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

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B.Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, APR / MAY 2025

ELECTRICAL AND ELECTRONICS ENGINEERING
IV Semester
EE23405 – TRANSMISSION AND DISTRIBUTION
(Regulation2023)

Time:3hrs Max.Marks: 100

CO1	understand structure of power system with different voltage levels
CO2	compute line parameters for different configurations
CO3	model transmission line and to determine the performance of line
CO4	choose various insulators and cables for transmission and distribution
CO5	carry out mechanical design of transmission line and grounding

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	Distinguish between feeder and distributor	2	CO1	L1
2	State the reason for transmitting power at very high voltage	2	CO1	L2
3	Define proximity effect	2	CO2	L1
4	Why are conductors transposed?	2	CO2	L2
5	Write down the formula for surge impedance of overhead line	2	CO3	L1
6	How is reactive power controlled in power system?	2	CO3	L2
7	Mention any two types of insulators	2	CO4	L1
8	Draw basic cross sectional view of three core cable and mark the parts	2	CO4	L2
9	Discuss the merits of steel towers	2	CO5	L1
10	What is meant by tower spotting?	2	CO5	L2

PART- B(5x 13=65Marks)
(Restrict to a maximum of 2 subdivisions)

Q.No.	Questions	Marks	CO	BL
11 (a)	(i) Derive expressions for voltage drop and power loss for a uniformly loaded distributor fed at one point. Show required diagrams.	6	CO1	L3
	(ii) Calculate voltage at a distance of 250m of a 350m long distributor uniformly loaded at the rate of 0.8A/m. The distributor is fed at one end at 250V. The resistance of distributor (go and return) per metre is 0.00016 Ω. Also find power loss in the distributor.	7	CO1	L4
	OR			
11 (b)	(i) Explain merits and demerits of underground power transmission and briefly discuss about XLPE cable	6	CO1	L3
	(ii) A DC distributor AB is fed at both ends. At feeding point A, voltage is maintained at 235V and at B 236V. The total length of distributor is 200m and loads are tapped off as: 20 A at 50m from A; 40A at 75m from A; 25A at 100m from A; 30A at 150m from A. If the resistance per km of one conductor is 0.4 Ω, calculate minimum voltage and the point at which it occurs.	7	CO1	L4
12 (a)	(i) Consider single phase line having composite conductors and derive an expression for inductance of any one of the composite conductor	6	CO2	L3
	(ii) In a three phase transmission line, the three conductors are placed at the corners of triangles of sides 1.5m, 3.0m and 2.6m respectively. If the			

	diameter of each conductor is 1.4cm and conductors are regularly transposed, calculate the inductance/phase/km length of the line.	7	CO2	L4
	OR			
12 (b)	(i) Derive an expression for capacitance and charging current per km length of a single phase line made up of two solid round conductors of radius r metres and spaced at D metres	6	CO2	L3
	(ii) A 220kV, 50Hz, 200km long three phase line has its conductors on the corners of a triangle with sides 6m, 6m and 12m. The conductor radius is 1.81cm. Find total capacitance per phase and charging current per phase.	7	CO2	L4
13 (a)	(i) Draw nominal T circuit of medium transmission line and derive expressions for A, B, C and D constants	6	CO3	L3
	(ii) A three phase 66 kV 50Hz line has a resistance of 9.6Ω, inductance of 0.097H and capacitance of 0.765μF per phase respectively. It delivers 24MVA at 66kV of 0.8 power factor lagging. Find voltage regulation and transmission efficiency using nominal T circuit	7	CO3	L4
	OR			
13 (b)	(i) Draw nominal π circuit of medium transmission line and derive expressions for sending end voltage and current	6	CO3	L3
	(ii) A three phase 50Hz 100km long overhead line has resistance per phase per km:0.153Ω, inductance per phase per km:1.21mH and capacitance per phase per km:0.00958μF. The line supplies a load of 20 MW at 0.9 power factor lagging at a line voltage of 110kV at the receiving end. Calculate sending end voltage and current using nominal π circuit	7	CO3	L4
14 (a)	(i) Explain the concept of using grading ring for improving voltage distribution across insulator rings	6	CO4	L3
	(ii) A suspension insulator with six discs has a uniform voltage distribution. Capacitance grading is used to give uniform voltage distribution. Each pin to earth capacitance is **C**. Capacitance of topmost disc is **10C**. Find mutual capacitances of the remaining discs.	7	CO4	L4
	OR			
14 (b)	(i) Derive formula for electric stress in a single core cable. Where is stress maximum and minimum?	6	CO4	L3
	(ii) A 33kV, 50Hz single core cable has conductor diameter 10mm and inner diameter of sheath 25mm. The relative permittivity of insulating material is 3.5. Find capacitance of cable per km, maximum and minimum stress on the cable.	7	CO4	L4
15 (a)	(i) Describe various factors affecting sag of overhead line	6	CO5	L3
	(ii) Derive an expression for sag of an overhead line by assuming short tower span.	7	CO5	L4
	OR			
15 (b)	(i) Explain any two methods of power system grounding	6	CO5	L3
	(ii) Describe substation layout of 230kV AIS and GIS. Compare their merits	7	CO5	L4

PART- C(1x 15=15Marks)

(Q.No.16 is compulsory)

Q.No.	Questions	Marks	CO	BL
16.	(i)Assuming shape of overhead line is parabola, find an expression for length of iced conductor subjected to wind pressure	8	CO5	L5
	(ii) An overhead line has a span of 152m and is supported on level supports. The conductor has an effective diameter of 2.068 cm, cross sectional area of 3.065 sq.cm and weighs 2.292 kg/m. The line subjected to a wind pressure of 39.063kg/sq.m of projected area. Assuming a maximum stress of 1054.63kg/sq.cm, find sag under given conditions. Also find vertical component of sag.	7	CO5	L6