Code No: 124AD

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, May - 2017
POWER SYSTEMS-I
(Electrical and Electronics Engineering)

Time: 3 Hours   **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) Why is the overall efficiency of a steam power station very low? Explain in detailed. [2]
  b) What is the principle source of generation of electrical energy? [3]
  c) What is the importance of minimum potential on the distributor? [2]
  d) What is the controlling factor in determining the size of a distributor? [3]
  e) Why do we use isolators on both sides of circuit brakers? [2]
  f) What is the utility of instrument transformers in substations? [3]
  g) Why is the power factor not more than unity? [2]
  h) What are the causes of low power factor? [3]
  i) What is the importance of interest on capital investment in calculating the cost of electrical energy? [2]
  j) What is the significance of depreciation in the economics of power generation? [3]

PART-B

(50 Marks)

2.a) What are the functions of economizer and superheated in a thermal power plant?
  b) What are the types of nuclear reaction? Discuss briefly. [5+5]

OR

3.a) What are the types of steam turbine? Briefly discuss about their use and characteristics.
  b) What are the methods of producing nuclear reaction? What is chain reaction? [5+5]

4.a) i) Write the difference between d.c. and a.c. distribution.
   ii) Write short notes on the following Current distribution in a 3-wire d.c. system.
  b) A 3-phase, 4-wire system supplies power at 400V and lighting at 230 V. If the Lamps are used require 70, 85 and 44 amperes in each of the three lines, what should be the current in the neutral wire? If a 3-phase motor is now started, taking 220 A from the lines at a p.f. of 0.3 lagging, what should be the total current in each line and neutral wire? Find also the total power supplied to the lamps and the motor. [5+5]

OR

5.a) In a 500/250 V d.c. 3-wire system, there is a current of 1200 A on the positive side and 1000 A on the negative side and a motor load of 200kW across the outers. The loss in each balancer machine is 5kW. Calculate load on each balancer machine.

b) Draw the phasor diagrams of A.C. distributor with concentrated loads for power factors with respect to respective load points. [5+5]

6.a) What is group switching? Explain its operation in detail with help of suitable diagram.

b) Draw the schematic line diagram of a typical 11kV/400V indoor substation showing all equipment. [5+5]

OR

7.a) Explain GIS with a single line diagram.

b) Give the compression between Air insulated substation and Gas insulated substation. [5+5]

8.a) Derive the expression for most economical power factor for constant kVA load.

b) Derive the expression for the capacity of phase modifier to improve power factor of a system. [5+5]

OR

9.a) Explain the working of on-load tap changing transformer for voltage control.

b) A 12500 kVA load is supplied at a power factor of 0.8 lagging by a 3-phase transmission line whose voltage is to be maintained at 33kV at both ends. Determine the capacity of the synchronous condenser to be installed at the receiving end. The impedance of the line is (3+j12) Ω per phase. [5+5]

10.a) Describe different types of tariff commonly used in practice.

b) Define and explain the importance of the following terms in generation:
   i) connected load   ii) demand factor   iii) average load. [5+5]

OR

11.a) A consumer has the following connected loads: 15 lamps of 40W each and two heaters of 1,000W each. His maximum demand is 15000W. On the average he uses 10 lamps 5 hours a day and each heater for 3 hours a day. Find his average load, monthly energy consumption and load factor.

b) Explain how a load duration curve is plotted? What is its use? [5+5]

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