**Autonomous Programme Structure ( Modified) of**
**S. Y. B. Tech. Mechanical Engineering**
**Academic Year: 2019-2020**

| S. Y. B. Tech. Mechanical Engineering Semester –I | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Course Code | Course Title | Teaching Scheme Hours / Week | | | Examination Scheme | | | | Marks | Credit |
| | | Lecture | Tutorial | Practical | In Semester | End Semester | Oral | Practical | | |
| ME 2101 | Engineering Thermodynamics | 3 | 1 | 0 | 50 | 50 | 0 | 0 | 100 | 4 |
| ME 2102 | Materials' Technology I | 2 | 1 | 0 | 50 | 50 | 0 | 0 | 100 | 3 |
| ME 2103 | Manufacturing Process-I | 3 | 0 | 0 | 50 | 50 | 0 | 0 | 100 | 3 |
| ME 2104 | Machine Drawing | 1 | 0 | 0 | 25 | 0 | 0 | 0 | 25 | 1 |
| ES 2101 | Electrical and Electronics Engineering | 3 | 1 | 0 | 50 | 50 | 0 | 0 | 100 | 4 |
| HS 2101 | Principles of Economics and Finance | 3 | 0 | 0 | 50 | 50 | 0 | 0 | 100 | 3 |
| ME 2105 | Engineering Thermodynamics Lab | 0 | 0 | 2 | 0 | 0 | 25 | 0 | 25 | 1 |
| ME 2106 | Materials' Technology-I Lab | 0 | 0 | 2 | 0 | 0 | 25 | 0 | 25 | 1 |
| ME 2107 | Manufacturing Process-I Lab | 0 | 0 | 2 | 0 | 0 | 0 | 25 | 25 | 1 |
| ME 2108 | Machine Drawing Lab | 0 | 0 | 2 | 0 | 0 | 0 | 25 | 25 | 1 |
| AC 2101 | Self Expression | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Total** | **15** | **3** | **10** | **275** | **250** | **50** | **50** | **625** | **22** |
| | **Grand Total** | **28** | | | **625** | | | | **625** | **22** |

**AC 2101 -- Audit Course : Self Expression**

1. Dance
2. Drawing / Painting / Sketching
3. English Communication Skill
4. Film Appreciation
5. Origami
6. Theater

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

**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

## ME 2101 – Engineering Thermodynamics

**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 Chemistry
3. Basic Mechanical Engineering

**Course Objectives:**

1 To state and illustrate laws of Thermodynamics.
2 To understand the concept of entropy and availability.
3 To get conversant with properties of steam, vapor processes and various steam calorimeters.
4 To analyze the performance of various Thermodynamic cycles.

**Course Outcomes:**

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

1 Apply laws of thermodynamics to closed and open systems processes.
2 Calculate entropy change of thermodynamic universe.
3 Calculate energy interactions in steam processes
4 Analyse various thermodynamic cycles.
5 Determine availability of thermodynamic system

**Unit 1: Laws of Thermodynamics** **(9 hrs)**

Review of basic concepts of Thermodynamics, First law applied to closed system and open system, Second law of thermodynamics, Carnot theorem, Carnot cycle.

**Unit 2: Entropy** **(6 hrs)**

Clausius Inequality, Entropy – a system property, Evaluation of entropy change for solids, liquids and ideal gases, Principle of increase of entropy- entropy generation.

**Unit 3: Properties of Pure Substances** **(8 hrs)**

Formation of steam, Properties of steam, Laws of thermodynamics applied to steam processes, Steam calorimeters.

**Unit 4: Thermodynamic Vapour Cycles** **(9 hrs)**

Carnot cycle, Rankine cycle, Reheat and Regeneration, Vapour Compression cycle.

**Unit 5: Thermodynamic Gas Cycles** **(6 hrs)**

Otto cycle, Diesel cycle, Dual cycle, Brayton cycle, Bell Coleman cycle.

**Unit 6: Exergy Analysis** **(4 hrs)**

Exergy, Exergy analysis of closed system, Exergy analysis of open system, $2^{nd}$ law efficiency.

