

- N.B.:**
- Question No 1 is compulsory.
 - Answer any four out of remaining six questions.
 - Assumptions made should be clearly stated.
 - Assume suitable data wherever required, but justify the same.

Q-1 Write short notes on any four of the following : [20]

- (a) Load management of power plant.
- (b) Benefits of cogeneration
- (c) Mechanical dust collectors
- (d) Surge tank
- (e) Cooling system for diesel power plant.
- (f) Water hammer and its remedial measures.

Q-2 a) (a) Prove that the condition for economic loading of different units for a power plant site is $dI_1/dL_1 = dI_2/dL_2 = dI_3/dL_3 = \dots = dI_n/dL_n$ [10]

b) A 300 MW thermal power plant is to supply power to a system having maximum and minimum demand of 240 MW and 180 MW respectively in a year. Assuming the load duration curve to be a straight line estimate the Load Factor and Capacity Factor of the plant. [10]

Q-3 a) Explain with a neat sketch the operation of Pressurised Water Reactor. [10]

b) Calculate the cost of generation per kWh for a power station having the following data: [10]

- i) Installed capacity of the plant = 210 MW
- ii) Capital Cost : Rs18000/kW
- iii) Rate of interest and depreciation = 12%.
- iv) Annual Load Factor = 60%
- v) Annual Capacity Factor = 54 %
- vi) Annual Running Charges = Rs 200 x 10⁶
- vii) Energy Consumed by power plant auxiliaries = 6%. Calculate the cost of power generation per kWh and the reserve capacity.

Q-4 a) In a closed cycle gas turbine there is a two stage compressor and two stage turbine [10]

All the components are mounted on the same shaft. The pressure and temperature at the inlet of the first stage compressor are 1.5 bar and 20^o C. The maximum cycle temperature and pressure are limited to 750^o C and 6 bar. A perfect intercooler is used between the two stage compressor and a reheater is used between the turbines. Gases are reheated in the reheater to 750^o C before entering into the LP turbine. Assuming the compressor and turbine efficiencies as 82 % calculate (i) The overall efficiency of the cycle and (ii) The mass of the fluid circulated if the power developed by the plant is 350 kW.

[TURN OVER