

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-VII EXAMINATION – WINTER 2025

Subject Code:2171910

Date:01-12-2025

Subject Name:Power Plant Engineering

Time:10:30 AM TO 01:00 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

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|------------|-----|--|-----------|
| Q.1 | (a) | State the advantages of high pressure boilers. | 03 |
| | (b) | Enlist the advantages and disadvantages of thermal power plant. | 04 |
| | (c) | Explain the factors to be considered for site selection of thermal power plants in details. | 07 |
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| Q.2 | (a) | State the requirements of good coal handling plant. | 03 |
| | (b) | State the necessity of feed water treatment. | 04 |
| | (c) | Explain with neat sketch construction and working of Benson boiler. | 07 |
| OR | | | |
| | (c) | Estimate the height of the chimney to produce a static draught of 20 mm of water if the mean temperature of hot gases is 250 °C and the ambient temperature is 20 °C. one kg of air and gases occupies the volume of 0.7734 m ³ and 0.7463 m ³ at NTP respectively. Also estimate the flue gas formed per kg of fuel burnt. | 07 |
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| Q.3 | (a) | Define the term “Nozzle” and state the effect of friction on performance of nozzle. | 03 |
| | (b) | Differentiate between forced draught and induced draught. | 04 |
| | (c) | Explain the principle of overfeed stoker with neat sketch. | 07 |
| OR | | | |
| Q.3 | (a) | Define the following term “ Stage efficiency and Reheat factor”. | 03 |
| | (b) | The steam expands isentropically in a simple impulse turbine from 12 bar, 250 °C with an enthalpy of 2935 kJ/kg to an enthalpy of 2584 kJ/kg at 0.1 bar. The nozzle makes 18° with blade motion and the blades are symmetrical. Calculate the blade velocity that produces maximum efficiency for turbine speed of 3500 rpm. Assume that steam enters the nozzle with negligible velocity. | 04 |
| | (c) | Explain the pressure velocity compounded impulse turbine with pressure, velocity and specific volume diagram. | 07 |
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| Q.4 | (a) | Draw the schematic of open and closed type condenser water cooling systems. | 03 |
| | (b) | List down the main elements of condensing plant and state the function of each elements. | 04 |
| | (c) | State the need of cooling tower in steam power plant and compare the natural draught cooling tower to mechanical draught cooling tower. | 07 |

OR

- Q.4** (a) Draw the schematic diagram of closed cycle gas turbine plant and state the applications of gas turbine. **03**
(b) Give the classification of gas turbines. **04**
(c) Explain the Zeolite Ion exchange process with neat sketch and state the advantages of it. **07**

- Q.5** (a) Enlist the losses occurs in steam turbine. **03**
(b) Differentiate between Ramjet engine and Pulsejet engine. **04**
(c) Explain the pressurized water reactor with neat sketch. **07**

OR

- Q.5** (a) Give the classification of rocket engines. **03**
(b) The annual peak load on a 30 MW power plant is 25 MW. The power station supplies load having maximum demand of 10 MW, 8.5 MW, 5 MW and 4.5 MW. The annual load factor is 0.45. Estimate,
1.Average Load
2.Diversity factor **04**
(c) Explain the significance of load factor and diversity factor in power generation. **07**
