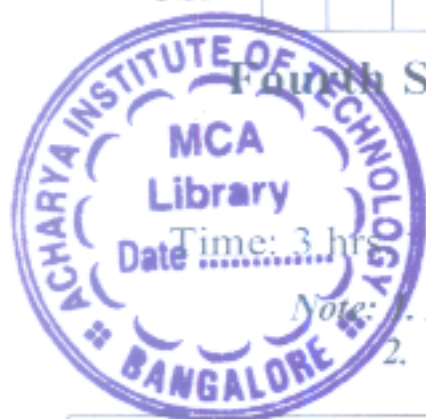


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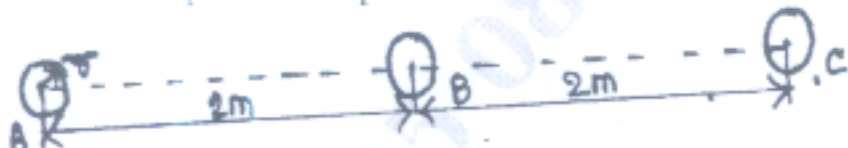
Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025

## Transmission and Distribution

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.

Module – 1			M	L	C
Q.1	a.	Draw the one line diagram of a typical power system scheme and explain the various stages.	6	L2	CO1
	b.	Define string efficiency. Derive an expression for the string efficiency of a 3 disc string.	6	L3	CO1
	c.	An overhead transmission line has a span of 200 m between the supports. The supports are at the same level. The area of cross-section of conductor is $1.9 \text{ cm}^2$ while the ultimate strength is $5000 \text{ Kg/cm}^2$ . The specific gravity of the conductor material is $8.9 \text{ gm/cm}^3$ . If the conductor is subjected to the wind pressure of $1.5 \text{ Kg/m}$ length, calculate the sag if factor of safety is 5. Also calculate the vertical sag.	8	L3	CO1
OR					
Q.2	a.	With usual notations, derive an expression for the sag of a transmission line when the supports are at different levels.	6	L3	CO1
	b.	Briefly explain the following : i) GTACSR conductors ii) GZTACSR conductors iii) Bundled conductors.	6	L2	CO1
	c.	A string of suspension insulator consists of four units. The capacitance between each link pin and the earth is $1/10^{\text{th}}$ of the self capacitance of a unit. The voltage between the line conductor and the earth is 100 kV. Find : i) the voltage distribution across each unit and b) string efficiency.	8	L3	CO1
Module – 2					
Q.3	a.	What is an unsymmetrical three phase line? Derive an expression for the inductance of unsymmetrical three phase line.	8	L2	CO2
	b.	Calculate the loop inductance per Km of a single phase transmission line consisting of two parallel conductors 1.5 m apart and 1.5 cm in diameter. Calculate also the reactance of the transmission line if it is operating at a frequency of 50 Hz.	6	L3	CO2
	c.	Write a short note on Transposition of transmission lines.	6	L2	CO2

OR					
Q.4	a.	Derive an expression for capacitance of a 3 phase single circuit line with equilateral spacing.	8	L3	CO2
	b.	A 3-phase, 50Hz, 66KV overhead line conductors are placed in a horizontal plane as shown in Fig Q4(b). The conductor diameter is 1.25cm. The line length is 100 Km. Calculate the capacitance per phase and charging current per phase. Assume complete transposition of the line.	6	L2	CO2
		 <p style="text-align: center;">Fig Q4(b)</p>			
	c.	Compare single circuit and double circuit arrangement of conductors.	6	L2	CO2
Module – 3					
Q.5	a.	Derive the expression for sending end voltage and current of a medium transmission line using nominal $\pi$ method with the help of vector diagram.	8	L3	CO3
	b.	Write a short note on classifications of transmission lines.	6	L2	CO3
	c.	A three phase transmission line delivers a power of 5000 kW at 30 kV and a p.f of 0.8 lagging. Find : i) The sending end voltage ii) The line current iii) The transmission efficiency and iv) percentage regulation. The total resistance and reactance of each phase are $4\Omega$ and $8\Omega$ respectively.	6	L3	CO3
OR					
Q.6	a.	Derive an expression for A, B, C, D constants of medium transmission line using nominal T method of analysis. Show that $AD - BC = 1$ .	10	L3	CO3
	b.	A 3 phase 50 Hz over head transmission line has the following constants per phase $R = 28\Omega$ , $X = 63\Omega$ , $Y = 4 \times 10^{-4}(\text{S})$ . If the load at the receiving end is 75 MVA at 0.8 pf lag with 132 KV between lines. Calculate the voltage, current and pf at the sending end. Use nominal $\pi$ method.	10	L3	CO3
Module – 4					
Q.7	a.	What is Corona? State the expression for disruptive critical voltage and visual critical voltage.	8	L2	CO4
	b.	What are the advantages and disadvantages of corona?	6	L2	CO4
	c.	A 3 phase line has conductors of 2 cm in diameter, spaced equilaterally, 1 m apart. If the dielectric strength of air is 30 kV/cm (max), find the critical disruptive voltage of the line. Air density factor $\delta = 0.952$ and irregularity factor $m_0 = 0.9$ .	6	L3	CO4
OR					
Q.8	a.	Derive an expression for the capacitance of a single core cable.	8	L3	CO4
	b.	Write a brief note on Thermal rating of cables.	6	L2	CO4



	c.	A 33KV, 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 0.5 cm. The relative permittivity of the dielectric is 3. Find : i) Capacitance of the cable/phase ii) Charging current phase iii) Total charging KVAR.	6	L3	CO4
<b>Module – 5</b>					
Q.9	a.	Explain the effect of disconnection of neutral in a 3 phase 4 wire systems.	8	L2	CO5
	b.	Explain Radial and parallel distribution schemes.	8	L2	CO5
	c.	Write a short note on power quality.	4	L2	CO5
<b>OR</b>					
Q.10	a.	Explain the probability concepts applied to Reliability.	6	L2	CO6
	b.	What are the limitations of distribution system?	6	L2	CO6
	c.	A 3 phase, 4 wire distributor supplies a balanced voltage of 400/230 V to a load consisting of 50 A at 0.8 p.g lagging for R phase, 50 A at 0.866 p.f lagging for Y phase and 50 A at unity p.f for B phase. The resistance of each line conductor is 0.2 $\Omega$ . Calculate the supply end voltage for R phase. The resistance of neutral is 0.4 $\Omega$ .	8	L3	CO6

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