Syllabus for Bachelor of Technology

Mechanical Engineering

Subject Code: 01ME0101

Subject Name: Elements of Mechanical Engineering

B.Tech. Sem-I

Type of course: Engineering Science

Prerequisite: Zeal to learn the subject

Rationale: Understanding of basic principles of Mechanical Engineering is required in various field of engineering.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks			Practical Marks		
L	T	P	C	ESE	IA	CSE	Viva	TW	
3	0	2	4	50	30	20	25	25	150

Content:

Sr. No.	Content	Total Hrs	%Weight age
1	**Introduction:** Prime movers and its types, Concept of Force, 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	25%
2	**Properties of gases:** Gas laws, Boyle's law, Charle's law, Combined gas law, Gas constant, Relation between Cp and Cv, Various non-flow processes like constant volume process, constant pressure process, Isothermal process, Adiabatic process, Poly tropic process	6	
3	**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	30%
4	**Heat Engines:** Heat Engine cycle and Heat Engine, working substances, Classification of heat engines, Description and thermal efficiency of Carnot; Rankine;	6	
5	**Steam Boilers:** Introduction, Classification, Cochran, Lancashire and Babcock and Wilcox boiler, Functioning of different mountings and accessories	4	

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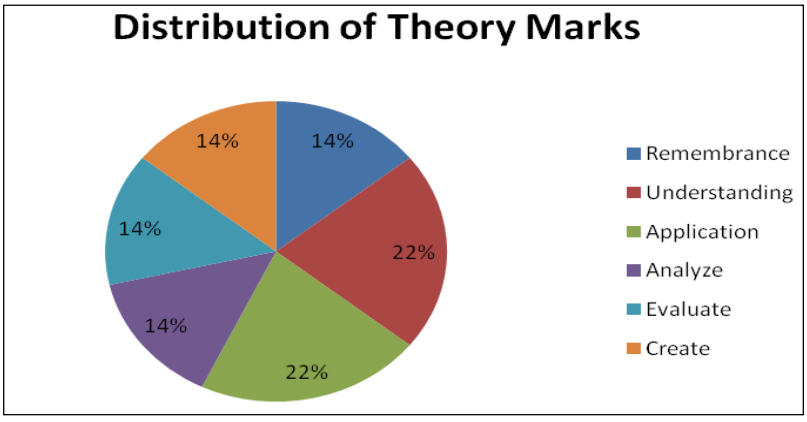
6	**Internal Combustion Engines:** Introduction, Classification, Engine details, four-stroke/ two-stroke cycle Petrol/Diesel engines, Indicated power, Brake Power, Efficiencies	**4**	**20%**
7	**Turbo machines:** Types and operation of Reciprocating, Rotary and Centrifugal pumps, Priming and air compressors	**4**	
8	**Refrigeration & Air Conditioning:** Refrigerant, Vapor compression refrigeration system, vapor absorption refrigeration system, Domestic Refrigerator, Window and split air	**4**	**25%**
9	**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)	**4**	
10	**Transmission of Motion and Power:** Shaft and axle, Belt drive, Chain drive, Friction drive, Gear drive	**4**	



Reference Books:

1. Basic Mechanical Engineering by Pravin Kumar, Pearson

2. Thermal Science and Engineering by Dr. D.S. Kumar, S.K. Kataria & sons, Publication New Delhi

3. Fundamental of Mechanical Engineering by G.S. Sawhney, PHI Publication New Delhi

4. Elements of Mechanical Engineering by Sadhu Singh S. Chand Publication

Course Outcome:

After learning the course the students should be able to:

1. To understand the fundamentals of mechanical systems
2. To understand and appreciate significance of mechanical engineering in different fields of engineering

List of Experiments:

1. To understand and appreciate significance of mechanical engineering in different fields of engineering
2. To understand construction and working of different boiler mountings and accessories.
3. To determine brake thermal efficiency of an I. C. Engine.
4. To understand construction and working of different types of air compressors.
5. To demonstrate vapor compression refrigeration cycle of domestic refrigerator OR window air conditioner OR split air conditioner.

Design based Problems(DP)/ Open Ended Problem:

1. Develop a prototype of gear train/drive for certain velocity ratios.
2. Develop a small boiler with different mountings.
3. Develop a hot air engine

List of Open Source Software/learning website:

1. http://nptel.iitm.ac.in,
2. http://vlab.co.in/