

COURSE TITLE : BASIC MECHANICAL ENGINEERING
COURSE CODE : 2021

COURSE CATEGORY : B
PERIODS/ WEEK : 4
PERIODS/ SEMESTER : 60
CREDIT : 4

TIME SCHEDULE

MODULE	TOPIC	PERIODS
1	Properties, testing and inspection of engineering materials Manufacturing of metals & alloys	17
2	Steam generators, steam engines.	18
3	Classification of IC Engines, and working of IC Engines	12
4	Basic power plant and its working	13
TOTAL		60

COURSE OUTCOME :

Sl.No.	sub	student will be able to
1	1	understand the properties, testing and inspection of engineering materials.
	2	Understand the manufacturing of metals & alloys
	3	Understand the working of steam generators and steam engines.
2	4	Understand the importance and uses of IC Engines, working of IC Engines .
3	5	Comprehend the working and use of various power plants.

SPECIFIC OUTCOME

MODUL E I

1.1.0 Understand the Properties, testing and inspection of engineering materials & Material science

- 1.1.1 Classify the engineering materials
- 1.1.2 Explain the different mechanical properties of materials
- 1.1.3 List and state other properties of materials such as physical, thermal and chemical
- 1.1.4 Explain the different destructive and non destructive testing methods
- 1.1.5 Draw and explain the stress- strain diagram of ductile & brittle material.
- 1.1.6 Explain the various inspection methods

1.2.0 Understand the manufacturing of metals & alloys

- 1.2.1 Classify the various metals- ferrous and non ferrous
- 1.2.2 Describe the Types of Cast iron- White, malleable, grey and nodular cast iron
- 1.2.3 Explain the Properties and application of the above cast irons
- 1.2.4 Illustrate the manufacturing of Pig iron- Blast Furnace
- 1.2.5 Illustrate the manufacturing of Cast iron - Cupola Furnace
- 1.2.6 List the various types of steels-
- 1.2.7 Identify the chemical composition of low carbon, medium carbon, high carbon, stainless steel, magnetic steel, Important non ferrous metals & alloys – Cu, Al, Zn, Sn, Ni

MODULE II

2.1.0 Understand the working of steam generators, steam engine

- 2.1.1 Define steam and its uses
- 2.1.2 Explain the concept of wet, dry and superheated steam
- 2.1.3 Classify the steam boilers
- 2.1.4 Explain the working of water tube & fire tube boilers (La-Mont boiler, Cochran boiler)
- 2.1.5 Compare water and fire tube boiler
- 2.1.6 Describe the functions of boiler accessories and mountings.
- 2.1.7 Know about the energy conservation in steam as a utility.
- 2.1.8 Explain the working of steam engines and classify

MODULE III

3.1.0 Understand the importance and uses of IC Engines, working of IC Engines

- 3.1.1 Define I C engine
- 3.1.2 Classify I C Engines
- 3.1.3 Explain the functions of various parts of an I.C. engine
- 3.1.4 Draw and explain the working of 2 stroke petrol engine
- 3.1.5 Describe the working of 2 stroke diesel engine
- 3.1.6 Illustrate the working of 4 stroke petrol engine
- 3.1.7 Draw and explain the working of 4 stroke diesel engine
- 3.1.8 Compare the S.I. and C.I. engines

MODULE IV

4.1.0 Comprehend the Working and use of various power plants.

- 4.1.1 Explain the classification of various power plants
- 4.1.2 Draw and explain the working of hydro –electric power plant
- 4.1.3 Describe the working of diesel power plant
- 4.1.4 Illustrate the working of steam power plant
- 4.1.5 Draw and explain the working of nuclear power plant
- 4.1.6 Explain the working of non conventional (solar, wind , tidal, geo thermal) power plants with the help of sketches.
- 4.1.7 Mention the advantages and disadvantages of various power plants.

CONTENT DETAILS

MODULE I

Types of Engineering materials

Metallic and non-metallic properties such as: - Mechanical, physical, and chemical properties -

Mechanical properties:- strength, hardness, toughness, brittleness, creep, fatigue, stiffness, ductility, malleability, elasticity and plasticity.-Physical properties: - density, viscosity, color, finish, porosity, specific gravity, , fusibility-

Thermal properties such as specific heat, thermal conductivity, thermal resistance, and thermal diffusivity- Magnetic properties- Electrical Properties such as Resistance, Resistivity, conductance and conductivity, capacitance-Chemical properties: - Corrosion resistance, acidity and alkalinity.

Destructive testing: - tensile and compressive test-Hardness test: - Brinnell, Rock well and Vickers pyramid Hardness test-Impact test, Fatigue test and Creep test-

Non-destructive testing: - Liquid Penetrant Test (LPT), Radiographic Test (RT), Ultrasonic Testing(UT)

-Stress- strain diagram for ductile and brittle materials.

Ferrous and non ferrous metalsti

Manufacturing of Pig iron- Blast Furnace, Manufacturing of Cast iron - Cupola Furnace,
Types of steel- Chemical composition & Applications - Steel classification depending on carbon content- unalloyed steel & alloy steel- dead mild steel, low carbon steel, medium carbon steel, high carbon steel, stainless steel – magnetic steel, high speed tool steel. BIS specification of steel.

Cast iron- White, malleable, grey and nodular cast iron, Properties and application

Non ferrous metals and alloys - Cu, Al, Zn, Sn, Ni, BIS specification of aluminium, Copper alloys- Brass, Bronze, Gunmetal, Bell metal, Muntz metal, Babbit metal, Bell metal, Muntz metal, Monel metal, German silver, Inconel, Nichrome, Nimonics.

MODULE II

Steam and its uses-classifications- wet steam, dry steam, Super heated steam.

Steam boilers- Classification - fire tube and water tube with simple sketches-Explain with sketches La-Mont boiler & Cochran boiler- comparison between water tube & fire tube boiler- Boiler mountings - functions with sketches of Stop valve-Safety valve-Water level indicator-Pressure gauge-Fusible plug, Boiler accessories - function with sketches of-Feed pump-Economizer-Super heater-Air preheater

Energy conservation for steam.

Steam engine-simple classification-Brief explanation (with line sketch) of working of double acting steam engine-

MODULE III

The Importance and uses of Engines-Definition, Classification-I C & E C Engines- two stroke engines - four stroke engines - various parts and functions of I C engines.-Working of two stroke petrol engine and diesel engine with line sketches - working of four stroke petrol and diesel engines with line sketches - Comparison between two stroke and four stroke engines -S I and C I engines.

MODULE IV

Classification of power plants- Working of power plant with line sketches-Steam power plant-Hydro-electric power plant - Diesel power plant -Nuclear power plant- merits and demerits.

Non conventional energy power plants – solar- wind-tidal- geo thermal, with line sketches- merits & demerits of various non conventional power plants.

REFERENCES

1. Workshop technology vol1, By S K Hajra choudhary
2. Thermal Engineering ,By RS Khurmi
3. Power plant Engg ,By Nagpal

4. Production technology ,By PC Sharma
5. Manufacturing processes & Engg materials By Serope Kalpakjian & Steven R Schmid.
6. Heat Engines Vol 1, By Pandya &Shah