Reg. No.																

Question Paper Code	14547

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2026

Fourth Semester

Electrical and Electronics Engineering

24EEPC401 - TRANSMISSION AND DISTRIBUTION

Regulations - 2024

Duration: 3 Hours | Max. Marks: 100

PART – A (i) (MCQ)
(16 × 1 = 16 Marks)
Answer ALL Questions

		Marks	K – Level	CO
1.	ACSR conductors have a) all conductors made of aluminium b) outer conductors made of aluminium c) inner conductors made of aluminium d) no conductors made of aluminium	1	K1	CO1
2.	In the Indian power grid scenario, which of the following is a "Inter-Regional" link? a) A 132 kV line between two cities in the same state b) An HVDC link between the Western and Southern Regions c) A 440 V distribution line d) A line connecting a house to a transformer	1	K1	CO1
3.	What is the main reason for using EHV for long-distance power transmission? a) Reduction in the size of insulators b) Reduction in the cross-sectional area of the conductor c) Increase in the current flowing through the line d) Simplification of the protection system	1	K2	CO1
4.	If capacitance between two conductors of a 3 phase line is 4 micro farad, then capacitance of each conductor to neutral is _____. a) 6 micro farad b) 8 micro farad c) 4 micro farad d) 2 micro farad	1	K3	CO2
5.	In which of the transmission systems is the skin effect observed? a) Cable carrying dc current b) DC transmission line only c) AC transmission line only d) DC and AC transmission lines	1	K2	CO2
6.	A 3-phase line has conductors of radius 1.5 cm arranged in an equilateral triangle configuration with 3m spacing. What is the GMR used to calculate the inductance per phase? a) 1.5 cm b) 1.168 cm c) 0.7788cm d) 1.875 cm	1	K3	CO2
7.	In a medium transmission line, if the voltage leads the current in the phasor diagram, it indicates _____. a) inductive reactance b) capacitive reactance c) resistive load d) no reactance	1	K2	CO3
8.	In the Nominal-T model of a medium transmission line, the total line capacitance is assumed to be: a) Distributed uniformly along the length b) Concentrated at the sending end c) Concentrated at the receiving end d) Concentrated at the center of the line	1	K1	CO3

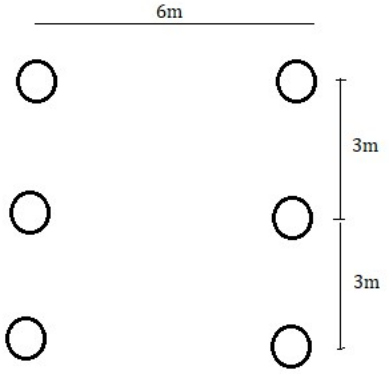
9.	Which of the following factors reduces the critical disruptive voltage, thereby increasing the chance of corona? a) Increasing the spacing between conductors b) Increasing the radius of the conductor c) Rough or irregular conductor surfaces d) High atmospheric pressure	*1*	*K2*	*CO3*
10.	Sag is provided in overhead lines to: a) Reduce conductor weight b) Avoid excessive tension in conductors c) Increase voltage rating d) Reduce corona	*1*	*K2*	*CO4*
11.	Which type of insulators is used on 132 kV transmission lines? a) Pin type b) Disc type c) Shackle type d) Strain type	*1*	*K1*	*CO4*
12.	A transmission line conductor is supported between two towers at the same level. If the span length is doubled and the allowable tension is kept constant, the sag of the conductor will: a) Double b) Remain the same c) Become four times its original value d) Become half its original value	*1*	*K3*	*CO4*
13.	The dielectric stress in a cable is maximum at: a) Outer sheath b) Conductor surface c) Middle of insulation d) Armouring	*1*	*K1*	*CO5*
14.	A single-core cable has a conductor diameter of 1 cm and an insulation thickness of 2.5cm. If the cable is tested at 33 kV, the maximum electrostatic stress in the dielectric is: a) 18.2 kV/cm b) 28.6 kV/cm c) 36.8 kV/cm d) 41.5kV/cm	*1*	*K3*	*CO5*
15.	A DC 2-wire distributor is fed at one end. If the total resistance of the line is 0.1Ω and it carries a uniform load of 1 A/m over a length of 100 m, the total voltage drop in the distributor is: a) 10 V b) 5 V c) 1 V d) 0.5 V	*1*	*K3*	*CO6*
16.	Primary distribution is carried out by _____. a) single phase two wire system b) two phase three wire system c) single phase three wire system d) three phase three wire system	*1*	*K3*	*CO6*

