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Total Pages : 5

425101

December, 2019

M.Tech. (PS) Ist Semester Examination

Power System Analysis

Paper: MPS 101A

Time : Three Hours]

[Maximum Marks : 75

Note : (i) Question no. 1 is compulsory from Part-I.
(ii) Attempt any four questions from Part-II.

PART-I

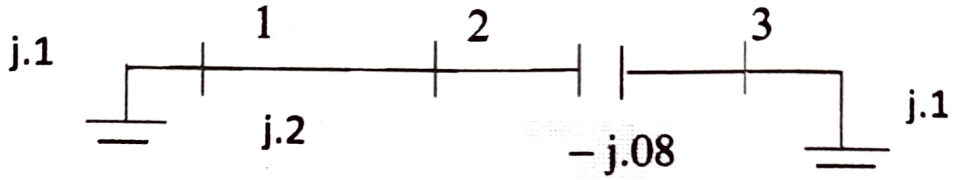
(1.5×10=15 Marks)

1. (a) List the operating constraints that are imposed in power flow study.

(b) What do you understand by Jacobian Matrix? How are the elements of this matrix determined?

(c) What do you understand by symmetrical and unsymmetrical fault in power system?

(d) A three bus network is shown in Fig. below indicating pu impedance of each element. Find the bus admittance matrix Y_{BUS} of the network.



(e) The sequence components of the fault current are as follows:

$$I^{+} = j1.5 \text{ pu}, \; I^{-} = -j0.5 \text{ pu}, \; I^{0} = -j1 \text{ pu}.$$

Name the type of fault it is?

(f) Explain how an element can be deleted or how its impedance value can be changed while forming Z_{BUS} using building algorithm. Neglect mutual effect.

(g) Give a flow chart for load flow study using FDLF method.

(h) Define sparsity and method of solving it.

(i) Define and explain sensitivity factors.

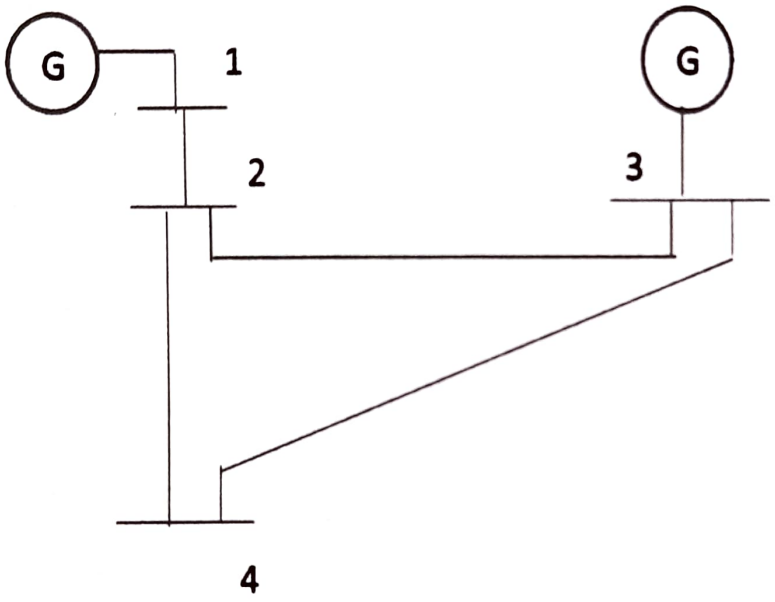
(j) What are Pseudo measurements in state estimation?

PART-II

(4×15 = 60 Marks)

2. (a) Formulate Y_{BR} from $\hat{Y}_{BR}$ and Z_{loop} using primitive network. (5)

(b) Consider the 4-bus power system network. Draw the oriented graph and determine Y_{BUS}, $\hat{Z}_{LOOP}$ and prove $A_b k^T = U$. (10)



3. Define Voltage Stability, reasons for voltage collapse and methods to improve the voltage stability. (15)

4. (a) Build the Z_{BUS} for a power system whose element data is given in following table and write the algorithm for the same.

Element No.	Connected between bus nos.	Self-reactance in p.u
1	1-2	0.3
2	1-3	0.4
3	2-3	0.5

(10)

(b) State and explain various power system operating states and draw security state diagram. (5)

5. (a) For the power system shown in the fig. below. The specifications of the various components are as follows:

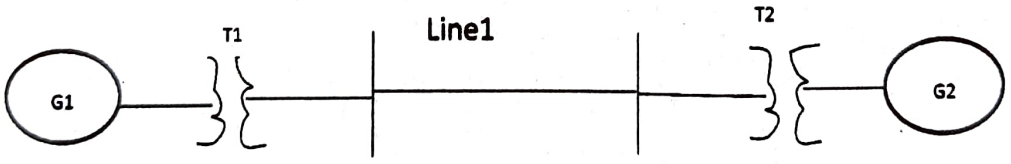
G1 = 25 kV, 100 MVA, X = 9%

G2 = 25 kV, 100 MVA, X = 9%

T1 = 25 kV/220 kV, 90 MVA, X = 12%

T2 = 220 kV/25 kV, 90 MVA, X = 12%

Line 1 : 220 kV, 150 Ω



Choose 25 kV as base voltage at generator G1 and 200 MVA as base MVA. Draw the impedance diagram. (7)

(b) Compute the fault analysis for LLG fault using symmetrical components. (8)

6. (a) Define bad data and how it is detected, identified and suppressed. (8)

(b) Define state estimation and explain the method of state estimation in detail. (7)

7. Single line diagram of a simple three bus power system with generation at bus 1. The scheduled loads on buses 2 and 3 are 320 MVAR, 400 MW and 270 MVAR, 300 MW respectively. Line reactances are marked in p.u. on a 100 MVA base. Perform the load flow study using NR method. Perform only one iteration. (15)