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Fifth Semester B.E. Degree Examination, Dec.08/Jan.09
Transmission and Distribution

Time: 3 hrs. Max. Marks:100

Note:1. ***Answer any FIVE full questions, choosing atleast two questions from each part.***
2. Assume any missing data.

Part A

1 a. What are the advantages of high voltage transmission? Explain. **(05 Marks)**
b. Explain with the help of neat diagram a typical transmission and distribution system scheme indicating the standard voltages. **(05 Marks)**
c. Write the factors affecting Corona. Derive the expressions for critical disruptive voltage and visual voltage and power loss in Corona. **(10 Marks)**

2 a. Define sag. What are the points to be noted for the calculation of sag? **(04 Marks)**
b. Derive the expression for sag when the supports are at unequal level. **(06 Marks)**
c. An overhead transmission line at a river crossing is supported from two towers at heights of 40 m and 90 m above water level, the horizontal distance between the towers being 400 m. If the maximum allowable tension is 2000 kg, find the clearance between the conductor and water at a point mid-way between the towers. Weight of conductor is 1 kg/m. **(10 Marks)**

3 a. Define string efficiency. Explain the methods of improving string efficiency. **(06 Marks)**
b. With neat figure explain pin-type insulator. **(06 Marks)**
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
i) the distribution of voltage over 3 insulators and ii) string efficiency. **(08 Marks)**

4 a. Derive an expression for insulation resistance of a single core cable. **(04 Marks)**
b. What is meant by grading of cables? Explain capacitance grading. **(08 Marks)**
c. A single core lead sheathed cable has a conductor diameter of 3 cm, the diameter of the cable being 9 cm. The cable is graded by using two dielectrics of relative permittivity 5 and 4 respectively with corresponding safe working stresses of 30 kV/cm and 20 kV/cm. Calculate the radial thickness of each insulation and the safe working voltage of the cable. **(08 Marks)**

Part B

5 a. Calculate the inductance of a conductor due to internal flux and external flux. **(10 Marks)**
b. What is transposition of transmission line? Calculate the inductance of three phase line with unsymmetrical spacing but transposed. **(10 Marks)**

6 a. How the transmission lines are classified? Explain. **(03 Marks)**
b. Explain with vector diagram the nominal T method for obtaining the performance calculations of medium transmission lines. **(07 Marks)**
c. A 3-phase, 50 Hz overhead transmission line 100 km long has the following constants resistance/km/phase= 0.1 Ω, Inductive reactance/km/phase = 0.2Ω, Capacitive susceptance/km/phase $= 0.4 \times 10^{-4}$ siemen. Determine i) Sending end current ii) Sending end voltage iii) Sending end power factor iv) Transmission efficiency when supplying a balanced load of 10000 kW at 66 kV, p.f. 0.8 lagging. Use nominal T method. **(10 Marks)**

7 a. How DC distributors are classified? Explain ring distributor, discuss its merits over other types of distributors. **(08 Marks)**
b. Derive an expression for uniformly loaded DC distributor fed at one end. **(04 Marks)**
c. A 2 wire DC distributor AB 900 meters long is fed at A at 400 V and loads of 50 A, 100 A and 150 A are tapped off from C, D and E which are at a distance of 200 m, 500 m and 800 m from point A respectively. The distributor is also loaded uniformly at the rate of 0.5 A/m. If the resistance of distributor per metre is 0.0001 Ω, calculate voltage i) at point B and ii) at point D. **(08 Marks)**

8 Write short notes on:
a. ABCD constants of transmission line.
b. Effect of ice loading and wind pressure on sag.
c. Capacitance of a three phase line with equilateral spacing.
d. Mathematical expression for string efficiency. **(20 Marks)**