PART – A (ii) (Short Answer Questions)
(6 × 3 = 18 Marks)
Answer ALL Questions

17.	Compare solid, stranded and bundled conductors used in power transmission systems.	*3*	*K3*	*CO1*
18.	Compute the inductance per km of a 1-phase line having 2 cm diameter conductors spaced 3 m apart.	*3*	*K3*	*CO2*
19.	Interpret the "Critical Disruptive Voltage" and explain why increasing the conductor spacing is an effective way to mitigate corona?	*3*	*K3*	*CO3*
20.	Analyze the sag of a conductor for a span of 150 m, if the weight is 0.6 kg/m and the allowable tension is 1200 kg.	*3*	*K4*	*CO4*
21.	Analyze the potential gradient profile of a cable and explain why the insulation is most stressed at the conductor surface.	*3*	*K4*	*CO5*
22.	A DC 2-wire distributor 500 m long is loaded at 2 A/m. If the resistance is 0.05 Ω/km (go and return), examine what will be the maximum voltage drop?	*3*	*K4*	*CO6*

PART - B (Descriptive Answer Questions)
(6 × 11 = 66 Marks)
Answer ALL Questions

23.	a)	Illustrate the structure of a modern electrical power system from generation to consumer. Apply the logic of step-up and step-down transformers at each stage to justify the voltage levels used.	*11*	*K3*	*CO1*
		OR			
	b)	Apply the concept of sustainable development to explain environmental considerations in EHV transmission line construction.	*11*	*K3*	*CO1*
24.	a)	A double-circuit, 3-phase transmission line is arranged vertically as shown in the figure. Each conductor has a radius of 1.2 cm. Find the inductance per phase per km of the double-circuit line. Assume the line is fully transposed.	*11*	*K3*	*CO2*



		OR			
	b)	A 3-phase, 50 Hz overhead transmission line has its conductors arranged at the corners of an equilateral triangle with spacing of 4 m between each conductor. Each conductor has a radius of 1.25 cm. The line length is 100 km, and it operates at a line voltage of 132 kV. Determine the capacitance per phase per km and the charging current per phase**.**	*11*	*K3*	*CO2*
25.	a)	A 3-phase, 50 Hz, 100 km transmission line has the following per-phase parameters: R=0.15 Ω/km, L=1.2 mH/km, C=0.01 μF/km. The line supplies a load of 20 MW at 0.8 power factor lagging at 110 kV. Calculate the sending-end voltage using the Nominal π method. Determine the sending-end current and transmission efficiency.	*11*	*K3*	*CO3*
		OR			
	b)	A 3-phase, 50 Hz, 120 km transmission line has the following per-phase parameters: R=0.18 Ω/km, X_L=0.4 Ω/km, $Y_c=3x10^{-6}$ S/km. The line supplies a load of 25 MW at 0.8 power factor lagging at a receiving-end voltage of 110 kV. Determine the sending end voltage and current using Nominal T method.	*11*	*K3*	*CO3*
26.	a)	A transmission line at a river crossing is supported by two towers 50 m and 55 m above water level. The horizontal distance between towers is 300 m. Tension in the conductor is 2000 kg and weight of the conductor is 0.85 kg/m. find a) minimum clearance between conductor and water b) position of minimum clearance.	*11*	*K3*	*CO4*
		OR			
	b)	In a 33 kV OHL, there are three units in a string of insulators. If the capacitance between each insulator pin and earth is 11% of self capacitance of each insulator, find (i) the distribution of voltage over 3 insulators and (ii) string efficiency.	*11*	*K3*	*CO4*

27.	a)	Analyze the methods of capacitance grading and inter-sheath grading in underground cables. Evaluate which method is more effective for maintaining a uniform potential gradient in high-voltage applications.	*11*	*K4*	*CO5*
		OR			
	b) (i)	The maximum and minimum stresses in the dielectric of a single core cable are 40 kV/cm (rms) and 10 kV/cm (rms) respectively. If the conductor is 2 cm, examine what could be the thickness of insulation and the operating voltage.	*6*	*K4*	*CO5*
	(ii)	Analyze what could be the most economical size of a single core cable working on a 132 kV, 3-phase system, if a dielectric stress of 60 kV/cm can be allowed.	*5*	*K4*	*CO5*
28.	a)	A 2 wire DC street mains AB, 600 m long is fed from both ends at 220 V. Loads of 20 A, 40 A, 50 A and 30 A are tapped at distances of 100 m, 250 m, 400 m and 500 m from the end A respectively. If the area of cross section of distributor conductor is 1 cm^2 and resistivity = $1.7x10^{-6}$ **Ω**-cm, examine what will be the minimum consumer voltage?	*11*	*K4*	*CO6*
		OR			
	b)	Analyze the role of tap changing transformers in maintaining voltage within the permissible limits.	*11*	*K4*	*CO6*