Reg.No. ____________

Karunya UNIVERSITY

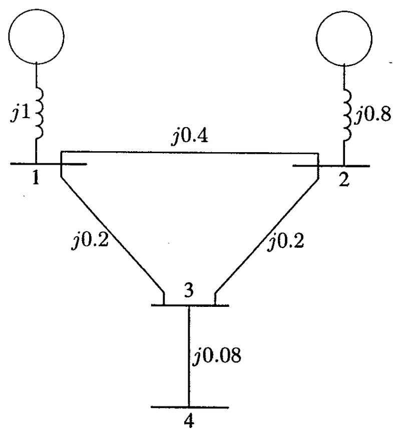
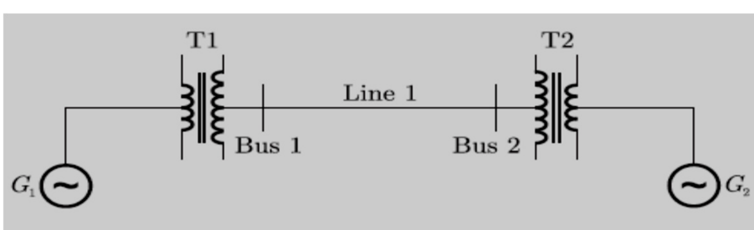
(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

End Semester Examination – April/May – 2017

			Semester	**:**	**2016-17 EVEN**
Code	**:**	**14EE2014**	**Duration**	**:**	**3hrs**
Sub. Name :		**Power System Analysis**	**Max. marks :**		**100**

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks
1.	a.	Power system analysis is very important in planning and operation of power system. Justify.	CO1	5
	b.	Formulate the Ybus for the system shown in the figure with element impedances marked in p.u using singular transformation.  	CO1	15
(OR)				
2.	a.	Distinguish between Type-1 and Type-4 modifications in Zbus formulation.	CO1	5
	b.	For the power system shown in the figure below, the specifications of the components are the following : 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: 200 kV, X = 150 ohms Choose 25 kV as the base voltage at the generator G1, and 200 MVA as the MVA base. Draw the reactance diagram with the quantities marked in p.u  	CO1	15
3.	a.	How will you select the circuit breaker rating to interrupt fault current?	CO2	5
	b.	Derive the expression for fault current due to line to line fault. Show how the sequence networks are connected for this fault.	CO2	15
(OR)				

4.	a.	Derive the expression for power in-terms of symmetrical components.	CO2	5
	b.	The Zbus of a three bus power system is given. If a symmetrical short-circuit fault occurs at i) bus 2 thoguh zero fault impedance and at ii) bus 3 with j0.6 pu fault impedance, find the fault current and fault voltages during the fault at all the buses in both the cases. Write the inference from the two set of results. $Z_{bus} = \begin{bmatrix} j0.12 & j0.08 & j0.04 \\ j0.08 & j0.12 & j0.06 \\ j0.04 & j0.06 & j0.08 \end{bmatrix}$	CO2	15
5.	a.	Write the objective of load flow analysis. How will you utilize the results of load flow analysis?	CO2	5
	b.	For the given power system, carry out the power flow analysis using Gauss-Seidal method for one iteration without using acceleration factor. $Y_{bus} = \begin{bmatrix} 3-j9 & -2+j6 & -1+j3 & 0 \\ -2+j6 & 3.6667-j11 & -0.6667+j2 & -1+j3 \\ -1+j3 & -0.6667+j2 & 3.6667-j11 & -2+j6 \\ 0 & -1+j3 & -2+j6 & 3-j9 \end{bmatrix}$	CO2	15

Bus #	Power Injection (p.u)		Voltage (p.u)	
	P	Q	Magnitutde	Phase Angle
1	----	----	1.04	0^0
2	0.5	-0.2	----	----
3	-1	0.5	----	----
4	0.3	-0.1	----	----

(OR)

6.	a.	List the assumbtions made in FDLF. Write the power flow equations for FDLF.	CO2	5
	b.	With the help of a flow-chart, explain how power flow analysis is carried out by N-R method.	CO2	15
7.	a.	Formulate the electric power scheduling as an optimization problem.	CO3	5
	b.	The fuel cost characteristics of four power plants are given by $F_1=0.0412P_1^2+7.21P_1+510$ ₹/hr $F_2=0.0194P_2^2+7.85P_2+310$ ₹/hr $F_3=0.0480P_3^2+7.97P_3+200$ ₹/hr $F_4=0.0340P_4^2+6.40P_4+300$ ₹/hr The power generation limits are Plant 1: $150\leq P_1\leq 600$ MW Plant 2: $100\leq P_2\leq 500$ MW Plant 3: $50\leq P_3\leq 250$ MW Plant 4: $100\leq P_4\leq 350$ MW Find the ED schedule and the total fuel cost for a demand 0f 1250MW.	CO3	15

(OR)

8.	a.	Define UC. List the algorithms available to solve UC.	CO3	5
	b.	Formulate the STHTS as an optimization problem. Clearly state various contraints.	CO3	15
		Compulsory:		
9.	a.	Define Power Quality. Mention two important power quality monitoring standards.	CO3	5
	b.	Write the swing equation. With the help of a flow chart, explain how the swing equation is solved by the second order Runge-Kutta (R-K) method.	CO2	15

ALL THE BEST