Duration – 3 Hours   **Total Marks - 80**
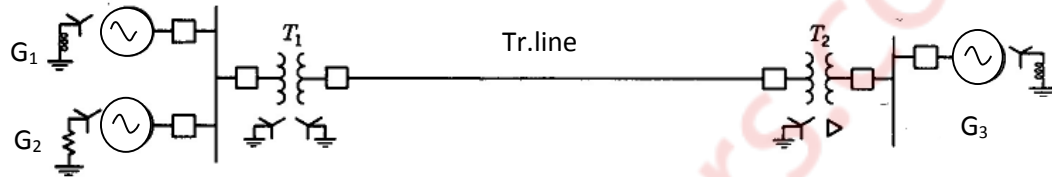
N.B.: - (1) Question No.**1** is compulsory.
      (2) **Attempt** any **Three** questions out of remaining **five** questions.
      (3) Assume suitable data if necessary and justify the same.

Q 1.   Answer **all questions**.

    A) Draw the positive, negative and zero sequence diagram for the power   **05**
        system given below.

    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   **05**
        for asymmetrical fault analysis

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

Q 2 b) Two generators G_1 and G_2 rated at 11kV, 3MVA, 20% X_d are interconnected by 100km **10**
          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.

Q 3 a) Explain the short circuit on synchronous alternator under no load with respect to sub **10**
          transient, transient and steady state condition.

Q 3 b) A generator supplies a motor through transformer T_1, transmission line and transformer **10**
          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.

Equipment	Z_1(p.u)	Z_2 (p.u)	Z_0(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 **10** end of the line is open circuited and derive the transmitted and reflected voltages and current.

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 **10** flow in transmission line?

Q 5 b) Illustrate the working principle of lightning arrestor and explain the operation of any type **10** of arrester in detail.

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**

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