Code No.: ME505PC [R20] H.T.No. [| | | 8 | R | | | | |]

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
III–B.TECH–I–Semester End Examinations (Supply) - June- 2024
THERMAL ENGINEERING-II
(MECH)

[Time: 3 Hours]   [Max. Marks: 70]

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks.

PART-A   (20 Marks)

1. a)	What's the benefit of using regeneration in a Rankine cycle?	[2M]
b)	Define equivalent evaporation.	[2M]
c)	What is the effect of friction on the flow through a steam nozzle?	[2M]
d)	List out the few applications of nozzle.	[2M]
e)	What is the advantage of using multiple stages in a steam turbine design?	[2M]
f)	What is the condition for maximum efficiency in a reaction turbine?	[2M]
g)	How does a condenser in a steam turbine power plant contribute to efficiency?	[2M]
h)	Name two combustion chambers used in gas turbines.	[2M]
i)	List out the various thrust augmentation methods.	[2M]
j)	How rockets are classified.	[2M]

PART-B   (50 Marks)

2. What are the different thermodynamic variables affecting efficiency and output of Rankine [10M] cycle. Explain their influence on Rankine cycle.

OR

3. Describe the working principle of a boiler including the function of its key components? [10M]

4. How are nozzles classified based on Mach number of the flow passing through? [10M]

OR

5. Dry saturated steam at a pressure of 8 bar enters a convergent divergent nozzle and leaves it [10M] at a pressure of 1.5 bar. If the flow is isentropic and the corresponding expansion index is 1.135. Find the ratio of cross-sectional area at exit and throat for maximum discharge.

6. A simple impulse turbine has one ring of moving blades running at 150 m/s, absolute [10M] velocity of steam at exit is 85 m/s at an angle 80^0 with the tangent of wheel, friction coefficient is 0.82, rate of steam flowing 2 Kg/s. Assuming the moving blades to be a symmetrical, find the i) Blade angles ii) Nozzle angle iii) absolute velocity of steam at entrance and iv) power developed.

OR

7. Explain the term "Degree of Reaction" and how the degree of reaction affect the [10M] performance of the turbine. What is the value of DoR for different turbines?

8. What is the principle of Ejector condenser and explain the working with line diagram of the [10M] same.

OR

9. A gas turbine unit receives air at 2 bar, 300K and compresses it adiabatically to 6.2 bar. The [10M] compressor efficiency is 88%. The fuel has a heating value of 44186 kJ/kg and fuel- air ratio is 0.017 kg fuel/kg of air. The turbine internal efficiency is 90%. Calculate the work of turbine and compressor per kg of air compressed and thermal efficiency. For products of combustion C_p=1.147 kJ/kg K, γ=1.33.

10. A jet propulsion system has to create a thrust of 100 tons to move the system at a velocity of [10M] 700 km/hr. If the gas flow rate through the system is restricted to a maximum of 30 kg/s. find the exit gas velocity and propulsive efficiency.

OR

11. Draw the schematic diagram of solid propellant rockets and discuss its working principle. [10M]

****