SIDDHARTH INSTITUTE OF ENGINEERING&TECHNOLOGY:PUTTUR
(AUTONOMOUS)

(Approved by AICTE, New Delhi & Affiliated to JNTUA, Ananthapuramu)
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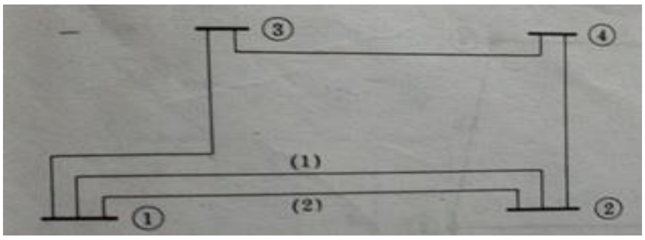
QUESTION BANK (DESCRIPTIVE)

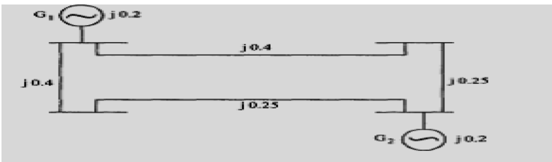
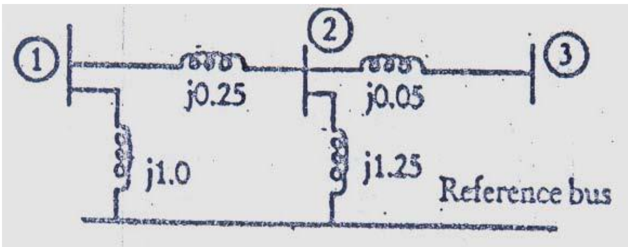
Subject with Code : Power System Analysis (20EE0223)

Course & Branch: B. Tech -EEE

Year & Semester: III- B. Tech. & II-Semester **Regulation:**R20

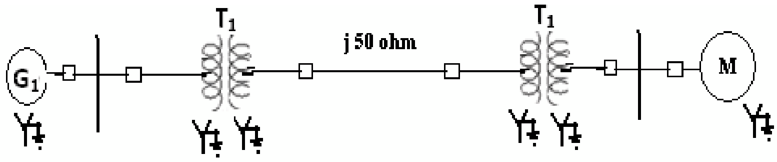
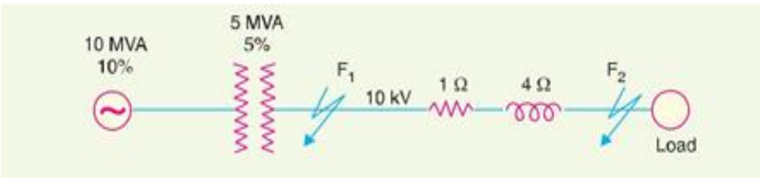
UNIT –I
POWER SYSTEMS NETWORK MATRICES

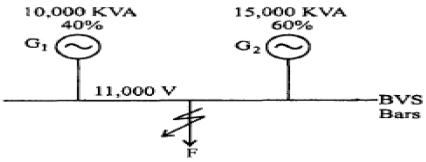
<table>
<tr><td>1</td><td>a)</td><td>What are the different power system elements in the power system network?</td><td>[L2][CO1][6M]</td></tr>
<tr><td></td><td>b)</td><td>Define the terms i) Graph ii) Sub-graph iii) Tree iv) Co-tree v)Planar Graph vi) Branch and Links</td><td>[L3][CO1][6M]</td></tr>
<tr><td>2</td><td>a)</td><td>What are Incidence matrices?</td><td>[L2][CO1][2M]</td></tr>
<tr><td></td><td>b)</td><td>Explain about the formation of Bus Incidence matrix by taking suitable example</td><td>[L2][CO1][8M]</td></tr>
<tr><td>3</td><td></td><td>For the network shown below. Draw the Oriented graph from that find Bus Incident matrix [A].

</td><td>[L3][CO1][12M]</td></tr>
<tr><td>4</td><td></td><td>Derive the expression for the Direct inspection method for a 3 Bus power system network.</td><td>[L3][CO1][12M]</td></tr>
<tr><td>5</td><td></td><td>For the following data form the bus admittance matrix by using By Direct inspection Method if the line series impedances are as given.
<table>
<tr><td>1-2</td><td>0.15+j0.6 p.u</td></tr>
<tr><td>1-3</td><td>0.1+ j0.4 p.u</td></tr>
<tr><td>1-4</td><td>0.15+j0.6 p.u</td></tr>
<tr><td>2-3</td><td>0.05+5j0.2 p.u</td></tr>
<tr><td>3-4</td><td>0.05+j0.2 p.u</td></tr>
</table></td><td>[L3][CO1][12M]</td></tr>
<tr><td>6</td><td>a)</td><td>What is a primitive network and represents its forms?</td><td>[L1][CO1][4M]</td></tr>
<tr><td></td><td>b)</td><td>Prove $Y_{BUS} = A^T [Y] A$ using singular transformation.</td><td>[L3][CO1][8M]</td></tr>
</table>

