

Code: EE6T5

**III B.Tech - II Semester – Regular/Supplementary Examinations
March 2020**

**POWER SYSTEM ANALYSIS
(ELECTRICAL & ELECTRONICS ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

PART – A

Answer *all* the questions. All questions carry equal marks

11x 2 = 22 M

1.

- a) Define single line diagram.
- b) List any two advantages of pu system.
- c) Write the symmetrical phasors for unsymmetrical three phase currents I_a , I_b and I_c .
- d) Write symmetrical component transformation matrix.
- e) Draw the zero sequence network of three phase Y connected load. Neutral is solidly grounded.
- f) What are the advantages of forming Ybus by inspection method?
- g) List types of buses for load flow analysis.
- h) Compare the convergence characteristics of Gauss Seidel and Newton Raphson methods of load flow solution.
- i) What are Jacobian elements in Newton Raphson solution?
- j) Draw the power angle curve of a single machine infinite bus system.
- k) Define critical clearing angle and critical clearing time.

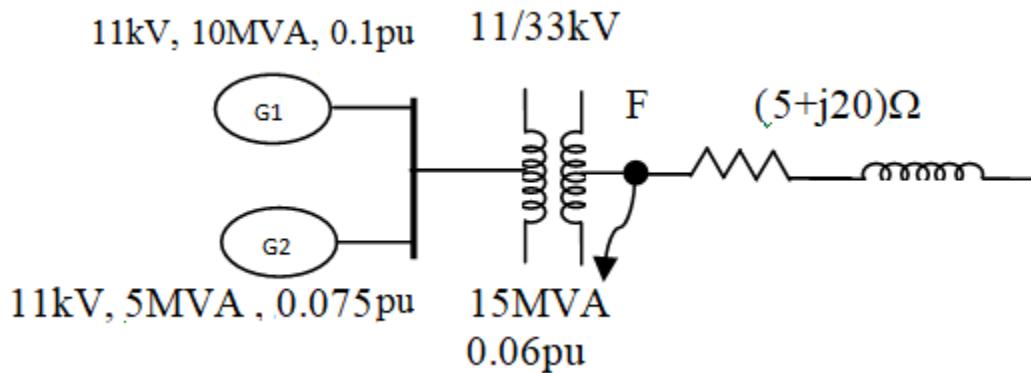
PART – B

Answer any *THREE* questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) A 3-phase transmission line operating at 33kV and having a resistance and reactance of 5Ω and 20Ω is connected to a generating station bus bar through a 15MVA step up transformer which has a reactance of 0.06pu. Connected to the bus bar are two generators one 10MVA, 0.1pu reactance and other 5MVA having 0.075pu reactance. Calculate the fault current and short circuit MVA when a 3 Φ short circuit occurs at HV terminals of transformer.

8 M



- b) (i) Explain the procedure of obtaining reactance diagram from single line diagram.

4 M

(ii) Prove that:

$$Z_{pu(new)} = Z_{pu(old)} \times \frac{MVA_{BASE(new)}}{MVA_{BASE(old)}} \times \frac{(KV)_{BASE(old)}^2}{(KV)_{BASE(new)}^2}$$

4 M

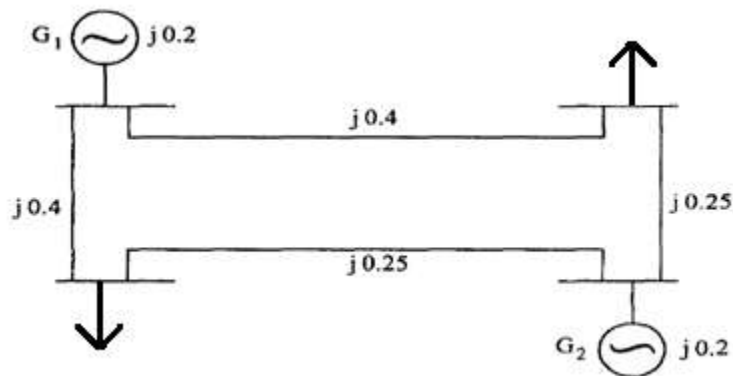
3. a) Explain interconnection of sequence networks for a LLG fault in power system network with necessary equations.

8 M

b) A 50 MVA, 12.6 kV, 3-phase, 50Hz generator has its neutral earthed through a 7% reactor. It is in parallel with another identical generator having its neutral earthed through a 5% reactor. Each generator has positive, negative and zero sequence reactance's which are 10%, 7% and 5% respectively. When line to ground short circuit occurs in the common bus bar, find the fault current.

8 M

4. a) Form the Ybus by using direct inspection method for the network shown in Figure by including the generator buses.



8 M

b) Derive the expressions for static load flow equations of a power system network.

8 M

5. a) Draw the flow chart and write the algorithm for Newton Raphson method load flow solution with necessary equations.

8 M

b) Derive the expressions for elements of Jacobian matrix in Newton Raphson method of solving load flow equations.

8 M

6. a) How does steady stability limit is computed from power angle curve? Explain the methods to improve steady state stability limit.

8 M

b) Derive the expression for critical clearing angle and critical clearing time for a 3-phase bus fault in power system network.

8 M