NARASIMHA REDDY ENGINEERING COLLEGE
(Autonomous)
Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad
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ELECTRICAL AND ELECTRONICS ENGINEERING

QUESTION BANK

Course Title: POWER SYSTEMS- II

Course Code: EE3102PC

Regulation:

NR20

Course Objectives

- To analyze the performance of transmission lines.
- To understand the voltage control and compensation methods.
- To understand the per unit representation of power systems. And examine the performance of travelling waves.
- To know the methods of overvoltage protection and Insulation coordination of transmission lines
- To know the symmetrical components and fault calculation analysis

Course Outcomes (CO's)

- Analyze transmission line performance.
- Apply load compensation techniques to control reactive power
- Apply the application of per unit quantities.
- Design over voltage protection and insulation coordination
- Determine the fault currents for symmetrical and unbalanced faults

UNIT–I

Performance of Lines

S.No		Questions	BT	CO	PO
Part – A (Short Answer Questions)					
1		How transmission lines are classified	L1	CO1	1,2
2		Draw the nominal T model of a transmission line	L4	CO1	1,2
3		Define the voltage regulation in transmission lines	L3	CO1	1,2
4		Write A, B, C and D constants of a short transmission line	L1	CO1	1,2
5		What are ABCD constants in a medium transmission line	L1	CO1	1,2
6		Draw the nominal Π model of a transmission line	L4	CO1	1,2
7		Define the transmission efficiency of a transmission lines	L3	CO1	1,2
8		What is Ferranti Effect in transmission system	L1	CO1	1,2
9		Write the receiving end active and reactive power expressions	L1	CO1	1,2
10		Write the receiving end active and reactive power expressions	L1	CO1	1,2
Part – B (Long Answer Questions)					
11	a)	What is a transmission line? Give its applications	L1	CO1	1,5
	b)	Explain the performance of medium transmission line using nominal T method	L2	CO1	1,2
12	a)	List the classification of transmission lines	L4	CO1	1
	b)	Explain the performance of medium transmission line using nominal π method	L2	CO1	1,2
13	a)	What is Ferranti Effect? Explain in details	L1	CO1	1,2
	b)	A 3-phase overhead short transmission line delivers 1100 KW at 33KV at 0.8 P.F lagging. The total resistance and inductive reactance per phase of the line are 10K ohm & 15K ohm respectively. Find sending end voltage, sending end PF, percentage efficiency & percentage regulation	L5	CO1	2
14	a)	The constants of a 3-phase line are A= 0.9∟2 0 and B=14∟70 0 Ω/phase. The line delivers 60 MVA at 132KV and 0.8 P.F lag. Draw circle diagram and find (a). Sending end voltage & amp; power angle (b). Maximum power (c). Sending end power and power factor (d). Line losses.	L5	CO1	2
	b)	Discuss the construction procedure of receiving end power circle diagram of a transmission line	L6	CO1	3
15	a)	Explain the power flow in a transmission line and obtain the active and reactive power Expressions	L2	CO1	1,2
	b)	Input to a single-phase short line is 2000 KW at 0.8 pf lagging.	L1	CO1	2

		The line has a series impedance of (0.4+j0.4) ohms. If the load voltage is 3 KV, find load and receiving end power factor. Also find supply voltage and supply power factor.			
16	a)	Discuss why equivalent π circuit of a long line is preferred over the equivalent T circuit	L6	CO1	1,5
	b)	Discuss the construction of sending end power circle diagram of a transmission line	L6	CO1	2

