Syllabus for Bachelor of Technology
Department of Mechanical Engineering

Subject Code: 01ME1101

Subject Name: Elements of Mechanical Engineering

B.Tech.Ist Year Semester: I

Typeofcourse: Engineering Science

Prerequisite: Zeal to learn the subject.

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

Course Outcome:

After learning the course, the students will be competent

1. To understand the various sources of energy and basic terminology of Mechanical systems.
2. To able to make elementary calculations of ideal gases and steam and heat engine cycles.
3. To understand working and construction of different boilers and mountings and accessories.
4. To analyze the performance of I.C. engines.
5. To understand various refrigeration cycles.
6. To understand various power transmission elements.

Teachingand ExaminationScheme:

TeachingScheme			Credits	ExaminationMarks					TotalMarks
				TheoryMarks			PracticalMarks		
L	T	P	C	ESE(E)	IA	CSE	Viva (V)	Term Work	
3	0	2	4	50	30	20	25	25	150

Content:

Sr. No.	Content	Total Hrs
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 Lawand First law.	04
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 constantvolume process, constant pressure process, Isothermal process, Adiabaticprocess, polytropic process	08
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	08
4	**Heat Engines:** Heat Engine cycle and Heat Engine, working substances, Classification of heat engines, Description and thermal efficiency of Carnot; Rankine; Otto and Diesel cycles.	08

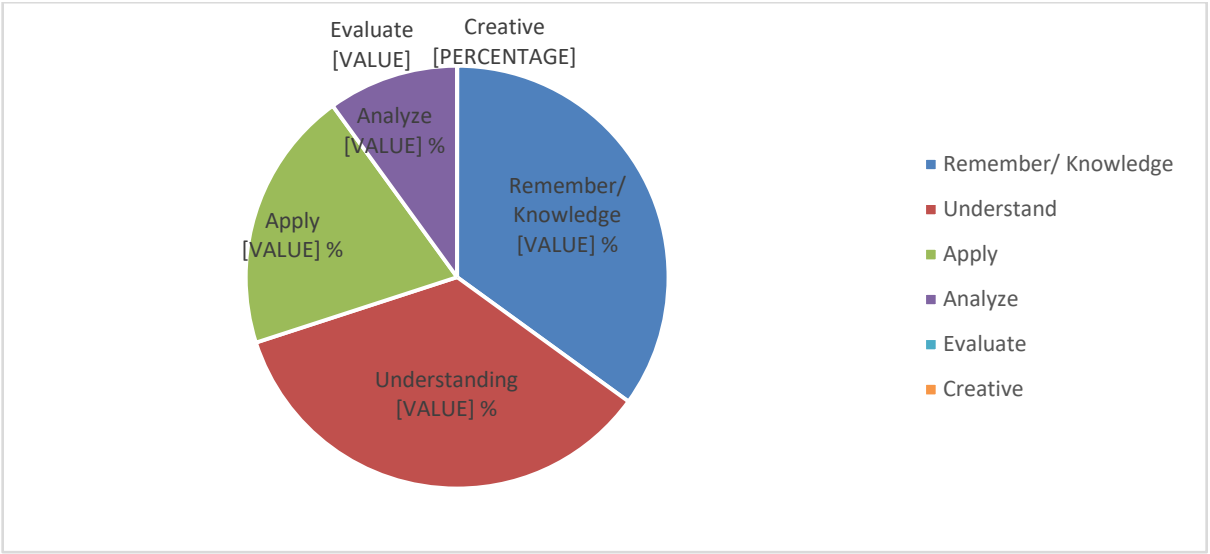
5	**Steam Boilers:** Introduction, Classification, Cochran Boiler, Babcock and Wilcox boiler, Working of different mountings and accessories	**-**
6	**Internal Combustion Engines:** Introduction, Classification, Enginedetails, four-stroke/ two-strokecycle Petrol/Diesel engines, Indicatedpower, Brake Power,Efficiencies	**08**
7	**Refrigeration & Air Conditioning:** Refrigerant, Vapour compression refrigeration system, vapour absorption refrigeration system, Window and split air conditioner.	**-**
8	**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)	**-**
9	**Transmission of Motion and Power:** Shaft and axle, Belt drive, Chain drive, Friction drive, Gear drive	**06**

Note: Unit no. 5, 7 and 8 needs to be conducted during Lab sessions.

DistributionofTheoryMarks

R Level	U Level	A Level	N Level	E Level	C Level
30	40	20	10	-	-

Legends:R: Remembrance**;U:** Understanding**;A:** Application,**N:**Analyze**,E:** Evaluate, **C:** Create



ListofExperiments:

1. To understand construction and working of different boilers, Boilermountings and accessories.
2. To demonstrate vapour compression refrigeration cycle and to determine its COP.
3. To demonstrate vapourabsorption refrigeration cycle and to determine its COP.
4. Performance test of 4 stroke Petrol Engine.
5. Performance test of 4 stroke Diesel Engine.
6. To understand construction, working and application of clutches, couplingand brakes.
7. To determine brake thermal efficiency of an I. C. Engine.

List of Assignment:

1. Theory and Example on Properties of gases.
2. Theory and Example on Properties of steam.
3. Theory and Example on Heat engine.

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

Listof Open BaseSoftware/learningwebsite:

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