CBCS SCHEME

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Fourth Semester B.E. Degree Examination, July/August 2022
Transmission and Distribution

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1   a.   Draw the line diagram of a typical transmission and distribution system indicating the standard voltages. **(06 Marks)**

    b.   With usual notations, derive an expression for the sag of a transmission line when the supports are at equal levels. **(06 Marks)**

    c.   Two towers of height 40 m and 30 m respectively support a transmission line conductor at water crossing. The horizontal distance between the towers is 300 m. If the tension in the conductor is 1500 kg, find the clearance of the conductor at a point midway between the supports. Weight of the conductor is 0.8 kg/m. Assume bases of the towers to be at the water level. **(08 Marks)**

OR

2   a.   Write the methods of improving the string efficiency and explain any one of the method. **(08 Marks)**

    b.   Each line of a three phase system is suspended by a string of three similar insulators. If the voltage across the line unit is 17.5 KV, calculate the line to neutral voltage and the string efficiency. Assume that the shunt capacitance between each insulator and earthed metal work of tower to be $1/8^{th}$ of the capacitance of the insulator. **(06 Marks)**

    c.   Discuss the advantages of high voltage transmission. **(06 Marks)**

Module-2

3   a.   Derive an expression for the inductance of a conductor due to internal and external flux. **(12 Marks)**

    b.   Two conductors of a single phase line, each of 1 cm diameter are arranged in a vertical plane with one conductor mounted 1m above the other. A second identical line is mounted at the same height as the first and spaced horizontally 0.25 m apart from it. The two upper and the two lower conductors are connected in parallel. Determine the inductance per km of the resulting double circuit line. **(08 Marks)**

OR

4   a.   Derive the expression for line to neutral capacitance of a three phase line with unsymmetrical spacing but transposed. **(08 Marks)**

    b.   A 3-phase, 50 Hz, 66 KV overhead line conductors are placed in a horizontal plane 2m apart. Conductor diameter is 1.25 cm. The line length is 100 km. Calculate the capacitance per phase and charging current per phase. Assume complete transposition of the lines. **(06 Marks)**

    c.   A single phase overhead line 30 km long consists of 2 parallel wires each 5 mm in diameter and 1.5 m apart. If the line voltage is 50 KV and 50 Hz, calculate charging current with line open circulated. **(06 Marks)**

Module-3

5 a. Write short note on classification of transmission lines. **(06 Marks)**
   b. Determine the sending end voltage and sending end current for medium transmission lines, assuming nominal T-method. **(06 Marks)**
   c. A 3 phase line delivers 5000 KW at 22 KV and at a p.f. of 0.8 lagging to a load. Determine:
   (i)   Sending end voltage
   (ii) Percentage Regulation
   (iii) Transmission efficiency.
   The resistance and reactance of each conductor is 4Ω and 6Ω respectively. **(08 Marks)**

OR

6 a. Explain with vector diagram, the nominal π - method for obtaining the performance of medium transmission line. **(08 Marks)**
   b. Two transmission lines having generalized circuit constants A_1, B_1, C_1, D_1 and A_2, B_2, C_2, D_2 are connected in (i) series and (ii) parallel. Derive expression for overall ABCD constant of the resulting network. **(12 Marks)**

Module-4

7 a. Explain the phenomenon of corona in overhead transmission line. **(06 Marks)**
   b. Explain the following terms with reference to the corona:
   (i) Critical disruptive voltage
   (ii) Visual critical voltage **(08 Marks)**
   c. A 33 KV, 3 phase underground cable, 4 km long uses three single core cables. Each of the conductor has a diameter of 2.5 cm and the radial thickness of insulation 0.5 cm. The relative permittivity of the dielectric is 3. Find:
   (i)   Capacitance of the cable/phase
   (ii) Charging current/phase
   (iii) Total charging KVAR **(06 Marks)**

OR

8 a. Define grading of cables. Explain capacitance grading. **(08 Marks)**
   b. Derive the expression for the capacitance of a single core cable and give the expression for the maximum and minimum dielectric stress. **(06 Marks)**
   c. Describe the various methods of reducing corona effect in an overhead transmission line. **(06 Marks)**

Module-5

9 a. Define: (i) Reliability   (ii) Availability   (iii) Adequacy   (iv) Security **(10 Marks)**
   b. A two wire dc distributor system is 3 km long and its supplies loads of 200 A, 100 A, 75 A and 50 A at 800 m, 1200 m, 2000 m and 3000 m from the feeding point A. Each conductor has go and return resistance of 0.004 Ω per 100 m. Calculate the voltage at each load point if voltage at feeding point 250 V. **(10 Marks)**

OR

10 a. Explain the radial distribution system and Ring main distribution system. **(10 Marks)**
   b. Explain with neat sketch different failure modes of bath tub curve. **(05 Marks)**
   c. Write a note on power quality. **(05 Marks)**

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