PVP 14

Code: EE7T5A

IV B.Tech - I Semester – Regular Examinations – October - 2017

COMPUTER METHODS IN POWER SYSTEMS
(ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks

11 x 2 = 22

1.

a) What is incidence matrix?
b) Define oriented graph and tree.
c) State the assumptions in short circuit studies.
d) Write the equation to find the elements new bus impedance matrix after eliminating n^{th} row and column in an n x n bus impedance matrix.
e) What is the need for load flow study?
f) What are the merits of Fast decoupled method?
g) What are the advantages of N-R load flow method?
h) What are different states in security analysis?
i) Express line outage distribution factor.
j) State the method to improve transient stability.
k) List out different numerical methods used to solve swing equation.

PART – B

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

3 x 16 = 48 M

2. a) Derive the loop admittance matrix from bus impedance matrix. 8 M

b) Verify the following relations for the network shown in Figure-1. 8 M

i) $A_b K^t = U$ ii) $C_b = -B_l^t$

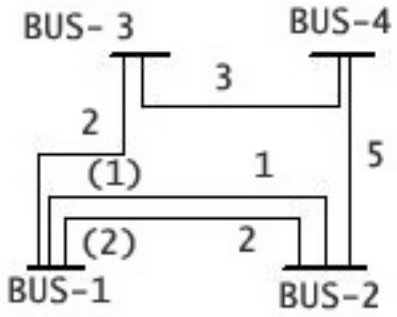

Figure-1

3. a) Derive the expressions for fault currents and voltages during SLG fault at p^{th} bus in an n-bus system. 8 M

b) Explain the algorithm for the modification of Z_{bus} on addition of a branch. 8 M

4. The load flow data for a three bus system is given in Tables I and II. Taking bus I as slack bus, determine the voltages of

the various buses at the end of first iteration stating with a flat voltage profile for all buses except slack bus using Gauss –Seidel method with acceleration factor 1.6

16 M

Table-I Impedances for sample system

Bus code	Impedance	Bus code	Line charging admittance $y_{pq}/2$
1-2	0.06+j0.18	1	j0.05
1-3	0.02+j0.06	2	j0.06
2-3	0.04+j0.12	3	j0.05

Table II Assumed bus voltages generation and load

Bus code	Assumed Voltages	Generation		Load	
		MW p.u.	MVAr p.u.	MW p.u.	MVAr p.u.
1	1.06+j0.0	0.0	0.0	0.0	0.00
2	1.0+j0.0	0.2	0.0	0.0	0.00
3	1.0+j0.0	0.0	0.0	0.6	0.25

5. a) Discuss about network sensitivity factor methods used in contingency selection. 8 M

b) Draw the flow chart for contingency selection technique and briefly explain it. 8 M

6. An alternator rated for 100 MVA supplies 100 MW to an infinite bus through a line of reactance 0.08 p.u. on 100 MVA base. The machine has a transient reactance of 0.2 p.u. and its inertia constant is 4.0 p.u. on 100 MVA base. Taking the infinite bus voltage as reference, current supplied by the alternator is (1.0 – j 0.6375) p.u. Calculate the torque angle and speed of the alternator for a period of 0.14 sec. When there is a three phase fault at the machine terminals and the fault is cleared in 0.1 sec. Use Modified Euler's method with a time increment of 0.02 sec. 16 M