GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V- EXAMINATION – SUMMER 2016

Subject Code: 151904   **Date: 06/05/2016**

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. **Use of steam table is allowed.**

Q.1 **(a)** (i) Draw general layout of modern thermal power plant with usual notation. **05**

(ii) Explain any six factors considered in selecting a site for big thermal power plant. **03**

(b) Draw a line diagram of a benson boiler. State the main difficulties experienced in the La Mont boiler and how it is prevented? **06**

Q.2 **(a)** State requirements of good ash handling plant and explain the working of Electrostatic Precipitator with neat sketch **07**

(b) (i) Explain any two method of controlling temperature of super heated steam. **04**

(ii) Differentiate between Superheater, Reheater and air Preheater. **03**

OR

(b) Steam with dryness fraction of 0.85 enter in surface condenser at an pressure of 0.013 Mpa and comes out as a water at 50°C.Cooling water enters at 30 °C and leaves at 45°C. Estimate quantity of circulating water and efficiency. **07**

Q.3 **(a)** Derive an expression for chimney height in order to obtain a draught of 'h' mm of water column if the boiler used 'm' kg of air/kg of fuel. Assume, surrounding air temperature as 'T_a' and flue gas temperature as 'T_g' in degree absolute. Also derive an expression for the condition of maximum discharge of flue gases through a chimney. **07**

(b) Compare

(i) Jet condenser with Surface condenser. **04**

(ii) Natural draught cooling tower and Mechanical draught cooling tower **03**

OR

Q.3 **(a)** Describe Ball and Race mill with its diagram. State its merits and demerits **07**

(b) (i) A chimney is 28 meter high and temperature of hot gases inside the chimney   is 320°C. The temperature of outside air is 27°C and furnace is supplied with 15 kg of air per kg of coal burnt. Calculate **04**

1. Draught in mm of water
2. Draught height in meters of hot gases

(ii) Explain any one cooling pond with neat sketch. **03**

Q.4 **(a)** Explain necessity of feed water treatment. What are the major impurities present in feed water? Explain in brief. **07**

(b) State the objective of a lubrication system. Explain working with a schematic of dry sump lubrication system. Differentiate between wet sum and dry sump lubrication system. **07**

OR

Q.4 **(a)** With neat sketch explain engine lubrication system of typical diesel power plant. **07**

(b) What is the importance of term pH value of water in feed water and explain sodium zeolite water treatment with neat sketch. **07**

Q.5 **(a)** Explain with neat sketch construction of CANDU type reactor along with its merit and demerits. **07**

(b) (i) Define following terms: **04**

Connected load, Average demand, Diversity factor, Utilization factor

(ii) Discuss bad effect of acid rains. **03**

OR

Q.5 **(a)** Explain with neat sketch Boiling Water reactor. **07**

(b) The annual peak load on 30 MW power station 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. Calculate: **07**

1. Average load
2. Energy supplied per year
3. Diversity factor
4. Demand factor

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