[Time : 3 hours]   [Marks : 80]

N.B. :   1) Question No. 1 is compulsory.
         2) Attempt any three questions from remaining Five.
         3) Assume suitable Data wherever necessary.
         4) Justify your answers with diagrams and graphs.

Q.1   Write short notes on any four:-   20
          i)   Methods of ash disposal.
          ii) Electrostatic precipitator.
          iii) Half life and radioactive decay.
          iv) Modified rankine cycle.
          v)   Advantages of combined cycle power plants.

Q.2 (a)   Prove that efficiency of power plant will be maximum at load where heat   10
          rate is equal to incremental heat rate.

Q.2 (b)   Calculate cost of generation per unit delivered from power plant if   06
          Installed capacity is 200 MW, annual load factor is 0.4, capital cost of
          power plant is 280 lac, annual expenses are 60 lac and interest and
          depreciation is 13%

Q.2 (c)   The turbine is to operate under a head of 24 m at 200 r.p.m. The   04
          discharge is 8.5 m^3/s, If overall efficiency is 88 % determine power
          generated and specific speed of turbine.

Q.3(a)   An electrical system of 120 MW capacity experiences linear changes in   08
          load such that its daily load curve is identified as follows

Time	Load (MW)	Time	Load(MW)
12 PM	24	12.30 PM	48
2 AM	12	1 PM	60
6 AM	12	5 PM	60
8 AM	60	6 PM	84
12 AM	60	12 PM	24

          Plot the chronological and load duration curve for the system, find the
          load factor and utilization factor.

Q.3(b)   Describe in-plant coal handling scheme.   08

Q.3(c)   Explain working of saddle siphon spillway.   04

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Q.4 (a) The nature of the load required for 24 hours and thermal efficiencies of the plant at the respective loads are as follows: **12**

Time period	Load(MW)	Thermal efficiency
10 AM - 6 PM	120	32%
6 PM - 8 PM	60	24%
8 PM - 12 AM	30	15%
12 AM – 6 AM	15	10%
6 AM – 10 AM	75	25%

i) Find total input to thermal plant if the load is supplied by the Single thermal plant only.
i) If the above load is taken by combined thermal and hydro power Plants then find the % saving in the input to the plant.
   Take Thermal efficiency at full load = 32 %
ii) Find overall efficiencies in both cases.

In hydraulic plant pump efficiency is 82% and turbine efficiency is 92%.

Q.4 (b) What is depreciation? Explain different methods to calculate depreciation cost. **08**

Q.5 (a) A gas turbine unit with pressure ratio of 6:1 and maximum cycle temperature of 610 ^{0}C, has the isentropic efficiencies of the compressor and turbine; 0.8 and 0.82 respectively. Calculate the power o/p in kW of an electric generator geared to the turbine when air enters compressor at 15 ^{0}C at the rate of 16 kg/s. Take Cp = 1.005 kJ/kg K and γ = 1.4 for compression and Cp = 1.005 kJ/kg K and γ = 1.3 for expansion process. **10**

Q.5 (b) What are the methods of reducing the wheel or rotor speed of steam turbines? **10**

Q.6 Answer any Four:- **20**
i) Classify nuclear reactors.
ii) Write short note on selection of type of dam.
iii) Compare steam power plant and hydroelectric power plant.
iv) Write short note on Spreader stoker.
v) What is chain reaction? What is significance of multiplication Factor?

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