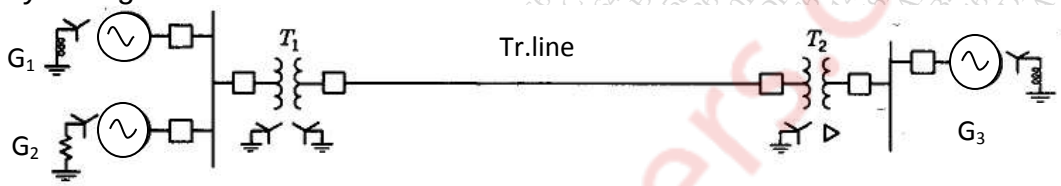
Duration – 3 Hours **Total Marks - 80**

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) Explain the significance of volt time curve in fault analysis. **05**

Q 2 a) Derive the necessary equation to determine the fault current for an L-G fault in power system and draw the interconnection of sequence networks for the same. **10**

Q 2 b) Determine disruptive critical voltage, visual critical voltage, coronal loss in fair and bad weather conditions for a 3 phase line 200km long conductor diameter 1 cm, 2.5 m delta spacing, air temperature 27°C, corresponding to an approximate barometric pressure of 73.15 cm operating voltage 110 kV,50Hz. **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 3Φ transmission line operating at 115kV and having resistance and reactance of 3.72Ω and 12.78Ω respectively, is connected to the generating station bus bars through a 25MVA, 12.8/115 kV step up transformer which has a reactance of 0.56p.u.There are two alternators connected to the bus bar of 15MVA, 12.8kV having 0.96p.u reactance and another with 20MVA, 124.8kV having 0.82p.u reactance. Calculate the short circuit MVA and fault current between the phases occurring at the high voltage terminals of a transformer and at the load end of the transmission line **10**

Q 4 a) Explain the variation of current and voltage on an overhead transmission line when one end of the line is short circuited and derive the transmitted and reflected voltages and current. **10**

Q 4 b) Discuss the factors effecting 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 arrestor and explain the operation of any type of arrester in detail. **10**

Q 6 a) Describe the algorithm for the formulation of bus impedance matrix. **10**

Q 6 b) Explain the concept of Fortescue theorem for asymmetrical fault analysis **10**

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