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Code No: 124AD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, December - 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) | What is the need of Control rods in nuclear plants? | [2] |
| b) | What is the function of economizer? | [3] |
| c) | What are the design features of distribution systems? | [2] |
| d) | How the distribution systems are classified? | [3] |
| e) | What are the merits and demerits of main and transfer bus bar system? | [2] |
| f) | What are the advantages and disadvantages of Air insulated substations? | [3] |
| g) | What are the methods used for improving power factor? | [2] |
| h) | What are the merits of on load tap changing transformer? | [3] |
| i) | Define the integrated load duration curves. | [2] |
| j) | What are the desirable characteristics of tariff? | [3] |

PART – B **(50 Marks)**

2. Write different components which are used for increasing the efficiency of a thermal power station. Explain them in detail. [10]

OR

- 3.a) Draw a neat line diagram of a nuclear power plant showing basic components. Discuss the merits of nuclear power plant compare to thermal power plants.
- b) Explain with a neat diagram, the various parts of a nuclear reactor, mentioning clearly the function of each part. [5+5]
- 4.a) Compare underground and over head distribution systems.
- b) If the resistance of a distributor (both return and ground) is 0.05 ohm/m and the distributed load in section ‘DE’ is 1 A/m , find the current distribution and minimum voltage in the distributor as shown in below figure 1, when
- Both the ends are at same potential and
 - Potential difference between the ends ‘A’ and ‘B’ is 4 Volts.
- [5+5]

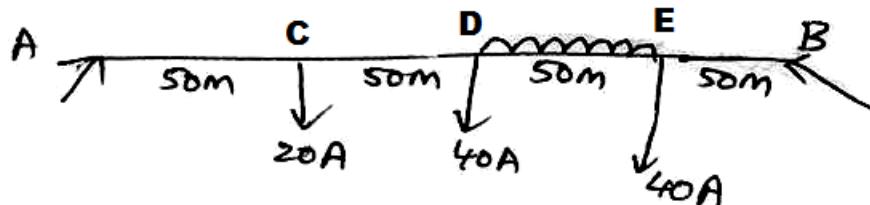


Figure 1

OR

5. A 3-phase distribution system is shown in below figure 2. Power is supplied at 'A' at a line voltage of 11kV and balance loads of 25A per phase at 0.8 p.f lag and 35A per phase at 0.9 p.f lag are taken at B and C. The impedance of the feeders are $Z_{AB} = (5+j9)\Omega$, $Z_{BC} = (6+j10)\Omega$ and $Z_{CA} = (4+j8)\Omega$. Calculate the voltages at B, C and D and the current in each branch. Load at mid point D of section BC is 10A at upf. Power factors are assumed with respect to voltage at 'A'. [10]

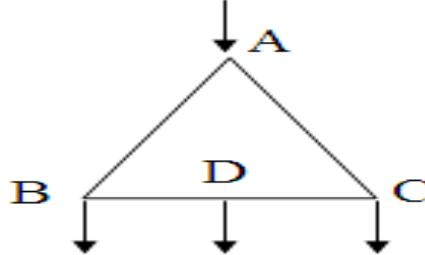


Figure 2

- 6.a) Make a list of the main equipment in a substation. Draw layout of a typical substation.
b) Explain the constructional aspects of gas insulated substations. [5+5]

OR

- 7.a) What is the difference between indoor and outdoor substations? What are the factors which are to be considered for a selection of a site of a substation?
b) Draw the single line diagram of a GIS. [5+5]

- 8.a) What are the sources for generation and absorption of reactive power in a given power system?
b) A synchronous motor having a power consumption of 40kW is connected in parallel with a load of 250 kW having a lagging p.f. of 0.85. If the combined load has a p.f of 0.95, what is the value of leading reactive kVA supplied by the motor and at what p.f is it working? [5+5]

OR

- 9.a) What are the various methods of voltage control? Explain the booster transformer for voltage control.
b) A single-phase motor connected to a 230 V, 50 Hz supply takes 25 A at a p.f of 0.8 lag. A capacitor is shunted across the motor terminals to improve the p.f to 0.95 lag. Determine the capacitance of the capacitor to be shunted across the motor terminals. [5+5]

OR

- 11.a) What are the costs of electrical energy? Explain.

- b) The data of a power station as follows:

=250 MW

= Rs. 300×10^6

= 15%

n = Rs. 40×10^6

= 0.7

Determine the cost of generation and cost of saving per kWh if the annual load factor is raised to 0.85. [5+5]

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