Code: 13A02604

R13

B.Tech III Year II Semester (R13) Regular & Supplementary Examinations May/June 2017

POWER SYSTEM ANALYSIS

(Electrical & Electronics Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

*****

1 Answer the following: (10 X 02 = 20 Marks)

(a) Define bus-incidence matrix.
(b) State branch impedance matrix.
(c) Write applications of reactor.
(d) What do you understand by short circuit kva?
(e) State the necessity for power flow studies.
(f) Write about voltage controlled bus.
(g) Explain in brief the importance of triangular decomposition.
(h) Write about differences between Gauss-Seidel and Newton Raphson methods.
(i) Write about factors affecting the transient stability.
(j) Define about synchronizing coefficient.

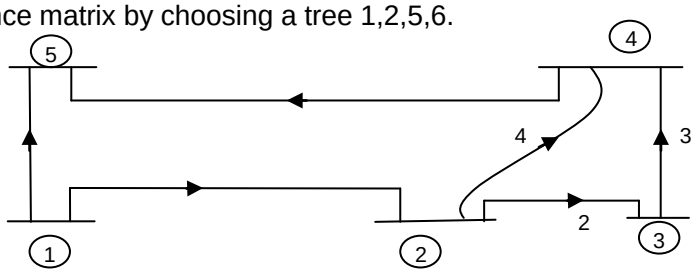
PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) Derive bus admittance and bus-impedance matrices by singular transformation.

(b) For the network shown figure below form bus incidence matrix, branch path incidence matrix and loop incidence matrix by choosing a tree 1,2,5,6.



OR

3 Derive the necessary expressions for building up of Z_{bus} when:

(a) New element is added.
(b) New element is added between two existing buses. Assume mutual coupling between added element and elements in the partial network.

UNIT – II

4 (a) How are reactors classified? Explain the merits and demerits of different types of system protection using reactors.

(b) There are two generating stations each which as estimated short circuit kVA of 5000 kVA and 6000 kVA respectively. Power is generated at 9 kV. If these two stations are interconnected through a reactor with a reactance of 0.3 ohms, what will be the short circuit kVA at each station?

OR

5 (a) Discuss about the significance of per unit system.

(b) A power plant has three generating units each rated at 7500 kVA with 15% reactance. The plant is protected by tie-bar system with reactance rated at 7500 MVA and 6%, determine the fault kVA when a short circuit occurs on one of the sections of bus bars.

Contd. in page 2

UNIT – III

6 (a) Derive and explain about static load flow equations.

(b) Draw flow chart and explain Gauss Seidel method of load flow solution.

OR

7 (a) Define and discuss briefly about active and reactive powers.

(b) Explain about sparsity and its applications in power flow studies.

UNIT – IV

8 Explain the Newton-Raphson method of load flow solution, using Cartesian coordinates, deriving necessary expressions.

OR

9 Discuss and write the algorithm of fast decoupled load flow solution deriving necessary expressions.

UNIT – V

10 (a) State and derive swing equation.

(b) A-4 pole synchronous generator supplies over a short line a load of 6 MW to a load bus. The maximum steady state capacity of the transmission line is 110 MW, determine the maximum sudden increase in the load that can be tolerated by the system without stability

OR

11 (a) Explain about various applications of equal area criterion.

(b) The power angle characteristic for a synchronous generator supplying infinite bus is given by $P_e = 1.25 \sin \delta$. Constant H is 5 sec and initially it is delivering a load of 0.5 p.u. Determine the critical clearing angle.

*****