

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2014

Subject code: 1722102

Date: 18-06-2014

Subject Name: Thermal Power Plant Engineering

Time: 02:30 pm - 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.

Q.1 (a) Draw the layout of 210 MW modern thermal power plant including major four circuits. Label the major equipments. **07**

(b) What is supercritical high pressure boiler? Explain working of it with neat Sketch. **07**

Q.2 (a) Explain three methods to improve the thermal efficiency of gas turbine power plant. **07**

(b) Explain different methods of controlling the superheat temperature of steam with line diagram. **07**

OR

(b) Explain pressurized fluidized bed combustion with neat sketch. Give its advantages. **07**

Q.3 (a) Explain the dual-pressure steam cycle in combined plant with a sketch & T-S diagram. **07**

(b) In a thermal power plant steam at 100 bar and 500°C expands till it becomes dry saturated. Then it is reheated to 500°C and expanded up to condenser pressure 0.1 bar. For 100 MW power plant find the steam consumption and efficiency of the plant. Consider both the turbine efficiency 80%. **07**

OR

Q.3 (a) Write short note on three stages in India's nuclear power programme. **07**

(b) A thermal power plant consists of two 60 MW units each running for 8000 hours and one 30 MW unit running for 2000 hours per year. The energy produced by the plant is 876×10^6 KWh per year. Determine the plant load factor and plant use factor. Consider the maximum load as equal to the plant capacity. **07**

Q.4 (a) Explain working of CANDU reactor with neat sketch. Give its advantages. **07**

(b) Draw neat sketch of diesel power plant. Give function of its components. **07**

OR

Q.4 (a) Define (1) Load factor, (2) diversity factor, (3) plant capacity factor, (4) plant use factor, (5) peak load, (6) average load, (7) connected load. **07**

(b) What do you mean by tariff? Explain straight line meter rate, two part tariff and three part tariff rates. **07**

Q.5 (a) Write short note on: **10**

(1) pumped hydro storage plant, (2) compressed air storage plant.

(b) Draw line diagram and T-S diagram for mercury steam binary vapour cycle. **04**

OR

Q.5 (a) In a gas turbine power plant air at 1 bar and 25°C is taken and compressed to a pressure 5 bar in two stages with perfect intercooling. The regenerator effectiveness is 0.65. The gas enters the gas turbine at 850 °C. Find (1) Efficiency of the plant, (2) Power output, (3) Work ratio, (4) Air fuel ratio, (5) Fuel consumption if C.V. of fuel is 42000 KJ/KgK. Air flow rate is 11 Kg/Sec. Take properties of air for calculation of air and gas. Take C_p as 1.0 KJ/KgK. **10**

(b) Draw line diagram and T-S diagram for combined steam and gas turbine plant. **04**
