

Code No: 124AD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year II Semester Examinations, April/May - 2023

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) Why feed water is to be heated before feeding to the boiler? [2]
- b) What is nuclear fusion? How does it different from nuclear fission? [3]
- c) How the classification of distribution systems is made? [2]
- d) What are the advantages of ring main distribution? [3]
- e) What is the function of i) circuit Breaker and ii) Isolator in a substation? [2]
- f) What are the advantages of indoor substation? [3]
- g) What is synchronous capacitor? [2]
- h) What are the causes of low power factor? [3]
- i) Define the terms load factor and diversity factor. [2]
- j) What are the factors to be considered in fixing up the tariff? [3]

**PART - B****(50 Marks)**

2. Draw a general layout of thermal power plant? Discuss the working of different circuits with necessary diagrams. [10]

**OR**

- 3.a) What is a moderator? Name common moderators and discuss their merits and limitations.
- b) What is boiling water reactor? How does it different from a pressurized water reactor? [5+5]

- 4.a) Describe the design considerations in a d.c distribution system.
- b) A 500 m distributor fed from both ends  $F_1$  and  $F_2$  is loaded uniformly at the rate of 2.6 A/m run. The resistance of loop is  $0.15 \Omega/\text{km}$ . Determine the minimum voltage and the point where it occurs, if the feeding points  $F_1$  and  $F_2$  are maintained at 220 V and 215 V respectively. Also find the currents supplied from the feeding points  $F_1$  and  $F_2$ . [5+5]

**OR**

- 5.a) Compare of DC distribution and AC distribution systems.
- b) A 1-phase distributor has a total resistance of  $0.4\Omega$  and a reactance of  $0.3\Omega$ . At the midpoint 'A', a current of 115A at 0.85 p.f lag and at the far end 'B', a current of 120A at 0.9 p.f lead is tapped. If the voltage at the midpoint is 230V, find the voltage at the supply end and also its phase angle with respect to voltage at the far end when the power factors are with reference to respective voltages at the load point. [4+6]

- 6.a) Draw the 33/11 kV substations layout showing the location of all the substation equipment.  
b) Describe the installation and maintenance of GIS. [5+5]
- OR**
- 7.a) Draw and explain the double bus bar with one circuit breaker system? List out its merits and demerits.  
b) What are the advantages of gas insulated substations? [6+4]
- 8.a) Explain how reduction in line current and hence power losses are obtained with p.f improvement.  
b) Obtain the expression for most economical power factor for constant KW load. [5+5]
- OR**
9. What are the numerous ways to improve overall voltage regulation of power system? Discuss them in details. [10]
- 10.a) What do you understand by the load curve? What information is conveyed by a load curve? Explain in brief.  
b) A 120 MW substation delivers 120 MW for 3 hours, 60 MW for 8 hours and shutdown for the rest of each day. It is also shutdown for the maintenance for 15 days each year. Calculate its annual load factor. [6+4]
- OR**
- 11.a) What are the objectives and requirements of tariff?  
b) Explain various types of Tariffs. [4+6]

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