Reg. No.															

Question Paper Code	13470

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Fourth Semester

Electrical and Electronics Engineering

20EEPC402 - TRANSMISSION AND DISTRIBUTION

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	In transmission line, the distributed constants are, (a) Resistance, Inductance (b) Resistance**,** Inductance**,** Capacitance (c) Resistance, capacitance (d) Resistance**,** Inductance**,** Conductance	1	K1	CO1
2.	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
3.	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
4.	The charging current in a transmission line increases due to corona effect because corona increases (a) Line current (b) Effective line voltage (c) Power loss in lines (d) Effective conductor diameter	1	K1	CO2
5.	What is the desired Impulse Ratio for pin type insulators? (a) Approximately 1.2 (b) Approximately 1.3 (c) Approximately 1.4 (d) Approximately 1.5	1	K1	CO3
6.	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	K2	CO3
7.	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
8.	Belted cables are generally used upto _____ kV. (a) 22KV (b) 33KV (c) 11KV (d) 400V	1	K1	CO4
9.	_____ a conductor or body of conductors in intimate contact with the earth for the purpose of providing a connection with the ground. (a) Equipment grounding conductor (b) Grounding conductor (c) Grounded conductor (d) Ground electrode	1	K1	CO5
10.	The distribution transformer links the primary and ..... distribution system (a) Primary (b) LT (c) Secondary (d) HT	1	K1	CO5

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

		Marks	K – Level	CO
11.	Define self GMD.	2	K1	CO1
12.	A transmission line has a capacitance of 8 pF per meter. Find the total capacitance of a 200 km line.	2	K2	CO1
13.	Compare ACSR and ACAR.	2	K2	CO1
14.	What is Critical disruptive voltage?	2	K1	CO2
15.	What is the effect of load power on voltage regulation and transmission efficiency?	2	K1	CO2

16.	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?	*2*	*K2*	*CO2*
17.	Define String efficiency of Insulator.	*2*	*K1*	*CO3*
18.	Compare RCC Poles and Steel towers.	*2*	*K2*	*CO3*
19.	What is meant by serving of a cable?	*2*	*K1*	*CO4*
20.	A cable has an inters heath at 10mm from the conductor (radius = 5mm**).** The outer radius is 20 mm**.** If the inters heath is maintained at 15kV, Find the stress in the inner layer.	*2*	*K2*	*CO4*
21.	List out the basic types of FACTS Controllers.	*2*	*K1*	*CO5*
22.	A distributor fed at one end has a resistance of 0.1 Ω/m and carries a current of 100 A at its midpoint (150m). Find the total power loss.	*2*	*K2*	*CO5*

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Derive an expression for inductance of a three phase line with unsymmetrical spacing. Also explain the transposition of conductors.	*11*	*K3*	*CO1*
		OR			
	b)	Derive an expression for the capacitance of a three-phase overhead transmission line.	*11*	*K3*	*CO1*
24.	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	*11*	*K3*	*CO2*
		OR			
	b)	A 3-phase, 50Hz, 150 km line has a resistance, inductive reactance and capacitive shunt admittance of 0·1 Ω, 0·5 Ω and 3 × 10−6 S per km per phase. If the line delivers 50 MW at 110 kV and 0·8 p.f. lagging, determine the sending end voltage and current. Assume a nominal π circuit for the line.	*11*	*K3*	*CO2*
25.	a)	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 three insulators and the string efficiency.	*11*	*K3*	*CO3*
		OR			
	b)	An overhead transmission line conductor having a parabolic configuration weighs 1.925kg per meter of length. The area of cross-section of the conductor is 2.2cm^2 and the ultimate strength is 8000kg/cm^2. The supports are 600m apart having 15m difference of levels. Compute the sag from the taller of the two supports which must be allowed so that the factor of safety shall be 5. Assume that ice load is 1kg per meter run and there is no wind pressure.	*11*	*K3*	*CO3*
26.	a)	A 33 kV, 50 Hz, 3-phase underground cable,4 km long uses three single core cables. Each of the conductor has a diameter of 2·5 cm and the radial thickness of insulation is 0·5cm. Determine (i) capacitance of the cable/phase (ii) charging current/phase (iii) total charging kVAR. The relative permittivity of insulation is 3.	*11*	*K3*	*CO4*
		OR			
	b)	Calculate the capacitance and charging current of a single core cable used on a 3-phase, 66 kV system. The cable is 1 km long having a core diameter of 10 cm and an impregnated paper insulation of thickness 7 cm. The relative permittivity of the insulation may be taken as 4 and the supply at 50 Hz.	*11*	*K3*	*CO4*

27. a) A 2-wire d.c. 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. *11 K3 CO5*

OR

b) A 2-wire d.c. distributor AB is fed from both ends. At feeding point, A, the voltage is maintained as at 230 V and at B 235 V. The total length of the distributor is 200 metres and loads are tapped off as under: *11 K3 CO5*

25 A at 50 metres from A; 50 A at 75 metres from B
30 A at 100 metres from A; 40 A at 150 metres from B
The resistance per kilometre of one conductor is 0·3 Ω. Compute:
(i) Currents in various sections of the distributor
(ii) Minimum voltage and the point at which it occurs.

28. a) (i) Compare the merits and demerits of underground system versus overhead system. *6 K2 CO4*

(ii) Explain the different HVDC links. *5 K2 CO5*

OR

b) (i) Summarize about grading of cables. *6 K2 CO4*

(ii) With neat diagram explain briefly about the various types of bus bar arrangements in a substation. *5 K2 CO5*