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COURSE CODE: BEE402

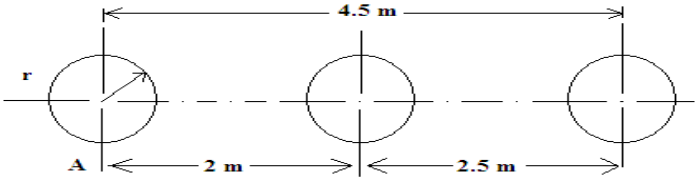
4th Semester B.E. / B. Arch. / MCA / M.Tech. Semester End Examination, MAR/APR. 2023-24

Transmission and Distribution (Model Question Paper)

Time: 3 Hours **Max. Marks: 100**

Instructions:	*1.*	*Answer any Five full questions choosing ONE from each unit.*

		UNIT - I	L	CO	PO	M
1	a.	**Explain the effects of high voltage transmission based on the conductor volume, transmission efficiency and line drop.**				
			(2)	**(1)**	**(1)**	**(6)**
	b.	**Derive an expression for sag of a line conductor suspended between equal level supports taking into effects of ice and wind loading from fundamental.**				
			(3)	**(1)**	**(2)**	**(6)**
	c.	**A transmission line has a span of 250m between supports, the supports being at the same level. The conductor has a cross sectional area of 1.29 cm^2. The ultimate strength is 4220 kg/cm^2 and factor of safety is 2. The wind pressure is 40 kg/cm^2. Calculate the height of the conductor above ground level at which it should be supported if the minimum clearance of 7m is to be kept between the ground and the conductor.**				
			(3)	**(1)**	**(2)**	**(8)**
2	a.	**Define string efficiency. Derive an expression for string efficiency. Mention the methods to improve string efficiency.**				
			(3)	**(1)**	**(2)**	**(8)**
	b.	**Explain the advantages of bundled conductors.**				
			(2)	**(1)**	**(1)**	**(6)**
	c.	**In a 3 phase overhead system, each line is suspended by a string of 3 insulators. The voltage across the top unit and middle unit are 10 kV and 11 kV respectively. Calculate (i) the ratio of shunt capacitance to self capacitance of each insulator (ii) the string efficiency and (iii) line voltage.**				
			(3)	**(1)**	**(2)**	**(6)**
		UNIT – II	**L**	**CO**	**PO**	**M**
3	a.	**Determine the inductance of conductor due to internal flux.**				
			(2)	**(2)**	**(1)**	**(7)**
	b.	**The three conductors of a 3 phase transmission line are arranged in a horizontal plane and are 3 m apart. The diameter of each conductor is 4cm. determine the inductance per km of each phase. Assume balanced load and R, Y, B sequence.**				
			(3)	**(2)**	**(2)**	**(7)**
	c.	**A two conductor, single phase line operates at 50 Hz. The diameter of each conductor is 30mm and the spacing between the conductor is 2m, calculate** **(i) Inductance of each conductor per km (ii) the loop inductance of the line per km** **(iii) the inductive reactance per km**				
			(3)	**(2)**	**(2)**	**(6)**
4	a.	**What is transposition of transmission line? Derive an expression for inductance of a 3-phase line with unsymmetrical spacing but transposed.**				
			(2)	**(2)**	**(1)**	**(6)**
	b.	**Derive an expression for the line to neutral capacitance for a 3 –phase overhead transmission line when the conductors are asymmetrically spaced.**				
			(3)	**(2)**	**(2)**	**(6)**
	c.	**A 3-phase, 50 Hz, 66kVoverhead line conductors are placed in a horizontal plane as shown in fig. 2(c). the conductor diameter is 1.25cm. the line length is 100km. calculate the**				