**Text Books:**


1 Principles of Engineering Thermodynamics- Moran, Shapiro, Boettner, Baily Eighth Edition, Wiley
2 P. K. Nag, Engineering Thermodynamics, $5^{th}$ Edition, Tata McGraw Hill Publications

3 C.P. Arora, Engineering Thermodynamics, Tata McGraw Hill
4 S. Domkundwar, C. P. Kothandaraman, Anand Domkundwar, Thermal Engineering, Dhanpat Rai Publishers

**Reference Books:**

1 Cengel and Boles, 'Thermodynamics – An Engineering Approach', 7th Edition, Tata McGraw Hill
2 Rayner Joel, "Basic Engineering Thermodynamics", Addison Wesley Longman

## ME 2102 – Materials' Technology I

**Teaching Scheme**
Lecture: 2 Hrs/week
Tutorials: 1 Hrs/week

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

**Prerequisites:**

1. Physics
2. Chemistry

**Course Objectives:**

1 To introduce material properties and behaviour that is relevant to Mechanical engineering.
2 To provide an integrated understanding of structure, properties, processing and performance

**Course Outcomes:**

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

1 Based on principles of material science and engineering, correlate the relationship between processing-structure-property-performance of materials.
2 Apply the knowledge of engineering fundamentals and material science to define and evaluate properties relevant to mechanical engineering.
3 Evaluate structure of engineering materials
4 Cite usual types of failures in materials correlate the structure of material with common failures and write their causes.

**Unit 1: Properties of Engineering Materials** **(8 hrs)**

Classification of various properties, expressing and computing properties relevant to mechanical engineering. Study conventional destructive and non destructive testing.

**Unit 2: Structure of Crystalline solids** **(8 hrs)**

Effect of making process on internal structure, structure of crystalline solids.

**Unit 3: Structure of Non crystalline solids** **(5 hrs)**

Polymers, composites and functionally graded materials.

**Unit 4: Structure property relation** **(9 hrs)**

Effect of inter-atomic distance on properties, effect of crystalline and non crystalline structure and defects on properties, effect of grain size on properties, defects, defect tolerance, slip, twinning, work hardening, failure modes.

**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." Raghavan 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 2103 – Manufacturing Processes-I

**Teaching Scheme**
Lecture: 3 Hrs/week

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

**Prerequisites:**

1. Basic Mechanical Engineering

**Course Objectives:**

1 To study basic production processes.
2 To study how to select appropriate production processes for a specific application.

**Course Outcomes:**

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

1 Apply knowledge of casting process to calculate various parameters of casting such as time required to fill the mould and solidification time etc.
2 Understand different machining operation on lathe machine; calculate various operation parameters and selection of gear train for various operations.
3 Select type of drilling machine required for different operations and will calculate various machining parameters.
4 Understand different machining operation on milling machine and will calculate various machining parameters.
5 Determine finishing process for selected component.

**Unit 1: Manufacturing Processes (3 hrs)**

Introduction, importance of manufacturing, economics and technological definition, introduction to product design process, role of mechanical engineer in classification and selection of manufacturing processes.

**Unit 2: Metal Casting Processes (8 hrs)**

Patterns, Types of patterns, allowances and material used for patterns, gating system, casting process. Moulding sands; properties and sand testing: Grain fineness, moisture content, clay content and permeability test. Core materials and core making. Moulding practices: Green, dry and loam sand moulding, pit and floor moulding; shell moulding; permanent moulding. Melting furnaces. Gating and Riser design fundamentals, Review of casting processes, casting design considerations, capabilities and applications of casting processes; casting defects.

**Unit 3: Metal Cutting Lathes (8 hrs)**

Introduction to Lathes, types of lathe machines, construction all arrangement and principal units of engine lathes, specifications of lathes, operations carried on lathe, attachment extending the processing capacities of engine lathes, Capstan and Turret lathes, Taper turning on lathe, Thread cutting on lathe using gear train and chasing dial.

