cycle and Actual cycle, the reasons and effects of various losses that occur in the actual engine operation.
2	They can demonstrate the knowledge in the operation of various engine systems along with their function and necessity.
3	Students will have the knowledge in normal and abnormal combustion phenomenonand knocking in S.I. and C.I. Engines and several engine operating parameters that affectthe
4	Students can perform testing on S.I and C.I Engines for the calculations of performance and emission parameters.
5	Students will have the knowledge in various compressors (Reciprocating, rotary, Dynamic and Axial flow compressors) principle of operation, factors and velocity triangles.
6	At the end of this course students are able to calculate the work required, power, pressure rise and efficiency of compressors.

Text Books:

1. I.C. Engines / V. Ganesan-TMH
2. Heat engines, Vasandani& Kumar publicationsThermal

References Books :

3. Thermal Engineering / RK Rajput/ LakshmiPublications
4. IC Engines – M.L.Mathur&R.P.Sharma – DhanpathRai&Sons.
5. I.C.Engines–AppliedThermosciences–C.R.Ferguson&A.T.Kirkpatrick-2nd Edition-WileyPubl
6. I.C. Engines - J.B.Heywood /McGrawHIll.
7. Thermal Engineering – R.S.Khurmi&J.S.Gupta- S.chandPubl
8. Thermal Engineering / PL Ballaney, KhannaPublishers

II Year - II Semester

FLUID MECHANICS & HYDRAULIC MACHINES LAB

L	T	P	C
0	0	3	2

Course Objective: To impart practical exposure on the performance evaluation methods of various flow measuring equipment and hydraulic turbines and pumps.

Experiments:

1. Impact of jets onVanes.
2. Performance Test on PeltonWheel.
3. Performance Test on FrancisTurbine.
4. Performance Test on KaplanTurbine.
5. Performance Test on Single Stage CentrifugalPump.
6. Performance Test on Multi Stage CentrifugalPump.
7. Performance Test on ReciprocatingPump.
8. Calibration ofVenturimeter.
9. Calibration of Orificemeter.
10. Determination of friction factor for a given pipeline.
11. Determination of loss of head due to sudden contraction in apipeline.
12. Turbine flowmeter.

Course Outcomes

1	Determine the co-efficient of impact of jet on various vanes
2	Estimate performance parameters of the Turbines.
3	Estimate performance parameters of the Centrifugal and Reciprocating pumps.
4	Calibratevariousflowmeasuringdeviceslikeventurimeter,orificemeterandturbineflowmeter.
5	Estimate the minor losses for a given pipe lines.
6	Determine head loss due to friction in pipes based on Dracy-weisbach equation.

II Year II Semester

PRODUCTION TECHNOLOGY LAB

L	T	P	C
0	0	3	2

Course Objective: To impart hands-on practical exposure on manufacturing processes and equipment.

Minimum of 12 Exercises need to be performed

I. METAL CASTING :

1. Pattern Design and making - for one castingdrawing.
2. Sand properties testing - for strength andpermeability
3. Mould preparation, Melting andCasting

II WELDING:

1. Gaswelding
2. Gascutting
3. Manual metal arc welding - Lap & ButtJoints
4. TIG/MIGWelding
5. Resistance SpotWelding
6. Brazing andsoldering

III METAL FORMING AND POWDERMETALLURGY:

1. Blanking & Piercing operations and study of simple, compound and progressivedies.
2. Deep drawing and extrusionoperations.
3. Bending and otheroperations
4. Basic powder compaction andsintering

IV PROCESSING OFPLASTICS

1. InjectionMoulding
2. BlowMoulding

Course Outcomes

1	Understand about the primary manufacturing processes such as casting, joining and forming processes.

2	Learn the working principles of different types of furnaces.
3	Understand the principles and learn the applications of various basic and advanced welding processes
4	Understand the steps involved in the process of Powder Metallurgy and its applications
5	Learn the various bulk deformation processes and sheet metal forming processes.
6	Learn the properties, processing and applications of various plastics