Lines	Impedance	Bus code	Lines charging admittance
1-2	0.06+j0.018	1	0.05j
1-3	0.02+j0.06	2	0.06j
2-3	0.06+j0.012	3	0.05j

Bus code	voltage	MW	MVAR	
1 (Slack)	1.06+j0.0	P_1	Q_1	
2 (PV)	$0.04\angle\delta$	0.2	Q2	(injected)
3 (PQ)	1-0+j0.0	–0.6	–0.25	(injected)

Unit IV

7. Describe the different types of 3-ϕ unsymmetrical faults. A 50 MVA, 11 KV 3-ϕ alternator was subjected to different types of faults. The fault currents are as : 3-ϕ phase fault = 2000 A, L-L fault = 2600 A, L-G fault = 4200 A. The generator neutral is solidly grounded. Find the values of three sequence reactances of the alternator. Ignore resistances. **15**

AA-43

M. Tech. EXAMINATION, May 2017

(First Semester)

(B. Scheme) (Re-appear Only)

EE(PS)

MPS-505-B

ADVANCED POWER SYSTEM ANALYSIS

Time : 3 Hours] [*Maximum Marks : 75*

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Evaluate the generalized circuit constants for short transmission line. **10**

   (b) Explain "Ferranti effect" with a phasor diagram. **5**

2. Determine the sending end voltage, current, power and power factor a 160 km section of 3-ϕ line delivering 55 MVA at 133 KV and p.f. 0.8 lagging. Also find the efficiency and regulation of the line. Resistance per line is 0.16 Ω per km, spacing 3.7 m, 6.5 m, 7.4 m transposed. Evaluate ABCD parameters also. Diameter = 1.96 cm. **15**

Unit II

3. (a) A primitive Y matrix is : **7**

$$\begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{array} \begin{array}{c} \begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \end{array} \\ \begin{pmatrix} 0.083 & -0.417 & 0 & -1.042 & 0 \\ -0.417 & 2.083 & 0 & 0.208 & 0 \\ 0 & 0 & 2.0 & 0 & 0 \\ -1.042 & 0.208 & 0 & 3.021 & 0 \\ 0 & 0 & 0 & 0 & 5 \end{pmatrix} \end{array}$$

   Form Y_{Bus}.

   (b) Develop an expression for Y_{Loop} (Loop admittance matrix) using basic loop incidence matrice B formulation. **8**

4. Develop equations for self and mutual elements when a link is added between two existing buses in an old network. **15**

Unit III

5. Explain clearly with a flow chart the computational procedure for load flow solution using newton-raphson method when the system contains all type of buses. **15**

6. The load flow data for a three bus system is given below. The voltage magnitude at bus 2 is to be maintained at 1.04 p.u. The maximum and minimum reactive power limits of the generator at bus 2 are 0.3 and 0.0 p.u. respectively. Taking bus 1 as the slack bus, determine the set of load flow equations at the end of first iteration starting with a flat voltage profile for all buses except slack bus using Gauss-Seidel method. Impedance for sample system :

8. For the network shown in fig. (1), determine the bus voltage after the fault, line flow and fault level for 1-phase to ground fault at bus 5. **15**

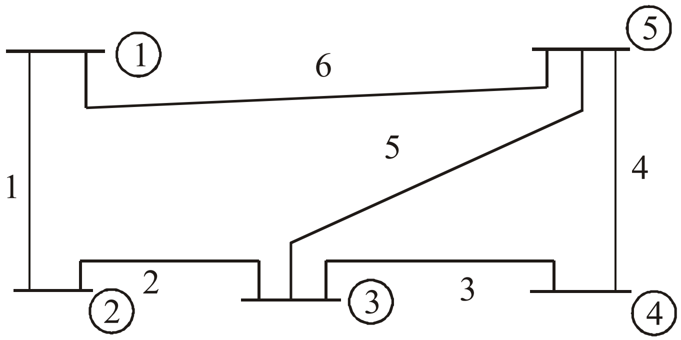
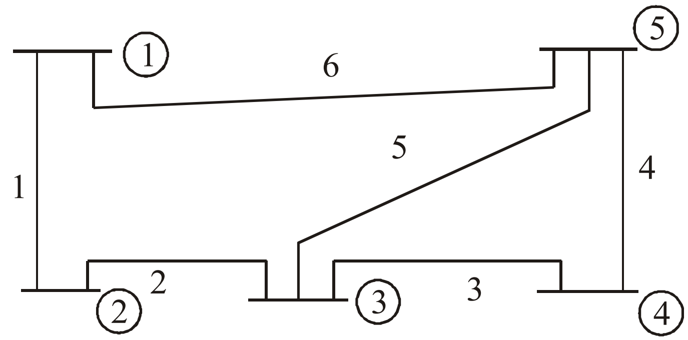


Fig. (1)

Element No.	**Bus Code (p-q)**	**Self Impe-dances**		$Z_M^{0,1,2}$
1	1-2	0.05	0.20	0.20
2	2-3	0.05	0.15	0.15
3	3-4	0.06	0.25	0.25
4	4-5	1.02	0.50	0.50
5	3-5	1.50	0.80	0.80
6	1-5	2.50	1.50	1.50

8. For the network shown in fig. (1), determine the bus voltage after the fault, line flow and fault level for 1-phase to ground fault at bus 5. **15**



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