**Unit 4: Drilling Machines (8 hrs)**

Purpose and field of application of drilling machines, Types of drilling machines, Drilling and allied operation: drilling, boring, reaming, tapping, countersinking, counterboring, spot facing; deep hole drilling, alignment tests of drilling machine. Boring Machine: Purpose and applications, Horizontal boring machines, Precision boring machines

**Unit 5: Milling Machines** **(8 hrs)**

Purpose and types of milling machines, general purpose milling machines, different types of milling operations, milling cutters, attachments extending the processing capabilities of general purpose milling machines, Indexing, Helical milling operation and its set up.

**Unit 6: Grinding Machines and Abrasives** **(6 hrs)**

Classification of grinding machines, cylindrical grinders, internal grinders, Surface grinders, tool and cutter grinders, centerless grinders, Types of grinding wheels, wheel characteristics and wheel selection. Grinding Wheels: Types of abrasives–natural, artificial; grain size; types of bonds; grade; structure; shapes and sizes; grinding wheel designation, selection of grinding wheels, balancing of grinding wheels, truing, dressing and mounting of grinding wheels. Lapping and honing.

**Text Books:**


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


**Reference Books:**


1 Production Technology Vol. I and II, B. S. Raghuvanshi, Dhanpat rai and co.
2 Workshop Technology part I, II & III, W. A. J. Chapman.
3 Introduction to Manufacturing Processes, John A. Schey, McGraw-Hill.
4 Mechanical Engineers' Handbook, Volume 3: Manufacturing and Management, Myer Kutz, Wiley.
5 Manufacturing processes Vol. 1 and 2, P. N. Rao, Tata McGraw-Hill.

## ME 2104 – Machine Drawing

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

**Examination Scheme**
In semester: 25 marks

Credits: 1

**Prerequisites:**
1. Engineering Graphics

**Course Objectives:**
1 To make students conversant with conventional representations of common features.
2 To make students to draw sectional views and dimensioning techniques.
3 To make students understand limits, Fits and tolerance.
4 To create Detail and Assembly drawing using CAD software.

**Course Outcomes:**
Upon completion of this course, students will be able to:
1 Interpret the machine parts and represented through IS conventions.
2 Illustrate the details of the given machine parts through sectional view and appropriate dimensional techniques.
3 Apply the tolerance from tolerance grade and demonstrate the type of fit resulting from the tolerance.
4 Acquire knowledge of CAD software to draw machine components.

**Unit 1: Conventions and Standards** **(2 hrs)**
Need of Graphical Language, Importance of Machine Drawing, Drafting equipment's (from Instruments to Current Software). Principles of Drawings: BIS Conventions, ISO standards, Importance of Title Block and Part list, Line types (Lines used in Machine Drawings).
Conventional Representations: Need and types, IS conventions of Springs, Gear, Shaft, Pipe, Bar, Washers, Knurling, array of holes, Ratchet & Pawl Angle etc.

**Unit 2: Projections and Dimensioning** **(3 hrs)**
Projections: Designation, Relative position of views.
Sectioning: Cutting Planes and Section, Hatching Lines, Half Sections, Aligned Sections, Offset Sections, Sectioning Revolved, Removed Sections, Local Sections,
Dimensioning: Principle of Dimensioning, Dimensioning of Common Features e.g. Diameter, radii, chords, arcs, angles, Countersunk, Counter drilled holes, Counter-bore holes, chamfered and Counter sunk holes on curved surfaces, Spot Faces, Chamfers, Tapered Features. Addition of Letters and symbols, special indications.

**Unit 3: Screw Threads and Threaded Fasteners** **(2 hrs)**
Introduction –Helix Thread terms and Nomenclature, Designation, Threads Form, Form of V Threads, Form of Square Threads, Conventional representations, Threaded fasteners- Bolts, Washers, Types of Bolts, Stud. Types of Nuts, Types of Screw, Designation of Bolted Joints, Stud, Types of Nut Locking Arrangements. Foundation Bolt.

