

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-VII (NEW) EXAMINATION – SUMMER 2024**

**Subject Code: 2171910****Date: 01-06-2024****Subject Name: Power Plant Engineering****Time: 02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

|           |                                                                                                                                         | Marks |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------|-------|
| Q.1       | (a) State the factors to be considered for selection of site for thermal power plant.                                                   | 3     |
|           | (b) Discuss presents status of power generation in India.                                                                               | 4     |
|           | (c) Draw a line diagram of a Benson boiler. State the main difficulties experienced in the La Mont boiler and how it is prevented?      | 7     |
| Q.2       | (a) Discuss requirements of oil burners.                                                                                                | 3     |
|           | (b) Describe the unit pulverized coal handling system.                                                                                  | 4     |
|           | (c) State the classification of Draught. Derive an expression for maximum discharge through a chimney.                                  | 7     |
| <b>OR</b> |                                                                                                                                         |       |
|           | (c) Explain Pneumatic ash handling system with advantages and disadvantages.                                                            | 7     |
| Q.3       | (a) What is sub-critical and super critical boiler?                                                                                     | 3     |
|           | (b) Explain friction in Nozzle during steam flow.                                                                                       | 4     |
|           | (c) Derive equation of maximum discharge through a nozzle or critical pressure ratio.                                                   | 7     |
| <b>OR</b> |                                                                                                                                         |       |
| Q.3       | (a) Explain the principle of operation of steam turbine.                                                                                | 3     |
|           | (b) Give comparison of Impulse and Reaction Turbine.                                                                                    | 4     |
|           | (c) Describe the term, “compounding of steam turbine” and explain Pressure-Velocity compounded impulse turbine with necessary diagrams. | 7     |
| Q.4       | (a) Explain the necessity of feed water treatment.                                                                                      | 3     |
|           | (b) Discuss role of pH in corrosion and scale formation.                                                                                | 4     |
|           | (c) Explain Zeolite ion exchange process used in thermal power plant for water treatment.                                               | 7     |
| <b>OR</b> |                                                                                                                                         |       |
| Q.4       | (a) Explain closed cycle gas turbine plant with figure.                                                                                 | 3     |
|           | (b) Explain the working principle of Turboprop engine with neat sketch.                                                                 | 4     |
|           | (c) Derive equation of maximum work for brayton cycle.                                                                                  | 7     |

- Q.5** (a) Discuss Chain Reaction in Nuclear Power plant. 3  
(b) Differentiate between nuclear fusion and fission. 4  
(c) Explain with neat sketch construction and working of CANDU type reactor. 7

**OR**

- Q.5** (a) Give importance of combined cycle power generation 3  
(b) Define: Demand Factor, Diversity Factor, Plant use factor and Plant Capacity Factor 4  
(c) What do you understand by the term tariff? State the various methods for calculation of tariff and discuss any three of them. 7

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