

## Model Question Paper-1 with effect from 2022-23 (CBCS 2022 Scheme)

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### Third Semester B.E. Degree Examination

### [Engineering Thermodynamics]

TIME: 03 Hours

Max. Marks: 100

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

Module -1			*Bloom's Taxonomy Level	COs	Marks
Q.01	a	Define i) Macroscopic and Microscopic approaches ii) Intensive and Extensive properties iii) Point function and Path function iv) Zeroth Law of Thermodynamics v) Thermodynamic Equilibrium	L1	CO1	10
	b	$T(K) = 273 + \frac{100(x - x_i)}{(x_s - x_i)}$ Show	L3	CO1	10
OR					
Q.02	a	Define work and heat, also list the similarities and dissimilarities	L1	CO1	10
	b	Using the p-v diagram Show the $W = \frac{p_1 V_1 - p_2 V_2}{\gamma - 1}$	L3	CO1	10
Module-2					
Q. 03	a	State First laws of thermodynamics for a closed system undergoing a cyclic process and also outline in detail joules experiment	L2	CO1	10
	b	With the relevant assumptions Develop Steady flow energy equation (SFEE) for an open system	L3	CO1	10
OR					
Q.04	a	Explain PMMI and PMMII and also outline the factors affecting the process irreversible	L2	CO2	10
	b	State Second laws of thermodynamics and prove the Violation of Kelvin plank statement leads to violation of Clausius statement.	L3	CO2	10
Module-3					
Q. 05	a	Define entropy and outline the principle of increase of entropy.	L2	CO2	10
	b	Estimate the change in entropy of the universe due to the following process i) A Copper block of mass 0.5kg at 100°C is placed in a Lake of water at 10°C. ii) Two such blocks at 100°C and 0°C respectively are joined together. Take for copper C=0.393Kj/kgK.	L4	CO2	10
OR					
Q. 06	a	In detail outline p-T diagram of water	L2	CO2	10
	b	Find the dryness fraction, specific volume and internal energy of steam at 7 bar and entropy 2550kJ/kg	L4	CO2	10
Module-4					
Q. 07	a	With the help of schematic diagram, explain the working of Vapor absorption refrigeration system	L2	CO2	10
	b	List the important refrigerants and also mention its important properties.	L1	CO2	10
OR					
Q. 08	a	Outline in detail about Psychrometric Processes	L2	CO3	10
	b	Define the following terms and write the expressions for the same i) Relative Humidity ii) Specific Humidity iii) Degree of saturation	L1	CO3	10

		iv)Daltons law of partial pressure v) Enthalpy of moist air			
<b>Module-5</b>					
Q. 09	a	With the help of p-v and T-s Diagram outline the efficiency of Otto cycle	L2	CO3	10
	b	In an Air standard Diesel Cycle the Compression ratio is 16. At the beginning of adiabatic compression the temperature is 15 <sup>o</sup> C and pressure is 10bar. Heat is added until the temperature at the end of constant pressure process is 1480 <sup>o</sup> C. Determine i) Cut off ratio ii) Heat supplied per kg of air iii) Cycle efficiency.	L4	CO4	10
OR					
Q. 10	a	Outline the following i)William's Line method ii)Morse Test	L2	CO4	10
	b	The following observations are made during one hour test on a single cylinder 4-stroke oil engine. Bore = 300mm, stroke=450mm; mass of fuel used =8.8kg, Calorific value = 41,800kJ/kg, Average speed = 200 rpm, mean effective pressure = 5.8 bar, brake load = 1860N, mass of cooling water circulated = 650 kg, Temperature rise = 22 <sup>o</sup> C, diameter of brake drum = 1.22m, Calculate i)Mechanical efficiency ii)Brake thermal efficiency	L4	CO4	10

## Model Question Paper-2 with effect from 2022-23 (CBCS 2022 Scheme)

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### Third Semester B.E. Degree Examination

### [Engineering Thermodynamics]

TIME: 03 Hours

Max. Marks: 100

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

Module -1			*Bloom's Taxonomy Level	COs	Marks
Q.01	a	Define i) Macroscopic and Microscopic approaches ii) Intensive and Extensive properties iii) Point function and Path function iv) Zeroth Law of Thermodynamics v) Thermodynamic Equilibrium	L1	CO1	10
	b	Show the neat sketch of Liquid in glass thermometer and outline in detail about temperature measurement.	L3	CO1	10
OR					
Q.02	a	Define work and heat, also list the similarities and dissimilarities	L1	CO1	10
	b	Using the p-v diagram Show the $W = \frac{p_1 V_1 - p_2 V_2}{\gamma - 1}$	L3	CO1	10
Module-2					
Q. 03	a	State First laws of thermodynamics for a closed system undergoing a cyclic process and also outline in detail joules experiment	L2	CO1	10
	b	With the relevant assumptions Develop Steady flow energy equation (SFEE) for an open system	L3	CO1	10
OR					
Q.04	a	With the help of line diagram explain heat engine and reversed heat engine and also mention about its performance parameters	L2	CO2	10
	b	State Second laws of thermodynamics and prove the Violation of Kelvin plank statement leads to violation of Clausius statement.	L3	CO2	10
Module-3					
Q. 05	a	Define entropy and outline the principle of increase of entropy.	L2	CO2	10
	b	A heat engine is supplied with 278kJ/s of heat at a constant fixed temperature of 2830C and rejection takes place at 50C. the following results were required. i)208kJ/s of heat rejected ii)139kJ/s of heat rejected iii)70kJ/s of heat rejected. Find which of the results report a reversible cycle, irreversible cycle and impossible cycle.	L4	CO2	10
OR					
Q. 06	a	In detail outline p-T diagram of water	L2	CO2	10
	b	Find the dryness fraction, specific volume and internal energy of steam at 7 bar and entropy 2550kJ/kg	L4	CO2	10
Module-4					
Q. 07	a	With the help of schematic diagram, explain the working of Vapor absorption refrigeration system	L2	CO2	10
	b	List the important refrigerants and also mention its important properties.	L1	CO2	10
OR					
Q. 08	a	Outline in detail about Psychometric Processes	L2	CO3	10
	b	Define the following terms and write the expressions for the same i)	L1	CO3	10

		Relative Humidity ii) Specific Humidity iii) Degree of saturation iv) Daltons law of partial pressure v) Enthalpy of moist air			
<b>Module-5</b>					
Q. 09	a	With the help of p-v and T-s Diagram outline the efficiency of Diesel cycle	L2	CO3	10
	b	The pressure and temperature at the beginning of compression in air standard otto cycle are 102kpa and 315K. Heat is added during the process at the rate of 250kJ/kg of air and air is used with the compression ratio of 9. Assuming $\gamma = 1.4$ and $R = 287\text{J/kgK}$ for air. Determine i) Thermal efficiency of the cycle ii) Maximum cycle temperature iii) Maximum cycle pressure	L4	CO4	10
OR					
Q. 10	a	Outline the following i) William's Line method ii) Morse Test	L2	CO4	10
	b	The following observations are made during one hour test on a single cylinder 4-stroke oil engine. Bore = 300mm, stroke = 450mm; mass of fuel used = 8.8kg, Calorific value = 41,800kJ/kg, Average speed = 200 rpm, mean effective pressure = 5.8 bar, brake load = 1860N, mass of cooling water circulated = 650 kg, Temperature rise = 22°C, diameter of brake drum = 1.22m, Calculate i) Mechanical efficiency ii) Brake thermal efficiency	L4	CO4	10