CBCS SCHEME

USN | 1 | A | Y | 2 | 3 | E | E | 0 | 5 | M |

BEE402

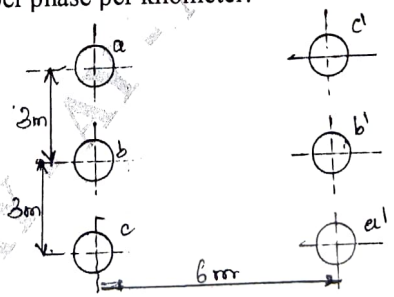
Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025
Transmission and Distribution

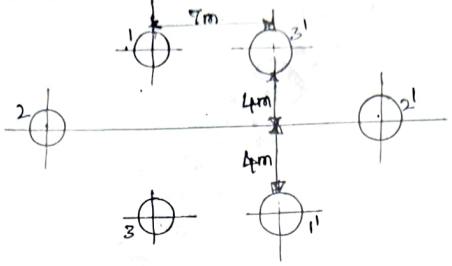
Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

			M	L	C
		Module – 1			
Q.1	**a.**	Draw a single line diagram of a typical transmission and distribution system. Indicate all the voltage levels and explain.	**10**	**L1**	**CO1**
	b.	Explain various types of line conductors used for overhead line.	**6**	**L2**	**CO1**
	c.	An overhead line has a span of 150 m between level supports. The conductor has a cross – sectional area of 2 cm^2. The ultimate strength is 5000 kg/cm^2 and safety factor is 5. The specific gravity of the material is 8.9 gm/cc. The wind pressure is 1.5 kg/m. Calculate the height of the conductor above the ground level at which it should be supported if a minimum clearance of 7 m is to be left between the ground and the conductor.	**4**	**L3**	**CO1**
		OR			
Q.2	**a.**	Draw a neat diagram of interconnection of component of distribution system and explain.	**8**	**L1**	**CO1**
	b.	Define Sag. With usual notations derive an expression for the sag of a transmission line when the supports are at equal level.	**8**	**L1**	**CO1**
	c.	Compare pin and suspension insulators.	**4**	**L2**	**CO2**
		Module – 2			
Q.3	**a.**	Derive an equation for inductance of 3 phase un-symmetrically spaced but transposed transmission line / km.	**8**	**L2**	**CO2**
	b.	Fig. Shows the spacings of a double circuit 3 phase – double circuit overhead line. The conductor radius is 1.3 cm and line is transposed. Calculate the inductance per phase per kilometer.	**6**	**L3**	**CO2**

Fig. Q3(b)



	c.	The six conductors of a double circuit three phase line are shown in Fig. Q3(c). The diameter of each conductor is 2.5 cm. Find the capacitance to neutral assuming that the line is transposed.  Fig. Q3(c)	6	L3	

OR

Q.4	a.	Derive an expression for capacitance of a 3 phase single circuit line with equilateral spacing.	8	L3	CO3
	b.	Calculate the loop inductance per km of a single phase line. Comprising of 2 parallel conductors 1 meter apart and 1 cm in diameter , when the material of conductor is i) Copper and ii) Steel of relative permittivity 50. Prove the formula used.	8	L3	CO3
	c.	Compare single circuit and double circuit arrangement of transmission lines.	4	L2	CO3

Module – 3

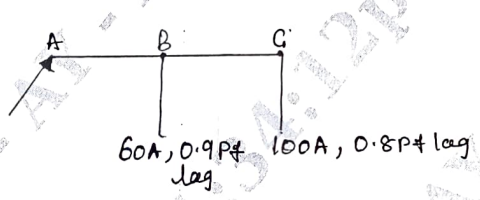
Q.5	a.	Deduce an expression for voltage regulation and transmission efficiency of single phase short transmission line by developing the vector diagrams.	10	L3	CO4
	b.	A 110 KV , 50 Hz , 3 phase transmission line delivers a load of 40 MW at 0.85 lag p.f at the receiving end. The generalized constants of the transmission line are A = D = 0.95 $\underline{\lfloor 1.4^\circ}$, B = 96 $\underline{\lfloor 78^\circ}$ Ω C = 0.0015 $\underline{\lfloor 90^\circ}$ mho regulation of the line and charging current. Apply nominal T method.	10	L3	CO4

OR

Q.6	a.	Derive expression for the generalized A , B, C, D constants for equivalent T network.	10	L3	CO4
	b.	Determine the efficiency and regulation of a 3 phase , 100 km , 50 Hz , transmission line delivering 20 MW at a power factor of 0.8 lag and 66 KV to a balanced load. The conductors are of copper , each having resistance of 0.1Ω per km , 1.5 m outside diameter spaced equilaterally 2 meters between centers. Neglect leakage , use normal π method.	10	L2	CO4

Module – 4

Q.7	a.	Explain the phenomena of Corona. List the factors affecting Corona.	10	L2	CO4
	b.	A 33 KV , 3 phase underground cable, 4 km long uses three core cables. Each of the conductor has a diameter of 2.5 cm and the radial thickness of insulation 0.5 cm. the relative permittivity of the dielectric is 3. Calculate 1. Capacitance of the cable / ph 2. Charging current / phase 3. Total charging KVAR.	10	L3	CO4

		OR			
Q.8	a.	Explain 1. Disruptive critical voltage 2. Visual critical voltages 3. Corona loss.	10	L2	CO5
	b.	Analyze grading of cables using capacitance grading method.	6	L4	CO5
	c.	The inner and outer diameters of a cable are 3 cm & 9 cm respectively. The cable is insulated with the two materials having permittivities of 5 and 4 respectively with corresponding maximum permissible stresses of 30 KV/cm and 20 KV/cm respectively. Calculate the radial thickness of each insulating layer and the safe working voltage of the cable.	4	L3	CO5
		Module – 5			
Q.9	a.	Explain 1. Radial distribution system 2. Ring main distribution system along with neat diagrams.	10	L2	CO6
	b.	Define Reliability. Explain different probability distributions.	10	L2	CO6
		OR			
Q.10	a.	A two wire distributor 1200 m long is loaded as shown in Fig. Q10(a) 'B' is the midpoint. The power factors at the two load points refer to the voltage at 'C'. The impedance of each line is (0.10 + j0.2) Ω. Calculate the sending end voltage, current and power factor. The voltage at point 'C' is 220 V. Fig. Q10(a) 	10	L3	CO6
	b.	Analyze the effect of disconnection of neutral in 3 phase 4 wire system.	6	L4	CO6
	c.	Explain any 4 limitations of distribution system.	4	L3	CO6

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