

CBCS SCHEME

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21EE51

Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024 Transmission and Distribution

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- What is sag in a conductor? Explain the effects of too low sag and too high sag. (05 Marks)
 - A transmission line conductor at a river crossing is supported from two towers at heights of 50 m and 80 m above water level. The horizontal distance between the towers is 300 m. If the tension in the conductor is 2000 kg, find the clearance between the conductor and water at a point midway between the towers. Weight of conductor/m is 0.844 kg. (07 Marks)
 - Define string efficiency. Why it should be as high as possible? Explain the use of guard ring for improving the string efficiency. (08 Marks)

OR

- Why are bundled conductors used? List out its advantages. (06 Marks)
 - Derive an expression for sag of a transmission line when the supports are at same levels. Also explain the effects of ice loading and wind pressure on it. (08 Marks)
 - A 3 phase overhead transmission line is being supported by three discs of suspension insulators. The potential across the first and second insulators are 8 kV and 11 kV respectively. Calculate (i) Line voltage (ii) Ratio of capacitance between pin and earth to self capacitance of each unit. (iii) String efficiency. (06 Marks)

Module-2

- Derive an expression for the inductance of a conductor due to internal and external flux. (10 Marks)
 - The three conductors of a 3 phase line are arranged at the corners of a triangle of side 2 m, 2.5 m and 4.5 m. Calculate the inductance / km of the line when the conductors are regularly transposed. The diameter of each conductor is 1.24 cm. (06 Marks)

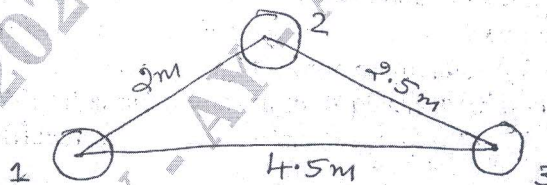


Fig. Q3 (b)

- Compare single circuit and double circuit. (04 Marks)

OR

- Calculate the capacitance of a 3 phase overhead transmission line with unsymmetrical spacing of a conductor. Assume lines are transposed. (08 Marks)
 - Discuss on transposition of transmission lines. (06 Marks)
 - Find the capacitance of a single phase line 40 km long consisting of two parallel wires each 8 mm in diameter and 2 m apart. Determine the capacitance of the same line taking into account effect of ground. The height of conductors above ground is 5 m. (06 Marks)

Module-3

- 5 a. Explain how transmission lines are classified. (06 Marks)
 b. Show how regulation and transmission efficiency are determined for medium transmission line using nominal T-method. Draw the corresponding phasor diagram. (08 Marks)
 c. A 3 phase transmission line delivers 5 MW at 33 KV, 0.8 pf lag. The resistance and reactance of the line are 3 ohm and 6 ohm respectively. Determine
 (i) Sending end voltage.
 (ii) Percentage regulation.
 (iii) Transmission efficiency
 using short line model. (06 Marks)

OR

- 6 a. Discuss the nominal π method of medium transmission line and obtain the expressions for,
 (i) Regulation.
 (ii) Transmission efficiency
 (iii) ABCD constants. (08 Marks)
 b. A 110 kV, 50 Hz, 3 phase transmission line delivers a load of 40 MW at 0.85 pf lagging at the receiving end. The generalized constants of the transmission line are,
 $A = D = 0.95 \angle 1.4^\circ$, $B = 96 \angle 78^\circ$ ohm, $C = 0.0015 \angle 90^\circ$ mho.
 Find the regulation of the line and charging current using nominal T-method. (06 Marks)
 c. Discuss on Ferranti effect. (06 Marks)

Module-4

- 7 a. Discuss various factors affecting corona and methods to reduce it. (08 Marks)
 b. What is meant by grading of cable? Explain capacitance grading. (08 Marks)
 c. Mention the requirements of underground cable. (04 Marks)

OR

- 8 a. Draw the cross sectional view of a single core cable and explain its constructional details. (08 Marks)
 b. A single core cable of conductor diameter 1.8 cm and lead sheath of diameter 5.4 cm is to be used on a 66 kV, 3 phase system. Two intersheaths of diameter 3 cm and 4.2 cm are used in between them to obtain uniform distribution of stress. Find the voltages at which the two intersheaths are maintained if the maximum stress in the layers is same. (08 Marks)
 c. Discuss the advantages and disadvantages of corona. (04 Marks)

Module-5

- 9 a. Define : (i) Reliability (ii) Availability (iii) Adequacy (iv) Security (08 Marks)
 b. Explain Radial and Ring main distributor. (08 Marks)
 c. What are the requirements of a power distribution system? (04 Marks)

OR

- 10 a. Explain 3 phase fourwire star connected unbalanced loads for AC distribution system. (06 Marks)
 b. Explain the effect of disconnection of neutral in a 3 phase 4 wire systems. (06 Marks)
 c. Explain the types of variations in power quality. (08 Marks)
