



R18 Regulation

**TKR COLLEGE OF ENGINEERING AND TECHNOLOGY**

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

Subject code:2E6CB

## B.Tech VI Semester Regular/Supplementary Examinations, June 2022

### Thermal Engineering-II (Mechanical Engineering)

Maximum Marks: 70

Date:17.06.2022 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)

- 1 List the main components of a steam power plant.
- 2 Mention a few boiler accessories and mountings.
- 3 Define nozzle efficiency.
- 4 What are the functions of steam nozzles?
- 5 Define degree of reaction in a turbine.
- 6 Compare impulse and reaction turbine.
- 7 What is Vacuum efficiency?
- 8 List the effects of regeneration in gas turbines.
- 9 What are the types of propellant? Give examples.
- 10 What is specific impulse in rockets?

#### Part-B

Answer All the following questions.

(5X10M=50Marks)

- 11 Explain the construction, working principle and advantages of Benson boiler with a neat sketch. 10  
OR
- 12 Discuss a simple Rankine cycle with a schematic layout of steam power plant. 10
- 13 (a) Derive the expression for critical pressure ratio in terms of index of expansion. 5  
(b) A convergent divergent adiabatic steam nozzle is supplied with steam at 10 bar and 250°C. 5  
The discharge pressure is 1.2 bar. Assuming the nozzle efficiency as 100% and initial velocity of steam is 50 m/s, find the discharge velocity.
- OR
- 14 (a) Briefly explain super saturated flow of steam through nozzle with h-s plot. What is meant by Wilson line? 5  
(b) In a steam nozzle, the steam expands from 4 bar to 1 bar. The initial velocity is 60 m/s and the initial temperature is 200°C. Determine the exit velocity if the nozzle efficiency is 92%. 5
- 15 Steam enters the blade row of an impulse turbine with a velocity of 600 m/s at an angle of 25° to the plane of rotation of blades. The mean blade speed is 200 m/s. the blade angle at the exit is 30°. The blade friction loss is 10%. Determine (a) The blade angle at inlet (b) The work done per kg of steam (c) The diagram efficiency (d) The axial thrust per kg of steam per second. 10

OR

- 16 In a 50 percent reaction turbine stage running at 50 revolutions per second, the exit angles are  $30^\circ$  and the inlet angles are  $50^\circ$ . The mean diameter is 1m. The steam flow rate is 10000 kg/mm and the stage efficiency is 85%. Determine (a) The power output of the stage (b) The specific enthalpy drop in the stage and (c) The percentage increase in the relative velocity of steam when it flows over the moving blades. 10
- 17 Classify condensers and explain the working of parallel and counter flow jet condensers. 10
- OR
- 18 Compare the working of a gas turbine with and without intercooling, including the necessary P-V and T-S diagrams. 10
- 19 Explain the principle of working of turbo jet engine with necessary diagrams. 10
- OR
- 20 Discuss the important properties of solid and liquid propellants desired for rocket propulsion. 10

NOTE: Allow the steam tables