Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2026

Fourth Semester

MECHANICAL ENGINEERING

UMETL24403 – THERMAL ENGINEERING

(Steam tables and Mollier diagram Can be Permitted)

Regulations -2024

Duration : 3 Hrs ***Maximum : 100 Marks***

PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

Q.No	*Questions*	*BTL*	*CO*	*Marks*
1.	Recall mean effective pressure as applied to gas power cycles.	L1	1	2
2.	Draw P-V & T-S diagram of Ericsson cycle	L2	1	2
3.	Infer the terms, Degree of super heat.	L1	2	2
4.	Define Kalina Cycle.	L1	2	2
5.	What do mean by scavenging in IC engine?	L1	3	2
6.	List out the factors affecting the ignition lag.	L2	3	2
7.	Define Isentropic efficiency	L1	4	2
8.	Mention the purpose of intercooler in the multistage compression?	L2	4	2
9.	State the desirable properties of refrigerant	L2	5	2
10.	Why ODP & GWP are important in the selection of refrigerant?	L2	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No			*Questions*	*BLT*	*CO*	*Marks*
11.	a		An engine working on the Otto cycle has a volume of 0.45 m^3, pressure 1 bar and temperature of 30°C at the beginning of the compression stroke. At the end of the compression stroke, the pressure is 11 bar. Heat added during the constant volume process is 210 kJ. Calculate: 1. Pressures, temperatures and volumes at salient points in the cycle. 2. Percentage clearance. 3. Air standard efficiency. 4. Mean effective pressure. 5. Ideal power developed by the engine, if the number of working cycles per minute is 210. Assume the cycle is reversible.	L3	1	16
			Or			
	b	i	Explain the working of Stirling cycle with help of P-V & T-S diagram,	L3	1	10
		ii	Write short on Lenoir cycle.	L3	1	6
12.	a		A Rankine cycle operates between pressures of 80 bar and 0.1 bar. The maximum cycle temperature is 600°C. If the steam turbine and condensate pump efficiencies are 0.9 and 0.8 respectively, Analyze the specific work and thermal efficiency.	L3	2	16
			Or			
	b		With a neat sketch explain the working process of Binary combined cycle with its P-V and T-S diagram.	L3	2	16
13.	a	i	List the IC engine components and its function.	L2	3	8
		ii	Draw the typical port timing diagram of two stroke SI engine and explain the salient points.	L2	3	8
			Or			

	b	i	Discuss the combustion phenomena in CI engine and explain.	L2	3	10
		ii	Describe the various methods of controlling knocking in SI engine	L2	3	6
14.	a		A single acting air compressor takes in atmospheric air (101.325 kPa, 27°C) and delivers it at 1.4 MPa. The compressor runs at 300 rpm and has cylinder diameter of 160 mm and the stroke 200 mm, clearance volume 4% of the stroke volume, if the pressure and temperature of air at the end of suction stroke are 100 kPa and 47°C and law of compression and expansion is $pV^{1.2} = C$, determine the (i) mass of the air delivered per minute, (ii) volumetric efficiency and (iii) driving power required if mechanical efficiency is 85 %	L3	4	16
			Or			
	b	i	Construct an expression for minimum work required for two stage reciprocating air compressor with perfect inter-cooling and neglect clearance volume	L3	4	8
		ii	Explain the working of vane compressor with neat sketch	L3	4	8
15.	a		With neat sketch explain the construction of air refrigeration system working on Bell-Coleman cycle and derive its coefficient of performance by showing all process on P-V & T-S diagram	L2	5	16
			Or			
	b		Discuss the construction and working of Aqua Ammonia refrigeration system with neat sketch and state its advantages over VCRS.	L2	5	16

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