

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2026***Sixth Semester**Mechanical Engineering***ME3451 - THERMAL ENGINEERING****(Use of Steam Table with Mollier diagram is permitted)****Regulations - 2021****Duration: 3 Hrs.****Maximum: 100 Marks****PART – A(ANSWER ALL QUESTIONS) (Marks 10*2=20)**

Q.No	Questions	BLT	CO	Marks
1.	Write any four differences between Otto and Diesel cycle?	L1	1	2
2.	Mention the effect of reheat on the Rankine cycle efficiency?	L2	1	2
3.	List the factors which influence nozzle efficiency.	L2	2	2
4.	Differentiate supersaturated flow and isentropic flow.	L2	2	2
5.	Define the term degree of reaction.	L1	3	2
6.	Classify the Gas Turbine,	L1	3	2
7.	Recall about the Pre ignition? State its effect.	L1	4	2
8.	Why the antifreeze solution is used in water cooling systems?	L1	4	2
9.	State the purpose of testing of IC engine	L2	5	2
10.	what is mean by supercharging?	L1	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 an air standard efficiency of 56% and rejects heat 544 kJ/kg of air. The pressure and temperature of air at the beginning of compression are 0.1 MPa and 60°C respectively. Compute (a) The compression ratio of the engine, (b) the work done per kg of air, (c) The pressure and temperature at the end of compression, and (d) The maximum pressure in the cycle.	L3	1	16
	Or			
b	In a gas turbine plant working on the Brayton cycle the air at the inlet is at 27°C, 0.1 MPa. The pressure ratio is 6.25 and the maximum temperature is 800°C, the turbine and compressor efficiencies are each 80% Find I. The compressor work per kg of air II. The turbine work per kg of air III. The heat supplied per kg of air IV. The cycle efficiency and V. The turbine exhaust temperature.	L3	1	16
12. a	Steam turbine develops 185 kW with a consumption of 16.5 kg/kW/h. The Pressure and temperature of the steam entering the nozzle are 12 bar and 220° C. The steam leaves the nozzle at 1.2 bar. The diameter of the nozzle at throat is 7mm, Find the number of nozzles. If 8% of the total enthalpy drop is lost in friction in the diverging part of the nozzle, determine the diameter at the exit of the nozzle and the exit velocity of the leaving steam. Sketch the skeleton Mollier diagram and show on it the values of pressure, temperature or dryness fraction, enthalpy and specific volume at inlet, throat and exit.	L2	2	16
	Or			
b i	Define critical pressure ratio of a nozzle and discuss why attainment of sonic velocity. Also determine the maximum discharge through steam nozzle.	L2	2	10
ii	State the physical significance of critical pressure ratio	L2	2	6

13.	a	Elucidate the working of velocity, pressure and velocity - pressure compounding methods of turbine with neat sketch.	L2	3	16
Or					
	b	i Explain with neat sketch Working Principle of Closed Cycle Gas Turbine	L2	3	10
		ii Difference between Open Cycle and Closed Cycle Gas Turbine	L2	3	6
14.	a	i Explain Valve timing diagram of four stroke cycle Diesel Engine with neat sketch	L1	4	8
		ii Compare Petrol Engine and Diesel Engine	L1	4	8
Or					
	b	i What do you mean by knocking? Describe phenomenon of knocking in SI engine.	L1	4	8
		ii What are factors affect knocking? How can it be controlled?	L1	4	8
15.	a	The following data are obtained while testing a 4 stroke, 4 cylinder, petrol engine : Air fuel ratio (by weight) = 15:1 Calorific value of fuel = 45000 kJ/kg Mechanical efficiency = 85% Air standard efficiency = 53% Relative efficiency = 65% Volumetric efficiency = 80% Stroke bore ratio = 1.3 Suction conditions = 1 bar, 30°C Engine speed = 3000 rpm Power at brakes = 75 kW Calculate i) compression ratio (ii) indicated thermal efficiency (iii) brake Specific fuel consumption (iv) bore and stroke of the engine.	L3	5	16
Or					
	b	i List the method of injection followed in diesel engine and with neat sketch discuss in detail about the common rail diesel injection (CRDI) system.	L3	5	10
		ii Discuss about the Turbocharging	L3	5	6
