B.E.(Electrical Engineering (Electronics & Power)) Semester Fifth (C.B.S.)

Electrical Power System - I

P. Pages : 3 **KNT/KW/16/7333**

Time : Three Hours * 0 6 4 9 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Draw and explain single Line diagram of an Electrical Power System showing all standard voltages at each stage. Give the range of HV | EHV and UHV. **5**

b) Compare indoor and outdoor type of substation. **4**

c) Explain voltage and Frequency dependence of loads. **4**

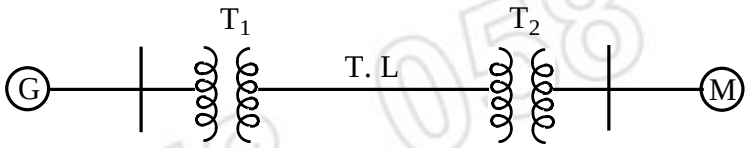
OR

2. a) How the substations are classified according to service requirement. **7**

b) Explain various category of load and their characteristics. **6**

3. a) Show that per unit impedance for the transformer derived from either side gives same value. **6**

b) Assuming generator rating as a base value find out p.u. values for different section for given power system shown in fig. 3(b) **8**



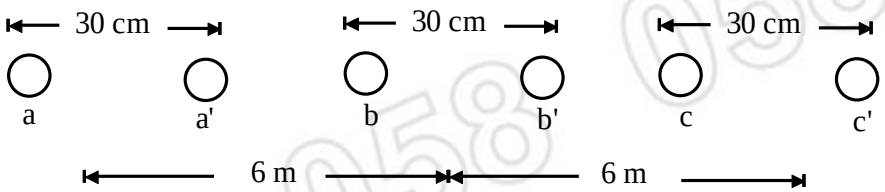
Fi.g 3 (b)

G : 150 MVA, 13.8 kV, x" = 15%
T_1 : 100 MVA, 132/13.8 kV, x = 10%
T_2 : 125 MVA, 12/125 kV, x = 12%
M : 150 MVA. 13.8 kV, x" = 15%
T.L. : $X_L = 500\ \Omega$

OR

4. a) Show that the inductance of a conductor due to its internal flux linkages is independent of its dimensions. **6**

b) Calculate the capacitance per phase for the double circuit line. **8**



Fi.g 4 (b)

Assume conductor diameter as 2 cm.

5. a) What are the various types of distribution schemes? **6**

b) Two three phase parallel feeders connect a generating station and a balanced load of 2 MW at 33 kV. The load operates at 0.8 p.f. lagging. One of the feeders has resistance and reactance of 0.5 Ω & 0.1 Ω respectively. It delivers 0.5 MW at 0.9 pf lagging. Calculate the resistance per phase of the other feeders. **7**

OR

6. a) Prove that in a string of suspension insulator, there is Unequal distribution of voltage. **6**

b) Each conductor of a 33 KV, 3 phase system is suspended by a string of three similar insulators. The capacitance of each disc is nine times the capacitance to ground. Calculate the voltage across each insulator. Determine the string efficiency. **7**

7. a) How are the transmission lines represented? Find ABCD constants for nominal 'T' circuit for medium length transmission line. **7**

b) A 3 phase transmission line has following distribution constants: **7**
Resistance = 30 Ω, Inductive reactance = 65 Ω, capacitive susceptance = 4.2×10^{-4}S.
If the load at receiving end is 75 MW at 0.8 p.f. Lagging with 132 kV.
Calculate:

i) Current ii) Voltage

iii) Power factor at sending end vi) Regulation of line by using nominal 'π' method

OR

8. a) Write short notes on: **6**
i) Surge impedance loading
ii) Ferranti effect

b) A 3 phase 50 Hz transmission line 100 km long delivers 20 MW at 0.9 p.f. lagging and at 110 kV. The resistance and reactance of the line per phase per km are 0.2 Ω and 0.4 Ω respectively, while capacitive admittance is 2.5×10^{-6} s/km/ph. Calculate current and voltage at sending end and transmission efficiency using nominal 'T' method. **8**

9. a) What is significance of load flow analysis in power system? What is load flow solution. **6**

b) What are various types of buses used in load How study? Write the significance of it. **7**

OR

10. a) Write short note on frequency and voltage as system State indicators. **7**

b) Explain the important characteristics of static load flow equation. **6**

11. a) Explain in brief the principle of working of speed governing system for turbo – Alternator? **6**

b) Explain the method of sharing the load between two alternators running in parallel. **7**

OR

12. a) Explain with neat diagram Automatic voltage Regulator for an alternator. **7**

b) Two alternators operating in parallel, their capacities and drooping characteristics are as follows: **6**

Alternative I : 600 KW, frequency drops from 50 Hz to 48.5 Hz at full load.

Alternative II: 700 KW, frequency drops from 50 Hz to 48 Hz at full load.

Calculate how a total load of 1300 KW will be shared by two alternator? What will be the system frequency?

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