R18 Regulation *Subject code:2E6CB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Supplementary Examinations, December 2024

THERMAL ENGINEERING - II

(ME)

Maximum Marks: 70 Date:10.01.2025 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	Describe various types of Steam nozzles.	2	L1
4	What is the stagnation temperature of steam nozzle.	2	L1
5	Draw the velocity tringle diagram for an Impulse turbine blades.	3	L1
6	What is the pressure- velocity compounding?	3	L1
7	Classify the steam condenser.	4	L1
8	Define isentropic efficiency of a compressor and turbine.	4	L1
9	State difference between air breathing and non-air breathing propulsion systems.	5	L1
10	Why does a ramjet engine not require a compressor or turbine?	5	L1
Part-B			
Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx
11	With the help of P-V and T-S diagrams explain various processes of a Rankine Cycle. [10M]	1	L2
	OR		
12	A simple Rankine cycle steam power plant operates between the temperatures of 260^0C and 95^0C. The steam is supplied to the turbine at a dry saturated condition. In the turbine it expands in an isentropic manner. Determine the efficiency of the Rankine cycle operating between these two temperature limits. [10M]	1	L2
13	Derive an expression for the condition for maximum discharge through nozzle. [10M]	2	L2
	OR		
14	Calculate the critical pressure and throat area per unit mass flow rate of steam expanding through a convergent-divergent nozzle from 10bar, dry saturated down to atmospheric pressure of 1bar. Assume that the inlet velocity is negligible and that the expansion is isentropic. [10M]	2	L2
15	Draw the velocity triangle diagram for an impulse turbine blades and derive the expressions for work done and axial thrust. [10M]	3	L2

	OR		
16	A Parsons reaction turbine while running at 400rpm, consumes 30 tons of steam per hour. The steam at a certain stage is at 1.6bar, with dryness fraction of 0.9 and the stage develops 10kw. The axial velocity of flow is constant and equal to 0.75 of the blade velocity. Find mean diameter of the drum and the volume of steam flowing per second. Take blade tip angles at inlet and exit as 35^0 and 20^0respectively. [10M]	3	L2
17	Explain with neat sketches different types of Jet condensers. [10M]	4	L2
	OR		
18	A surface condenser is designed to handle 12000 kg of steam per hour. The steam enters at 8kpa, 0.9 dry. The condensate leaves the condenser at the corresponding saturation temperature. Calculate the rate of cooling water, if cooling water temperature rise is limited to 12^0C. [10M]	4	L2
19	What are the different methods used to improve efficiency of a gas turbine plant .Explain any one method with a neat sketch. [10M]	5	L2
	OR		
20	The effective jet velocity from a rocket engine is 3000m/s. The forward velocity is 1500m/s and propellent consumption is 80kg/s. Calculate the thrust, thrust power, and propulsive efficiency. [10M]	5	L2