		capacitance per phase and charging current per phase. Assume complete transposition of the line.  **fig.4 (c)**				
			(3)	**(2)**	**(2)**	**(8)**
		UNIT - III	**L**	**CO**	**PO**	**M**
5	a.	**Explain how transmission lines are classified. also explain voltage regulation and transmission efficiency.**				
			(1)	**(3)**	**(1)**	**(5)**
	b.	**Explain the nominal T- method for obtaining the performance parameters of medium transmission line. Draw the corresponding vector diagram and derive expressions for input voltage and input current.**				
			(3)	**(3)**	**(2)**	**(7)**
	c.	**A 3-phase 50Hz, overhead transmission line 100km long has the constants: resistance per phase per km =0.1 Ω; reactanceper phase per km = 0.2 Ω; susceptance per phase per km = 0.04x10-4 siemens. Determine (i) sending end voltage (ii) sending end current (iii) sending end p.f. (iv) transmission efficiency when supplying a balanced load of 10MW at 66kV, 0.8 pf lagging. Use nominal PI method.**				
			(3)	**(3)**	**(2)**	**(8)**
6	a.	**Obtain A B C D constants of a medium transmission line using nominal T – method and prove AD –BC = 1.**				
			(3)	**(3)**	**(2)**	**(7)**
	b.	**Draw the corresponding vector diagram and derive expressions for input voltage and input current for short transmission line.**				
			(2)	**(3)**	**(1)**	**(5)**
	c.	**A 3 – phase line delivers 3600 kW at a p.f. of 0.8 lagging to a load. If the sending end voltage is 33kV, calculate (i) the receiving end voltage (ii) line current (iii) transmission efficiency. The resistance and reactance of each conductor are 5.31 Ω and 5.54 Ω respectively.**				
			(3)	**(3)**	**(2)**	**(8)**
		UNIT - IV	**L**	**CO**	**PO**	**M**
7	a.	**What is corona? Define. Explain the factors affecting corona.**				
			(2)	**(4)**	**(1)**	**(7)**
	b.	**Mention advantages and disadvantages and also methods of reducing corona.**				
			(1)	**(4)**	**(1)**	**(6)**
	c.	**A 3 phase 220 kV, 50 Hz transmission line consists of 1.5 cm radius conductor spaced 2 m apart in equilateral triangular formation. If the temperature is 400 C and atmospheric pressure is 76 cm, calculate the corona loss per km of line. Take m0 = 0.85**				
			(3)	**(4)**	**(2)**	**(7)**
8	a.	**With a neat diagram, show the various parts of a high voltage single core UG cable and explain each part.**				
			(2)	**(4)**	**(1)**	**(6)**
	b.	**Derive an expression for the capacitance of a single core cable.**				
			(3)	**(4)**	**(2)**	**(6)**
	c.	**A single core lead sheathed cable is graded by using three dielectrics of relative permittivity 5, 4 and 3 respectively. The conductor diameter is 2 cm and overall diameter is 8 cm. if the three dielectrics are worked at the same maximum stress of 40 kV/cm, find the safe working voltage of the cable. What will be the value of safe working voltage for an ungraded cable, assuming the same conductor and overall diameter and the maximum dielectric stress?**				

		Comment on the results.				
			(3)	**(4)**	**(2)**	**(8)**
		UNIT -V	**L**	**CO**	**PO**	**M**
9	a.	**With neat diagram explain radial distributor and interconnected distributor. Mention their advantages and disadvantages.**				
			(2)	**(5)**	**(2)**	**(7)**
	b.	**Explain what is the effect of disconnecting neutral in a 3 phase 4 wire system with example.**				
			(2)	**(5)**	**(2)**	**(5)**
	c.	**A single phase distributor one km long has resistance and reactance per conductor of 0.1 Ω and 0.15 Ω respectively. At the far end voltage is 200 V and the current is 100 A at p.f of 0.8 lagging. At the mid point M of the distributor, a current of 100 A is tapped at a p.f of 0.6 lagging with reference to the voltage at point M. Calculate: (i) voltage at mid point (ii) sending end voltage (iii) phase angle between sending end voltage and far end voltage.**				
			(3)	**(5)**	**(2)**	**(8)**
10	a.	**Explain the limitations of distribution system.**				
			(2)	**(5)**	**(1)**	**(6)**
	b.	**Define (i) reliability (ii) availability (iii) adequacy (iv) security**				
			(2)	**(5)**	**(1)**	**(6)**
	c.	**Write a short note on (i) Bath Tub Curve (ii) MTTF and MTBF (iii) Power Quality issues**				
			(2)	**(5)**	**(1)**	**(8)**