

**Power Station Practice**

P. Pages : 2

**KNT/KW/16/7389**

Time : Three Hours



Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
  2. Solve Question 1 OR Questions No. 2.
  3. Solve Question 3 OR Questions No. 4.
  4. Solve Question 5 OR Questions No. 6.
  5. Solve Question 7 OR Questions No. 8.
  6. Solve Question 9 OR Questions No. 10.
  7. Solve Question 11 OR Questions No. 12.
  8. Due credit will be given to neatness and adequate dimensions.
  9. Assume suitable data whenever necessary.
  10. Illustrate your answers whenever necessary with the help of neat sketches.
  11. Use of non programmable calculator is permitted.
  12. Use graph papers whenever necessary.

1. a) Define & explain:- 6
- i) Diversity factor    ii) Utilisation factor    iii) Load factor

- b) Load variations on power plant on a typical day is as follows: 7

Time	12-5 am	5-9 am	9-6 pm	6-10 pm	10-12 mid night
Load in MW	20	40	80	100	20

- i) Plot the load curve and load duration curve.
- ii) Find load factor and energy consumed in 24 hrs.
- iii) If installed capacity is 125 MW, find capacity factor.

**OR**

2. a) What do you mean by conventional and non-conventional energy sources. Explain with examples. 5

- b) Explain any two process of energy conversion for non-conventional sources of energy. 8

3. a) What are the various requirements for boiler used in Thermal power plant. 6

- b) The peak load on a power station is 30 MW. The loads having maximum demands of 15 MW, 10 MW and 7 MW are connected to the power station. The capacity of the power station is 40 MW. and annual load factor is 50%. Find- 8

- a) Average load on power station
- b) Energy supplied per year
- c) Demand factor
- d) Diversity factor.

**OR**

4. a) Enlist the main equipments of coal fired station with diagram. 6

- b) Determine the generation cost per unit of energy from the following plant data: 8

Installed capacity = 120MW

Capital cost of plant = Rs. 40,000 per KW.

Interest &amp; depreciation = 15%

Fuel consumption = 0.64 kg/KWh

Fuel cost = Rs. 1500 per 1000 kg

Salaries, wages, repairs and = Rs. 50,000,000 other operating costs/annum

Peak load = 100 MW.

Load factor = 60%

5. a) Explain the working of pumped storage hydroelectric plant with the help of neat diagram. Explain its utility. **7**
- b) A proposed hydro station has a catchment area of 500 sq.km. With average rainfall of 200 cm. per year. Effective head of water on turbine is 120 cm. If the overall efficiency of turbine and generator is 50%, determine the electrical power that could be generated from the project. Assume 70% of the collected water is available to power generation. **6**
- OR**
6. a) Discuss the difference between Kaplan, Francis and Pelton turbines and state the types of power plant they are suitable for. **6**
- b) A hydro-electric station is supplied from a reservoir at ahead of 40 m. If the area of the reservoir is 1.8 km<sup>2</sup> and generating 24 MW power. Determine the rate at which the level will fall in the reservoir. Take overall efficiency as 80%. **7**
7. a) List out main parts of a nuclear reactor and briefly explain their functions. **6**
- b) State the factors which influence the choice of the site of the nuclear station. **7**
- OR**
8. a) Explain the working of pressurised water reactor (PWR) with suitable diagram. **7**
- b) Describe the method of disposing solid, liquid and gaseous waste in nuclear power plant. **6**
9. a) Define tariffs. Explain any three types of tariffs in detail. **6**
- b) An industrial consumer has an annual energy consumption of 201500 KWh at a load factor of 0.35. The tariff is Rs. 4000 + Rs. 1200 per KW of maximum demand + Rs. 2.20 per KWh. **8**
- a) Find his annual bill.
- b) What is the bill if total energy consumption is the same but load factor improved to 0.55.
- c) What is the bill if energy consumption is reduced by 25% and load factor remains at the same initial value of 0.35.
- d) Find average energy cost in each case.
- OR**
10. a) Explain principle and working of AVR. **7**
- b) Explain brushless excitation system for modern alternators. **7**
11. a) Define Co-generation. Also explain benefits of co-generation in brief. **6**
- b) What are the different technologies used for co-generation? **7**
- OR**
12. a) What are the advantages, constraints and options for captive generation. **6**
- b) How the captive power plants are classified? **7**

\*\*\*\*\*