Total No. of Questions : 8]

**SEAT No. :**

**P289**

[Total No. of Pages : 3

**[6003]-368**

# T.E. (Electrical)

# POWER SYSTEM-II

## (2019 Pattern) (Semester-II) (303148)

*Time : 2½ Hours]* *[Max. Marks : 70*

***Instructions to the candidates:***

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*
2) *Neat diagram must be drawn wherever necessary.*
3) *Figures to the right side indicate full marks.*
4) *Use of a calculator is allowed.*
5) *Assume suitable data if necessary.*

***Q1)*** a) Give the detailed classification of buses used in load flow analysis. **[6]**

b) State the following statements are true or false with justification. **[6]**

i) The bus admittance matrix is a sparse matrix

ii) In fast decoupled load flow, the resistance of the lines are neglected.

c) Impedances (in pu) between buses are given in the following Fig. Calculate the Ybus of the system. **[6]**

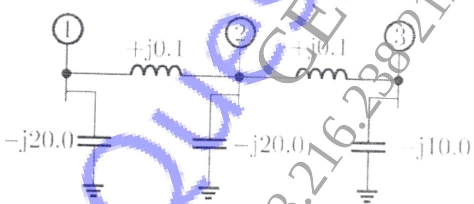


Fig Q1 c)

OR

***Q2)*** a) Draw the per-unit impedance diagram of the system shown below. Take the base values as 10MVA, 33kV on the load. **[6]**

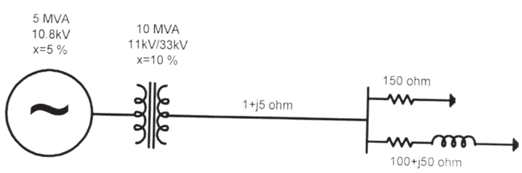


Fig Q2A)

***P.T.O.***

b) Explain load flow analysis using the fast decoupled method. **[6]**

c) What is per unit system? State the advantages and disadvantages. **[6]**

***Q3)*** a) For the power system shown in the figure below, the specifications of the components are the following: **[12]**

G1 : 25kV, 100 MVA, X=9% G2: 25kV, 100 MVA, X=9%

T1 : 25kV/220 KV, 90 MVA, X=9% T2: 220 kV/25kV, 90MVA, X=9%

Line 1:X=150 ohms

If the three-phase fault is taken place at bus 1, calculate fault current supplied by each generator. Take generator 1 rating as base values.

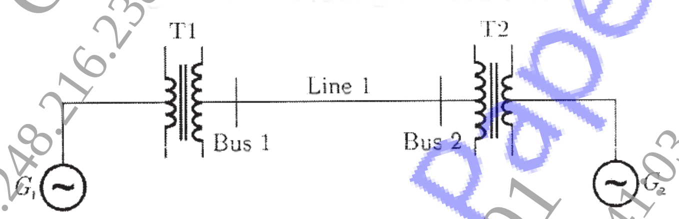


Fig. Q3A)

b) Draw the nature of fault current, if the symmetrical fault is taken place at the terminal of an unloaded alternator. Clearly mark the sub-transient, transient and steady state period. **[6]**

OR

***Q4)*** a) Find the fault current, if three phase fault is taken place at (i) F1 and (ii)F2. **[12]**

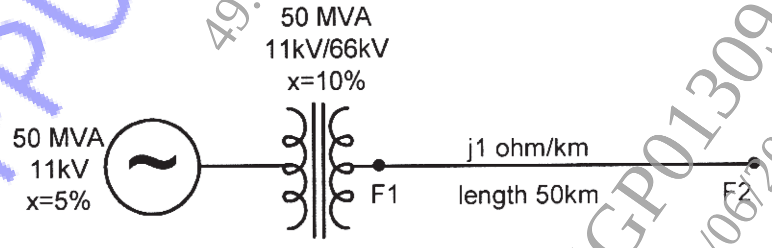


Fig Q4A)

b) Write a short note on "Feeder reactor". **[6]**

**Q5)** a) With usual notation, prove that three-phase apparent power. **[6]**

$$S_{abc} = 3(V_{a1}I^*_{a1} + V_{a2}I^*_{a2} + V_{a0}I^*_{a0})$$

b) Draw a zero-sequence diagram for the following transformer connection. **[6]**

i) Delta-star transformer (With isolated neutral)

ii) Delta-star connected transformer with neutral grounded with impedance.

c) For a transmission line, positive sequence impedance is (1+j10) ohm and zero sequence impedance is (4+j31) ohm. Determine following matrix where Zs=Self impedance and Zm is mutual impedance of the transmission line. **[6]**

$$Z_{line}\begin{bmatrix} Z_s & Z_m & Z_m \\ Z_m & Z_s & Z_m \\ Z_m & Z_m & Z_s \end{bmatrix}$$

OR

**Q6)** a) Derive the equation for fault current in LLG fault. **[9]**

b) A20-MVA, 6.6-kV, 3-Phase alternator is connected to a 3-Phase transmission line. The per unit positive, negative and zero-sequence impedances of the alternator are j0,1,j0.05 and j0.04 respectively. The neutral of the alternator is connected to the ground through an inductive reactor of j0.05 p.u. The per unit positive, negative and zero-sequence impedances of the transmission line are j0.2, j0.2 and j0.3, respectively. Per-unit values are based on the machine ratings. A solid ground fault occurs at one phase of the far end of the transmission line. Calculate the fault current. **[9]**

**Q7)** a) Compare HVDC and EHVAC transmission systems. **[6]**

b) Draw the complete single-line diagram of the HVDC system showing all components. **[5]**

c) Write a short note "Monopolar HVDC station". **[5]**

OR

**Q8)** a) Explain "Constant Extinction Angle control in HVDC systems" **[6]**

b) Write the functions of the following components in HVDC system: **[5]**

i) AC side filters.

ii) Converter transformer.

c) Write a short note " Chandrapur-Padghe HVDC line". **[5]**

● ● ●