R20 Regulation *Subject code:3P5CC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, June/July 2023

THERMAL ENGINEERING-II

(Mechanical Engineering)

Maximum Marks: 70 Date:28.06.2023 Duration: 3 hours

Part-A

All the following questions carry equal marks (10x2M=20 Marks)

1 What is regeneration in Rankine cycle?
2 Compare water tube and fire tube boilers.
3 What is the effect of friction on flow through a steam nozzle?
4 Give four applications of steam nozzles.
5 Compare impulse and reaction turbines.
6 Define diagram efficiency of a steam turbine.
7 Why is gas turbine efficiency so low?
8 What is the purpose of a steam condenser?
9 Mention the factors affecting rocket acceleration.
10 What is meant by equivalent jet speed?

Part-B

Answer All the following questions. (10MX 5=50Marks)

11 Explain the construction and working of Babcock and Wilcox Boiler with neat sketch. [10]

OR

12 A steam power plant works between 40 bar and 0.05 bar. If the steam supplied is dry saturated and the cycle of operation is Rankine, find (a) Cycle efficiency , (b) Specific steam consumption. [10]

13 Dry air steam at 10 bar is expanded in a nozzle to 0.4 bar. The throat area is 7 cm^2 and inlet velocity is negligible. Determine the mass flow and exit area. The steam flow process is isentropic and the corresponding expansion index is 1.1 for dry saturated steam. [10]

OR

14 A convergent-divergent nozzle is required to discharge 350 kg of steam per hour. The nozzle is supplied with steam at 8.5 bar and 90% dry and discharges against a back pressure of 0.4 bar. Neglecting the effect of friction, find the throat and exit diameters. [10]

15 Explain the construction and working principle of an impulse turbine with a neat sketch. [10]

OR

16 In a stage of Parson's reaction turbine, the mean diameter of the wheel is 1.05 m and the speed is 3000 rpm. The angles of receiving tips are 35° and the discharging tips is 20°. If the steam flow rate is 1 kg/min, draw the velocity diagram for blades and evaluate, (a) Tangential thrust on blades (b) Axial thrust on blades (c) Power developed in the blades and (d) Diagram efficiency. [10]

17 Classify condensers and explain any two with necessary diagrams. [10]

OR

18 Compare the working of a gas turbine with and without intercooling. Draw the necessary P-V and T-S diagrams. [10]

19 Give a broad classification of rockets. Compare the characteristic features of a liquid fuel rocket with a solid-fuel rocket. [10]

OR

20 Differentiate turbojet and turbo propulsion engine with suitable diagrams. [10]