**Unit 4: Limits, Fits and Tolerance** **(3 hrs)**
Theory of Conventional Tolerancing, Tolerancing and limit systems, symbols for tolerances, deviations and fits, Method of tolerancing, Tolerance grade. Fits-System of fits, classification of fits, Selection of Fits, Method of indicating fits on drawing.

**Unit 5: Geometric Dimensioning and Tolerancing** **(3 hrs)**

Need of Geometrical Tolerance, Geometrical Characteristics of Symbols, Characteristics (such as Straightness, Flatness, Circularity, Cylindricity etc) Tolerances for Related Features such as Parallelism, Perpendicularity, Angularity, Concentricity, its symbols and interpretations.

**Unit 6: Assembly drawing and details** **(4 hrs)**

Assembly Drawings: Introduction, Types of Assembly, Importance of BOM, Assembly procedures, Assembly of Engine Parts, Assembly of Machine Tools Parts etc.

**Text Books:**


1 N. D. Bhatt, Machine Drawing. Charotor Publication House, Bombay.

2 Gill P. S., "A Text book of Machine Drawing", Revised Edition K. Kataria and Sons, New Delhi, 2008, ISBN 81-85749-79-5.


**Reference Books:**


1 N. Sidheshwsr, P. Kannaiah and V. V. S. Sastry. Machine Drawing, Tata McGraw Hill, New Delhi.

2 R. K. Dhavan, Machine Drawing. S. Chand and Company.

3 Narayana, Kannaiah and Venkatareddv, Machine Drawing, New Age International.

4 N. D. Junnarkar Machine Drawing 1st print Pearson Education.

5 IS: SP46- Engineering drawing practice for schools and colleges, B.I.S. Publications.

6 IS: 696- Code of practice for general engineering drawings B.I.S. Publications.

7 IS: 2709-Guide for selection of fits, B.I.S. Publications.

8 IS:919- Recommendation for limits and fits for Engineering, B.I.S. Publications.

9 IS: 8000- Part I, II. III. TV, geometrical Tolerancing of technical drawings -- B.I.S. Publications.

## ES 2101 – Electrical and Electronics Engineering

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

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

**Prerequisites**:
1. Basic Electrical and Electronics Engineering I.
2. Basic Electrical and Electronics Engineering II.

**Course Objectives:**
Students should be conversant with Electrical and Electronics controls basic
1 To study Electrical drive system required to drive machines.
2 It will be prerequisite for Mechatronics.
3 To study Microcontrollers.

**Course Outcomes:**
Upon completion of this course, students will be able to:
1 Understand and interpret the working of D.C motor, various methods of speed control and its industrial application.
2 Interpret the performance and torque -slip characteristic of I.M.
3 Understand and analyze the electrical drive system.
4 Apply the knowledge of microcontrollers in automation.

**Unit 1: D.C. Machines** **(6 hrs)**
Construction, working principle of D.C. generator, emf equation of D C generator. Working principle of D.C. motor. Types of D. C. motor, back emf, torque equation for D.C. motor, characteristics of D. C. motor (series, shunt and compound), Three point starter for D.C Shunt motor, Braking of D.C. Motor, methods for speed control of D.C shunt and series motors, Industrial applications.

**Unit 2: Three phase Induction Motor** **(6 hrs)**
Constructional feature, working principle of three phase induction motors, types, torque equation, torque slip characteristics, power stages and efficiency. Types of starters, braking of induction motor, methods of speed control & Industrial applications.

**Unit 3: Electrical Drives** **(6 hrs)**
Advantages of Electrical Drives,, Parts of electrical drives, choice of electric drive ,Status of ac and dc drives, Brushless dc motor drives , stepper motor drives, synchronous motor variable speed drive.

**Unit 4: Introduction to Microcontrollers** **(6 hrs)**
Introduction to microcontroller and microprocessors, role of embedded systems, open source embedded platforms, Atmega328p-features, architecture, port structure, sensors and actuators, data acquisition systems, introduction to Arduino IDE- features, IDE overview, programming concepts: variables, functions, conditional statements

**Unit 5: Peripheral Interface – 1** **(6 hrs)**
Concept of GPIO in Atmega 328P based Arduino board, digital input and output, UART concept, timers, interfacing with LED, LCD and keypad, serial communication using Arduino IDE.

