Reg. No.																

Question Paper Code	14489

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

Fourth Semester

Electrical and Electronics Engineering

20EEPC402 - TRANSMISSION AND DISTRIBUTION

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

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

		Marks	K – Level	CO
1.	Skin effect depends upon a) cross-section of conductor b) supply frequency c) permeability of conducting material d) all of the above	1	K1	CO1
2.	What is the main reason a transmission line has inductance? a) Electric fields between conductors b) Magnetic fields around conductors c) Current crowding near the surface d) Energy loss in the insulation	1	K2	CO1
3.	In a bundled conductors the spacing between sub conductors is approximately a) 3.5cm b) 40cm c) 80cm d) 20cm	1	K3	CO1
4.	In the nominal π-model of a transmission line, the line capacitance is assumed to be: a) Lumped at the sending end b) Lumped at the receiving end c) Uniformly distributed along the line d) Divided into two halves at both ends	1	K1	CO2
5.	What does the nominal T model of a medium transmission line concentrate at the centre? a) Resistance b) Inductance c) Capacitance d) Conductance	1	K3	CO2
6.	A 200 km transmission line has a per-unit-length capacitance of 0.01 μF/km. What is the total capacitance of the line? a) 0.1 μF b) 1.0 μF c) 2.0 μF d) 0.02 μF	1	K2	CO2
7.	Sag depends on which factor? a) Span length b) Weight of the conductors c) Tension in the conductors d) All of the above	1	K1	CO3
8.	What is the effect of temperature rise on the overhead lines? a) Increase the sag and decrease the tension b) Decrease the sag & increase the tension c) Both sag and tension increases d) Both sag and tension decreases	1	K2	CO3
9.	A 132 kV transmission line, with the weight of conductor = 680 kg/km, length of span = 260 m, ultimate strength = 3100 kg, safety factor =2. Calculate the height above ground at which the conductor should be supported. Ground clearance required is 10 m. a) 10.7 m b) 13.7 m c) 20.83 m d) 18.75 m	1	K3	CO3
10.	A metallic sheath is provided over the insulation to protect the cable from _____. a) over voltage b) over current c) moisture d) water	1	K1	CO4
11.	The working voltage level of belted cable is limited to 22 kV because of the _____ set up in the dielectric. a) tangential stresses b) axial stresses c) vertical stresses d) inclined stresses	1	K2	CO4

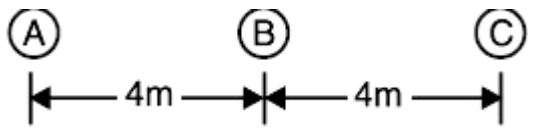
12.	If a cable of homogeneous insulation has maximum stress of 5 kV/mm, then the dielectric strength of insulation should be_____. a) 5-kV/mm b) 2·5 kV/mm c) 3 kV/mm d) 10-kV/mm	*1*	*K3*	*CO4*
13.	The distribution transformer links the primary and _____ distribution system. a) primary b) LT c) secondary d) HT	*1*	*K1*	*CO5*
14.	Which of the following is important when designing a substation? a) Choosing a good location b) Keeping the initial cost low c) Making it safe and reliable d) All of the above	*1*	*K2*	*CO5*
15.	A 1-phase AC distributor supplies two loads: 10 A at 0.8 lagging PF and 15 A at 0.6 lagging PF. The total current drawn from the feeding point is nearly a) 25 A b) 24.2 A c) 22.8 A d) 20 A	*1*	*K3*	*CO5*
16.	A 2-wire DC distributor AB is 300 m long. The end A is fed at 250 V and end B is fed at 248 V. The distributor has resistance of 0.2 Ω per 100 m. Find the total current supplied by end A if the distributor has no load tapped. a) 3.33 A b) 5 A c) 2 A d) 0 A	*1*	*K3*	*CO5*

