[4459] – 167

Seat No.	

T.E. (Electrical) (II Semester) Examination, 2013
POWER SYSTEM – II
(2008 Pattern)

Time : 3 Hours Max. Marks : 100

N.B.: *i) Answer **any three** questions from **each** Section.*
*ii) Answer to the **two** Sections should be written in **separate** answer books.*
*iii) Neat diagram must be drawn **whenever** necessary.*
*iv) Figures to the **right** indicate **full** marks.*
*v) Use of logarithmic tables, slide rule, electronic pocket calculator is **allowed**.*

SECTION – I

1. a) What is line compensation ? Why it is necessary ? Compare static capacitors and synchronous compensators. **8**

   b) Generalized constants of a three phase line are A = 0.92 $\angle$1.5° and B = 140$\angle$76°Ω . The load of 60 MVA at 0.9 p.f. lagging is supplied at the receiving end at a voltage of 220 kV. Find : **8**

   a) The sending voltage.

   b) Find voltage regulation at this load assuming sending end voltage to be constant.

   c) If the sending end voltage is reduced by 5%, find the compensation required at the receiving end for the above load.

OR

2. a) Derive expression for active and reactive power flow in the transmission line. **8**

   b) What do you mean by receiving end circle diagram ? Explain the procedure of drawing the receiving end circle diagram. **8**

P.T.O.

3. a) Explain phenomenon of corona. Also explain visual critical voltage of corona. **8**

   b) A 3-phase, 50 Hz, 132 kV transmission line consists of conductors of 1.17 cm diameter and are spaced equilaterally at a distance of 3 units. The line has surface irregularity factor = 0.96, The barometric pressure is 72 cm of Hg and temperature of 20° C. Determine the fair and foul weather corona loss per km per phase. Assume that at foul weather the critical disruptive voltage drops down to 80% of the value during fair weather condition. Dielectric strength of air = 30 kV(peak)/cm. **8**

OR

4. a) Explain power handling capacity and power loss at various voltage levels. **8**

   b) Explain advantages & disadvantages of EHVAC transmission. **8**

5. a) What do you mean by p.u. system ? Prove that the single phase and three phase values are same in p.u. **9**

   b) Generators A and B are identical and rated 13.8 kV, 21,000 kVA and have a transient reactance of 30% at own kVA base. The transformers are also identical and are rated 13.8/66 kV, 7000 kVA and have a reactance of 8.4% to their own kVA base. The tie line is 50 km long; each conductor has a reactance of 0.848 ohm/km. The three phase fault is assumed at F, 20 km from station A. Find short circuit current. **9**

OR

6. a) Explain the concept of sub transient, transient and steady state current and impedances in detail with proper diagrams. **9**

   b) A simple power system is shown in Fig. (1). Redraw this system where the per unit impedances are represented on a common 100 MVA, 220 kV base on 50 Ω line. **9**

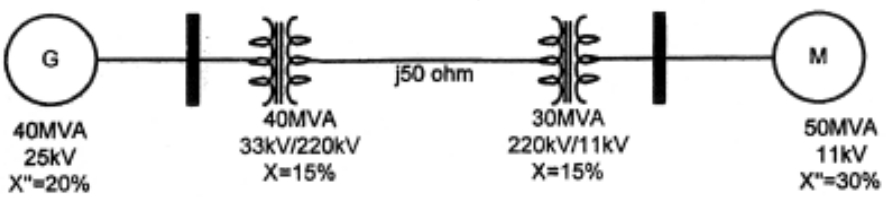

Fig. 1

SECTION – II

7. a) Derive the expression for fault current when L-G fault occurs at the terminals of solidly grounded star connected alternator. **8**

   b) A 50 MVA, 11 kV, 3 phase synchronous generator was subjected to different types of faults. The fault currents are as follows,

   LG fault – 4500 amp

   LL fault – 3000 amp

   LLL fault – 2500 amp

   The generator neutral is solidly grounded. Find per unit values of 3 sequence reactances of generator. **8**

OR

8. a) For a three phase transmission line with self impedance Z_s and mutual impedance Z_m, show that $Z_1 = Z_2 = Z_s - Z_m$ and $Z_o = Z_s + 2Z_m$. **8**

   b) A 3 phase, 37.5 MVA, 33 kV alternator having X_1=0.18 pu, X_2 = 0.12 pu and X_o = 0.1 pu based on its rating is connected to a 33 kV overhead line having X_1 = 6.3 Ω /ph, X_2 = 6.3 Ω /ph and X_0 = 12.6 Ω /ph. A single line to ground fault occur at remote end of the line. The alternator neutral is solidly grounded. Calculate fault current. **8**

9. a) Write a general form of power flow equations for n bus power system and explain :
   i) Nature and characteristics of equations
   ii) Various constraints to be considered
   iii) Types of buses. **10**

   b) Determine the Y bus for the three bus system. Neglect the shunt capacitances of the lines. The line series impedances are as follows. **6**

Bus code	Impedance (pu)
1-2	0.08 +j0.24
1-3	0.02+j0.06
2-3	0.06+j0.18

OR

10. a) Explain the step by step method for formation of Y_{bus} matrix. **8**

    b) Compare Newton Raphson method with Gauss Seidal method of load flow analysis. **8**

11. a) Explain different types of HVDC links. Discuss future scope of HVDC transmission system in India. **10**

    b) Explain constant ignition control method for HVDC transmission system. **8**

OR

12. a) Give advantages and disadvantages of HVDC transmission system. **8**

    b) Explain components of HVDC transmission system with single line diagram. **10**