

B.TECH.
(SEM-VII) THEORY EXAMINATION 2018-19
POWER STATION PRACTICE

Time: 3 Hours.

Max. Marks: 100

Note: 1. The question paper contains three sections- A, B & C.
 2. Read the instructions carefully in each section

SECTION A

1. Attempt ALL the parts:

[2 × 10=20]

- a. What is the total power plant installed capability in India?
- b. Define load factor & penalty factor.
- c. What do understand by tariff? Give its types.
- d. Classify hydraulic turbines.
- e. What are the functions of moderator & coolant in a nuclear power plant??
- f. What do you understand by economic load dispatch & unit commitment?
- g. What are the causes of low power factor?
- h. What is the power output of a $^{92}\text{U}^{235}$ reactor if it takes 30 days to use of 2 Kg fuel? Given that energy is released per fission is 200 MeV and Avogadro is 6.023×10^{23} per mole.
- i. What are the advantages of using pulverised coal in thermal power plant?
- j. What are the different types of generators used in wind energy generation?

SECTION B

[10 × 3=30]

2. Attempt any THREE parts:

- a. Explain open and closed cycle gas turbine plant along with methods to improve its thermal efficiency. What are its merits and demerits compared to the steam power plants?
- b. Explain following terms:
 - (i)Reservoir (ii)Spillways
 - (iii)Trash Rack (iv) Penstock

- c. A thermal power plant spends Rs. 25 lakhs in one year on coal consumption. The coal has a calorific value of 5000 Kcal/kg. with cost of Rs. 500/ton. If thermal efficiency is 32% & electrical efficiency is 90%. Find the average load on the power plant.

- d. A generating station has the following daily load cycle:

Time (hours): 0-6 6-8 8-12 12-14 14-18 18-20 20-24

Load (MW): 45 35 75 20 80 25 50

- a) Draw the daily load curve
- b) Draw the load duration curve
- c) Calculate load factor
- d) Calculate plant capacity factor if the capacity of the plant is 120 MW
- e. Describe the working of open loop MHD system and closed loop MHD system with the block diagram.

SECTION C

3. Attempt any one part:

[10x1=10]

- a. Draw the layout of thermal power plants & describe the working of it. A 100 MW steam power plant uses a coal of calorific value 6400 kcal/kg. Thermal efficiency of station is 30 % and

a. electrical efficiency is 92%. Calculate the coal consumption per hour when the station is delivering to full rated output.
b. Classify hydro-electric power plants based on (i) water flow regulation (ii) head (iii) load

4. Attempt any one part: [10x1=10]

a. Explain the working of diesel plants with the help of diagram? Give its advantages & disadvantages.
b. What are the criteria for site selection for nuclear power plant? Explain with a neat sketch the working of a nuclear power plant. Give the classification of nuclear reactors.

5. Attempt any one part: [10x1=10]

a. An electric supply system has a maximum load of 70 MW. The annual expenses of the system are :
Generation Rs. 8,00,000
Fuel cost Rs. 28,00,000
Transmission Rs. 3,45,000
Distribution Rs. 27,50,000
Repairs etc Rs. 3,00,000
The no. of units generated per year is 600×10^6 kWh. The consumers have an aggregate maximum demand of 75 MW. Evaluate a two-part tariff to be charged from the consumers. Assume that the fixed charges for generation, fuel, transmission, distribution, repair etc are 90%, 15%, 85%, 95% and 50% respectively. Losses in transmission & distribution are 20%.

b. Explain following:
(i) Substation layout
(ii) Busbar arrangements

6. Attempt any one part: [10x1=10]

a. Explain hydrothermal scheduling with various power system constraints.
b. What do you understand by economic load scheduling? Explain & derive the expression
(i) Neglecting transmission losses (ii) Considering transmission losses

7. Attempt any one part: [10x1=10]

a. Explain generation of electricity by photovoltaic cell & thermoelectric converters for direct conversion of solar energy into electricity.
b. What is geothermal energy? How it is utilized for the power generation?