

GUJARAT TECHNOLOGICAL UNIVERSITY
ME Semester –II Examination Dec. - 2011

Subject code: 1722102**Date: 12/12/2011****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.
4. Use of Steam table & Mollier diagram is permitted.

- Q.1** (a) Give the layout of modern thermal power station including major circuits/paths of flow of coal, air & flue gases, condensate & steam and cooling water. Label the major equipments. **07**
- (b) Explain the principle of fluidized Bed Combustion systems with diagram. **07**
What are main problems with such system? How such problems are overcome?

- Q.2** (a) Explain a high pressure boiler which can carry higher salt concentration in feed water than any other type with neat sketch. **07**
- (b) Which method is used to improve the efficiency of a gas turbine power plant? Explain with a neat sketch. **07**

OR

- (b) Derive an expression for the optimum pressure ratio giving maximum specific output in simple cycle gas turbine. **07**

- Q.3** (a) A gas turbine set draws in atmospheric air at 1.013 bar and 15.6 °C; there are two pressure stages with intercooler, and the total pressure ratio is 8:1. The maximum temperature of the cycle is 593 °C and there is one turbine for expansion. A regenerator is used and recovers 80 % of the available heat. Determine the efficiency of plant and the ratio of the useful work to turbine work (work ratio). The turbine and compressor efficiencies may be taken as 0.86 and 0.83 respectively. **07**
- (b) Explain with neat sketch simple GT-ST combined plant. **07**

OR

- Q.3** (a) Explain with neat sketch Pressurized Water Reactor. Explain function of pressurizer in PWR. **07**
- (b) Explain Nuclear waste and its disposal. **07**

- Q.4** (a) Explain with neat sketch arrangement of a diesel power plant and also function of each system. **07**
- (b) Explain the main features of supercharging with the help of p – V diagram. **07**
What do you mean by mechanical supercharging and turbocharging?

OR

- Q.4** (a) Define: Load factor, Diversity factor and plant use factor. When Load factor and capacity factor are numerically equal? **07**
- Q.4** (b) Define the following terms: **07**
(1) Peak load (2) Average load (3) Plant capacity factor (4) Connected load.

- Q.5 (a)** What is energy management? How it helps in solving problems of energy crisis? **07**
- (b)** Why economizer is used in steam turbine power plant? Discuss the different type of economizers. **07**

OR

- Q.5 (a)** A steam turbine plant is supplied with steam at pressure 17 bar and superheated to 100°C . The exhaust pressure is 0.06 bar. The temperature of the condensate in the hot-well is actually 33°C ($v_w = 0.001\text{m}^3/\text{kg}$). if the measured steam condensate is 5 kg/kWh, and if the boiler efficiency is 82 %. What is the absolute thermal efficiency of the whole boiler and turbine plant? **07**
- (b)** What is meant by tariff? Explain straight line meter rate, two part tariff and three part tariff rates. **07**

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