CBCS SCHEME

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BAU304

Third Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Engineering Thermodynamics

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.
3. Use of Thermodynamics data hand book is permitted.

		Module – 1	M	L	C
Q.1	a.	Define the followings: (i) Microscopic and Macroscopic approaches (ii) Zeroth law of thermodynamics (iii) Point and path function (iv) Intensive and extensive properties (v) Open system and closed system	10	L1	CO1
	b.	Show the neat sketch of liquid in glass thermometer and outline in detail temperature measurement.	10	L3	CO1
		OR			
Q.2	a.	Define heat and work, also mention about the sign convention for heat and work.	10	L1	CO1
	b.	Show for a polytropic process $w_{1-2} = \frac{p_1v_1 - p_2v_2}{n-1}$.	10	L3	CO1
		Module – 2			
Q.3	a.	State first law of thermodynamics for a closed system undergoing a cyclic process and also outline the joules experiment.	10	L2	CO1
	b.	With the suitable assumptions, derive an expression for Steady Flow Energy Equation (SFEE) for an open system.	10	L3	CO1
		OR			
Q.4	a.	With the help of line diagram, explain heat engine and reversed heat engine. Also mention about its performance parameters.	10	L2	CO2
	b.	State two statements of second law of thermodynamics and also show the violation of Clausius leads violation of Kelvin Plank statement.	10	L3	CO2
		Module – 3			
Q.5	a.	Define entropy and explain the principle of increase of entropy.	10	L2	CO2
	b.	A heat engine is supplied with 278 kJ/s of heat at a constant fixed temperature of 283°C and the heat rejection takes place at 5°C. The following results were required: (i) 208 kJ/s of heat rejected (ii) 139 kJ/s of heat rejected (iii) 70 kJ/s of heat rejection Find which of the results report a reversible cycle, irreversible cycle and impossible cycle.	10	L4	CO2
		OR			

Q.6	**a.**	Outline in detail P-T diagram of water as a pure substance.	**10**	**L2**	**CO2**
	b.	Find the dryness fraction, specific volume and internal energy of steam at 7 bar and enthalpy of 2550 kJ/kg.	**10**	**L4**	**CO2**
		Module – 4			
Q.7	**a.**	With the help of a schematic diagram, explain the working of vapour absorption refrigeration system.	**10**	**L2**	**CO2**
	b.	List the important refrigerants and also mention its important characteristics as a refrigerant.	**10**	**L1**	**CO2**
		OR			
Q.8	**a.**	Explain in detail about phychrometric processes.	**10**	**L2**	**CO1**
	b.	Define the following terms and write the expressions for the same: (i) Relative humidity (ii) Specific humidity (iii) Degree of saturation (iv) Dalton's law of partial pressure (v) Enthalpy of moist air	**10**	**L1**	**CO2**
		Module – 5			
Q.9	**a.**	With the help of P-V and T-S diagram, outline an expression for air-standard efficiency of diesel cycle with usual notation.	**10**	**L2**	**CO1**
	b.	The pressure and temperature at the beginning of compression in an air standard Otto cycle are 102 kPa and 315 K. Heat is added during the process at the rate of 250 kJ/kg of air and air is used with a compression ratio of 9. Assuming $\gamma = 1.4$ and R = 287 J/kgK for air, determine: (i) Thermal efficiency of the cycle (ii) Maximum cycle temperature (iii) Maximum cycle pressure	**10**	**L2**	**CO1**
		OR			
Q.10	**a.**	Briefly write about the following: (i) William's line method (ii) Morse test	**10**	**L2**	**CO1**
	b.	The following data were obtained from a Morse test on a 4 cylinder 4 stroke cycle SI engine, coupled to a hydraulic dynamometers operating at a constant speed of 1500 RPM. Brake load with all the four cylinders firing = 296 N; brake load with cylinder No.1 not firing = 201 N; brake load with cylinder No.2 not firing = 206N; brake load with cylinder No.3 not firing = 192 N; Brake load with cylinder No.4 not firing = 200 N; BP can be calculated using the equation in kW i.e. BP = WN/42300; where 'W' is the brake load in Newton's and N speed in RPM. Calculate: (i) BP (ii) IP (iii) FP (iv) η_{mech}	**10**	**L2**	**CO1**

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