PART – A (ii) (Short Answer Questions)
(8 × 3 = 24 Marks)
Answer ALL Questions

17.	How does a lagging power factor affect the voltage regulation of a transmission line?	*3*	*K3*	*CO1*
18.	A single-phase overhead line has a conductor spacing of 2 m and a conductor radius of 0.01 m. Find its inductance per metre.	*3*	*K4*	*CO1*
19.	A 3-phase, 132 kV transmission line is to be designed for a hilly region with high altitude, frequent dust storms, and rain. Analyze how the following factors would influence corona formation on this line, and suggest two design changes to minimize corona loss.	*3*	*K3*	*CO2*
20.	A short transmission line of length 50 km has a resistance of 0.15 Ω/km and reactance of 0.35 Ω/km. What is the total impedance of the line?	*3*	*K3*	*CO2*
21.	Suggest three practical methods to improve the string efficiency to the required level. For each method, explain how it redistributes the voltage across the discs.	*3*	*K3*	*CO3*
22.	Which type of insulation (PVC or impregnated paper) would be selected for cables will be exposed to high humidity, corrosive vapors, and frequent temperature variations (0°C to 50°C). The required voltage rating is 11 kV. Justify each choice.	*3*	*K4*	*CO4*
23.	A 3-phase underground cable has a conductor resistance of 0.2 Ω/km and a length of 5 km. If the current flowing through the cable is 200 A, calculate the total voltage drop in the cable.	*3*	*K4*	*CO4*
24.	Why transmission lines are 3 phase 3 wire circuits while distribution lines are 3 phase 4 wire circuits?	*3*	*K3*	*CO5*

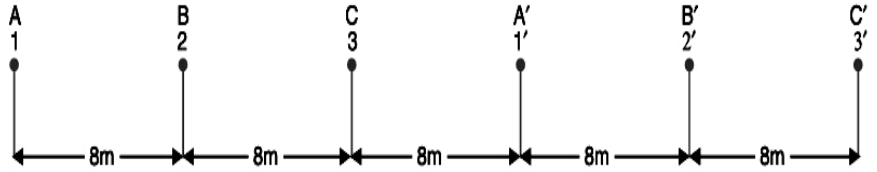
PART - B (Descriptive Answer Questions)
(5 × 12 = 60 Marks)
Answer ALL Questions

25.	a)	A 3-phase, 50 Hz, 132 kV overhead line has conductors placed in a horizontal plane 4 m apart. Conductor diameter is 2 cm. If the line length is 100 km, calculate the charging current per phase assuming complete transposition.	*12*	*K3*	*CO1*



OR

b) Calculate the inductance per phase per meter for a three-phase double-circuit line whose phase conductors have a radius of 5·3 cm with the horizontal conductor arrangement as shown in Fig. *12 K3 CO1*



26. a) A single-phase overhead transmission line delivers 1100 kW at 11 kV at 0·8 p.f. lagging. The total resistance and inductive reactance of the line are 10 Ω and 15 Ω respectively. Determine: (i) sending end voltage (ii) sending end power factor and (iii) transmission efficiency. *12 K3 CO2*

OR

b) Derive the expression to calculate the performance of medium transmission line by nominal T method. *12 K3 CO2*

27. a) Derive the mathematical expression and develop the model to calculate the string efficiency and voltage distribution over string insulators. *12 K3 CO3*

OR

b) In a 33kV overhead line, there are three units in the string of insulators. If the capacitances between each insulator pin and earth is 11% of self-capacitance of each insulator, find the distribution of voltage over 3 insulators and the string efficiency. *12 K3 CO3*

28. a) A single-core cable has a conductor diameter of 1 cm and insulation thickness of 0.4 cm. If the specific resistance of insulation is 5×10^{14} Ω-cm, calculate the insulation resistance for a 2 km length of the cable. *12 K4 CO4*

OR

b) The maximum and minimum stresses in the dielectric of a single core cable are 40 kV/cm (r.m.s.) and 10 kV/cm (r.m.s.) respectively. If the conductor diameter is 2 cm, Find: i) thickness of insulation (ii) operating voltage. *12 K4 CO4*

29. a) A 2-wire DC distributor cable AB is 2 km long and supplies loads of 100A, 150A, 200A and 50A situated 500 m, 1000 m, 1600 m and 2000 m from the feeding point A. Each conductor has a resistance of 0.01 Ω per 1000 m. Make use of distributor fed at one end method, Calculate the p.d. at each load point if a p.d. of 300 V is maintained at point A. *12 K4 CO5*

OR

b) A 2-wire DC ring distributor is 300 m long and is fed at 240 V at point A. At point B, 150 m from A, a load of 120 A is taken and at C, 100 m in the opposite direction, a load of 80 A is taken. If the resistance per 100 m of single conductor is 0.03 Ω, find: *12 K4 CO5*
(i) Current in each section of distributor.
(ii) voltage at points B and C.