BVM ENGINEERING COLLEGE [AN AUTONOMOUS INSTITUTION]

ES110: BASIC MECHANICAL ENGINEERING
CREDITS - 4 (LTP:3,0,1)

Course Objectives:
To Study the fundamentals of mechanical systems and appreciate significance of mechanical engineering in different fields of engineering.

Teaching and Assessment Scheme:

Teaching Scheme (Hours per week)			Credits	Assessment Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	CE	ESE	CE	
3	0	2	4	60	40	20	30	150

Course Contents:

Unit No.	Topics	Teaching Hours
1	**Introduction:** Prime movers and its types, Concept of Force, Torque, Pressure, Energy, Work, Power, System, Heat, Temperature, Specific heat capacity, Change of state, Path, Process, Cycle, Internal energy, Enthalpy, Statements of Zeroth law and First law	4
2	**Energy:** Introduction and applications of Energy sources like Fossil fuels, Nuclear fuels, Hydro, Solar, Wind, and Bio-fuels, Environmental issues like Global warming and Ozone depletion	3
3	**Properties of gases:** Gas laws, Boyle's law, Charle's law, Combined gas law, Gas constant, Relation between c_p and c_v, Various non-flow processes like constant volume process, constant pressure process, Isothermal process, Adiabatic process, Polytropic process	5
4	**Properties of Steam:** Steam formation, Types of steam, Enthalpy, Specific volume, Internal energy and dryness fraction of steam, use of steam tables, steam calorimeters	6
5	**Heat Engines:** Heat engine cycle and Heat engine, working substances, Classification of heat engines, Description and thermal efficiency of Carnot; Rankine; Otto cycle and Diesel cycles	5
6	**Steam Boilers:** Introduction, Classification, Cochran, Lancashire and Babcock and Wilcox boiler, Functioning of different mountings and accessories	-

Unit No.	Topics	Teaching Hours
7	**Internal Combustion Engines:** Introduction, Classification, Engine details, four-stroke/ two-stroke cycle Petrol/Diesel engines, Indicated power, Brake Power, Efficiencies	4
8	**Pumps:** Types and operation of Reciprocating, Rotary and Centrifugal pumps, Priming	3
9	**Air Compressors:** Types and operation of Reciprocating and Rotary air compressors, significance of Multistaging	3
10	**Refrigeration & Air Conditioning:** Refrigerant, Vapor compression refrigeration system, Vapor absorption refrigeration system, Domestic Refrigerator, Window and split air conditioners	4
11	**Couplings, Clutches and Brakes:** Construction and applications of Couplings (Box; Flange; Pin type flexible; Universal and Oldham), Clutches (Disc and Centrifugal), and Brakes (Block; Shoe; Band and Disc)	-
12	**Transmission of Motion and Power:** Shaft and axle, Different arrangement and applications of Belt drive; Chain drive; Friction drive and Gear drive	-
13	**Engineering Materials:** Types, properties and applications of Ferrous & Nonferrous metals, Timber, Abrasive material, silica, ceramics, glass, graphite, diamond, plastic and polymer	4
	Total	**41**

Note: Topic No. 6, 11 and 12 of the above syllabus are to be covered in Practical Hours.

List of References:

1. N M Bhatt and J R Mehta, "*Elements of Mechanical Engineering*", Mahajan Publishing House
2. Pravin Kumar, "*Basic Mechanical Engineering"*, Pearson Education
3. G.S. Sawhney, "*Fundamental of Mechanical Engineering"*, PHI Publication New Delhi
4. Sadhu Singh, "*Elements of Mechanical Engineering"* S. Chand Publication
5. B.K. Agrawal, "*Introduction to Engineering Materials"* McGraw Hill Publication, New Delhi

Course Outcomes (COs):

At the end of this course students will be able to …

1. Explain the fundamentals of mechanical systems in context of energy conversion.
2. Describe thermodynamic properties of gases and steam, and apply it to systems of relevance.
3. Interpret the fundamentals of Heat engine and I C Engine
4. Explain the operation and use of pumps, Air compressors, refrigerators and air-conditioners.
5. Understand power transmission elements, and applications of various engineering materials