

Q.No	Questions	CO	Bloom Taxonomy Category	Marks
Section I				
1	Short Answer type questions.			
a	Illustrate Work and Heat in thermodynamics. What is Specific heat?	CO1	Remember	4 x 5 = 20
	or			
b	Explain briefly zeroth law of thermodynamics. What is reversible and irreversible process?	CO1	Understand	
	or			
c	Define Enthalpy. What is perpetual motion machine of first kind (PMM 1)?	CO2	Remember	
	or			
d	State the assumptions of Steady Flow Energy Equation. Write the general energy equation for a steady flow system.	CO2	Understand	
	or			
e	A refrigeration system is to be designed for a food storage facility that must be maintained at a temperature of -5°C. The surrounding environment has a temperature of 25°C, and the heat transfer into the storage space occurs at a rate of 5 kW. Assuming the system functions based on the reversed Carnot cycle, calculate the minimum power necessary to operate the refrigeration plant.	CO3	Evaluate	
	or			
f	A reversible heat engine produces 0.6 kW of power while expelling heat energy to a thermal reservoir at 300 K at a rate of 24 kJ per minute. Determine the efficiency of the engine and the temperature of the heat source supplying energy to the engine."	CO3	Evaluate	
	or			
g	Explain mass density, weight density and specific gravity.	CO4	Understand	
	or			
h	Write short notes on kinematic viscosity and surface tension.	CO4	Understand	
	or			
Section II				
Long Answer type questions.				
2	One kg of air is expanded slowly in a piston-cylinder arrangement from 6 bar and 0.015 m ³ to a final volume of 0.1 m ³ . During the process, heat is exchanged with the surroundings at a rate sufficient to make the process isothermal. Make calculations for final pressure, work done, change in internal energy and heat interaction.	CO1	Apply	3 x 10 = 30
	or			
3	Derive the equation of work done in a closed system for a polytropic process.	CO1	Evaluate	
	or			
4	2 kg of an ideal gas is compressed adiabatically from pressure 100 kPa and temperature 220 K to a final pressure of 400 kPa. Make calculations for: (a) initial volume, (b) final volume and temperature (c) work performed, (d) heat added to or subtracted from the system and (e) change in internal energy. It may be presumed that for the given ideal gas Cp = 1kJ/Kg K and Cv = 0.707k J/Kg K.	CO2	Apply	
	or			
5	A steam turbine operates under steady flow conditions receiving steam at the following state: pressure 15 bar; internal energy 2700 kJ/Kg; specific volume 0.17 m ³ /kg and velocity 100 m/s. The exhaust steam from the turbine is at 0.1 bar with internal energy 2175 kJ/Kg, specific volume 15 m ³ /kg and velocity 300 m/s. The intake is 3 m above the exhaust. The turbine develops 35 kW and heat loss over the surface of turbine is 20 kJ/Kg. Determine the steam flow rate through the turbine.	CO2	Apply	
	or			
6	Articulate the laws of fluid friction for laminar and turbulent flow.	CO5	Understand	
	or			
7	Derive the equation of calculating discharge by using Venturimeter.	CO5	Evaluate	
	or			
Section III				
Application based questions				
8	a. Two reversible heat engines, A and B, are connected in series, with engine A transferring its rejected heat directly to engine B. Engine A absorbs 200 kJ of heat from a high-temperature source at 421°C, while engine B releases heat to a cold reservoir at 5°C. If the work output from engine A is twice that of engine B, determine: (i) The intermediate temperature at which heat is exchanged between A and B, (ii) The efficiency of each engine, and (iii) The amount of heat discharged into the cold reservoir."	CO3	Evaluate	1 x 20 = 20
	b. Analyze Heat engine and Heat pump with suitable diagram.		Analyze	
9	or			

Two reversible heat engines, E1 and E2, are arranged in series between a high-temperature reservoir at $T_1 = 600$ K and a low-temperature reservoir at $T_2 = 300$ K. Engine E1 absorbs 500 kJ of heat from the hot reservoir. Given that both engines operate at equal thermal efficiency, determine:
(i) The intermediate temperature where E1 rejects heat and E2 receives it. (ii) The thermal efficiency of each engine. (iii) The work output of E1 and E2. (iv) The heat rejected by E2 into the cold reservoir.

CO3

Apply

COURSE OUTCOME

CO1 Understand the basic thermodynamics systems & concept of temperature and heat.

CO2 To identify and formulate power production based on the fundamental laws of thermal engineering.

CO3 Understand the various cycles and its implications in real practical applications.

CO4 Understand the basic fluid properties & their types.

CO5 Understand the concept of fluid flow & losses that happen due to their flow in small cross-sections like pipe.