7		Form the YBUS by using singular transformation for the network shown below. Including the generator buses.  	**[L3][CO1][12M]**
8	**a)**	Derive the necessary expressions for building up of Z-bus whenNew element is added to Reference.	**[L2][CO1][6M]**
	b)	Derive the necessary expressions for building up of Z-bus whenNew element is added between New bus to old bus.	**[L2][CO1][6M]**
9	**a)**	Derive the necessary expressions for building up of Z-bus when Element added between Old bus to Reference Bus	**[L2][CO1][6M]**
	b)	Derive the necessary expressions for building up of Z-bus when Element added between Two Old buses	**[L2][CO1][6M]**
10		Find the bus impedance matrix for the system whose reactance diagram as shown below. All the impedances are in p.u.  	**[L3][CO1][12M]**

UNIT –II

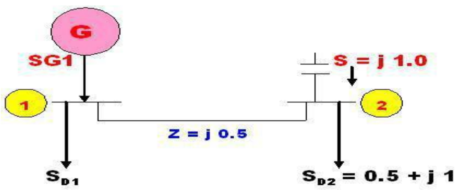
SHORT CIRCUIT ANALYSIS

1	**a)**	Define per unit system and write an equation for new base impedance?	**[L2][CO2.[4M]**
	b)	Draw the Per Unit equivalent reactance network of a three-phase powe system consisting of a generator, transmission line, transformer, and motor.	**[L1][CO2][8M]**
2		Draw the reactance diagram for the power system shown in fig. Neglect resistance and use a base of100MVA, 220KV in 50KΩ line. The ratings of the generator motor and transformer are given below.Generator: 40MVA,25KV,X=20% Motor: 50MVA,11KV,X=30%Y-Y Transformer: 40MVA,33Y - 220YKV,X=15% Y-Y Transformer: 30MVA, 11Y -220Y KV,X=15%.  	**[L2][CO2]12M]**
3		Explain about Short Circuit KVA and short-circuit current.	**[L4][CO2][12M]**
4		A 3-phase transmission line operating at 10 kV and having a resistance of 1Ωand reactance of 4 Ω is connected to the generating station bus-bars through 5 MVA step-up transformer having a reactanceof 5%. The bus bars are supplied by a 10 MVA alternator having 10% reactance. Calculate the shortcircuit kVA fed to a symmetrical fault between phases if it occurs (i) at the load end of the transmission line (ii) at the high voltage terminals of the transformer.  	**[L3][CO2][12M]**

5		What is the fault level? Consider the system shown in Fig below, The percentage of reactance each alternator is expressed on its own capacity determine the short circuit current that will flow into a dead 3 – Ø short circuit at F.  	**[L3][CO2][12M]**
6	**a)**	Explain different types of reactors briefly.	**[L2][CO2][6M]**
	b)	Explain the merits and demerits of different types of system protection using reactors.	**[L2][CO2][6M]**
7	**a)**	Define positive, negative, and zero sequences components in 3 phase systems.	**[L3][CO2][6M]**
	b)	Explain about sequential components for star connected load.	**[L3][CO2][6M]**
8		Discuss the principle of symmetrical components. Derive the necessary equations to convert: (i) Phase quantities into symmetrical components. (ii) Symmetrical components into phase quantities.	**[L2][CO2][12M]**
9	**a)**	Derive an expression for the fault current for the LG fault. i)with impedance ii)without impedance	**[L3][CO3][6M]**
	b)	Derive an expression for the fault current for the LL fault i)with impedance ii)without impedance	**[L3][CO3][6M]**
10	**a)**	A three phase generator with constant terminal voltages gives the following currents when under fault: 1400 A for a line-to-line fault and 2200 A for a line-to-ground fault. If the positive sequence generated voltage to neutral is 2 ohms, find the reactance of the negative and zero sequence currents.	**[L2][CO3][6M]**
	b)	Derive an expression for the fault current for the LLG fault.	**[L2][CO3][6M]**

