

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 $A = 0.98 \angle 3^\circ$ and $B = 110 \angle 75^\circ$ 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]

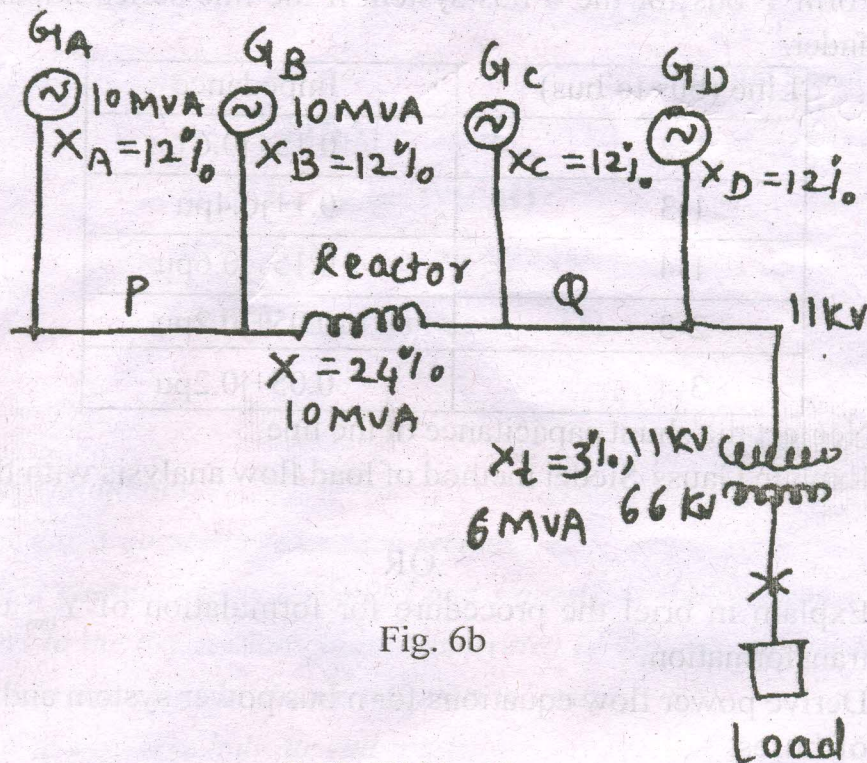


Fig. 6b

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 $V_{an} = 200 \angle 0^\circ$, $V_{bn} = 600 \angle 100^\circ$, $V_{cn} = 400 \angle 270^\circ$. 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 $j0.3$, $j0.2$, $j0.05$ pu 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	$0.15+j0.6 \text{ pu}$
1-3	$0.1+j0.4 \text{ pu}$
1-4	$0.15+j0.6 \text{ pu}$
2-3	$0.05+j0.2 \text{ pu}$
3-4	$0.05+j0.2 \text{ pu}$

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]