Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B.Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, NOV / DEC 2024

ELECTRICAL AND ELECTRONICS ENGINEERING

V Semester

EE5503 – TRANSMISSION AND DISTRIBUTION

(Regulation2019)

Time:3hrs Max.Marks: 100

CO1	To impart knowledge about the configuration of the electrical power system
CO2	To study the line parameters and interference with neighbouring circuits
CO3	To analyse and model different components of power system
CO4	To learn different insulators and underground cables
CO5	To compute sag and conductor length for different weather conditions

BL – Bloom's Taxonomy Levels

(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART- A(10x2=20Marks)

(Answer all Questions)

Q.No.	Questions	Marks	CO	BL
1	What is meant by distributor?	2	CO1	L1
2	A two wire DC distributor 300 m long is uniformly loaded with 2A/m. Resistance of single wire is 0.3Ω/km. If the distributor is fed at one end, calculate its maximum voltage drop	2	CO1	L2
3	Define proximity effect	2	CO2	L1
4	Distinguish between self GMD and mutual GMD	2	CO2	L2
5	Classify transmission lines based on their length	2	CO3	L1
6	Define transmission efficiency	2	CO3	L2
7	Mention any two types of insulators	2	CO4	L1
8	Draw single core cable and mark various parts	2	CO4	L2
9	What is meant by tower spotting?	2	CO5	L1
10	State the merits of steel towers	2	CO5	L2

PART- B(5x 13=65Marks)

(Restrict to a maximum of 2 subdivisions)

Q.No.	Questions	Marks	CO	BL
11 (a)	(i) Describe requirements of a good distribution system	6	CO1	L3
	(ii) A two wire distributor cable AB is 2km long and supplies loads of 50A, 100A and 150A situated at 0.4 km, 1km and 1.6 km from point A. Each conductor has a resistance of 0.05Ω/km. Calculate potential difference at each point if a potential difference of 400V is maintained at point A.	7	CO1	L4
	OR			
11 (b)	(i) Discuss advantages and disadvantages of HVAC and HVDC transmission systems	6	CO1	L3
	(ii) A ring main system has length of 300m and fed at point P. It is loaded as: 100A at Q (60m from P), 70A at R (140m from P), 50A at S (230m from P). The resistance of each conductor is 0.2Ω/km. If the distributor is fed from P at 250V, find voltages at Q, R and S.	7	CO1	L4
12 (a)	(i) Discuss various ill-effects of unsymmetrical spacing of conductors in transmission systems. Also explain, their remedial measures	6	CO2	L3
	(ii) Derive an expression for calculating internal flux linkages of a solid conductor carrying current I.	7	CO2	L4
	OR			
12 (b)	(i) Derive an expression for capacitance between conductors of single phase line. Deduce the expression for line to neutral capacitance	6	CO2	L3
	(ii) What is method of images? How can it be used to take into account	7	CO2	L4

	the presence of ground in calculating capacitance of single phase line?			
13 (a)	(i) Derive an expression for power transmission capacity of transmission lines	6	CO3	L3
	(ii) Explain Ferranti effect with phasor diagram. Calculate no load sending end voltage and voltage rise from sending end to receiving end for a 50Hz 300 km long line if the receiving end voltage is 220kV	7	CO3	L4
	OR			
13 (b)	(i)Draw equivalent circuit of a medium line using nominal π model	6	CO3	L3
	(ii) Determine sending end voltage, current and power factor of a single phase 50 Hz, 76.2 kV transmission delivering a load of 12 MW at 0.8 power factor lagging. The line constants are, R:25 Ω, L:200mH and C:2.5μF. Use nominal π method.	7	CO3	L4
14 (a)	(i)Describe various methods for improving string efficiency	6	CO4	L3
	(ii) A string five insulators is fitted with a grading ring. All discs are similar and capacitance of each pin to earth is C. Find the values of line to pin capacitances so that voltage distribution is uniform.	7	CO4	L4
	OR			
14(b)	(i) Using suitable explanation, show that a cable is an imperfect capacitor.	6	CO4	L3
	(ii) A 33kV underground feeder, 3.4 km long, uses three single core cables. Each cable has a diameter of 2.5 cm and radial thickness of insulation is 0.6cm. The relative permittivity of dielectric is 3.1. Find dielectric loss per phase if power factor of unloaded cable is 0.03.	7	CO4	L4
15 (a)	(i)Discuss various considerations which govern selection of span and conductor configuration of high voltage transmissions	6	CO5	L3
	(ii)Derive an expression for sag of an iced conductor in the presence of wind with suitable approximations	7	CO5	L4
	OR			
15 (b)	(i)Describe various factors influencing sag	6	CO5	L3
	(ii)Discuss any two types of grounding in power systems	7	CO5	L4

PART- C(1x 15=15Marks)

(Q.No.16 is compulsory)

Q.No.	Questions	Marks	CO	BL
16.	(i) What are the factors which govern an inductance of a transmission line?	5	CO2	L5
	(ii) A single phase transmission line has two parallel conductors, each of 1.2 cm diameter and 2.5 m apart. Calculate loop inductance per km length of the line if the material of the conductor is copper. Also find the same, if copper is replaced by another material of relative permittivity, 200.	10	CO2	L6