**Unit 6: Peripheral Interface – 2** **(6 hrs)**
Concept of ADC in Atmega 328P based Arduino board, interfacing with temperature sensor (LM35), LVDT, strain gauge, accelerometer, concept of PWM, DC motor interface using PWM.

**Text Books:**


1 Electrical Machines-D P Kothari and I J Nagrath, Tata McGraw Hill ,Third Edition
2 Electrical Machinery-S.K. Bhattacharya, TTTI Chandigad.
3 Fundamentals of Elecrical drives-G K Dubey
4 Ajay Deshmukh-Microcontrollers Theory and Applications, TATA McGraw Hill
5 Arduino microcontroller processing for everyone -Steven F Barret,Morgan and Claypool Publisher.
6 C programming with ardino - Warwick Smith Elektor Publication.


**Reference Books:**


1 Electrical Technology-Edward Hughes, Pearson Education.
2 Electrical Machines by Ashfaq Husain, Dhanpat Rai & Sons.
3 Electrical Technology- Vol I & Vol II- B. L.Theraja, S Chand Publication Co Ltd.
4 The 8051 Microcontrollers - Architecture, Programming and Applications by K. J. Ayala, Penram International Publishing (I) Pvt Ltd.
5 Started with Arduino by Massimo Banzi and Michael Shiloh Published by Maker Media, Inc.
6 Getting Started With Arduino: A Beginner's Guide by Brad Kendall (Author), Justin Pot (Editor), Angela Alcorn (Editor).
7 Arduino Cookbook, 2nd Edition by Michael Margolis published by O'Reilly Media.
8 Application notes from ATMEL microcontroller data book.


**Tutorials:**

1 Study of AC and DC starter.
2 Verification of speed control of D.C. shunt motor by armature voltage and flux control method.
3 Load test on three phase induction motor.
4 Interfacing of LED to blink after every 1 sec.
5 Interfacing with transducer.
6 Display data using serial communication.
7 Interfacing of LCD to display the message.

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

## HS 2101 – Principles of Economics and Finance

**Teaching Scheme**
Lecture: 3 Hrs/week

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

**Prerequisites**: NIL

**Course Objectives:**

1. To enable students to acquire knowledge and develop an understanding of basic concepts and principles of Economics & Finance.
2. To make students acquaint with standard concepts and tools that they are likely to find useful in their profession when employed in the firm/industry/corporation in public or private sector.
3. To sensitize students to the current economic issues of the nation.
4. To develop an understanding of the role of institutions in the functioning of an economy.
5. To enhance financial literacy of engineering students.

**Course Outcomes:**

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

1. Solve the questions of What, How and for Whom for various economics systems using the concept of Production Possibility Frontier curve.
2. Solve, with the help of Supply and Demand curves, the Equilibrium Price and Quantity for a product or service in various types of market structures.
3. Analyse the performance of different business organisations and various investments using financial ratios and time value of money concept respectively.
4. Evaluate current Fiscal and Monetary policies of the nation by understanding the objectives of Macroeconomics and the role of Indian Financial System.

**Unit 1: Central Concepts Of Economics** **(6 hrs)**

Economics as a science of choice and scarcity, Microeconomics and Macroeconomics, Positive & Normative Economics, Basic Economic Problems, Economic Systems-Market, Command and Mixed Economies, Society's Technological Possibilities, Opportunity Cost, Efficiency.

**Unit 2: Basic Elements of Supply & Demand** **(6 hrs)**

Concept of Demand- Demand Schedule & Curve, Law of Demand, Determinants of Demand, Concept of Supply- Supply schedule, Supply curve, Equilibrium of Supply and Demand, Market and Market Structures- Perfect Competition, Monopolistic Competition, Oligopoly, Duopoly and Monopoly.

