Code No: **R32022** **R10** **Set No. 1**

III B.Tech II Semester Supplementary Examinations, November - 2018

POWER SYSTEM ANALYSIS

(Electrical and Electronics Engineering)

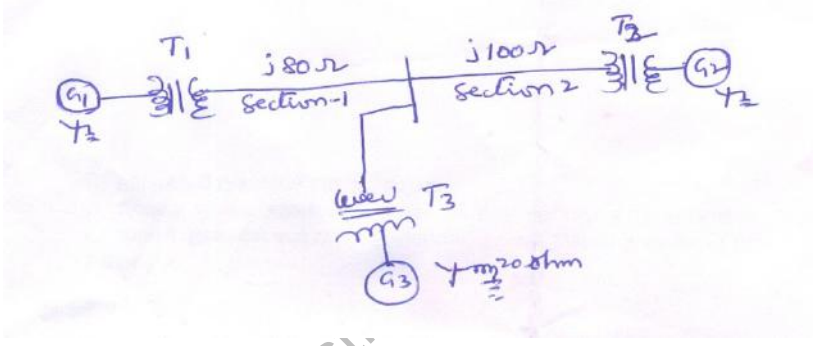
Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

*****

1 The single line diagram of an unloaded power system is show in below figure. [15M]
The ratings of the generators and transformers as follows:
G1 = 100 MVA,26 kV, X''=10%
G2 = 50 MVA,13 kV, X"=15%
G3 = 75 MVA,12.6 kV, X"=20%
T1 = 100 MVA,220/25 kV, X=10%
T2 = 3 single phase units each rated at 20 MVA,127/13 kV, X=10%
T3 = 50 MVA,220/12 kV, X=10%
Draw the reactance diagram using the base values of generator G1.



2 a) What is the necessity of power flow studies in power system studies [8M]
b) Explain the various types of buses in power systems [7M]

3 a) What are the merits and demerits of N-R method over G-S method [8M]
b) Write an algorithm for fast decoupled load flow method [7M]

4 Build the Z_{Bus} using algorithm for a power system whose element data is given in the following table: [15M]

Element No.	Connected between bus No.	Self reactance (p.u)
1	1-2	0.1
2	1-3	0.15
3	2-3	0.3
4	2-3	0.1

Code No: **R32022** **R10** **Set No. 1**

5		Two generators are connected in parallel to the LV side of a three phase Δ-Y transformer. Generator1 is rated 100 MVA, 12.6 kV, Generator2 is rated 50MVA, 12.6 kV with same subtransient reactance of 20%. The transformer is rated 120 MVA at 12 Δ/ 132Y kV with reactance of 15%. Find the subtransient current in each generator when a three phase short circuit occurs on the HV side of the transformer.	[15M]
6	a)	Explain the concept of sequence impedance of a 3-phase connected, rotating load when neutral is grounded through some impedance and draw its sequence impedance networks.	[8M]
	b)	What are symmetrical components? Why are they used in power system fault analysis? Explain in details.	[7M]
7	a)	Derive the expression for fault current and the terminal voltages of a 3-phase alternator, when there is a double line to fault occurs at the far end of the alternator. Assume that the generator neutral is solidly earthed. i) Neglect fault impedance Z_f ii) Consider fault impedance Z_f	[8M]
	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. Is a line to ground short circuit occurs in the common bus bar, find the fault current.	[7M]
8	a)	A double circuit line feeds an infinite bus from a power station. If a fault occurs on one of the line and the line is switched off, derive an expression for the critical clearing angle.	[8M]
	b)	State and derive the swing equation.	[7M]

*****