

Roll No.

Total No. of Pages : 02

Total No. of Questions : 08

M.Tech. (EE) (2018 & Onwards) (Sem.-1)

POWER SYSTEM ANALYSIS

Subject Code : MTEE-101-18

M.Code : 75215

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWELVE marks.

1.
 - a) Develop an algorithm for fast decoupled method of load flow analysis including PV buses in the power system. (6)
 - b) Compare G-S method and N-R method for load flow solutions. (6)
2.
 - a) Derive the necessary equations to determine the fault current for a single line to ground fault. Draw a diagram showing interconnected sequence networks. (6)
 - b) The line to ground voltages on the high voltage side of a step-up transformer are 100kV, 33kV and 38kV on phases a, b and c respectively. The voltage of phase a leads that of a phase b by 100° and lags that of phase c by 176.5° . Determine analytically the symmetrical components of voltage. (6)

$$V_a = 100/0^\circ, V_b = 100/-100^\circ \text{ and } V_c = 100/176.5^\circ$$

3. The following is the system data for a load flow solution. The line admittances : (6)

Bus Code	Admittance
1-2	2-j8
1-3	1-j4
2-3	0.666-j2.664
2-4	1-j4
3-4	2-j8

The schedule of active and reactive powers : (6)

Bus Code	P	Q	V	Remarks
1	--	--	1.06	Slack
2	0.5	$0.1 \leq Q_2 \leq 1.0$	$1.04 + j0.0$	PV
3	0.4	0.3	$1 + j0$	PQ
4	0.3	0.1	$1 + j0$	PQ

Determine the voltages at the end of first iteration using Gauss-Seidal method. Take $\alpha = 1.6$.

4. a) What is voltage collapse? Explain its causes and prevention methods taken against it. (6)
 b) Draw PV graph for a typical line. What is the use of this graph in voltage stability studies? (6)
5. Explain the Ward equivalents for computing static network equivalents applied on the nodal admittance matrix. What are the benefits of REI reduction techniques over the Ward reduction techniques? (6)
6. What is the need of contingency analysis for power system? What are the parameters of this analysis? Explain **any one** method of contingency analysis used in power system. (6)
7. a) What are symmetrical components? Explain. (6)
 b) Derive an expression for the fault current for a line to line ground fault as an unloaded generator and draw its equivalent circuit. (6)
8. a) Explain the steps of computational procedure for the G-S method of load flow studies. (8)
 b) Explain sparsity technique and optimal ordering. (4)

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.