**Unit 3: Role and Environment of Managerial Finance** **(6 hrs)**

Role of Finance in business, Forms of business organizations, Goals of the firm, Capital structure-Debt and equity capital, Sources of finance, Time value of money, Risk and Return.

**Unit 4: Economic Analysis And Costs** **(6 hrs)**

Cost Concepts- Fixed and Variable Cost, Marginal Cost, Average Cost, Total Cost, Opportunity Cost, Link between production and cost, Break even Analysis, Financial analysis of a business firm- Statement of Profit and Loss, Balance Sheet, Basic Ratios.

**Unit 5: Overview of Macroeconomics** **(6 hrs)**

Tools to measure economic activity- GDP, Employment rate, Inflation & Consumer Price Index, Fiscal & Monetary policy.

**Unit 6: Money And The Financial System** **(6 hrs)**

Evolution of money, Role & Functions of the Financial System, Indian Financial System.

**Text Books:**


1 Paul A Samuelson, Economics,Indian Adaptation, Sudip Chaudhari,Anindya Sen, Mc Graw Hill (2010), 19th edition.
2 Lawrence J Gitman,Principles of Managerial Finance,Pearson.(2016), 11th edition.
3 K .K. Dewett, Modern Economic Theory,S.Chand (2005).


**Reference Books:**


1 Geetika, Ghosh P. & Choudhury, P.R. (2018), Managerial Economics,Mc Graw Hill Education,3rd Edition.
2 Thursen Gerald, Engineering Economics,Prentice Hall.( 9th edition, 2008).
3 V. Mote, S. Paul, G. Gupta, Managerial Economics,Tata McGraw Hill.(2004).


**Websites:**

1 www.economicshelp.org
2 www.rbi.org
3 www.khanacademy.org

## ME 2105 – Engineering Thermodynamics Lab

**Teaching Scheme**
Practical: 2 Hrs/week

**Examination Scheme**
Oral Examination: 25 marks
Credits: 1

**Course Objectives:**

1 To study different types of calorimeters to determine calorific value of fuels.
2 To get conversant with various types of boilers.
3 To get conversant with boiler mountings and accessories.
4 To understand boiler performance calculations.
5 To understand performance calculations of vapor compression cycle.

**Course Outcomes:**

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

1 Conduct trial on calorimeters to determine calorific value of various fuels.
2 Understand different types of fire and water tube boilers.
3 Demonstrate working of various boiler mountings and accessories.
4 Calculate performance parameters of boiler.
5 Determine COP of a system working on vapor compression cycle.

**Lab work to be accomplished**

1. Determination of calorific value using gas calorimeter.
2. Determination of calorific value using bomb calorimeter.
3. Study of various types of boilers.
4. Study of boiler mountings.
5. Study of boiler accessories.
6. Study of various types of steam traps.
7. Determination of dryness fraction of steam.
8. Trial on boiler to determine boiler efficiency, equivalent evaporation and energy balance.
9. Industrial visit to any process industry which uses boiler and submission of detailed report.
10. Determination of COP of Vapor Compression cycle.

**Text Books:**


1. P. L. Ballaney, Thermal Engineering: Engineering Thermodynamics and Energy Conversion Techniques, Khanna Publishers
2. S. Domkundwar, C. P. Kothandaraman, Anand Domkundwar, Thermal Engineering, Dhanpat Rai Publishers.

## ME 2106 – Materials' Technology-I Lab

**Teaching Scheme**
Practical: 2 Hrs/week

**Examination Scheme**
Oral Examination: 25 marks
Credits: 1

**Course Objectives:**

1 To provide firsthand experience of procedures and equipment required for measuring common mechanical properties of material that are specified in component drawings.

**Course Outcomes:**

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

1 Inspect components and measure mechanical properties of engineering materials using equipments in the laboratory.
2 Propose testing method for mechanical properties considered in design, quality assurance and servicing of engineering components.
3 Prepare reports consisting drawings, graphs, written procedures, observations, results and conclusions.
4 Identify the phases and measure grain size of the material using metallography.
5 Demonstrate an understanding of professional, ethical and social responsibility by applying codes and standard practices on material testing.

