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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.
 - b) Generalized constants of a three phase line are A = $0.92 \ge 1.5^{\circ}$ and B = $140 \ge 76^{\circ}\Omega$. The load of 60 MVA at 0.9 p.f. lagging is supplied at the receiving end at a voltage of 220 kV. Find :
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- 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.

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- 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.

OR

- 4. a) Explain power handling capacity and power loss at various voltage levels. 8
 - b) Explain advantages & disadvantages of EHVAC transmission.
- 5. a) What do you mean by p.u. system ? Prove that the single phase and three phase values are same in p.u.
 - 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.

OR

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



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SECTION-II

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

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 $Z_o = Z_s + 2Z_m$.
 - b) A 3 phase, 37.5 MVA, 33 kV alternator having $X_1=0.18$ pu, $X_2=0.12$ pu and $X_0=0.1$ pu based on its rating is connected to a 33 kV overhead line having $X_1=6.3 \Omega$ /ph, $X_2=6.3 \Omega$ /ph and $X_0=12.6 \Omega$ /ph. A single line to ground fault occur at remote end of the line. The alternator neutral is solidly grounded. Calculate fault current.
- 9. a) Write a general form of power flow equations for n bus power system and explain :

b) Determine the Y bus for the three bus system. Neglect the shunt capacitances

i) Nature and characteristics of equations

of the lines. The line series impedances are as follows.

- ii) Various constraints to be considered
- iii) Types of buses.
- Bus codeImpedance (pu)1-20.08 +j0.241-30.02+j0.062-30.06+j0.18

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10.	a)	Explain the step by step method for f	formation of Y _{bus} matrix.	8
	b)	Compare Newton Raphson method v analysis.	vith Gauss Seidal method	of load flow 8
11.	a)	Explain different types of HVDC links transmission system in India.	s. Discuss future scope of	HVDC 10
	b)	Explain constant ignition control met	hod for HVDC transmissio	on system. 8
		OR		
12.	a) b)	Give advantages and disadvantages Explain components of HVDC transm	of HVDC transmission sy ission system with single l	vstem. 8 line diagram. 10

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