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 Distribution:

Module	Name of Module	Course Outcome no.	Total periods per semester		
			Instructional	Test	Total
1	Properties, testing and inspection of engineering materials, manufacturing of metals & alloys	1,2	Theory :16 Practical :	1	17
2	Steam generators, steam engines.	3	Theory :17 Practical :	1	18
3	Classification of IC Engines and working of IC Engines	4	Theory :11 Practical :	1	12
4	Basic power plant and its working	5	Theory :12 Practical :	1	13
Total periods per semester					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