GALGOTIAS UNIVERSITY

ADMISSION NUMBER												

School of Engineering

B.TECH Mechanical Engineering
Mid Term Examination - May 2024

Duration : 90 Minutes
Max Marks : 50

Sem IV - G3UB404B - Applied Thermodynamics

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1)	Explain the major differences between Otto and Diesel Cycle.	K2 (2)
2)	Define expansion ratio.	K1 (3)
3)	With the help of T-s diagrams, explain the effect of following on the thermal efficiency of Rankine cycle: i) Increasing boiler pressure ii) Superheating of steam in the boiler	K2 (4)
4)	Explain the major differnces between Carnot and Vapor compression cycle	K2 (6)
5)	An ideal reheat cycle utilizes steam as the working fluid. Steam at 100 bar, 400°C is expanded in the HP turbine to 15 bar. After this, it is reheated to 350°C at 15 bar and is then expanded in the LP turbine to the condenser pressure of 0.5 bar. Determine the thermal efficiency and steam rate.	K3 (6)
6)	An ideal regenerative cycle operates with dry saturated steam, the maximum and minimum pressures being 30 bar and 0.04 bar respectively. The plant is installed with a single mixing type feed water heater. The bled steam pressure is 2.5 bar. Determine (a) the mass of the bled steam, (b) the thermal efficiency of the cycle	K3 (9)
7)	A simple steam power cycle uses solar energy for the heat input. Water in the cycle enters the pump as a saturated liquid at 40°C, and is pumped to 2 bar. It then evaporates in the boiler at this pressure, and enters the turbine as saturated vapour. At the turbine exhaust the conditions are 40°C and 10% moisture. The flow rate is 150 kg/h. Determine (a) the turbine isentropic efficiency, (b) the net work output (c) the cycle efficiency, and (d) the area of solar collector needed if the collectors pick up 0.58 kW/m2 .	K4 (8)
8)	A steam turbine receives steam at pressure 20 bar and superheated to 88.6°C. The exhaust pressure is 0.07 bar and the expansion of steam takes place isentropically Using steam table,Determine the following. (a) Heat rejected (b) Heat supplied, assuming that the feed pump supplies water to the boiler at 20 bar (c) Net work done (d) Work done by the turbine (e) Thermal efficiency (f) Theoretical steam consumption	K4 (12)
	OR	
	In a Rankine cycle, steam leaves the boiler and enters the turbine at 4 MPa and 400°C. The condenser pressure is 10 kPa. Determine the cycle efficiency. In above cycle if after expansion in the turbine to 400 kPa, the steam is reheated to 400°C in a reheater and then expanded in the low-pressure turbine to 10 kPa. Determine the cycle efficiency. Compare and conclude on the results obtained.	K4 (12)