UNIT–II

Voltage Control

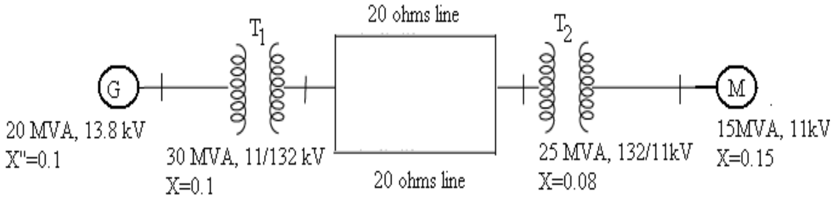
S.No		Questions	BT	CO	PO
Part – A (Short Answer Questions)					
1		What is the importance of voltage control in the modern power system.	L1	CO2	1.2
2		What are the various methods of voltage control in a power system	L1	CO2	1,2
3		What are the limitations off-load tap changing transformer method of voltage control	L1	CO2	1,2
4		Why Voltage control equipment is generally located at more than one point.	L2	CO2	1,2
5		Why Tap-changing is generally performed on load.	L2	CO2	2
6		Why do we use overshooting the mark principle in automatic voltage regulators	L2	CO2	2
7		Draw the connection diagram for On-load tap-changing transformer	L4	CO2	3
8		Draw the connection diagram for Auto-transformer tap-changing	L4	CO2	3
9		What are the limitations on-load tap changing transformer method of voltage control	L1	CO2	1
10		What are the sources of reactive power? How it is controlled	L1	CO2	1
Part – B (Long Answer Questions)					
11	a)	what are the different voltage control methods of transmission line	L1	CO2	1,2
	b)	Explain the voltage control in a transmission line by using shunt reactor	L2	CO2	1,2
12	a)	Explain the voltage control by using phase modifiers in a transmission line.	L2	CO2	1,2
	b)	what are the disadvantages of dynamic voltage control devices compared to static devices in a transmission line	L1	CO2	1,2
13	a)	What is the need of voltage control in a power system?	L1	CO2	1
	b)	Explain the voltage control by using shunt capacitors in a transmission line	L2	CO2	1,2
14	a)	Explain the voltage control in a transmission line by using tap changing transformers	L2	CO2	1,2
	b)	At an industrial sub-station with a 4 MW load, a capacitor of 2 MVAR is installed to maintain the load P.F of 0.97 lag. If the capacitor bank is out of service, what is the load power factor	L1	CO2	2
15	a)	Explain about the load compensation in power system	L2	CO2	2
	b)	Explain the working of on-load tap changing transformer for voltage control	L2	CO2	1
16	a)	Explain series and shunt compensation of lines and discuss their	L2	CO2	2

		effect on the surge impedance loading of the lines. If shunt compensation is 100%, what happens to SIL and voltage profile.			
	b)	A radial long uncompensated line with constant sending end voltage is terminated through an asynchronous load, derive an expression for maximum power transfer when termination is through a variable resistance.	L3	CO2	1

UNIT–III

Per Unit Representation of Power Systems

S.No		Questions	BT	CO	PO
Part – A (Short Answer Questions)					
1		What is the per unit impedance Z(pu)	L1	CO3	1
2		Calculate the per- unit synchronous reactance on the base value of 200 MVA and 20 KV when a 100 MVA with 20 KV synchronous generator has 1 pu synchronous reactance	L5	CO3	2
3		Why the load current in short circuit calculations are neglected	L2	CO3	1
4		What is proximity effect	L1	CO3	1
5		What is the per unit value of a 2 ohm resistor at 100 MVA and 10 kV base voltage	L1	CO3	2
6		Explain about termination of line with open circuit for travelling wave	L2	CO3	1
7		The base value of a power system is chosen based upon which considerations	L1	CO3	1
8		Tell brief about power loss due to corona	L1	CO3	1
9		What is the coefficient of reflection for current for an open ended line	L1	CO3	1
10		An overhead line with surge impedance of 400 Ω is terminated through a resistance R. A surge traveling over the line will not suffer any reflection at the junction, then what is the value of R	L1	CO3	2
Part – B (Long Answer Questions)					
11	a)	Explain the p.u. system of analyzing power system problems. Discuss the advantages of this method over the absolute method of analysis.	L5	CO3	1,2
	b)	A synchronous generator having 75 MVA, 10 KV, X d =0.4 pu. Calculate the value in pu to a base of 100 MVA, 11 KV	L5	CO3	2
12	a)	Obtain the expression for velocity of a travelling wave of short transmission line	L3	CO3	3
	b)	A 3-Ø generator with rating 1000KVA, 66 KV has its armature resistance and synchronous reactance as 60Ω/phase and 90Ω/phase. Calculate p.u impedance of the generator	L5	CO3	2
13	a)	Explain about the termination of transmission line through open ended line	L2	CO3	1
	b)	A generator is rated 600MVA, 35kV. Its star-connected winding has a reactance of 1.4p.u. Find the ohmic value of the reactance of winding	L1	CO3	2
14	a)	Surge of 100 KV travelling in a line of natural impedance 600 ohm arrives at a junction with two lines of impedance 800 ohm and 200 ohm respectively, Find the surge voltage and current transmitted into the line.	L5	CO3	2
	b)	If the generator is working in a circuit for which the specified values are 400MVA, 30KV, then find the p.u value of reactance of generator winding on the specified base.	L1	CO3	2
15	a)	Explain about the termination of transmission line through capacitance	L2	CO3	1

