R20 Regulation *Subject code: 3P5CC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech V Semester Supplementary Examinations, April 2026

THERMAL ENGINEERING-II

(ME)

Maximum Marks: 70 Date: 20.04.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X2M=20 Marks)		Marks	CO	BTL
1	What are the methods used to improve Rankine cycle efficiency?	2M	1	L1
2	Classify the different types of boilers.	2M	1	L1
3	What is the function of a steam nozzle?	2M	2	L1
4	What is the stagnation pressure of steam nozzle?	2M	2	L1
5	Draw the combined velocity triangle diagram of an Impulse turbine?	2M	3	L1
6	Draw the pressure velocity profile of Reaction turbine?	2M	3	L1
7	Classify the steam condensers.	2M	4	L1
8	What are methods to improve the overall efficiency of gas turbine?	2M	4	L1
9	What is the principle of Rocket propulsion?	2M	5	L1
10	What is the classification of Jet Propulsion?	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Explain with a neat sketch working of Benson Boiler and mention its advantages.	10M	1	L2
	OR			
12	Explain the working principle of Babcock and Wilcox boiler with neat sketch.	10M	1	L2
13	Derive Critical pressure ratio of nozzle and determine the maximum mass rate of flowthrough steam nozzle?	10M	2	L2
	OR			
14	Superheat steam enters a steam nozzle at a pressure of 20 bar and discharged at a pressure of 2 bar. If the dryness fraction of discharge steam is 0.86, what will be the final velocity of steam? Neglect initial velocity of steam. If 15 % of heat drop is lost infraction, Examine the percentage reduction in the final velocity.	10M	2	L2
15	The velocity of steam exiting the nozzle of the impulse stage of turbine is 400 m/s. The blades operate close to the maximum blading efficiency. The nozzle angle is 12°. Considering equiangular blades and ne glecting blade friction, calculate for a steam flow of 0.6 kg/s, the diagram power and the diagram efficiency.	10M	3	L2

	OR			
16	Explain jet condenser and surface condenser with neat sketch.	10M	3	L2
17	A gas turbine plant consists of two stage compressors with perfect intercooler and a single stage turbine. If the plant works between the temperature limits of 300 K and 1000K and 1 bar and 16 bar. Find the net power of the plant per kg of air. Take C_P= 1kJ/kg K	10M	4	L2
	OR			
18	Explain the working principle of down flow surface condenser with neat sketch.	10M	4	L2
19	In a gas turbine plant, the air is compressed in a single stage compressor from 1 bar to 9 bar and from an initial temperature of 300 K. The same air is then heated to a temperature of 800 K and then expanded in the turbine. The air is then reheated to a temperature of 800 K and expanded in the second turbine. Find the maximum power that can be obtained from the installation, if the mass of air circulated per second is 2 kg. Take C_P=1 kJ/ kg K	10M	5	L2
	OR			
20	The effective jet exit velocity of a rocket is 2500 m/s, the forward flight velocity is 1250 m/s, and the propellant consumption if 65 kg/s. Calculate: i) The thrust; ii) The thrust power and iii) The propulsive efficiency.	10M	5	L2