



SILVER OAK UNIVERSITY

Engineering and Technology (B.Tech.)

All Departments

Subject Name: Basic Mechanical Engineering

Semester: 1st Year

Prerequisite: Zeal to learn the subject

Objective:

1. To provide the knowledge of different engineering materials and its properties.
2. To impart the basic knowledge of various properties of Gases and Steam.
3. To give Fundamental awareness about Boilers, IC engines, Heat Engine, Pumps and Air Compressor.
4. To impart the basic knowledge of Power transmission system and its components.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Evaluation Scheme				Total Marks
L	T	P	C	Internal		External		
				Th	Pr	Th	Pr	
3	0	2	4	40	50	60	--	150

Content:

Unit No.	Course Contents	Teaching Hours	Weightage %
1	Introduction: Prime movers and its types, Concept of Force, Pressure, Energy, Work, Power, System, Heat, Temperature, Specific heat capacity, Stress, Strain, Change of state, Path, Process, Cycle, Internal energy, Enthalpy, Statements of Zeroth law and First law	3	6
2	Engineering Materials: Types of Engineering Materials, Ferrous & Nonferrous materials, Metallic and Nonmetallic Materials, Applications and its Properties	4	7
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, Polytrophic process	8	12
4	Properties of Steam:	8	18

	Steam formation, Types of steam, Enthalpy, Specific volume, Internal energy and dryness fraction of steam, use of steam tables, steam calorimeters		
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	6	10
6	Steam Boilers: Introduction, Classification, Cochran, Lancashire and Babcock and Wilcox boiler, Functioning of different mountings and accessories	*	12
7	Internal Combustion Engines: Introduction, Classification, Engine details, four-stroke/ two-stroke cycle Petrol/Diesel engines, Indicated power, Brake Power, Efficiencies	6	10
8	Pumps: Types and operation of Reciprocating, Rotary and Centrifugal pumps, Priming Air Compressors: Types and operation of Reciprocating and Rotary air compressors, significance of Multi-staging	5	10
9	Refrigeration & Air Conditioning: Refrigerant, Vapor compression refrigeration system, Vapor absorption refrigeration system, Domestic Refrigerator, Window and split air conditioners	4	5
10	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)	*	5
11	Transmission of Motion and Power: Shaft and axle, Different arrangement and applications of Belt drive; Chain drive; Friction drive and Gear drive	*	5
12	Recent Trends in Mechanical Engineering: Role and responsibilities of a Mechanical Engineer in various industries, Entrepreneurship, Start-up, etc.	1	-

***Note: Topic No. 6, 10 and 11 of the above syllabus are to be covered in Practical Hours**

Course Outcome:

Sr. No.	CO statement	Unit No
CO-1	Discuss the various sources of energy and basic terminology of Mechanical engineering	1
CO-2	Make calculations for commonly used working fluids i.e. ideal gases and steam	3, 4
CO-3	Analyze various heat engine cycles and understand construction and working of IC engines	5, 7

CO-4	Discuss working and applications of steam boilers and various energy conversion systems	6, 8, 9
CO-5	Discuss various power transmission elements and properties of various engineering materials with their applications	2, 10, 11

Teaching & Learning Methodology:-

The various methods or tools follows by the faculties to teach the above subject are:

- Chock and Board
- PPT
- Flip Class Room
- Video Animations
- Explanations with Model Demonstration
- Industrial Visit

List of Experiments/Tutorials:

1. To recognize construction and working of various types of boilers.
2. To recognize construction and working of different boiler mountings and accessories.
3. To interpret construction features of two/four stoke petrol/diesel engines.
4. To determine brake thermal efficiency of an I. C. Engine.
5. To perceive construction and working of different types of air compressors.
6. To demonstrate vapor compression refrigeration cycle of domestic refrigerator or window air conditioner OR split air conditioner.
7. To recognize construction, working and application of clutches, coupling and brakes.
8. To perceive different arrangement and application of various power transmission drives.

Major Equipment:

Models of Cochran, Lancashire and Babcock and Wilcox boilers, models of various mountings and accessories, Models of various types of IC engines, Single cylinder two stroke /four stroke petrol/ diesel engine, models of pumps, compressors, Domestic refrigerator/window air conditioner/split air conditioner, models of various types of brakes, coupling, clutches, drives.

Books Recommended-

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

List of Open Source Software/learning website:

1. <http://silveroakuni.ac.in/video-lecture>
2. <https://nptel.ac.in>
3. www.vlab.co.in