MIE 1071: BASIC MECHANICAL ENGINEERING [3 0 0 3] (2022)

Properties of Steam and Boilers: Steam formation, Types of steam, Steam properties- Enthalpy, Simple numerical for finding enthalpy and dryness fraction. Steam Boilers: Classification, Working principle of Babcock & Wilcox Boiler. Introduction to Boiler Mountings and Accessories.

Prime Movers: Classification of Prime movers, working principle of steam, gas and water turbines, Concept of impulse and reaction steam turbines. Compounding of steam turbines- velocity compounding, pressure compounding and pressure – velocity compounding.

Refrigeration: Principle and working of vapour compression refrigeration system, Desirable properties of an ideal refrigerant, Definition of COP, Unit of refrigeration.

I.C. Engines: Classification, working of 2-stroke, 4 - stroke C.I and S.I Engines with P-V diagrams, Definitions and simple numerical for determining Indicated Power, Brake Power, Mechanical efficiency, indicated thermal efficiency, and Brake thermal efficiency, Working of simple carburettor.

Power Transmission: Definition, Belt drives- open and crossed, Velocity ratio, stepped cone pulley, Fast and loose pulley, Length of belt, Tension in the belt, Slip, Creep (No derivations), Introduction to rope drive and chain drives, Gear Drives-Types of gears, Velocity ratio for Gear trains, Simple and compound gear trains, Numerical on belt and gear drives.

Machine Tools: Lathe - Classification, Block diagram of engine lathe, Specification of lathe, lathe operations such as plain turning, step turning, thread cutting, knurling, facing, chamfering and taper turning. Methods of taper turning such as swivelling the compound rest and tail stock set over. Simple numerical involving calculation of machining time. Drilling - Classification of drilling machines, Block diagram of radial drilling machine, drilling operations such as reaming, boring, counter boring, counter sinking, spot facing and tapping.

Casting and Forging: Moulding sand and its desirable properties, Patterns- Single piece and split piece pattern, Pattern allowances, steps in the preparation of two box green sand mould, Introduction to forging.

Welding: Classification, Principle of Resistance spot welding, Electric arc welding, TIG welding, MIG welding and oxy-acetylene gas welding, Gas flames, Introduction to soldering and brazing.

Automation and Advanced Manufacturing: Introduction to automation, basic elements of automation, levels of automation, Introduction to CNC – History and evolution, advantages and disadvantages, classification, basic programming, Industrial robotics, robot configurations, industrial robot applications, Introduction to Additive manufacturing.

References:

1. Gopalakrishna K.R., Text book of elements of Mechanical Engineering, Subhash Publications, Bangalore, 2005.

2. Rajput R. K., Elements of Mechanical Engineering, Fire Wall Media, 2005.

3. Raghuvanshi B.S., A course in Workshop Technology, Vol. 1, Dhanpat Rai & sons, New Delhi, 2005.

4. Groover Mikell P., Automation, Production systems, and Computer-Integrated Manufacturing. Pearson Education India, 2016.

5. HMT Limited, Mechatronics, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

6. Roy & Choudhury, "Elements of Mechanical Engineering", Media Promoters & Publishers Pvt. Ltd, Mumbai, 2000.