**Lab work to be accomplished**

1. Introduction to Lab safety.
2. Perform Tensile test.
3. Perform Hardness tests (3).
4. Failure analysis based on demonstration of Impact test.
5. Ultrasonic flaw detection.
6. Magnetic particle test.
7. Dye penetrant test.
8. Tasks/ Activity based practical.

## ME 2107 – Manufacturing Processes-I Lab

**Teaching Scheme**
Practical: 2 Hrs/week

**Examination Scheme**
Practical Examination: 25 marks
Credits: 1

**Course Objectives:**

1 To practice lathe operations like turning, taper turning, thread cutting etc.
2 To understand various concepts related to pattern making for casting.
3 To understand joint preparation and welding phenomenon.

**Course Outcomes:**

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

1 Work on lathe machine for different operations like turning, thread cutting, grooving etc.
2 Analyse and estimate machining time for different operations on lathe machine..
3 Prepare pattern for sand casting.
4 Make welding joints for different applications.

**Lab work to be accomplished**

1. One job on plain and taper turning and screw cutting.
2. Demonstration of pattern making for sand casting.
3. One simple exercise on welding-preparing a component comprising of welded joints.
4. Demo of turning operation on plastic rod to know the difference in machining of metals and plastics (Any of the commercial plastics like Nylon-6, Nylon-66, Plyster, PET etc.)

**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 2108 – Machine Drawing Lab

**Teaching Scheme**
Practical: 2 Hrs/week

**Examination Scheme**
Practical Examination: 25 marks
Credits: 1

**Prerequisites:**

1. Engineering Graphics

**Course Objectives:**

1 To make students to use the drafting software for creating drawing.
2 To make students to understand IS conventions.
3 To make students to draw assembly drawing from part drawing.
4 To make students to draw the sectional view of assembly drawing with part list.

**Course Outcomes:**

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

1 Draw part drawing of machine component using drafting software.
2 Represent the features of the parts using IS Conventions.
3 Construct an assembly of parts of machine components.
4 Illustrate the sectional assembly drawing using drafting software.

**Lab work to be accomplished**

**Sheet 1: IS conventions**

A2 Sheet based on various IS conventions (Manual Drawing sheet) Use CAD software to get conversant with modern tools to develop orthographic projections of simple objects studied in Engineering Graphics. Assembly Drawing and Detail Drawing.

**Sheet 2 and Sheet 3: Detail and Assembly Sheet**

Sheets based on one Simple Mechanical Assemblies (max. 5 parts) e.g. Plummer Block, Bench Vice, Screw Jack, Foot Valve, Pipe Vice, Machine Vice, Stuffing Box etc. Application and working of the studied assembly, Use BOM. One Full Imperial sheet of details and assembly of this assignment should be prepared on Auto-CAD.

**Sheet 4 and Sheet 5: Detail and Assembly Sheet**

Sheets based on one Complex Mechanical Assemblies (max. 10 parts) e.g. Tail Stock, Four Jaw Chuck, Tool Head for Shaping Machine etc. Application and working of the studied assembly, Prepare BOM. One Full Imperial sheet of details and assembly of this assignment should be prepared on Auto-CAD.

**Text Book:**


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

**Reference Books:**


1. N. Sidheshwsr, P. Kannaiah and V. V. S. Sastry. Machine Drawing, Tata McGraw Hill, New Delhi.
2. R. K. Dhavan, Machine Drawing. S. Chand and Company
3. Narayana, Kannaiah and Venkatareddv, Machine Drawing, New Age International
4. N. D. Junnarkar Machine Drawing 1st print Pearson Education
5. IS: SP46- Engineering drawing practice for schools and colleges, B.I.S. Publications.
6. IS: 696- Code of practice for general engineering drawings B.I.S. Publications.
7. IS: 2709-Guide for selection of fits, B.I.S. Publications.
8. IS:919- Recommendation for limits and fits for Engineering, B.I.S. Publications
9. IS: 8000- Part I, II. III. TV, geometrical Tolerancing of technical drawings - B.I.S. Publications.