MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section2(f) & 12(B)of the UGC act,1956

III B.Tech I Sem Regular End Examination, December 2022
Thermal Engineering – II
(Mechanical)

Time: 3 Hours.   **Max. Marks: 70**

Note: 1. Question paper consists: Part-A and Part-B.
    2. In Part – A, answer all questions which carries 20 marks.
    3. In Part – B, answer any one question from each unit.
    Each question carries 10 marks and may have a, b as sub questions.

PART- A
(10*2 Marks = 20 Marks)

1.	a)	Explain the concept of Mean Temperature of Heat addition.	2M	CO1	BL4
	b)	Discuss the function of fusible plug.	2M	CO1	BL2
	c)	What are the functions of nozzles?	2M	CO2	BL1
	d)	What are various types of nozzles?	2M	CO2	BL1
	e)	What is the working principle of impulse turbine?	2M	CO3	BL1
	f)	Define degree of reaction.	2M	CO3	BL1
	g)	Define Vacuum efficiency	2M	CO4	BL1
	h)	Draw the layout of simple gas turbine and indicate various energy interactions.	2M	CO4	BL1
	i)	Define propulsion efficiency.	2M	CO5	BL1
	j)	Write classification of rockets.	2M	CO5	BL1

PART- B
(10*5 Marks = 50 Marks)

2	a)	Explain the operation of any one type of modern high pressure boiler with a neat sketch.	5M	CO1	BL4
	b)	Explain all the 3-types of mechanical draught systems with neat sketches	5M	CO1	BL4

OR

3	a)	Steam at 28 bar and 50⁰ C super heat is passed through a turbine and expanded to a pressure where the steam is dry and saturated. It is then reheated at constant pressure to its original temperature and then expanded to the condenser pressure of 0.2 bar. The expansion being isentropic, find i. Work done per kg of steam. ii. Thermal Efficiency with and without reheat.	5M	CO1	BL3
	b)	How do you write heat balance for a boiler? Explain in detail about the calculations involved.	5M	CO1	BL4

4		A steam turbine develops 185 kW with a consumption of 16.5 kg/kWh. Pressure and temp. of the steam at inlet of nozzle are 12 bar and 220^0 C respectively. The steam leaves the nozzle at 1.2 bar. The diameter of nozzle at throat is 7 mm. Find the no of nozzles.	10M	CO2	BL3

<div align="center">**OR**</div>

5	a)	A gas expands in a convergent divergent nozzle from 5 bar to 1.5 bar, the initial temperature being 700^0C . Calculate the velocities at the throat and at the exit.	5M	CO2	BL3
	b)	Derive the expression for critical pressure ratio. What is the significance of critical pressure ratio?	5M	CO2	BL6
6	a)	Write the expression for blade efficiency for a single stage reaction turbine for getting the maximum blade efficiency.	5M	CO3	BL1
	b)	Draw the velocity triangle for Parson's reaction turbine. Define all the terms?	5M	CO3	BL3

<div align="center">**OR**</div>

7		A 50% Parson's reaction turbine has a mean drum diameter of 200 cm. The speed is 600 rpm and the steam consumption is 5 kg/sec. The other data is: blade speed ratio = 0.45; velocity loss factor = 0.85; nozzle efficiency both for the stator and rotor blades = 0.9; exit angle of stator and rotor blades = 20^0. Neglecting carry over and wind age loss, estimate the power developed per stage, blade efficiency and stage efficiency.	5M	CO3	BL3
8	a)	Describe with neat sketches, the working of a simple constant pressure open cycle gas turbine.	5M	CO4	BL2
	b)	A simple gas turbine operating on Brayton cycle has air inlet temperature of 27^0C, pressure ratio of 9 and the maximum cycle temperature of 727^0C. What will be the improvement in the cycle efficiency and the output if the turbine process is divided into two stages each of pressure ratio 3 with intermediate reheating to 727^0C.	5M	CO4	BL3

<div align="center">**OR**</div>

9	a)	Discuss the working principles of barometric jet condenser with neat sketch?	5M	CO4	BL2
	b)	What are the elements of a Condensing plant? Briefly explain the function of each element or component.	5M	CO4	BL4
10	a)	Explain constriction and working of turbo jet with the help of a neat sketch.	5M	CO5	BL4
	b)	Compare and contrast turbojet engine with Rocket propulsion engine in all aspects	5M	CO5	BL2

<div align="center">**OR**</div>

11	a)	Discuss various thrust augmentation techniques.	5M	CO5	BL2
	b)	What are various types in solid propellant rockets? Explain in detail.	5M	CO5	BL4

<div align="center">---oo0oo---</div>

CO - Course Outcome   **BL - Blooms Taxonomy Levels**