CourseName: Basic Thermodynamics

CourseOutcomes(CO):

At the end of this course, the students will be able to:

1. Fundamental knowledge of laws and principles of thermodynamics.

2. Knowledge of heat and work transfer and their effect, application of first law of thermodynamics to different machines as well as second law of thermodynamics.

3. Knowledge of steady flow energy equation and its use in compressor, turbines, nozzles, evaporators etc.

4. Knowledge of quality of energy and its balance

Model Question Paper
Total Duration (H:M): 3:00
**Course: Basic Thermodynamics**
Maximum Marks :100

Note: (1)_Use of steam table is permitted._
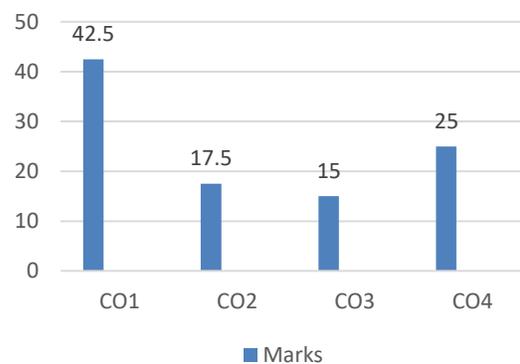 **(2)**_For Unit- I, Unit II, Unit III,Unit-1V,Unit-V Attempt all questions._

Q. No	Questions	Marks	CO	BL
	UNIT-I			
1a)	Under what conditions is the work done equal to $\int_1^2 pdV$?	2.5	CO1	L3
1b)	An object of 40 kg mass falls freely under the influence of gravity from an elevation of 100 m above the earth's surface. The initial velocity is directed downward with a magnitude of 100 m/s. ignoring the effect of air resistance. What is the magnitude of the velocity, in m/s, of the object just before it strikes the earth? The acceleration of gravity is g = 9.81 m/s^2	2.5	CO2	L4
1c)	An open system defined for a fixed region and a control volume are synonymous. Explain	2.5	CO1	L3
1d)	What is a quasi-static process? what is its characteristic feature?	2.5	CO1	L3
2a)	The drag force F imposed by the surrounding air on an automobile moving with velocity V is given by $F_D = C_D A\frac{1}{2}PV^2$, where C_D is the drag coefficient, A is the projected frontal area of the vehicle, and ρ is the density of air. For $C_D = 0.42$, $A = 2$ m^2 and ρ = 1.25 kg/m^3, calculate the power required to overcome the drag at a constant	5	CO1	L5

	velocity of 100 km/h.			
2b)	A closed, rigid tank contain 2 kg of water initially at 80°C and quality of 0.6. heat transfer occurs until the tank contains only saturated vapor. Kinetic and potential energy effects are negligible. For the water as the system, determine the amount of energy transfer by heat, in kJ	5	CO4	L5
UNIT-II				
3a)	Under what conditions does the S.F.E.E. reduce to Euler's equation?	5	CO3	L3
3b)	How does the efficiency of a reversible cycle depend only on the two temperatures at which heat is transferred?	5	CO2	L4
3c)	A reversible power cycle receives 100 kJ by heat transfer from a hot reservoir at 327°C and rejected 40 kJ by heat transfer to a cold reservoir at Tc. Determine (a) the thermal efficiency and (b) the temperature Tc of the cold reservoir, in °C.	5	CO2	L3
3d)	How is the entropy change of a reversible process estimated? Will it be different for an irreversible process between the same end states?	5	CO4	L2
UNIT-III				
4a)	Give the exergy balance for a closed system and steady flow system.	5	CO4	L2
4b)	What is the condition for exact differential? Derive maxwell's equations.	10	CO1	L3
4c)	Explain Joule- Thomson coefficient? Why is it zero for an ideal gas?	5	CO2	L4
UNIT-IV				
5a)	What is a pure substance? Draw the phase equilibrium diagram for a pure substance on p-T coordinates. Why does the fusion line for water have negative slop?	10	CO1	L4
5c)	What is quality of steam? What are the different methods of measurement of quality?	10	CO1	L4
UNIT-V				
6a)	With the help of p-v and T-s diagrams, show that for the same maximum pressure and temperature of the cycle and the same heat rejection, $\eta_{Diesel} > \eta_{Dual} > \eta_{Otto}$	10	CO4	L5
6b)	Why are regenerators and intercoolers are not used in aircraft engines? What is after burning? Why is it used?	10	CO3	L3

BLOOM'S LEVEL WISE MARKS DISTRIBUTION

- Level 2: 10
- Level 3: 37.5
- Level 4: 32.5
- Level 5: 20
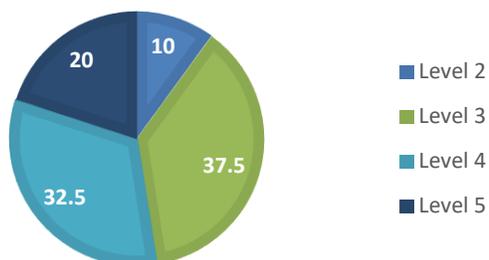
COURSE OUTCOMEWISE MARKS DISTRIBUTION

CO	Marks
CO1	42.5
CO2	17.5
CO3	15
CO4	25

BL–Bloom'sTaxonomyLevels(1-Remembering,2-Understanding,3 –Applying,4– Analyzing,5 –Evaluating,6-Creating)

CO–CourseOutcomes