

Duration – 3 Hours

Total Marks - 80

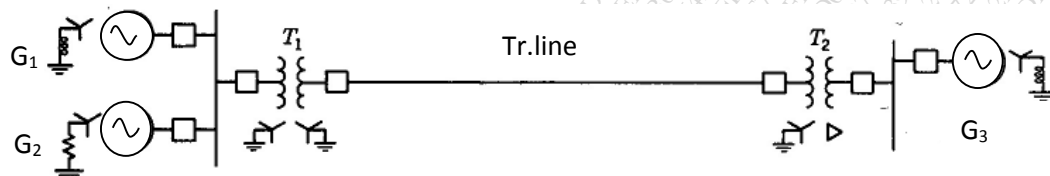
N.B.: - (1) Question No.1 is compulsory.

(2) **Attempt** any **Three** questions out of remaining **five** questions.

(3) Assume suitable data if necessary and justify the same.

Q 1. Answer **all** questions.

A) Draw the positive, negative and zero sequence diagram for the power system given below.

05

B) Discuss the importance of short circuit MVA for fault analysis in power system

05

C) Illustrate the significance of surge impedance loading in transmission line.

05

D) Inspect the concept of power invariance in symmetrical component transformation for asymmetrical fault analysis

05**Q 2 a)** Derive the necessary equation to determine the fault current for an L-L fault in power system and draw the interconnection of sequence networks for the same.**10****Q 2 b)** Two generators G_1 and G_2 rated at 11kV, 3MVA, 20% X_d are interconnected by 100km transmission line, $X_{tr, line}=0.1$ ohm/km. Transformer near generators are rated at 6MVA, 11/66 kV and 5% reactance. A three phase fault occur at a distance of 20 km from generator G_1 , when the system is at no load. Calculate fault MVA and fault current.**10****Q 3 a)** Explain the short circuit on synchronous alternator under no load with respect to sub transient, transient and steady state condition.**10****Q 3 b)** A generator supplies a motor through transformer T_1 , transmission line and transformer T_2 . Find the fault current at the point of fault if an LG fault occurs at the midpoint of the transmission line. All reactances are on same base.**10**

Equipment	$Z_1(\text{p.u})$	$Z_2(\text{p.u})$	$Z_0(\text{p.u})$
Generator (star grounded)	j 0.16	j 0.12	j 0.03
Transformer T_1 (delta/star grounded)	j 0.2	j 0.2	j 0.2
Transmission line	j 0.38	j 0.38	j 0.5
Transformer T_2 (star grounded/ delta)	j 0.2	j 0.2	j 0.2
Motor (star grounded through neutral reactance of j 0.3 p.u)	j 0.52	j 0.29	j 0.14

- Q 4 a)** Explain the variation of current and voltage on an overhead transmission line when one end of the line is open circuited and derive the transmitted and reflected voltages and current. **10**
- Q 4 b)** Discuss the disadvantages of Corona. **10**
- Q 5 a)** What is the effect of line length, load power and power factor on the voltage and power flow in transmission line? **10**
- Q 5 b)** Illustrate the working principle of lightning arrester and explain the operation of any type of arrester in detail. **10**
- Q 6 a)** Describe the algorithm for short circuit studies. **10**
- Q 6 b)** Explain the following (i) Fortescue theorem (ii) volt time curves **10**
