

(03 Hours)

Total Marks: 80

N.B.: 1. Question No. 1 is compulsory.

2. Attempt **any three** questions out of remaining **five** questions.
3. Assume suitable data wherever required.
4. Assumptions made should be stated clearly.

- Q.1** a) Explain modified Rankine cycle. 05
 b) Write short note on base load and peak load plants. 05
 c) Explain the parameters affecting the thermodynamic efficiency of combined cycles. 05
 d) Briefly explain dust collection. 05
- Q.2** a) Write short notes on i) saddle spillway and siphon spillway. 10
 ii) Pumped storage hydro power plant. 10
 b) With the help of neat sketches explain working of pulverized coal system with its advantages and disadvantages. 10
- Q.3** a) The data of river for 12 months at a hydro power plant is 10

Month	Discharge (millions of cu m / month)	Month	Discharge (millions of cu m / month)
Jan.	1500	July	3000
Feb.	1200	Aug.	3500
March	900	Sept.	3000
April	600	Oct.	2400
May	300	Nov.	2100
June	2150	Dec.	1700

Draw the hydrograph and flow duration curve if available head is 90 m, Find the power available for 90% turbine efficiency and 95% generator efficiency.

- b) With neat sketches discuss the working of sodium graphite reactor. Write the advantages and disadvantages 10
- Q.4** a) Write short notes on i) Regenerative cycle ii) Various energy sources 10
 b) The following data relate to a gas turbine plant: 10
 Power developed = 5 MW, Inlet pressure and temperature = 1 bar, 30°C,
 Pressure ratio = 5, Isentropic efficiency of the compressor = 80%,
 Isentropic efficiency of both turbines = 85%, Maximum temperature in both turbines = 550°C, $C_{pa} = 1 \text{ kJ/kgK}$, $C_{pg} = 1.15 \text{ kJ/kgK}$, $\gamma_{\text{air}} = 1.4$, $\gamma_{\text{gases}} = 1.33$.
 If a reheater is used between two turbines at a pressure of 2.24 bar, Calculate
 i) the mass flow rate of air ii) the overall efficiency. Neglect the mass of fuel.
- Q.5** a) i) What is chain reaction? What is significance of multiplication factor? 10
 ii) Explain half life and radioactive decay.

- b) The peak load on a 50 MW power station is 39 MW. It supplies power through four transformers whose connected loads are 17, 12, 9, and 10 MW. The maximum demands on these transformers are 15, 10, 8, and 9 MW respectively. If the annual load factor is 50% and the plant is operating for 65% of the period in a year. Find the following: 10

i) Average load on the station ii) Energy supplied per year iii) Demand factor
iv) Diversity factor v) Power station use factor

- Q.6** a) With the help of flow chart explain coal handling system. 10

- b) What is depreciation? Explain in detail, the different methods to calculate depreciation cost. 10
