Code No. : **6086/S**

FACULTY OF ENGINEERING

B.E. 3/4 (EEE) I Semester (Supple.) Examination, July 2014

POWER SYSTEMS – II

Time : 3 Hours] [Max. Marks : 75

Note : *Answer **all** questions from Part – **A** and **any five** questions from Part – **B**.*

PART – A

1. For a medium length nominal π transmission line draw the circuit and the phasor diagram for lagging power factor conditions. **2**
2. Obtain the exact condition for zero regulation for a short transmission lines. **3**
3. Show that the load voltage V_2 is not affected much due to the component of the load. **3**
4. Compare series and shunt capacitor for voltage control. **2**
5. List out the advantages of p.u. systems. **2**
6. A transformer is rated at 11 kV/0.4 kV, 500 kVA, 5.2% reactance. Determine the short circuit MVA of the transformer when it is connected to an infinite bus. **3**
7. Draw the connection of sequence networks for Double line to ground fault through an impedance Z_r. **2**
8. Derive the expression for fault current for a single line to ground fault of an unloaded alternator. **3**
9. Draw the travelling waves on a line terminated by inductance and capacitance. **3**
10. Explain why a travelling wave suffers reflection when it reaches a discontinuity? **2**

PART – B

11. A 3 phase transmission line, 165 km long, transmits a load of 95,000 kW at 0.80 p.f. lagging. The line voltage at the receiving end is 230 kV. The constants of the line are as follows :

    $A = D = 0.9785 \angle 0.3°$ $B = 85.2 \angle 77.47°$ and $C = 0.000503 \angle 90.1°$

    Construct the receiving end and sending end circle diagrams for the transmission line and calculate :

    a) Sending end voltage, current, power factor, regulation and efficiency of the transmission line.

    b) The load in kW at 0.08 p.f lagging that could be carried at 8% regulation. **10**

12. a) Explain the method of capacity of synchronous phase modifier capacity using graphical method. **6**

    b) Explain the principle of operation of thyristor switched capacitors. **4**

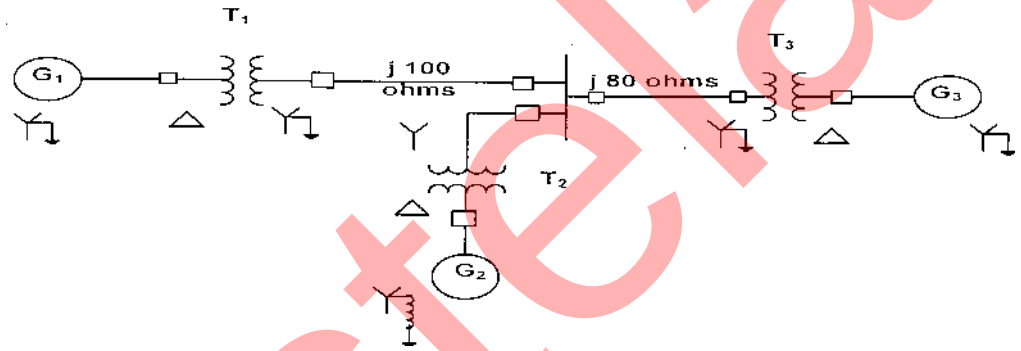
13. The single line diagram of an unloaded power system is shown in below fig. The generator and transformers are rated as follows :

    G_1 = 20 MVA, 13.8 kV, X"=20%, G_2 = 30MVA, 18 kV, X" = 20%,

    G_3 = 30MVA, 20 kV, X" = 20%, T_1 = 25MVA, 220/13.8 kV, X = 10%,

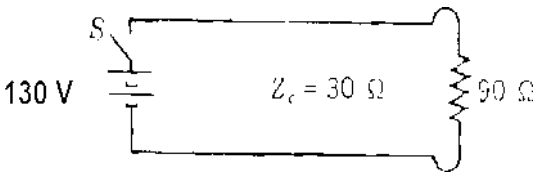
    T_2 = 3 single phase units each rated at 10MVA, 127/18 kV, X = 10%,

    T_3 = 30MVA, 220/22 kV, X = 10%. Draw the reactance diagram using a base value of 50MVA and 13.8 kV on the generator G_1. **10**



14. A salient pole generator without dampers is rated 20 MVA, 13.8 kV and has a direct axis subtransient reactance of 0.25 p.u. The negative and zero sequence reactance are 0.35 and 0.10 p.u. respectively. The neutral of the generator is solidly grounded. Determine the sub-transient current in the generator and the line-to-line voltages for subtransient conditions when a single line-to-ground fault occurs at the generator terminals with generator operating unloaded at rated voltage. Neglect resistance. **10**

15. a) A dc source of 110 V with negligible resistance is connected through switch S to a lossless transmission line having Z_c = 30 ohms. The line is terminated in a resistance of 90 ohms. If the switch closes at t = 0, plot v_R versus time until t = 5T, where T is the time for a voltage wave to travel through the length of the line. **6**



    b) Obtain the transmission line coefficient for voltage and current for a line terminating with two dissimilar lines. **4**