

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 you 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

2. Attempt any THREE parts:**[10 × 3=30]**

- 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

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 stem are :

Generation Rs. 850000

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?