



R20 Regulation

Subject code:3P5CC

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, December 2024

THERMAL ENGINEERING - II

(ME)

Maximum Marks: 70

Date:31.12.2024

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 which carries 10M.
 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)		CO	Bloom Tx
1	Mention various processes in a Rankine Cycle.	1	L1
2	Mention various factors considered for the selection of Boilers.	1	L1
3	Write the various types of Steam nozzles?	2	L1
4	What is the stagnation pressure of steam nozzle?	2	L1
5	Draw the combined velocity triangle diagram of an Impulse turbine?	3	L1
6	Draw the pressure velocity profile of Reaction turbine?	3	L1
7	What are the comparisons of Jet and Surface condensers	4	L1
8	Draw the T-S diagram of multistage intercooling in gas turbine	4	L1
9	Why does a ramjet engine not require a compressor or turbine?	5	L1
10	What are the advantages of a ramjet engine?	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx
11	A simple Rankine cycle works between pressures 28 bar and 0.006 bar, the initial condition of steam being dry saturated. Calculate the cycle efficiency, work ratio and specific steam consumption? [10M]	1	L2
	OR		
12	Explain with a neat sketch working of Benson Boiler and mention its advantages? [10M]	1	L2
13	Derive the condition for maximum discharge through a nozzle (Critical pressure ratio). [10M]	2	L2
	OR		
14	Dry saturated steam enters a frictionless adiabatic nozzle with negligible velocity at a temperature of 300°C. It is expanded to pressure of 5000 KPa. The mass flow rate is 1 kg/s. Calculate the exit velocity of the steam. [10M]	2	L2
15	Explain the Parson's reaction turbine with neat sketch. [10M]	3	L2
	OR		

16	In a certain stage of an impulse turbine, the nozzle angle is 20° with the plane of the wheel. The mean diameter of the ring is 2.8 meters. It develops 55 kW at 2400 rpm. Four nozzles, each of 10 mm diameters expand steam isentropically from 15 bar and 250°C to 0.5 bar. The axial thrust is 3.5 N. Calculate: 1. Blade angles at entrance and exit, and 2. power lost in blade friction. [10M]	3	L2
17	Distinguish between Impulse and Turbine. [10M]	4	L2
	OR		
18	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 $C_p = 1\text{kJ/kg K}$ [10M]	4	L2
19	Explain the principle of operation of a turbojet engine and state its advantages and disadvantage [10M]	5	L2
	OR		
20	The effective jet exit velocity of a rocket is 3500 m/s, the forward flight velocity is 1250 m/s, and the propellant consumption is 75 kg/s. Calculate: i) The thrust; ii) The thrust power and iii) The propulsive efficiency [10M]	5	L2