

ELEMENTS OF MECHANICAL ENGINEERING

Subject Code : 14EME14/14 EME 24

Hours/Week : 04

Total Hours : 50

IA Marks : 25

Exam. Hours : 03

Exam. Marks : 100

Course Objectives :

Students belonging to all branches of Engineering are made to learn certain fundamental topics related to mechanical engineering so that they will have minimum understanding of mechanical systems, equipment and process.

Module – 1

Energy Resources : Non-renewable and renewable energy resources, **Fossil fuel based** solid, liquid and gaseous fuels, Calorific values of fuels, **Combustion** and combustion products of fuels, **Solar Power :** Solar Radiation, **Geothermal** (definition only), Solar Thermal energy harvesting, ex: liquid **plate** collectors, solar ponds (principle of operation only), Solar **photovoltaic** principle. **Wind Power :** principle of operation of a typical **windmill**. **Hydro Power :** Principles of electric power generation from **hydropower** plants, **Nuclear Power :** Principles of Nuclear power plants, **Bio Fuels :** introduction to bio fuels, examples of various biofuels used in **engineering** applications, Comparison of biofuels with petroleum fuels in **terms** of calorific value and emission. **Steam Formation and Properties :** Classification of boilers, Lancashire boiler, Babcock and Wilcox boiler, boiler **mountings** and accessories (No sketches for mountings and accessories), **Properties of** steam, saturated and superheated steam, specific volume, enthalpy and **thermal** energy. (No numerical problems in this module) **10 Hours**

Module – 2

Steam turbines and IC Engines and Pumps **Steam turbines :** Classification, Principle of operation of Impulse and reaction turbines, DeLaval's turbine, Parson's turbine. **Compound** of turbines). **Gas turbines :** Classification, Working principles and Operations of Open **cycle** and closed cycle gas turbines. **Water** **turbines :** Classification, Principles and operations of Pelton wheel, **Francis** turbine and Kaplan turbine **Internal Combustion Engines :** Classification, I.C. Engines parts, 2 Stroke **and** 4 stroke Petrol engines, 4 stroke diesel engines. P-V diagrams of Otto

and Diesel cycles. Problems on indicated power, brake power, indicated thermal efficiency, brake thermal efficiency, mechanical efficiency, and specific fuel consumption, [numericals on IC Engines]. **10 Hours**

Module – 3

Machine Tools and Automation Machine Tools Operations :

Turning, facing, knurling, Thread cutting, Taper Turning by swivelling the compound rest, Drilling, Boring, Reaming, Tapping, Counter Sinking, Counter Boring, -Plane milling, End milling, Slot milling. (No sketches of Machine tools, sketches to be used only for explaining operations. Students to be shown the available machine tools in the Machine Shop of the college before explaining the operations)

Robotics and Automation :

Robotics : Introduction, classification based on robots configuration; Polar, cylindrical, Cartesian Coordinate and spherical. Application, Advantages, and disadvantages

Automation : Definition, types -Fixed, Programmable & Flexible automation, NC/ CNC machines: Basic elements with simple block diagrams, advantages and disadvantages. **10 Hours**

Module – 4

Engineering materials and joining processes :

Engineering Materials :

Types and applications of Ferrous & Nonferrous metals and alloys,

Composites : Introduction: Definition, Classification and applications (Air craft and Automobiles)

Soldering, Brazing and Welding :

Definitions, classification and method of soldering, Brazing and welding. Differences between soldering, Brazing and Welding. Description of Electric Arc Welding and Oxy-Acetylene Welding. **10 Hours**

Module – 5

Refrigeration, Air-Conditioning :

Refrigerants : properties of refrigerants, list of commonly used refrigerants.

Refrigeration –

Definitions – Refrigerating effect, Ton of Refrigeration, Ice making capacity, COP, Relative COP, unit of Refrigeration. Principle and working of vapor

pression refrigeration and vapour absorption refrigeration: Principles and applications of air conditioners, Room air conditioner. 10 Hours

Course Outcomes :

Students shall demonstrate knowledge associated with, Various Energy sources, Boilers, Prime movers such as turbines and IC engines, refrigeration and air-conditioning systems Metal removal process using Lathe, drilling, Milling Robotics and Automation. Fair understanding of application and usage of various engineering materials.

Scheme of examination :

Two full questions (with a maximum of four sub questions) of twenty marks each to be set from each module. Each question should cover all the contents of the respective module.

Students have to answer five full questions choosing one full question from each module

1 Books :

V.K.Manglik, "Elements of Mechanical Engineering", PHI Publications, 2013. (Module-1,2,4,5)

Mikell P.Groover, "Automation, Production Systems & CIM", 3rd Edition, PHI (Module -3)

K.R.Gopalkrishna, "A text Book of Elements of Mechanical Engineering"- Subhash Publishers, Bangalore. (Module -1,2,3,4,5)


Reference Books :

S.TrymbakaMurthy, "A Text Book of Elements of Mechanical Engineering", 4th Edition 2006, Universities Press (India) Pvt Ltd, Hyderabad.

K.P.Roy, S.K.Hajra Choudhury, Nirjhar Roy, "Elements of Mechanical Engineering", Media Promoters & Publishers Pvt Ltd, Mumbai, 7th Edition, 2012

Pravin Kumar, "Basic Mechanical Engineering", 2013 Edition, Pearson.

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COMPUTER AIDED ENGINEERING DRAWING

Subject Code : 14CDE14/14CDE24

IA Marks : 25

Hours/Week : 06

Exam. Hours : 03

(Instruction 2Hrs. + Sketching & Practice 4 Hrs.)

Total Hours : 56

Exam. Marks : 100

Course Objectives :

The main objectives of this course are to impart knowledge on:

1. Fundamentals of engineering drawing and usage of CAD software
2. Students of all branches of Engineering are trained to solve Engineering problems enabling them to understand Engineering applications.

Module – 1

Introduction to Computer Aided Sketching :

Introduction, Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning and free hand practicing. Computer screen, layout of the software, standard tool bar/menus and description of most commonly used tool bars, navigational tools. Co-ordinate system and reference planes. Definitions of HP, VP, RPP & LPP. Creation of 2D/3D environment. Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line conventions, material conventions and lettering. 12 Hours

Module – 2

Orthographic Projections :

Introduction, Definitions - Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (No application problems).

Orthographic Projections of Plane Surfaces (First Angle Projection Only) :

Introduction, Definitions-projections of plane surfaces-triangle, square, rectangle, rhombus, pentagon, hexagon and circle, planes in different

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