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B.M.S. College of Engineering, Bengaluru-560019

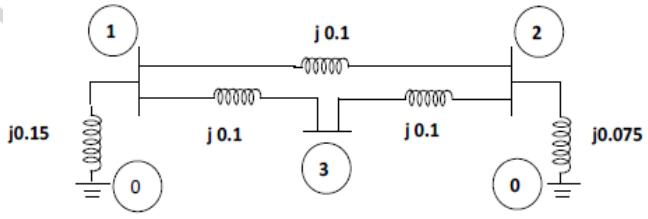
Autonomous Institute Affiliated to VTU

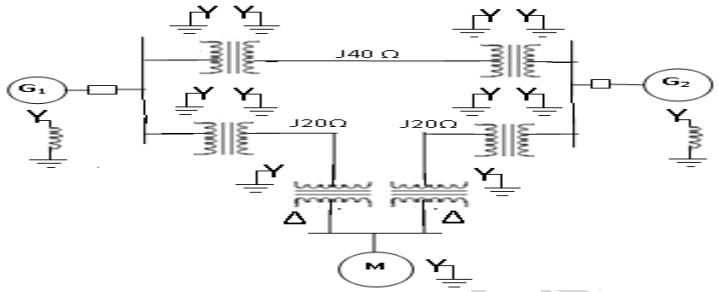
September / October 2024 Supplementary Examinations

Programme: B.E. **Semester: VI**
Branch: Electrical and Electronics Engineering **Duration: 3 hrs.**
Course Code: 19EE6PCPS1 **Max Marks: 100**
Course: Power Systems - I

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	Draw the online line symbols of power systems. How will you change the base impedance from one set of base values to another set?	CO1	PO1	**06**
	b)	What are the advantages of Per Unit system?	CO1	PO1	**04**
	c)	Two generators rated 10 MVA, 13.2 KV and 15 MVA, 13.2 KV are connected in parallel to a bus bar. They feed supply to 2 motors of inputs 8 MVA and 12 MVA respectively. The operating voltage of motors is 12.5 KV. Assuming the base quantities as 50 MVA, 13.8 KV, draw the per unit reactance diagram. The percentage reactance for generators is 15% and that for motors are 20%.	CO1	PO2	**10**
		UNIT - II			
2	a)	Develop an expression for the short circuit during symmetrical fault on a transmission line including waveforms.	CO1	PO2	**10**
	b)	Obtain Zbus by building algorithm method for the Fig 2. (b). all values are in impedance form.  Fig 2.(b).	CO1	PO2	**10**
		OR			
3	a)	Analyze and develop the doubling effect of the short circuit during symmetrical fault on a transmission line with waveforms.	CO1	PO2	**10**
	b)	Develop step by step procedure for Z-bus building Algorithm using the type1-4 modification.	CO1	PO2	**10**

			UNIT - III			
	4	a)	The line b of a 3-phase line feeding a balanced Y-load with neutral grounded is open resulting in line currents: $I_a = 10\angle 0^\circ\ A;\ I_c = 10\angle 120^\circ A$. Evaluate the sequence current components.	*CO2*	*PO2*	**06**
		b)	Draw different configuration of transformer for zero sequence networks.	*CO2*	*PO1*	**06**
		c)	Obtain positive, negative and zero sequence network of the electrical power system shown in Figure .4.c, mark all impedance values in per unit on the base of 50MVA in 40-ohm transmission line. The machine ratings are: Generator: $G_1$and G_2: 20MVA, 13.2KV, X" =15% Motor: 30MVA, 6.9KV Sub transient reactance: X" =20% 3Ø Y-Y Transformer: 20MVA 13.8/138 KV, Reactance=10% 3Ø Y-ΔTransformer :15MVA 6.9/138 KV, Reactance=10%  Figure .4.c	*CO2*	*PO2*	**08**
			UNIT - IV			
	5	a)	Analyze and obtain an expression for fault current, line current for double line to ground fault on unloaded generator through impendence. Draw the inter connection of sequence network.	*CO3*	*PO2*	**10**
		b)	Analyze and obtain an expression for fault current, line current for single line to ground fault on unloaded generator through impendence. Draw the inter connection of sequence network.	*CO3*	*PO2*	**10**
			UNIT - V			
	6	a)	Analyze and develop the relation for power-angle equation of a salient pole Synchronous machine connected to an infinite bus and also draw the power angle curve.	*CO3*	*PO2*	**10**
		b)	Evaluate the steady state stability limit (SSSL) of a system consisting of a generator of equivalent reactance 0.5 p.u. connected to an infinite bus through a series reactance of 1.0 p.u. The terminal voltage of the generator is held at 1.2 p.u and voltage of the infinite bus is 1.0 p.u.	*CO3*	*PO2*	**10**
			OR			
	7	a)	Analyze and develop an expression for application of equal area criterion with the case for Sudden change in input.	*CO3*	*PO2*	**10**
		b)	Explain the following: 1. Rotor angle stability 2. Transient stability 3. Transient stability limit 4. Dynamic stability 5. Voltage stability	*CO3*	*PO2*	**10**

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