Exam.Code:0936
Sub. Code: 6674

2014

B.E. (Electrical and Electronics Engineering)

Sixth Semester

PCEE-601: Computer Aided Power System Analysis (CAPSA)

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part.

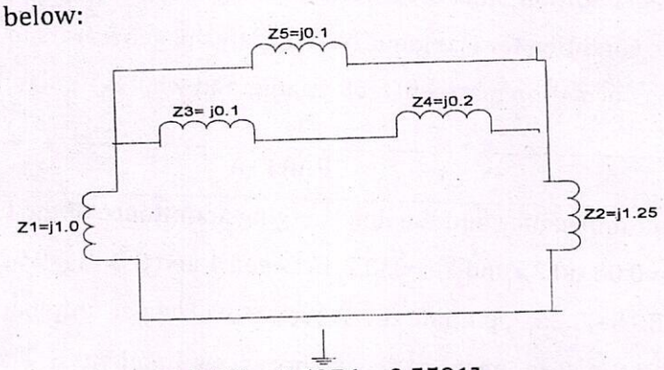
x-x-x

Q.I	**i)** Compare NR method with Gauss Seidel method in terms of storage and convergence? **ii)** What is the critical clearing angle? What is its significance? **iii)** Under what condition LG fault is more severe than 3 phase fault? **iv)** What is the condition for economic load dispatch of generators in a power system? **v)** What is transformation matrix in fault studies and what is its significance?	**Mark** **2*5=10**
	PART -A	
Q.II	**a)** The per unit impedance and the line charging admittance of the line connecting buses 1 and 2 is Z_{12}=0.03+j0.25 and Y_{sh}=0.j0.2, between 1 and 3 is Z_{13}=0.02+j0.3 and between 2 and 3 is Z_{23}=0.15+j0.25. Compute the Y_{BUS} matrix. The per unit load on bus 2 is 1.1+j0.5 and on bus 3 is 0.8-j0.4. There are generators at bus 1 and bus 3. The per unit generation on bus 3 is 0.9+j0.3 and bus 1 is slack bus. If the slack bus voltage is fixed at 1+j0; determine the voltage at bus 2 and 3 using Gauss Seidel method. **b)** Drive the expression for Swing Equation and explain the concept of stability using equal area criterion.	**5,5**
Q.III	**a)** Two generators rated 500 MW and 300 MW are operating in parallel. The droop characteristics of their governors' are 5 % and 6 % respectively from no load to full load. Assuming them to be operating at 50Hz at no load, how will load of 600 be shared between them? What will be system frequency? **b)** Derive the load frequency control transfer function model for two area system and hence deduce the expression for Tie-Line power flow.	**5,5**
Q.IV	**a)** Drive the expression for critical clearing time and angle for a system feeding a load through a parallel transmission line from a generator to an infinite bus bar. The fault occurs on one of the two parallel lines in the middle and cleared by restoring the line. **b** A 50 Hz, 500 MVA, 400 kV generator is connected to 400 kV infinite bus bar through an interconnector. The generator has an inertia constant H=2.5 MJ/MVA with voltage	**5,5**

P.T.O.

	behind the transient reactance of 450kV and loaded 460 MW. The transfer reactances between generator bus bar under various conditions are: Prefault : 0.5 p.u. During Fault : 1.0 p.u. Post Fault : 0.75 p.u. Calculate the swing curve using intervals 0.05 s and assuming that the fault is cleared at 0.15.	

PART-B

Q.V	Find the new Z_{BUS} for the network shown when Z_5 is removed from the network. The data is given as below:  The Z_{Bus} is given as $Z_{BUS} = j\begin{bmatrix}0.5699 & 0.5376 & 0.5591\\ 0.5376 & 0.5780 & 0.5511\\ 0.5591 & 0.5511 & 0.6231\end{bmatrix}$	**10**
Q.VI	**a)** Derive the expression for the fault current and voltages for a generator having fault the its two phases a and b with fault impedance Z_f. Draw the sequence network connection for the fault. **b)** A three phase unbalanced source with the following phase-to-neutral voltages $V^{abc} = \begin{bmatrix}150\angle -120°\\ 175\angle 90°\\ 150\angle -30°\end{bmatrix}$ is applied to the circuit. The load series impedance is Z_s=5+j20 and mutual impedance between the phases is Z_m=j2.5. The load and source neutral are solidly grounded. Find Z^{012} and sequence components of voltages.	**5,5**
Q.VII	An 11 KV, 100 MVA alternator having a sub-transient reactance of 0.25 p.u. is supplying a 50 MVA motor having a sub-transient reactance of 0.2 p.u. through a transmission line. The line reactance is 0.05 p.u. on a base of 100 MVA. The motor is drawing 40 MW at 0.8 p.f. leading with terminal voltage of 10.95 kV when a 3 phase fault occurs at the generator terminals. Calculate the total current in generator and motor under fault condition.	**10**