CBCS SCHEME

USN | | | | | | | | | | **15EE43**

Fourth Semester B.E. Degree Examination, June/July 2019
Transmission and Distribution

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define sag. What are factors affecting sag? **(04 Marks)**

b. Discuss any two methods to improving the string efficiency in string insulator. **(06 Marks)**

c. An overhead line over a hillside with a gradient of 1 in 15 is supported by two 40 m towers. The horizontal distance between towers is 300 m. The weight of the conductor 1.5 kg/m and the tension is 1500 kg. Find the clearance between the lowest point of the conductor and the ground. **(06 Marks)**

OR

2 a. Discuss the properties of transmission line conductors. **(04 Marks)**

b. Obtain the expression for sag in overhead line conductor supported at different levels of height. **(06 Marks)**

c. A 3-phase overhead transmission line is being supported by three disc insulator. The potentials across top and middle units are 9 KV and 11 KV respectively. Calculate:
i) The ratio of capacitance between pin and earth to self capacitance of each unit
ii) The line voltage
iii) String efficiency **(06 Marks)**

Module-2

3 a. Explain the terms self GMD and mutual GMD. **(04 Marks)**

b. The three conductors of 3-phase line are arranged at the three corners of a triangle of sides 2m, 2.5m and 4.5m. Calculate the inductance per km of the line when conductors are regularly transposed. The diameter of each line conductors are 1.24 cm. **(06 Marks)**

c. Derive the expression for inductance of a single phase line. **(06 Marks)**

OR

4 a. Write a short note on transposition of transmission lines. **(04 Marks)**

b. A single phase overhead line 30 km long consists of two parallel wires each 5 mm in diameter and 1.5 m apart. If the line voltage be 50 KV at 50 Hz. Calculate current with the line open circuited. **(06 Marks)**

c. Derive the expression for a capacitance of the symmetrical 3-phase line. **(06 Marks)**

Module-3

5 a. Write a short note on classification of overhead transmission lines. **(04 Marks)**

b. Determine ABCD constants of medium line nominal T-method and check AD-BC = 1. **(06 Marks)**

c. A 220 KV, 3-phase overhead transmission line has an impedance per phase of (20 + J100)Ω and admittance of J0.0010 mho. Using π-model, determine the sending voltage and current when the current at the receiving end is 300 A at 0.9 pf lagging. **(06 Marks)**

OR

6 a. Discuss Ferranti effect in transmission lines. (04 Marks)

b. A 3 phase 300 km long transmission line has
Inductance/Ph = 10^{-3} H/km
Capacitance/Ph = 10×10^{-9} F/km
Resistance/Ph = 0.02 Ω/km
Determine ABCD parameters of the line. (06 Marks)

c. A single phase transmission line supplier of a load 1 MW at 11 KV, 0.8 pf lagging. The resistance and reactances of the line are 5Ω and 10Ω respectively. Determine:
i) Sending end voltage
ii) Efficiency of transmission line
iii) Percentage of regulation (06 Marks)

Module-4

7 a. Discuss the advantages and disadvantages of Corona. (04 Marks)

b. Prove that for a 3 layer inter sheath
$$\frac{g_{max}\text{ (with inter sheath)}}{g'_{max}\text{ (without inter sheath)}} = \frac{3}{1+\alpha+\alpha^2} \text{ where } \alpha = \frac{r_1}{r} = \frac{r_2}{r_1} = \frac{R}{r_2}.$$ (08 Marks)

c. A single core cable has a diameter of 1.5 cm covered with an insulation layer of 2 cm thickness. The specific resistance of insulation of the material is 7.5×10^{12} MΩ-m. Calculate the insulation resistance/km of the cable. (04 Marks)

OR

8 a. Draw the cross sectional view of single core cable and explain its construction. (04 Marks)

b. A 132 KV line with 1.956 cm diameter conductor is built so, that corona takes place if the line voltage exceeds 210 KV (rms). If the value of potential gradient at which insulation occurs can be taken as 30 KV/cm. Find the spacing between conductors. Assume δ = 1, irregularity factor = 1. (06 Marks)

c. For most economical diameter of single cone cable to be used on a 132 KV, 3-phase system. Find also the overall diameter of the insulation if the peak permissible stress is not be exceed 60 KV/cm. (06 Marks)

Module-5

9 a. What are requirements of a power distribution system? (04 Marks)

b. Discuss the effect of disconnection of neutral in a 3-phase Four wire system. (04 Marks)

c. A single phase distributor AB is 500 m long and is fed at point A and it is loaded as follows:
i) 100 A at 0.8 pf lagging 200 m from A
ii) 150 A at 0.707 pf lagging at 500 m from A.
The total resistance and reactance of the distributor are 0.2 Ω and 0.1Ω per km respectively. If the receiving end voltage is 400 V, find the sending end voltage and power factor. (08 Marks)

OR

10 a. Discuss the limitation of distribution system. (04 Marks)

b. Write short note on radial and ring main distribution system. (06 Marks)

c. Explain the following with respect to distribution system:
i) Reliability
ii) Quality (06 Marks)

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