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

Electrical Power System – I

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. Assume suitable data whenever necessary.
9. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Compare overhead and underground transmission system. **6**

b) Describe the significance of various essential components of modem power system and represent it with single line diagram. **7**

OR

2. a) Write short note on **7**

i) Voltage and frequency dependence of load.

ii) Comparision of indoor and outdoor substation.

b) Explain the importance of Complex Power. **6**

3. a) What are the advantages of per unit impedances? Show that per unit impedance for the transformer derived from either side gives same values. **7**

b) For the system shown in fig. 3 (b), determine the generator voltage. **7**

Fig. 3 (b)
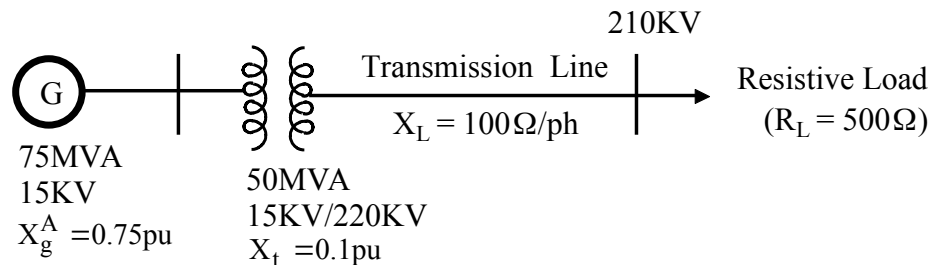
When Load side voltage maintained at 210 kV.

OR

4. a) Derive the formula for Inductance of Composite conductor lines & hence define GMD & GMR. **7**

b) A three phase bundled conductor line with two sub conductor per phase has a horizontal configuration as shown in fig. 5 (b). The radius at each sub – conductor is 1.5 cm & spacing is mentioned below. Determine Inductive reactance per km per phase of the line. **7**
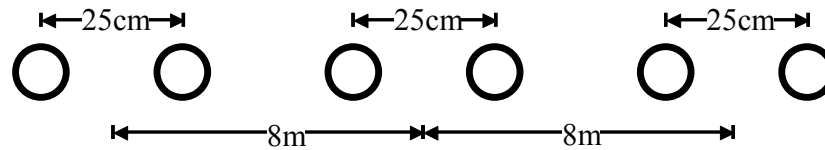

Fig. 5 (b)

5. a) Discuss the necessity of Grading of cable. Explain any one method of grading of cable in detail. **6**

b) A single phase ring distributor ABC is fed at 'A'. Load at B & C are 40A, 0.8pf lag. & 60A, 0.75 pf lag. Respectively. Both expressed relative to voltage at A. The total impedance of three sections AB, BC & CA are $(2 + j1)$, $(2 + j3)$ & $(1 + j2)$ respectively. Determine the current in each section. **7**

OR

6. a) Why the voltage across each unit of string insulator is not uniform? Derive the formula for distribution of voltage across a string. **6**

b) String of suspension insulators consists of 4 units. If capacitance of link pin to earth and to the line are 25% and 10% of self capacitance of each unit respectively. Calculate the voltage distribution and string efficiency if it is used for 66 kV system. **7**

7. a) Find ABCD parameters of a medium transmission line using nominal 'T' method. **6**

b) An overhead 3 phase transmission line delivering 5000 kW at 22 kV at 0.8 pf lagging. The resistance and reactance of each conductor is 4Ω and 6Ω respectively.
Determine (a) sending end voltage (b) Percentage regulation (c) Transmission efficiency. **7**

OR

8. a) Explain the π type transmission line with the help of phasor diagram. **6**

b) A three phase short transmission line delivers 3600 kW at a p.f. 0.8 lagging. If the sending end voltage is 33 kV. Find (i) Receiving end voltage (ii) Line current (iii) Transmission efficiency.
Given that for line $R = 5.31\Omega / ph$, $X = 5.54 \ \Omega / ph$. **7**

9. a) Discuss the significance of load flow studies in power station. **7**

b) Single line diagram of 3 phase system is shown in fig. 9 (b). **7**
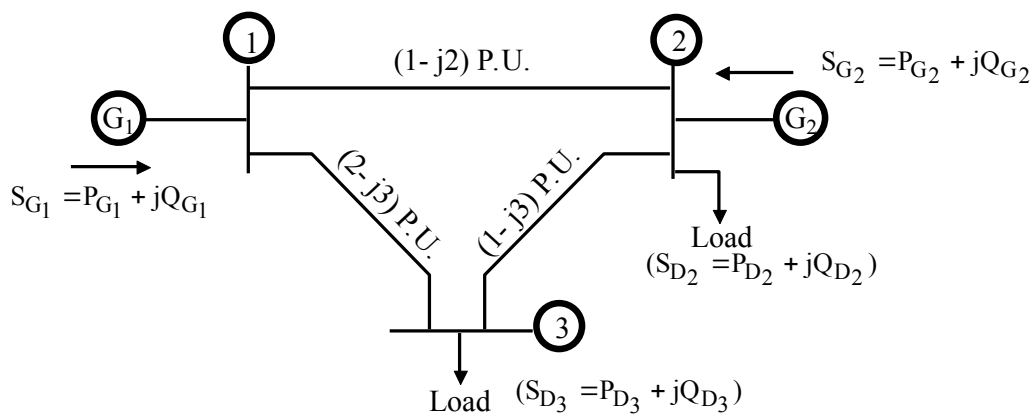
i) Draw the network model for load flow analysis.

ii) Write bus admittance matrix.

iii) Write the static load flow equation for the system.

OR

10. a) Write a note on Static Load Flow Equation (SLFE) in load flow studies. **7**

b) How buses are classified in load flow studies? **7**

11. a) Explain the working principle of speed governing system for turbo alternator. **6**

b) Two generator rated 200 MW and 400 MW are operating in parallel. The drop characteristics of their governors are 4% and 5% respectively from no load to full load. The speed changers are so set that the generators operate at 50 Hz sharing the full load of 600 MW in the ratio of their ratings. If the load reduces to 400 MW, how will it be shared among the generators and what will be system frequency? Assume free governor response. **7**

OR

12. Write short notes on :

i) Automatic Voltage Regulator. **6**

ii) Active Power sharing between two alternators. **7**

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