UNIT –III

POWER FLOW STUDIES-I

1	**a)**	What is load flow analysis? What is the necessity for load flow studies?	**[L2][CO2][6M]**
	b)	Explain the data for Load flow studies.	**[L1][CO2][6M]**
2		Derive and explain about static load flow equations.	**[L3][CO2]12M]**
3		Write short notes on (i)Load Bus (ii) generator bus (iii)Slack bus	**[L4][CO2][12M]**
4	**a)**	What is Acceleration factor and Explain its role gauss seidel method?	**[L1][CO2][8M]**
	b)	State merits and demerits of Gauss-Seidel method.	**[L2][CO2][4M]**
5		Write step by step algorithm for Gauss-seidel method with PV buses.	**[L3][CO2][12M]**
6		Draw the flow chart for Gauss-Seidel method with PV buses and explain	**[L2][CO2][12M]**
7		Explain the algorithm of Gauss-Seidel method without PV buses.	**[L4][CO2][12M]**
8		Explain with a neat flow chart for Gauss-Seidel method without PV buses.	**[L3][CO2][12M]**
9	**a)**	State limitations of Gauss-Seidel method	**[L1][CO3][6M]**
	b)	What are the Known and Unknown parameters of each bus in Power system network and explain briefly	**[L1][CO3][6M]**
10	**a)**	Obtain the voltage at bus 2 for the simple system shown in Figure, using the Gauss-Seidel method, if V1 = $1\angle 0^0$pu. 	**[L2][CO3][12M]**

UNIT-IV

POWER FLOW STUDIES-II

1		Write an Algorithm for N-R Rectangular Coordinate Method when PV Bus is absent.	**[L2][CO5][12M]**
2		Draw a Flow Chart for N-R Rectangular Coordinate Method when PV Bus is absent.	**[L3][CO5][12M]**
3		Write Step by step algorithm for N-R Rectangular Coordinate Method when PV Bus is present.	**[L2][CO5][12M]**
4		With neat sketch explain the Flow Chart for N-R Rectangular Coordinate Method when PV Bus is present.	**[L2][CO5][12M]**
5		Develop an Algorithm for N-R Polar Coordinate Method when PV Bus is absent.	**[L2][CO5][12M]**
6		Explain with a Flow Chart for N-R Polar Coordinate Method when PV Bus is absent.	**[L3][CO5][12M]**
7		Write an Algorithm for N-R Polar Coordinate Method when PV Bus is present.	**[L2][CO5][12M]**
8		Draw and explain the Flow Chart for N-R Polar Coordinate Method when PV Bus is present.	**[L4][CO5][12M]**
9	**a)**	Explain about Decoupled Load Flow Method.	**[L3][CO5][6M]**
	b)	Explain about Fast Decoupled Load Flow Method.	**[L4][CO5][6M]**
10	**a)**	Write the Comparison of Gauss-Seidel & Newton Rapson Method.	**[L4][CO5][6M]**
	b)	What are the Comparisons of Decoupled & Fast Decoupled Methods	**[L1][CO5][6M]**

UNIT-V

POWER SYSTEM STABILITY ANALYSIS

1	**a)**	What is stability? Explain different types of stabilities.	**[L1][CO6][6M]**
	b)	What is steady state stability and define steady state stability limit.	**[L1][CO6][6M]**
2		Explain the Factors effecting the Transient stability.	**[L2][CO6][12M]**
3		Explain about steady-state stability power limit.	**[L2][CO6][12M]**
4	**a)**	Derive and explain about Synchronous power coefficient	**[L3][CO6][6M]**
	b)	Explain about power angle curve.	**[L4][CO6][6M]**
5		Discuss the various methods of improving steady state stability.	**[L2][CO6][12M]**
6		State and derive swing equation?	**[L2][CO6][12M]**
7		Discuss the various methods of improving transient state stability.	**[L2][CO6][12M]**
8	**a)**	What is equal Area Criteria? What are the applications of equal area criterion?	**[L1][CO6][4M]**
	b)	50Hz,4 pole turbo alternator rated 100MVA, 11KV has an inertia constant of 8 MJ/MVA. Find: (i)The energy stored in the rotor at synchronous speed. (ii)The rotor acceleration if the mechanical input is suddenly raised to 80MWfor an electric load	**[L3][CO6][8M]**
9	**a)**	What is critical clearing angle? Explain by using Swing curves.	**[L2][CO6][7M]**
	b)	Derive an expression for critical clearing angle.	**[L2][CO6][5M]**
10		A Large generator is delivering 1.0pu power to an initiate bus through a transmission network. The maximum powerswitch can be transferred for pre fault,during fault and post fault conditions are 1.8p.u,0.4p.u and 1.3p.u respectively find the critical clearing angle	**[L3][CO6][12M]**

Prepared by N.BINDU MADHAVI