

R16

Code No: 134BX

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year II Semester Examinations, February - 2024

POWER SYSTEMS – I
(Electrical and Electronics Engineering)

Time: 3 Hours

Max. Marks: 75

Note: i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

- 1.a) What are the advantages and disadvantages of Gas Power Station? [2]
- b) Write name of the components in nuclear power station. [3]
- c) What is the expression for power developed in hydroelectric power station? [2]
- d) Write importance of draft tube in hydroelectric power station. [3]
- e) Classify types of DC distribution system. [2]
- f) What is power factor and write its importance in distribution system? [3]
- g) Write any two differences between indoor and outdoor substations. [2]
- h) Write components in gas insulated substation. [3]
- i) Define Average load and Maximum demand. [2]
- j) What are the objectives of a tariff? [3]

PART – B

(50 Marks)

- 2.a) Describe the functions of economizers, boilers, and turbines in thermal power station
 - b) Discuss nuclear fission and Fusion in detail [5+5]
- OR**
- 3.a) Discuss the features and operational principles of Boiling Water Reactor (BWR) and Fast Breeder Reactor (FBR).
 - b) Write safety precautions and measures implemented to mitigate radiation risks in nuclear power plants. [5+5]
- 4.a) Explain different types of hydroelectric power stations.
 - b) A hydroelectric power station is supplied from a reservoir having an area of 100 km^2 and a head of 50 m. If overall efficiency of the plant is 50%, find the rate at which the water level will fall when the station is generating 20MW. [5+5]
- OR**
- 5.a) How the power developed from catchment area by considering head and efficiencies
 - b) Classify hydraulic turbines and distinguish between impulse and reaction turbines [5+5]

QA QA QA QA QA QA QA G

- 6.a) Discuss the classification of distribution systems and explain their features.
b) Derive voltage drop calculations performed for a ring main distributor in a DC distribution system. [5+5]

OR

- 7.a) A 2-wire AB has 600 m long is fed from both ends at 220 V with loads of 10 A, 20 A and 30 are tapped at distances of 100m, 200m and 300 m from the end A respectively. If the area of X-section of distributor conductor is 1cm^2 , find the minimum consumer voltage if $\rho = 1.5 \times 10^{-5} \Omega \text{ cm}$.

- b) Explain the design features of secondary distribution system. [5+5]

- 8.a) What are the parameters to be taken in locating the site for a substation?

- b) Draw and explain construction procedure of gas insulated substation [5+5]

OR

- 9.a) What are the different bus bar arrangements used in substations? Explain.

- b) Compare gas insulated substation and air insulated substation. [5+5]

- 10.a) Define and explain capacity, utilization, and plant use factors.

- b) Describe various tariff methods in economic operation of power system. [5+5]

OR

- 11.a) Explain the terms load factor and diversity factor. Justify how these factors influence the cost of generation.

- b) The maximum demand of a consumer is 10 A at 230 V and total energy consumption is 8760 kWh. If the energy is charged at the rate of 200 paise per unit for 500 hours, maximum demand per annum plus 50 paise per unit for additional units. Determine annual bill of the consumer [5+5]

---ooOoo---

QA QA QA QA QA QA QA G

QA QA QA QA QA QA QA G

QA QA QA QA QA QA QA G