ME114 FUNDAMENTALS OF MECHANICAL ENGINEERING 3-0-2

COURSE OBJECTIVE:

1. To familiarize with the basic concept of Mechanical Engineering
2. To familiarize with the scope of Mechanical Engineering
3 To familiarize with the job prospects of Mechanical Engineer

COURSE CONTENT:

MANUFACTURING PROCESSES: Sheet Metal Work processes(applications, advantages/ disadvantages). Welding: Types – Equipments– Tools and accessories – Techniques employed - applications, advantages / disadvantages – Gas cutting – Brazing and soldering. Lathe Practice: Types - Description of main components – Cutting tools – Work holding devices – Basic operations. Simple Problems. Drilling Practice: Introduction – Types – Description – Tools. Simple Problems.

POWER GENERATION: External and internal combustion engines Auto diesel & dual cycles, comparative study – Hydro, thermal and nuclear power plants (layouts, element/component description, advantages, disadvantages, applications). Simple Problems. Introduction to Steam water and gas turbines, basics of Rankine & Joule cycle, centrifugal pumps.

MACHINE ELEMENTS: Springs: Helical and leaf springs – Springs in series and parallel. Cams: Types of cams and followers – Cam profile Power Transmission: Gears (terminology, spur, helical and bevel gears, gear trains). Belt drives (types). Chain drives. Simple problems. Introduction to mechanisms, four bar chain , inversions .

THERMAL ENGINEERING: Basic concepts of thermodynamics , Concept of system ,Introduction to Zeroth , first & second law of thermodynamics , salient features of steam boilers , accessories & mountings ,High pressure boilers Basic modes of heat transfer Fourier's law , Stefan Boltzmann's law ,Newton's law . Concept of refrigeration & air conditioning, ton of refrigeration, COP. working of domestic refrigerator & air conditioner

MECHANICAL PROPERTIES AND DEFORMATION MECHANISMS: Mechanisms of plastic deformation, slip and twinning – Types of fracture –mechanical Properties of materials , Testing of materials under tension, compression and shear loads – Hardness tests (Brinell, Vickers and Rockwell), hardness tests, Impact test lzod and charpy, fatigue and creep failure mechanisms. Ferrous & non ferrous materials, non metallic materials, Alloys & phase diagram.

LABORATORY

Experiments as suggested by the course coordinator.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES

Jonathan Wickert, Kemper Lewis, An Introduction to Mechanical Engineering, CENGAGE Learning.

Michael Clifford, Kathy Simmons, Philip Shipway, An Introduction to Mechanical Engineering: Part 1 and Part 2, Taylor and Francis