CBCS SCHEME

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18EE43

Fourth Semester B.E. Degree Examination, Jan./Feb. 2021
Transmission & Distribution

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Explain typical line diagram of transmission and distribution scheme indicating voltage levels used at different stages. **(06 Marks)**

b. Deduce an approximate expression for sag in overhead lines when supports are at unequal levels. **(06 Marks)**

c. A 3 phase overhead transmission line is being supported by three discs of suspension insulators. The potentials across the first and second insulator are 8 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. **(08 Marks)**

OR

2 a. Explain any two methods of improving string efficiency. **(06 Marks)**

b. With suitable expression, explain the advantages of high transmission voltage. **(06 Marks)**

c. The towers of height 30 m and 90 m respectively, support a transmission line conductor at water crossing. The horizontal distance between the two towers is 500 m. If the tension in the conductor is 1600 kg, find the minimum clearance of the conductor and water clearance midway between the supports. Weight of conductor is 1.5 kg/m and Bases of the towers are at water level. **(08 Marks)**

Module-2

3 a. Derive an expression for inductance per phase of a 3 phase overhead transmission line when conductors are symmetrically placed. **(08 Marks)**

b. Explain the concept of, (i) Self GMD (ii) Mutual GMD **(06 Marks)**

c. A 3-phase, 50 Hz, 132 kV overhead line has conductors placed in a horizontal plane 4 m apart conductor diameter is 2 cm. If the line length is 100 km, calculate the charging current per phase assuming complete transposition. (Refer Fig. Q3 (c)) **(06 Marks)**

Fig. Q3 (c)

OR

4 a. What is Skin effect? What are the factors influencing skin effect? **(06 Marks)**

b. Derive an expression for capacitance of a 3 phase line with unsymmetrical spacing but transposed. **(08 Marks)**

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

Module-3

5 a. Derive an expression for A, B, C, D constants of a medium transmission line, using nominal π method of analysis. Show that $AD - BC = 1$. **(10 Marks)**

b. A balanced 3-phase load of 30 MW is supplied at 132 KV, 50 Hz and 0.85 pf lagging by means of transmission line. The series impedance of a single conductor is (20+j52) Ω and the total phase neutral admittance is 315×10^{-6} Siemens. Using nominal T method determine
(i) A, B, C and D constants of line
(ii) Sending end voltage
(iii) Regulation of line. **(10 Marks)**

OR

6 a. Derive an expression for voltage regulation and transmission efficiency of a single phase short transmission line with the help of vector diagram. **(06 Marks)**

b. Write a short note on classification of transmission lines. **(06 Marks)**

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 0.03 Ω per phase per km. Calculate the sending end voltage, voltage regulation and efficiency of transmission. **(08 Marks)**

Module-4

7 a. What is grading of cable? Briefly explain capacitance grading. **(10 Marks)**

b. What is Corona? What are the factors which affect Corona? **(06 Marks)**

c. A single core cable has a conductor diameter of 1 cm and insulation thickness of 0.4 cm. If the specific resistance of insulation is 5×10^{14} Ωcm. Calculate the insulation resistance for a 2 km length of cable. **(04 Marks)**

OR

8 a. Derive an expression for capacitance of a single core cables. **(08 Marks)**

b. Compare Underground cables and overhead Transmission line system. **(06 Marks)**

c. A 3 phase, 220 KV, 50 Hz transmission line consists of 1.5 cm radius conductor spaced 2 m apart in equilateral triangular formation. If the temperature is 40°C and atmospheric pressure is 76 cm, calculate the corona loss per km of the line. Take $m_0 = 0.85$ and $g_0 = 21.2$ KV/cm(rms) **(06 Marks)**

Module-5

9 a. Write a short note on :
(i) Radial distribution system
(ii) Ring main distribution system. **(06 Marks)**

b. What is power quality? Explain various power quality problems. **(06 Marks)**

c. A two wire distributor 1200 m long is loaded as shown in Fig. Q9 (c). B is the midpoint. The power factors at the two load points refer to the voltage at C. The impedence of each live is (0.10+j0.2) ohm. Calculate the sending end voltage, current and power factor. The voltage at point C is 220 V. **(08 Marks)**

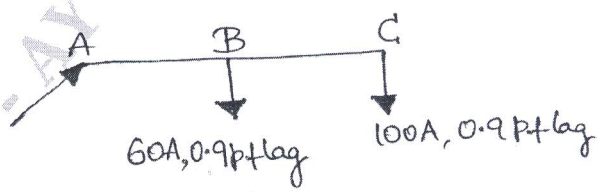

Fig. Q9 (c)

OR

10 a. With the help of neat graph, explain Bathtub curve. **(06 Marks)**

b. What are the limitations of distribution system? **(06 Marks)**

c. A single phase ac distributor AB 300 m long is fed from end A and is loaded as:

(i) 100 A at 0.707 p.f. lagging 200 m from point A.

(ii) 200 A at 0.8 p.f. lagging 300 m from point A.

The load resistance and reactance of the distributor is 0.2 Ω and 0.1 Ω per km. Calculate the total voltage drop in the distributor. The load p.f. refer to the voltage at the far end. **(08 Marks)**

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