	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.	L5	CO3	2
16		Draw the per unit impedance diagram of the network shown in the figure. Choose base quantities as the generator values 	L6	CO3	2

UNIT–IV

Overvoltage Protection and Insulation Coordination

S.No		Questions	BT	CO	PO
Part – A (Short Answer Questions)					
1		Discuss the causes of over voltages.	L6	CO4	1
2		What is lightning? Give the various types of lightning strokes	L1	CO4	1
3		How do earthling screen provide protection against direct lightning strokes	L3	CO4	1
4		How do ground wires provide protection against direct lightning strokes	L3	CO4	1
5		What is the basic principle of operation of a surge diverter	L1	CO4	1
6		What is a surge absorber	L1	CO4	1
7		Why are steep fronted surges more dangerous to power system equipment	L1	CO4	1
8		What are the harmful effects of lightning	L1	CO4	1
9		Explain Horn gap diverter	L2	CO4	1
10		Why are surge diverters located very close to the equipment to be protected	L2	CO4	1
Part – B (Long Answer Questions)					
11	a)	What are the different types of lightning arresters	L1	CO4	1,2
	b)	Explain about the construction and working of valve type of lightning arrester	L2	CO4	1,2
12	a)	Explain the working of Ground wires and Ground rods	L2	CO4	1,2
	b)	Explain the working of counter poise	L2	CO4	1
13	a)	What are the causes of over voltage in power system	L1	CO4	1
	b)	Explain about the construction and working of Expulsion type of lightning arrester	L2	CO4	1,2
14	a)	What is insulation co-ordination. Explain volt-time curves of protective devices	L1	CO4	1,2
	b)	what are the different types of faults	L1	CO4	1,2
15	a)	Explain about the over voltage due to arcing ground and working of Peterson coil	L2	CO4	1,2
	b)	Discuss the construction and working of horn-gap	L6	CO4	1,2
16	a)	Explain about the surge protection in rotating machines	L2	CO4	1,2
	b)	Explain the working of surge absorber	L2	CO4	1,2

UNIT–V

Symmetrical Components and Fault Calculations

S.No		Questions	BT	CO	PO
Part – A (Short Answer Questions)					
1		What is meant by a fault	L1	CO5	1
2		Why fault occur in a power system	L1	CO5	1
3		List the various types of shunt and series faults	L4	CO5	1
4		What is symmetrical and unsymmetrical faults	L1	CO5	1
5		List any two methods of reducing short –circuit current	L4	CO5	1
6		What are different types of symmetrical components	L1	CO5	1
7		Define negative sequence component	L2	CO5	1
8		What is meant by short circuit fault	L1	CO5	1
9		Define zero sequence component	L2	CO5	1
10		What assumption is made at the star / delta transformer	L1	CO5	1
Part – B (Long Answer Questions)					
11	a)	Explain the method of fault calculation for single line to ground	L2	CO5	1,2
	b)	Obtain expression of three phase power in terms of sequences component		CO5	3
12	a)	Explain about the significance of positive, negative and zero sequence components	L2	CO5	3
	b)	Discuss phase shifting in star-delta transformers		CO5	1
13	a)	Explain the method of fault calculation for line to line fault	L2	CO5	2
	b)	Derive an expression for the fault current for a double line to ground fault as an unloaded generator and draw its equivalent circuit	L6	CO5	3
14	a)	Explain the double line to ground fault for the significance of sequence component equations	L2	CO5	1
	b)	Discuss the significance of zero sequence circuit. Why should Zn appear as 3Zn in zero sequence equivalent circuit		CO5	1,2
15	a)	Explain the method of fault calculation for single line to ground with fault impedance Z_f	L2	CO5	1,2
	b)	What is 3 phase unsymmetrical fault? Discuss any one type of unsymmetrical in brief.	L1	CO5	3
16		A generator rated 120MVA, 11KV has X1=X2= 30% and X0= 15%. Its neutral is grounded through a reactance of 0.1 ohm. The generator is operating at rated voltage , load is disconnected from the system when double line to ground fault occurs at its terminals. Find the sub-transient current in the faulted phases and line to line fault current.	L5	CO5	3

* **Blooms Taxonomy Level (BT)** (L1 – Remembering; L2 – Understanding; L3 – Applying; L4 – Analyzing; L5 – Evaluating; L6 – Creating)

Course Outcomes (CO)

Program Outcomes (PO)

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