PVP 20

Code: 20ME3403

II B.Tech - II Semester – Regular / Supplementary Examinations
MAY - 2024

APPLIED THERMODYNAMICS
(MECHANICAL ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
UNIT-I					
1	a)	Discuss the classifications of IC Engines.	L2	CO1	7 M
	b)	Explain the difference between two-stroke and four-stroke engines.	L2	CO1	7 M
OR					
2		The following data was recorded during the testing of a four-stroke cycle gas engine. Area of indicator diagram=900 mm^2; Length of indicator diagram = 70 mm; spring scale = 0.3 bar/mm; Diameter of piston = 200 mm; Length of stroke = 250 mm; Speed = 300 rpm. Determine: i) Indicated mean effective pressure ii) Indicated power.	L3	CO2	14 M

UNIT-II					
3	a)	Discuss in detail about the combustion process in a SI engine with suitable diagrams.	L2	CO1	7 M
	b)	Differentiate the normal combustion and abnormal combustion for SI engines.	L2	CO1	7 M
OR					
4		Explain different variables affecting the delay period and knocking in CI engines.	L2	CO1	14 M
UNIT-III					
5		In a Rankine cycle, the steam at inlet to turbine is dry and saturated at a pressure of 30 bar and expands isentropically to a pressure of 0.25 bar. Determine: a) The turbine work b) The pump work c) Rankine efficiency d) Condenser heat flow e) Dryness fraction at the end of expansion.	L3	CO3	14 M
OR					
6		A turbine is supplied with steam at a pressure of 32 bar and temperature of 410^{o}C. The steam then expands isentropically to a pressure of 0.08 bar. Find the dryness fraction at the end of expansion and thermal efficiency of the cycle. If the steam is reheated at 5.5 bar to a temperature of 395^{o}C and then expanded isentropically to a pressure of 0.08 bar, what will be the dryness fraction and thermal efficiency of the cycle?	L3	CO3	14 M

UNIT-IV					
7	a)	Dry saturated steam at 2.8 bar is expanded through a convergent nozzle to 1 .7 bar. The exit area is 3 cm^2. Calculate the exit velocity and mass flow rate for, i) Isentropic expansion ii) supersaturated flow.	L3	CO4	10 M
	b)	List out some applications of steam nozzles.	L2	CO4	4 M
OR					
8	Classify different types of condensers, and explain in detail the working of jet condensers.		L2	CO4	14 M
UNIT-V					
9	a)	Differentiate the open and closed-cycle gas turbines.	L2	CO4	7 M
	b)	Explain how the intercooling method will increase the gas turbine efficiency.	L4	CO4	7 M
OR					
10	In an air standard regenerative gas turbine cycle the pressure ratio is 5. Air enters the compressor at 1 bar, 300 K and leaves at 490 K. The maximum temperature in the cycle is 1000 K. Calculate the cycle efficiency, given that the efficiency of the regenerator and the efficiency of the turbine are each 80%. Assume for air the ratio of specific heats as 1.4. Also show the cycle on a T-S diagram.		L3	CO4	14 M