PVP 14

Code: EE6T5

III B.Tech-II Semester–Regular/Supplementary Examinations–March 2019

POWER SYSTEM ANALYSIS
(ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

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

11x 2 = 22 M

1. a) Define symmetrical short circuit current.
   b) Write formula for converting PU values from one base to other base values.
   c) Define short circuit MVA.
   d) What is the need for short circuit analysis?
   e) Define negative sequence impedance.
   f) What is the necessity of power flow studies.
   g) Explain why direct solution of load flow problem is not possible.
   h) Write the advantages of N-R method.
   i) What is Jacobian matrix?
   j) Define ‘stability’ of power system?
   k) Define transient stability.

PART – B

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

3 x 16 = 48 M

2. a) What are the advantages of per-unit computations? 6 M

b) A three phase transmission line operating at 33kV and having a resistance of 5ohms and reactance of 20ohm is connected to generating station through 11kV/33kV 15MVA step-up, 5% reactance transformer connected to the bus bar are two alternators one of 11kV, 10MVA with 10% reactance and another of 11kV, 5 MVA with 7.5% reactance. Calculate the short circuit MVA fed to the symmetrical fault between phases if it occurs at the end of the transmission line. 10 M

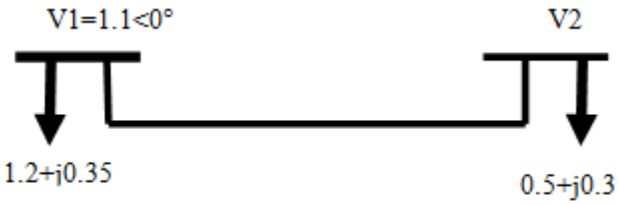
3. a) The line to ground voltages on high voltage side of step up transformer are 100 kV, 33 kV and 38 kV on phases a, b & c respectively . The voltages of phase 'a' lead that of phase 'b' by 100^0 and lag that of phase 'c' by 176.5^o. Determine analytically the symmetrical components of voltages. 8 M

b) Derive an expression for fault current when double line to ground fault occurs on the terminals of a unloaded alternator? Draw the sequence network diagram. 8 M

4. a) Explain with suitable example, formulation of Y_{bus} by direct inspection method. 6 M

b) A two bus system is shown in below figure. Calculate the bus 2 voltage at the end of first iteration by G-S method. The elements of bus admittance matrix are
$Y_{11}= Y_{22}= 1.5 \angle -86°$ P.U and $Y_{21}=Y_{12}= 1.8\angle 110°$ P.U.

10 M



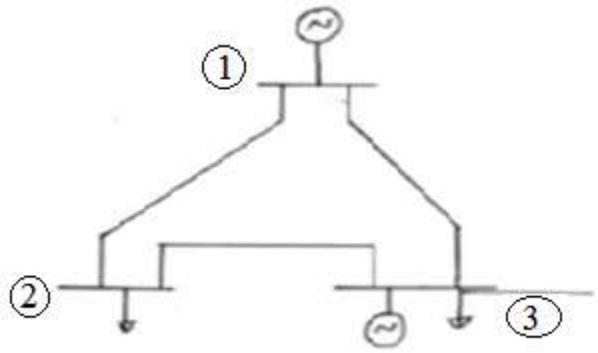
5. a) Consider the single line diagram of a power system shown in figure. Take bus 1 as slack bus and Y_{bus} matrix is given below: 12 M

$$Y_{bus} = \begin{bmatrix} 3-j5 & -1.2+j6 & -1.5+8j \\ -1.2+j6 & 4-j12 & -3+j6 \\ -1.5+j8 & -3+j6 & 5-j6 \end{bmatrix}$$

Schedule of generation and loads are as follows

Bus No.	Generation		Load		Assumed Bus voltages
	MW	MVAR	MW	MVAR	
1	0	0	0	0	1.04+j0.0
2	0	0	250	150	1.0+j0.0
3	100	70	50	20	1.0+j0.0

Using Newton-Raphson method, obtain bus voltages at the end of 1st iteration.



b) Compare Newton-Raphson and Fast Decoupled Load Flow methods. 4 M

6. a) What is Equal area Criterion? Discuss the application of Equal area criterion for the System Stability when a sudden change in mechanical input. 8 M

b) Define and briefly explain the terms with respect to stability 8 M

i) Steady state stability power limit.

ii) Transfer Reactance.

iii) Synchronizing power coefficient.