Computer Application to Power System

time: Three Hours   *Maximum Marks: 70*

Note: Attempt all the Questions.

1. a) How will you form Y bus matrix using graph theory? Explain with the help of an example. 7

   b) Bus impedance matrix of a three bus system is given as follows.

$$Z_{BUS} = \int \begin{bmatrix} 0.10 & 0.06 & 0.07 \\ 0.05 & 0.15 & 0.10 \\ 0.06 & 0.09 & 0.17 \end{bmatrix}$$

   A transmission line having series reactance of $J\,0.1$ PU is

   added between bus # 1 and bus # 3. Find modified bus impedance matrix. 7

OR

2. a) Answer the following. 7

   i)   W model is preferred over T model of transmission line.

   ii)   Nodal analysis is preferred over mesh analysis in power systems usually.

b) Explain loadability of transmission line along with loadability curve. 7

3. a) With the help of necessary derivations. Show that how electrical length of transmission line get

modified due to

i) Uniformly distributed shunt compensation.

ii) Uniformly distributed series compensation. 7

b) If the slope of the power angle curve of a transmission line operating at 50 Hz and provided uniform

shunt compensation is 1.70 pu/rad, calculate the length of the transmission line. 7

OR

4.a) Explain the use of SVC and S VS in power system. How they are connected in power system

network? Draw their circuit diagram. 7

b) Why series compensation is preferred over shunt compensation for long transmission line? What are

the demerits of series compensation? 7

5. a) Develop general relation for sensitivity analysis in power system. 7

b) How can you find Mw-line flow in a transmission line using DC load flow model. 7

Or

6. Derive the following: 14

i) GSDF ii) LODF iii) Compensated shift factor What is the significance of these factors.

7. a) Differentiate the following: 7

i) Security ii) Stability iii) Reliability

b) Define various security levels in power system with the help of flow chart. 7

OR

8.a) Suggest a suitable method for the solution of SCED problem. 7

b) Define the following terms: 7

i) Contingency Analysis

ii) Security control

9. a) Differentiate 'Voltage stability1 and 'Angle stability'. 7

b) Discuss with the help of derivations voltage stability assessment using modal analysis. 7

OR

10. a) Suggest various voltage stability indices for assessment of maximum loadability point. Also draw p-v curve under pre contingency and post contingency conditions. 7

b) Describe with the help of necessary derivations the effect of shunt compensation on voltage stability. 7