Course Code: 1950209 **MLRS- R19**

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INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
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III B.Tech I Sem Supply End Examination, July 2022

Power Systems – II

(EEE)

Time: 3 Hours. **Max. Marks: 70**

Note: 1. Question paper consists: Part-A and Part-B.
2. In Part – A, answer all questions which carries 20 marks.
3. In Part – B, answer any one question from each unit.
Each question carries 10 marks and may have a, b as sub questions.

PART- A

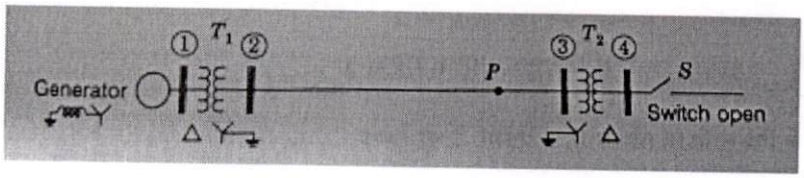
(10*2 Marks = 20 Marks)

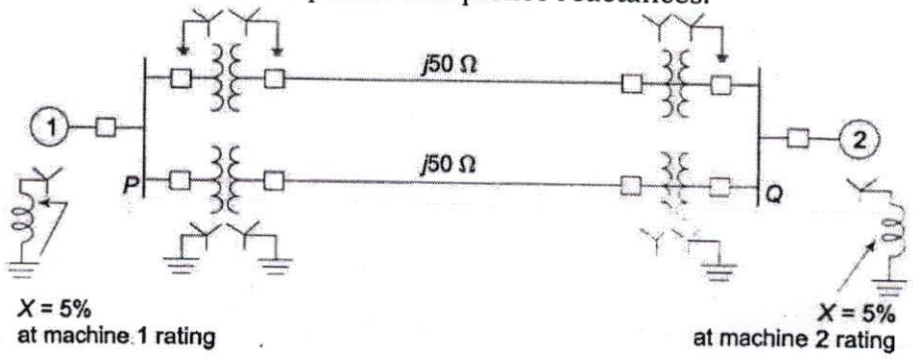
1.	a)	What is electrical length of the line?	2M	CO1	BL
	b)	Give the A,B,C,D constant in terms of line parameters.	2M	CO1	BL
	c)	Briefly discuss about loadability characteristics of a Transmission line.	2M	CO2	BL
	d)	Compare switched capacitor and Synchronous phase modifier type voltage compensation.	2M	CO2	BL
	e)	Explain reflection and refraction co-efficient of a travelling voltage wave at T-junction.	2M	CO3	BL
	f)	What is Bewley's Lattice Diagrams? Mention their advantages.	2M	CO3	BL
	g)	Define Insulation Coordination.	2M	CO4	BL
	h)	What is a Horn-Gap? Explain briefly.	2M	CO4	BL
	i)	Define Short circuit MVA rating of a bus.	2M	CO5	BL
	j)	What are Symmetrical components? Explain their role in Fault Analysis.	2M	CO5	BL

PART- B

(10*5 Marks = 50 Marks)

2	a)	Define regulation and efficiency of transmission line. Derive the expression for regulation of the line.	5M	CO1	BL
	b)	Explain Ferranti effect with the help of a phasor diagram.	5M	CO1	BL
		OR			
3		A three phase 50 Hz transmission line is of 100km long and delivers 25MW Power at 0.85 pf lagging at 110kV. The resistance and reactance of the line per km per phase are 0.3Ω and 0.9Ω respectively. The line charging admittance is 0.3×10^{-6} mho per km per phase. Compute by applying the nominal Π method the voltage regulation and transmission efficiency.	10M	CO1	BL
4	a)	Explain the Voltage control using Synchronous Phase modifier.	5M	CO2	BL

		Draw the relevant phasor diagram.			
	b)	Explain the necessity of Transmission Line compensation.	5M	CO2	BL
		OR			
5		Explain the concept of shunt and series compensation of Transmission line using Capacitors.	10M	CO2	BL
6	a)	What is travelling wave? Explain the development of such a wave on an overhead line.	5M	CO3	BL
	b)	An overhead line with surge impedance 400 ohms bifurcates into two lines of surge impedance 400 ohms and 40 ohms respectively. If a surge of 20 kV is incident on the overhead line, determine the magnitudes of voltage and current which enter the bifurcated lines.	5M	CO3	BL
		OR			
7		The single-line diagram of a small power system is shown in figure below. The ratings and reactances of the generator and transformers are Generator: 100 MVA, 20 kV; $X'' = X_2 = 20\%$, $X_0 = 4\%$, $X_n = 5\%$. Transformer T_1 and T_2 : 100 MVA, 20Δ/345Ykv; $X = 10\%$. Transmission Line: X_l=10% On a common base of 100 MVA, 345 kV in the transmission line circuit draw the positive sequence reactance diagram 	10M	CO3	BL
8	a)	Briefly explain the occurrence of over-voltages due to arcing ground.	5M	CO4	BL
	b)	Explain types of over-voltage protection systems employed in the power system at various operating voltage levels.	5M	CO4	BL
		OR			
9		With the help of a neat diagram explain the construction and working principle of Valve-Type Lightning Arrester.	10M	CO4	BL
10	a)	Explain the necessity of Short Circuit Analysis and also give brief classification of types of faults? Compare their severity (in terms of fault current) and probability of occurrence?	5M	CO5	BL
	b)	Draw the positive, negative and zero sequence impedance networks for the power system shown in below figure. Choose a base of 50MVA, 220kV in the 50Ω transmission lines, and mark all reactances are in pu. The ratings of the generators and transformers are: Generator 1 and 2 : 25 MVA, 11 kV, X" = 20% Three-phase transformer (each):20MVA, 11Y/220Y kV, X=I5%. The negative sequence reactance of each synchronous machine is equal to its sub-transient reactance. The zero sequence reactance of each machine is 8%. Assume that the zero sequence reactances of	5M	CO5	BL

		lines are 250% of their positive sequence reactances.  			
		OR			
11		A synchronous generator and motor are rated 30,000kVA, 13.2kV, and both have sub-transient reactances of 20%. The line connecting them has a reactance of 10% on the base of the machine ratings. The motor is drawing 20,000kW at 0.8 power-factor leading and a terminal voltage of 12.8kV when a symmetrical three-phase fault occurs at the motor terminals. Find the sub-transient currents in the generator, the motor and in the fault.	10M	CO5	BL

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BL: Blooms Taxonomy Levels

Note: 1. Font style: Cambria.

2. Bloom's Taxonomy Level (BL) have to mention for each question. For reference, find the attachment in the mail.