Code: EE6T5

III B.Tech - II Semester – Regular/Supplementary Examinations March 2018

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) Mention any two advantages of per unit quantities over percentage quantities.

b) What are the different types of buses in a power system?

c) Mention the parameters obtained from loadflow studies.

d) Mention any two advantages of N-R method over G-S method of loadflow solution.

e) What assumptions are made in FDLF?

f) Draw zero sequence network of generator whose neutral is grounded through impedance 'Z_n'.

g) When a 3-phase system is said to be unbalanced?

h) Find the symmetrical component of currents for the phase currents

$I_a = 10 \angle 0^0$, $I_b = 10 \angle 180^0$ and $I_c = 0$

i) Express Short Circuit MVA of a 3-phase circuit in terms of base MVA.

j) Distinguish between Steady state stability and Dynamic Stability.

k) Write any two methods for improving Steady state stability.

PART – B

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

$$3 \times 16 = 48 \text{ M}$$

2. a) Explain the need of PU System also mention their advantages.   6 M

b) Draw the PU diagram for the below given circuit with generator parameters as base value.   10 M

30 MVA	20 MVA		15 MVA	15 MVA
13.8 kv	11/132 kv	10 Ω	132/11 kv	11 kv
x" = 0.1	x=0.1		x=0.1	x=0.15
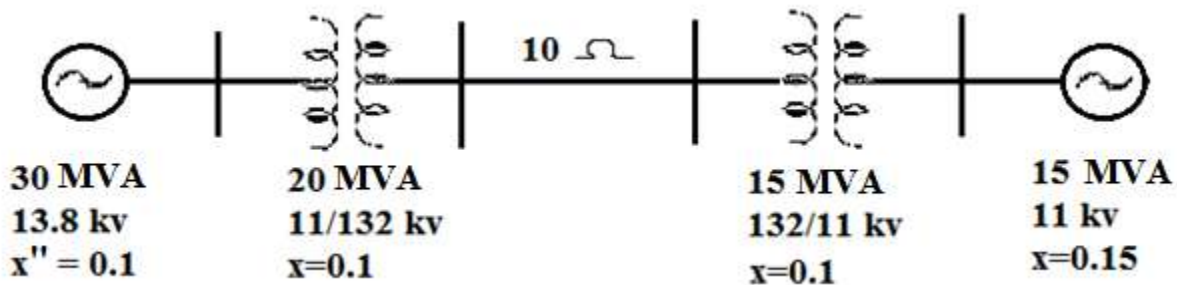
3. a) What are the advantages of symmetrical components? 4 M

b) The line-to-line voltages in an unbalanced three-phase supply are $V_{ab} = 1000 \angle 0^{0}$; $V_{bc} = 866 \angle -150^{0}$; $V_{ca} = 500 \angle 120^{0}$. Determine the symmetrical components for line and phase voltages, then find the phase voltages V_{an}, V_{bn} and V_{cn} 12 M

4. a) How do you improve the rate of convergence of a GS-iterative method? 6 M

b) In a 2-Bus power system with Bus-1 as slack bus $V_1 = 1.0 \angle 0^0$ p.u., $P_2 = 1.0$ p.u. and $Q_2 = 0.5$ p.u. with $Z_{12} = 0.012+j0.16$ p.u. Using GS-method, determine V_2 after second iteration. Also find the line flows and line losses. 10 M

5. a) Compare GS-method, NR, decoupled and FDLF methods with respect to   i) Number of equations   ii) Memory iii)Time for iteration. 6 M

b) What are the assumptions made in reducing NR-method to decoupled method of power flow solution? 10 M

6. A 50-Hz, 4-pole turbo generator rated 100 MVA, 11 KV has an inertia constant of 8 MJ/MVA. 16 M
    Find:
    a) The stored energy in the rotor at synchronous speed.
    b) If the mechanical input is suddenly raised to 80 MW for an electrical load of 50 MW, find the rotor acceleration, neglecting mechanical and electrical losses.
    c) If the acceleration calculated in part (b) is maintained for 10 cycles, find the change in torque angle and rotor speed in revolutions per minute at the end of their period.