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EAST POINT COLLEGE OF ENGINEERING & TECHNOLOGY
An Autonomous Institution Affiliated to Visvesvaraya Technological University (VTU) Belagavi

USN | | | | | | | | | | |

24ME41

Fourth Semester B.E. Degree Examination, May 2026
APPLIED THERMODYNAMICS

TIME:3 hrs. Max.Marks:100

Note: 1.Answer **any FIVE** full questions, choosing **ONE** question from **each MODULE**.
2. M: Marks, L: Bloom's level,C: Course outcomes.
3. Use of thermodynamics data hand book and steam table are permitted
4. Assume missing data suitably

		Module-1	M	L	C
Q.1	a	Explain the Carnot cycle with P–V and T–S diagrams.	10	L2	CO1
	b	Derive the expression for the air standard efficiency of an Otto cycle.	10	L3	CO1
		OR			
Q.2	a	Explain Morse test for multi-cylinder engines.	10	L2	CO1
	b	An air-standard Otto cycle has the following data: Compression ratio r=8, Initial pressure $P_1 = 1$ bar, Initial temperature $T_1 = 300$ K, Maximum temperature $T_3 = 1800$ K, $\gamma = 1.4$, $C_v =$ 0.718 kJ/kgK Find: i)Temperature at all states ii)Heat supplied iii)Heat rejected iv)Net work done v)Efficiency	10	L3	CO1
		Module–2			
Q.3	a	Why is intercooling used in gas turbines?	6	L2	CO2
	b	Explain Brayton cycle with P–V and T–S diagrams.	8	L2	CO2
	c	State conditions for maximum effectiveness of regenerator.	6	L3	CO2
		OR			
Q.4	a	Explain the working principle of a turbojet engine.	10	L2	CO2
	b	Describe the working of a ramjet engine with advantages and limitations.	10	L3	CO2
		Module–3			
Q.5	a	Explain simple Rankine cycle with T–S diagram.	6	L2	CO3
	b	Derive expression for thermal efficiency of Rankine cycle.	6	L2	CO3
	c	A steam power plant operates on Rankine cycle with Boiler pressure=30 bar Condenser pressure = 0.04 bar Steam at turbine inlet is dry saturated Find: i) Turbine work ii) Pump work iii) Heat supplied iv) Thermal efficiency	8	L3	CO3
		OR			
Q.6	a	Briefly explain reheat Rankine cycle with neat T–S diagram.	10	L2	CO3
	b	Explain regenerative cycle with open feed water heater using T–S diagram.	10	L3	CO3

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		Module–4			
Q.7	**a**	Explain working of VCR system with neat diagram.	**10**	**L2**	**CO4**
	b	A refrigerator operates betweenEvaporator temperature = –10°C, Condenser temperature = 30°C, Given:Enthalpy at compressor inlet $h_1 = 250$ kJ/kg, Enthalpy at compressor outlet $h_2 = 300$ kJ/kg, Enthalpy at condenser exit $h_3 = 100$ kJ/kgFind: Refrigerating effect, Work input and COP.	**10**	**L3**	**CO4**
		OR			
Q.8	**a**	Explain specific humidity and enthalpy of moist air.	**6**	**L2**	**CO4**
	b	Explain heating and cooling processes using psychrometric chart.	**8**	**L2**	**CO4**
	c	A refrigeration system has refrigerating effect of 140 kJ/kg and compressor work of 35 kJ/kg. Find COP.	**6**	**L3**	**CO4**
		Module–5			
Q.9	**a**	Explain operation of a single-stage reciprocating compressor with neat sketch.	**10**	**L2**	**CO5**
	b	A compressor delivers 3 m^3/min of air at 6 bar from 1 bar. Assuming isothermal compression, find:a) Work doneb) Power required	**10**	**L3**	**CO5**
		OR			
Q.10	**a**	Derive expression for velocity of steam at nozzle exit.	**8**	**L2**	**CO5**
	b	Steam enters a nozzle with enthalpy of 3200 kJ/kg and leaves with enthalpy of 3000 kJ/kg.Find exit velocity. (Neglect inlet velocity)	**6**	**L2**	**CO5**
	c	Explain critical pressure ratio and its significance.	**6**	**L3**	**CO5**

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