Sem-VII / mech / 20-12-10 / Power plant Engg.

P4–Con No–106

**Con. 6616–10.** **(REVISED COURSE)** **GT–8752**

(3 Hours) **[Total Marks : 100**

**N.B.** 1) Question no. 1 is compulsory.
2) Answer any **four** from the remaining **six** questions.
3) Assume suitable data wherever necessary.
4) Figure to the right indicates full marks.

1. Write short notes on any five: **(20 marks)**
   (a) Surge tank
   (b) Requirement of exhaust system in diesel power plant
   (c) Flow duration curve
   (d) Different types of tariff methods
   (e) Water hammer effects and its remedies.
   (f) Mechanical dust collectors.

2. (a) The incremental fuel costs for two generating units A and B of a power plant are given as. **(12 marks)**
   $dF_A/dP_A = 0.065P_A + 25$
   $dF_B/dP_B = 0.08P_B + 20$
   Where F is fuel cost in rupees per hour and P is power output in MW.
   Find: (1) The economic loading of the two units when the total load supplied by the power plants is 160 MW.
   (2) The loss in fuel cost per hr if the load is equally shared by both units.

   (b) Explain BWR with neat sketch. **(8 marks)**

3. (a) The yearly load duration curve of a power plant is considered as a straight line from maximum 300 MW to Minimum 80 MW. Power is supplied by one unit of 200 MW and two units of 100 MW each. Determine **(10 marks)**
   (i) Installed capacity
   (ii) Plant factor
   (iii) Load factor
   (iv) Utilisation factor.

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(b) What is the installed power generation capacity of India? What is the percentage contribution from thermal, hydro and nuclear power? Explain in brief the current energy scenario in Maharashtra. **(10 marks)**

4. (a) What are the parameters to be considered in choosing a site for a coal fixed thermal power station? **(10 marks)**

(b) Prove that if there are n units supplying constant load, then the required condition for the minimum input or maximum system efficiency is- **(10 marks)**
$dI_1/dL_1 = dI_1/dL_2 = dI_3/dL_3 = \ldots dI_N/dL_N$

5. (a)What are the advantages of a pumped storage hydropower plant? Draw a neat sketch and explain the working. **(10 marks)**

(b) The air supplied to a gas turbine power plant is 10 kg/sec. The pressure ratio is 6 and pressure at the inlet of the compressor is 1 bar. The compressor is two stage and provided with perfect inter cooler. The inlet temperature is 300 K and maximum temperature is limited to 1073 K. Take the following data: **(10 marks)**
Isentropic efficiency of compressor each stage = 85%
Isentropic efficiency of turbine = 75%
A regenerator is included in the plant whose effectiveness is 0.7
Neglect the mass of fuel. Take $\gamma = 1.4$, $C_{PAIR} = 1$
Find:1) Heat supplied in the combustion chamber
2) Power capacity of plant
3) Thermal efficiency

6. (a) Write short notes on (any two): **(10 marks)**
(i) Half life period and radioactive decay
(ii) Hazards of radiation from Nuclear power plants and precautions.
(iii) Electrostatic precipitator
(iv) Advantages of hydropower plant

(b) Give advantages of gas turbine power plant over Diesel and thermal power plant. **(10 marks)**

7. (a) What is peak loads and Base load plants? **(7 marks)**
(b) Explain briefly Fluidized Bed Combustion. **(7 marks)**
(c) Explain methods to improve thermal efficiency of gas turbine. **(6 marks)**

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