



P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Fifth Semester, B.E. - Electrical and Electronics Engineering

Semester End Examination; Feb. - 2021

Power Transmission and Distribution

Time: 3 hrs

Max. Marks: 100

Course Outcomes

The Students will be able to:

CO1: Recognize the structure and operation of electricity generation, transmission and distribution systems and its impact on the society and environment.

CO2: Students are able to analyze the various power transmission methods involved in the power system.

CO3: Solve problems involving modeling, mechanical and electrical design and performance evaluation of power transmission lines.

CO4: Calculation of line parameters for the 1-phase and 3-phase systems, considering different configurations.

CO5: Analyze the importance of overhead and underground transmission systems.

CO6: Calculation of the capacitance and stress levels to solve simple designing problems of single and three core underground cables.

CO7: To analyze the causes and effects of corona phenomenon on OHT lines, precautions to be taken to eliminate it.

CO8: To analyze various types of power DSs.

Note: I) PART - A is compulsory. Two marks for each question.

II) PART - B: Answer any **Two** sub questions (from a, b, c) for Maximum of **18 marks** from each unit.

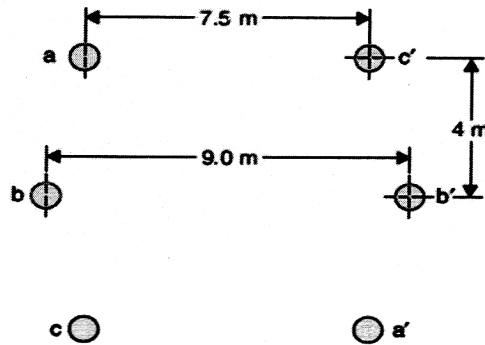
Q. No.	Questions	Marks	BLs	COs	POs
I: PART - A		10			
1 a.	Define voltage regulation of transmission line.	2	L1	CO1	PO1
b.	Explain the term string efficiency.	2	L2	CO2	PO1
c.	Define mutual GMD.	2	L1	CO3	PO1
d.	Give the classification of transmission lines.	2	L2	CO4	PO1
e.	Define critical disruptive voltage and visual critical voltage.	2	L1	CO5	PO1
II: PART - B		90			
UNIT - I		18			
1 a.	With a flow diagram, explain the different stages of electric power transmission from its generation to utilization.	9	L2	CO1	PO1
b.	Derive expressions for sag and tension when the supports are at unequal heights.	9		CO1	PO2
c.	The towers of height 30 m and 90 m respectively support a transmission line conductor at water crossing. The horizontal distance between the towers is 500 m. If the tension in the conductor is 1600 kg, find the minimum clearance of the conductor and water and clearance mid-way between the supports. Weight of conductor is 1.5 kg/m. Bases of the towers can be considered to be at water level.	9	L3	CO2	PO2
UNIT - II		18			
2 a.	Explain the different methods of improving string efficiency of insulators.	9	L2	CO2	PO2
b.	With a neat sketch, explain the construction of a single core cable and derive expression for the insulation resistance.	9	L2	CO2	PO2
c.	In a 33 kV overhead line, there are three units in the string of insulators. If the capacitance between each insulator pin and earth is 11% of self capacitance of each insulator. Find;	9	L4	CO2	PO3
	i) The distribution of voltage over 3 insulators ii) String efficiency				

UNIT - III

18

- 3 a. Obtain expression for the inductance of a three phase unsymmetrically spaced transmission line and what is the effect, if the lines are transposed?
- b. Derive the expression for capacitance of a single phase transmission line considering the effect of ground.
- c. Determine the inductance per km of a transposed double circuit 3Φ line shown in Fig. 3 (c). Each circuit of the line remains on its own side. The dia of the conductor is 2.532 cm.

9 L5 CO3 PO2
9 L3 CO3 PO2



9 L3 CO3 PO3

Fig. 3(c)

UNIT - IV

18

- 4 a. Obtain the ABCD parameters of a medium transmission line for its π configuration. Draw the vector diagram.
- b. Deduce expressions for voltage regulation and transmission efficiency of a short transmission line, giving the vector diagram.
- c. A 3-phase, 50 Hz, 16 km long overhead line supplies 1000 kW at 11 kV, 0.8 p.f. lagging. The line resistance is 0.03Ω per phase per km and line inductance is 0.7 mH per phase per km. Calculate the sending end voltage, voltage regulation and efficiency of transmission.

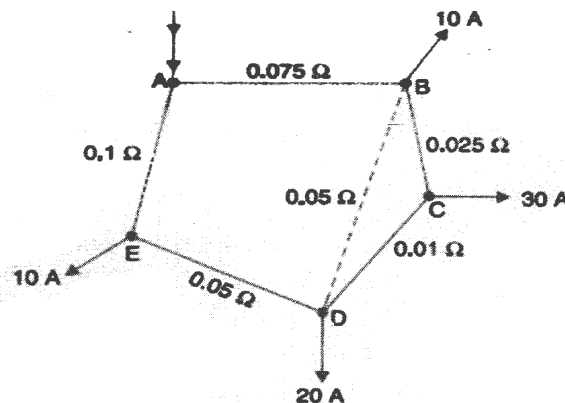
9 L4 CO4 PO2
9 L4 CO4 PO2
9 L4 CO4 PO3

UNIT - V

18

- 5 a. Define critical disruptive voltage and derive expression for the same for a single phase overhead line.
- b. What is corona? What are the factors which affect corona?
- c. Fig. 5(c) shows a ring distributor with interconnector BD. The supply is given at point A. The resistances of go and return conductors of various sections are indicated in the figure. Calculate;
 - i) Current in the interconnector
 - ii) Voltage drop in the interconnector

9 L1 CO5 PO2
9 L1 CO5 PO2



9 L4 CO5 PO3

Fig. 5(c)

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