PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
M.Tech. Winter 2019 - 20 Examination

Semester:1   Date:16/12/2019
Subject Code: 203207101   Time:10:30 am to 01:00 pm
Subject Name: Power System Analysis   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 A) Compare GS and NR method of load flow.   **(05)**

B) A three-phase, Y-connected, 75 MVA, 27 kV synchronous generator has a synchronous reactance
of 9.0 Ω per phase. Using rated MVA and voltage as base values, determine the per unit reactance.   **(05)**
Then refer this per unit value to a 100 MVA, 30 kV base.

C) Compare static state estimation and dynamic state estimation.   **(05)**

Q.2 **Answer the following questions**. (Attempt any three) (Each five mark)   **(15)**
A) Explain power system security.
B) Explain impact of large disturbance on voltage stability
C) What do you mean by state estimation?
D) The line currents in a 3-phase system are Ia = 5∠60° A, Ib = 5∠-60° A and Ic = 0. Find the
symmetrical components

Q.3 A) What is the significance of load flow in power system? How is load flow analysis done with the   **(07)**
help of Gauss Seidel technique?

B) The one-line diagram of a simple power system is shown below.
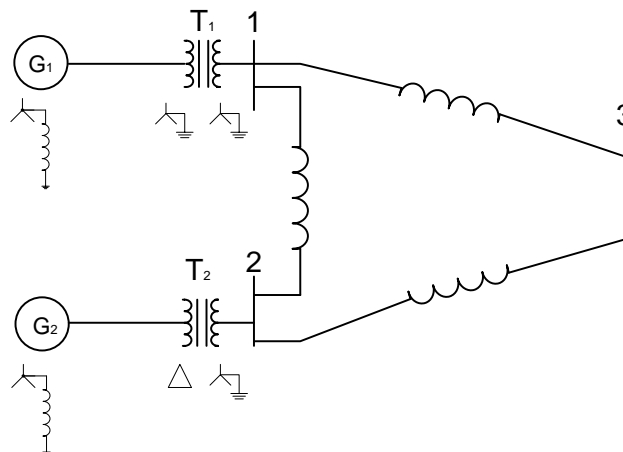
The neutral of each generator is grounded through a current-limiting reactor of 0.25/3 per unit on a
100 MVA base. The system data expressed in per unit on a common 100 MVA base is tabulated   **(08)**
below.

| Item	G_1	G_2	T_1	T_2	L_{12}	L_{13}	L_{23}
Base MVA	100	100	100	100	100	100	100
Voltage Rating	20 kV	20 kV	20/220 kV	20/220 kV	220 kV	220 kV	220 kV
X^1(p.u.)	0.15	0.15	0.10	0.10	0.125	0.15	0.25
X^2(p.u.)	0.15	0.15	0.10	0.10	0.125	0.15	0.25
X^0(p.u.)	0.05	0.05	0.10	0.10	0.30	0.35	0.7125

The generators are running on no-load at their rated voltage and rated frequency with their emfs are
in phase.
Determine the fault current for the following faults.
(a) A balanced three-phase fault at the bus 3 through a fault impedance Z_f = j0.1 pu.
(b) A single line-to-ground fault at bus 3 through a fault impedance Z_f = j0.10 pu.

B) Below figure shows the one-line diagram of a simple three-bus system with generation at bus 1. The magnitude of voltage at bus 1 is adjusted to 1.05 per unit. The scheduled loads at buses 2 and 3 are as marked on the diagram. Line impedance are marked in per unit on 100 MVA base and the line charging susceptances are neglected.
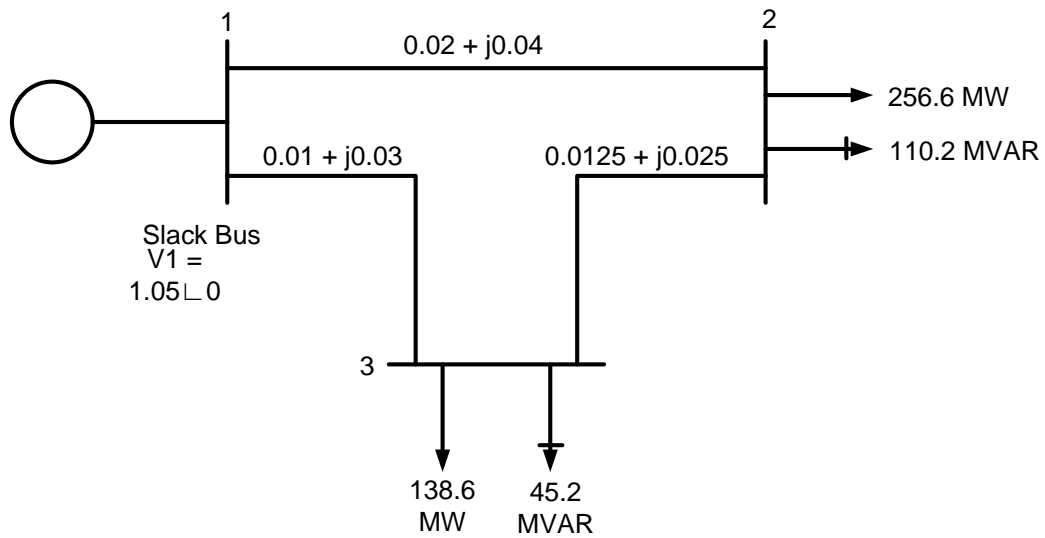
(08)

(a) Using Gauss-Seidel method, determine the phasor values of the voltage at the load buses 2 and 3 (P-Q buses) accurate to three decimal places.

(b) Find the slack bus real and reactive power.

Q.4 A) Draw and explain state estimation solution algorithm. **(07)**

A) Discuss voltage collapse in power system and its classification. **(07)**

B) How P-V curve is important for analyzing voltage stability? Explain it. Also deduce the relationship between P and V for 2 bus power system and plot graph between them. **(08)**