R16

Code No: 134BX

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, May - 2019
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 as sub questions.

PART – A
                                                                                              (25 Marks)

1.a) What is the use of condenser in thermal power station?   [2]
  b) What is the necessity of moderator in nuclear power station?   [3]
  c) Explain selection of site for a hydroelectric power plant.   [2]
  d) What is the significance of specific speed of hydraulic turbines?   [3]
  e) Compare underground distribution with over ground distribution system.   [2]
  f) Outline the line diagram of radial distribution system.   [3]
  g) What are the limitations of Indoor substation?   [2]
  h) List different types of Gas insulated substations.   [3]
  i) What is the significance of operating reserve?   [2]
 j) Define the (i) Simple rate (ii) Flat Rate and (iii) Block-Rate.   [3]

PART – B
                                                                                              (50 Marks)

2.   Discuss the essential components of a nuclear reactor.   [10]

OR

3.a) Explain the importance of fast breeder reactor in nuclear power station.
  b) Explain how the heat output of nuclear reactor can be controlled.   [5+5]

4.   Explain the following terms with reference to water turbines. Give expression of each
     efficiencies.
     a) Hydraulic efficiency
     b) Mechanical efficiency and
     c) Overall efficiency.   [10]

OR

5.   Francis turbine designed to develop 160 kw working under a head 10 m and running at
     200 rpm. The hydraulic losses in turbine are 15% of available energy. The overall
     efficiency of turbine is 80%. Assume flow ratio=0.94 and speed ratio=0.25. Estimate:
     (a) guide blade angle and runner vane angle at inlet and (b) diameter and width at inlet.
                                                                                              [10]

6. Determine the cross sectional area of the d.c distribution shown. Take $\rho=1.78\times10^{-8}$ Ωm. The maximum voltage drop is not to exceed 10V. The conductor is fed at A.   [10]
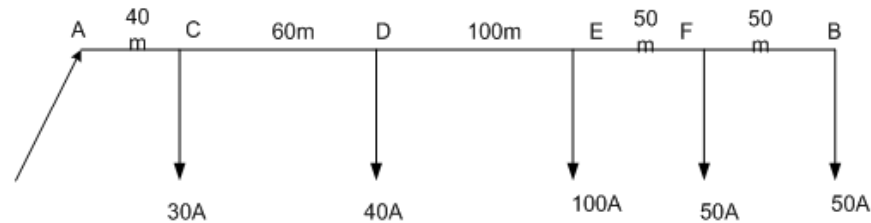
OR

7. List out the Comparisons between AC and DC distribution systems.   [10]

8.a) Elaborate the doubly bus bar scheme with neat diagram.
   b) Explain Gas insulated substation with single line diagram.   [5+5]

OR

9. Elaborate the following with neat diagrams:
    a) AC 3-phase, 3 wire distribution system
    b) AC 3-phase, 4 wire system.   [5+5]

10.a) Discuss the division of cost of electrical energy generated and express the total cost in three part form and two part form.
   b) A system has a straight line annual load duration curve with maximum and minimum demands of 15 MW and 5 MW respectively. The annual cost characteristics of base load and peak load stations are respectively given by:
   C1 = (Rs 1,00,000 + Rs 100/KW + 6 Paise/KWhr)
   C2 = (Rs 80000 + Rs 60/KW + 8 Paise/KWhr.
   Determine the operating schedule of peak load station for minimum annual cost. Also determine the overall cost per kWhr.   [5+5]

OR

11. Analyze the following terms:
    a) Different load curves
    b) Maximum demand,
    c) Average load and
    d) Diversity factor.   [10]

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