



**TKR COLLEGE OF ENGINEERING AND TECHNOLOGY**

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

**B.Tech III Year II Semester Regular Examinations, October 2020**

**THERMAL ENGINEERING-II**

(Mechanical Engineering)

**Maximum Marks: 70**

**Date:28.10.2020 Duration: 2 Hours**

**Part-A**

**All the following questions carry equal marks**

**(10x1M=10 Marks)**

- 1 Mention various processes in a Rankine cycle.
- 2 Mention any one factor for the selection of Boilers.
- 3 What is the main function of a Steam nozzle.
- 4 What is the stagnation pressure of a Steam nozzle.
- 5 What is a Velocity triangle diagram.
- 6 Explain the basic principle of working of an Impulse turbine.
- 7 Mention any two types of Steam condenser.
- 8 Define isentropic efficiency of a Compressor.
- 9 What is main advantage of a Ramjet engine.
- 10 What is Thrust power.

**Part-B**

**Answer ANY FIVE QUESTIONS**

**(12MX 5=60Marks)**

- 11 Explain the working of Babcock and Wilcox water tube boiler with a neat sketch.
- 12 A simple Rankine cycle steam power plant operates between the temperatures of  $260^{\circ}\text{C}$  and  $95^{\circ}\text{C}$ . The steam is supplied to the turbine at dry saturated condition. In the turbine it expands in the isentropic manner. Determine the efficiency of the Rankine cycle.
- 13 Derive an expression for the mass of steam discharged through a Nozzle.
- 14 Dry saturated steam at a pressure of 15 bar enters in a nozzle and discharged at a pressure of 1.5 bar. Find the final velocity of steam when the initial velocity of steam is negligible. If 10% of the heat drop is lost in friction, find the percentage reduction in the final velocity. Take Dryness fraction of discharge steam as 0.96.
- 15 Explain briefly various components of Reaction turbine.
- 16 Draw the combined velocity triangle diagram for Impulse turbine.
- 17 The steam leaves the nozzle of a simple impulse turbine of outlet area is  $15.5\text{ cm}^2$  at  $920\text{ m/s}$ . The steam coming out of the nozzle is 0.91 dry at 150 kpa absolute. The blade inlet and outlet angles are  $30^{\circ}$  and the blade velocity is  $230\text{ m/s}$ . If the friction factor is 0.8 find the nozzle angle and power developed.
- 18 Briefly explain the different methods to improve the efficiency of a Gas turbine plant.
- 19 Explain briefly working principle of Turbojet.
- 20 The diameter of propeller of an aircraft is 2.5 cm. It flies at a speed of  $540\text{ km/h}$  at an elevation of  $8000\text{ m}$ , where air density is  $0.525\text{ kg/m}^3$  The flight to jet speed ratio is 0.75. Calculate i) air flow rate through the propeller b) Thrust produced



