Total No. of Questions : 12]

SEAT No. :

P1084

[Total No. of Pages : 4

[4163] - 256

May - June 2012

T.E. (Electrical)

POWER SYSTEM - II

(2008 Pattern) (Sem. - II)

Time :3 Hours] *[Max. Marks :100*

Instructions to the candidates:

1) ***Answer any 3 questions from each section.***
2) ***Answer 3 questions from section - I and 3 questions from section - II.***
3) ***Answers to the two sections should be written in separate answer books.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Figures to the right indicate full marks.***
6) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
7) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Derive the power flow equations for real and reactive power at receiving end. **[8]**

b) A three phase 220 kV overhead line delivers 100 MVA, and power factor of 0.8 lagging at its receiving end. The constants of line are $A = 0.98 \angle 3°$ and $B = 110 \angle 75°$. ohms per phase. Find **[10]**

i) Sending end voltage and power angle.
ii) Sending end active and reactive power.
iii) Line losses and VAR absorbed by the line.

OR

Q2) Write short note on (any three) **[18]**

a) Procedure of drawing circle diagram.
b) Line efficiency, regulation and compensation.
c) Surge impedance loading.
d) Complex power.

P.T.O.

Q3) a) List out the advantages and drawbacks of EHV transmission. **[8]**

b) Explain the phenomenon of corona and state the various methods to reduce it. **[8]**

OR

Q4) a) Describe the concept of corona loss in detail and explain the factors affecting it. **[8]**

b) A three phase, 50 Hz, 132 kV transmission line consists of conductors of 1.17cm 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. at temperature of 20°C. Determine fair and foul weather corona loss per km/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]**

Q5) a) What do you understand by a per unit system applicable to power system? What are the advantages and applications of p.u. system? **[8]**

b) Two generators rated 15 MVA, 13.2 kV and 20 MVA, 13.2 kV, respectively are connected in parallel to a bus. The bus feeds two motors rated 10 MVA, 15MVA respectively. The rated voltage of motors are 12.5 kV. The reactance of each generator is 15% and that of each motor is 20% on its own rating. Assume 60 MVA, 13.8 kV, base and draw a reactance diagram. **[8]**

OR

Q6) a) What do you mean by d.c. offset current? What is the effect of the instant of short circuit on the waveform of short circuit current (consists of d.c. offset) of R-L circuit. **[8]**

b) An 11 kV generating station has four identical three phase alternators A, B, C and D each of 10 MVA capacity and 12% reactance. There are two sections P & Q linked by a reactor rated at 10 MVA with 24% reactance. The single line diagram for the system is as shown. Load is connected as shown calculate current fed into three phase S.C. fault shown. **[8]**

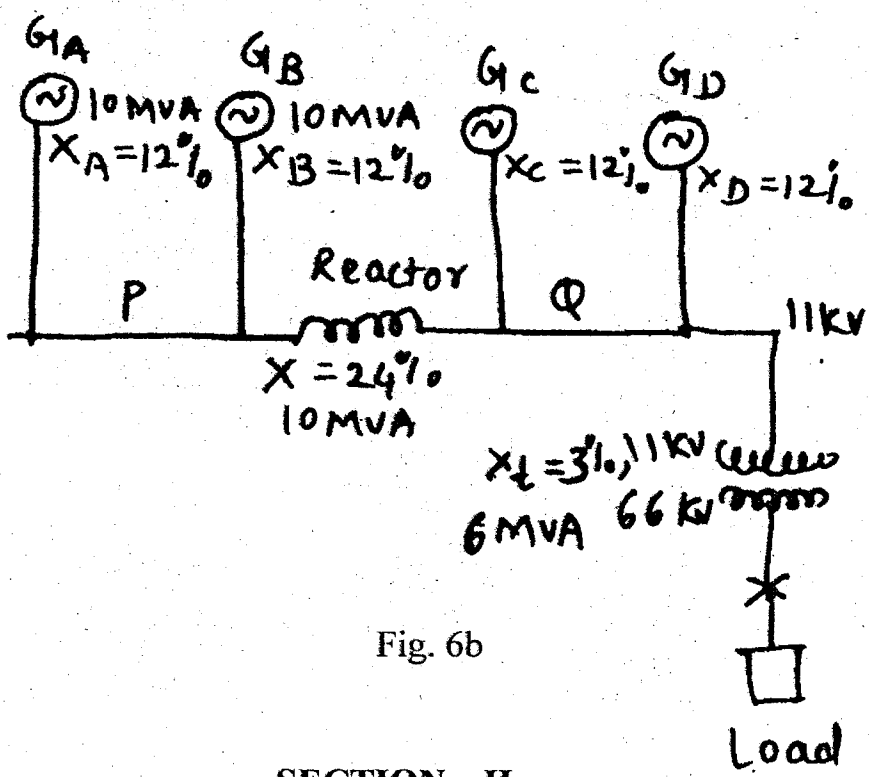

Fig. 6b

SECTION - II

Q7) a) Show that Positive and Negative sequence currents is equal in magnitude but out of phase by 180° in the Line to Line fault. Draw sequence networks. **[8]**

b) The line to neutral voltages in a three phase system are $V_{an} = 200\angle 0°$, $V_{bn} = 600\angle 100°$ $V_{cn} = 400\angle 270°$. Find the symmetrical components of the voltages. **[8]**

OR

Q8) a) Draw zero sequence diagram for all types of combinations of two winding transformer. **[8]**

b) A 3-phase generator 'A' having positive, negative and zero sequence reactances of j0.3, j0.2, j0.05pu respectively has an earthed neutral. It feeds a 3-phase line through a transformer. T_1. The transformer has $X_1 = X_2 = X_0 = j0.12$pu. and is connected in star-star with both neutrals earthed. For the line $X_1 = X_2 = j0.15$pu and $X_0 = 0.35$ pu. The other end of the line is connected to a transformer T_2 having $X_1 = X_2 = X_0 = j0.1$pu. The generator 'B' feeds T_2. The positive, negative and zero sequence reactances of generator B are j0.3, j0.2, j0.05 pu respectively has an earthed neutral. The transformer T_2 is also connected in star-star with both neutrals earthed. Find currents flowing into fault from the three lines for a double line to ground fault, occurs on secondary of T_1. Find fault current in pu. All the reactances are on same base. **[8]**

Q9) a) Form Y bus for the 4 bus system if the line series impedances are as under. **[9]**

Line (bus to bus)	Impedance
1-2	0.15+j0.6 pu
1-3	0.1+j0.4pu
1-4	0.15+j0.6pu
2-3	0.05+j0.2pu
3-4	0.05+j0.2pu

Neglect the shunt capacitance of the line.

b) Explain Gauss-Siedel method of load flow analysis with flow chart. **[9]**

OR

*Q10)*a) Explain in brief the procedure for formulation of Y_{bus} using singular transformation. **[9]**

b) Derive power flow equations for n bus power system and explain types of buses. **[9]**

*Q11)*a) Explain different types of HVDC links. Name any two HVDC systems in India. **[8]**

b) Draw single line diagram of HVDC system. Explain components of it. **[8]**

OR

*Q12)*a) Compare HVAC system with HVDC system. **[8]**

b) Explain in brief different control techniques used for HVDC system. **[8]**