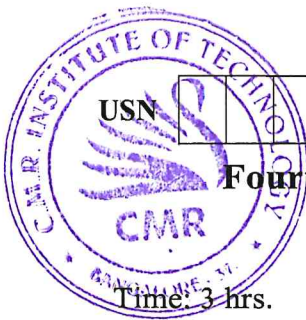


CBCS SCHEME

17EE43



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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

- Draw and explain the Typical structure of a power system indicating standard voltages. (06 Marks)
 - Explain the following types of Conventional conductors used in transmission line :
i) ACSR ii) ZTAI iii) GZTACSR iv) TACSR. (07 Marks)
 - An overhead line is supported between two towers 250m apart having a difference in their levels equal to 4m. Calculate the sag at the lower support if the wind pressure is 39kg/m^2 of projected area. Factor of safety is 2. The conductor data is : Nominal copper area 110mm^2 , Standard conductor 37/2.79mm, Weight 844 kg/km, Ultimate strength 7950 kg. (07 Marks)

OR

- Explain how overhead transmission lines are protected against lightning. (06 Marks)
 - Discuss the factors affecting the vibrations in a conductor and methods to minimise them. (07 Marks)
 - A three phase 33kV transmission line is carried by a string of five suspension insulators. The capacity of each unit insulator to the capacity relative to earth is 4 : 1. Calculate the potential across each unit and the string efficiency. (07 Marks)

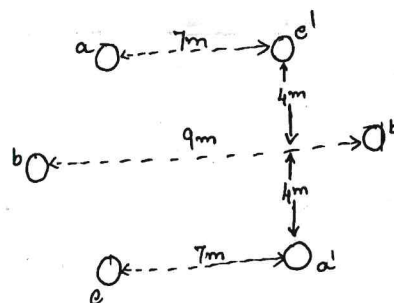
Module-2

- Derive the expression for inductance in a conductor due to external flux. (06 Marks)
 - What is Skin effect? Which are the factor influencing skin effect? (07 Marks)
 - The three conductors of a 3 phase transmission line are arranged in a horizontal plane and are 3m apart. The diameter of each conductor is 4cm. Determine the inductance per km of each phase. Assume balanced load and R, y, B phase sequence. (07 Marks)

OR

- Derive the expression for capacitance of a 3 phase single circuit line with equilateral spacing. (08 Marks)
 - The six conductors of a double circuit, three phase line are arranged as shown in Fig. Q4(b). The diameter of each conductor is 2.5cm. Find the capacitance to neutral assuming that the line is transposed. (12 Marks)

Fig. Q4(b)



Module-3

- 5 a. Explain the nominal π method for obtaining the performance calculations of a medium transmission line. Draw the corresponding vector diagram. (10 Marks)
- b. A 3 phase line delivers 3600 kW at a power factor of 0.8 lagging to a load. If the sending end voltage is 33kV, determine i) The receiving end voltage ii) Line current iii) Transmission efficiency. The resistance and reactance of each conductor are 5.31Ω and 5.54Ω respectively. (10 Marks)

OR

- 6 a. Derive an expression for sending end voltage and current for long transmission line using Rigorous solution. (10 Marks)
- b. A 3 phase, 400km long transmission line caters a load of 450 MVA, 0.8 p.f. lag at 345 kV. The ABCD constants are $A = D = 0.8181 \angle 1.3^\circ$, $B = 172.2 \angle 84.2^\circ \Omega$, $C = 1.933 \times 10^{-3} \angle 90.4^\circ \text{U}$. Find the sending end current and percentage voltage drop at full load. Also calculate the sending end line to neutral voltage. (10 Marks)

Module-4

- 7 a. What is Corona? What are the factors affecting Corona? (06 Marks)
- b. What are the advantages and disadvantages of Corona? (07 Marks)
- c. A three phase 220 kV line, 60Hz, 150 km long transmission consists of conductors of diameter 2.8cm, spaced 2m apart equilaterally. The dielectric strength of air is 30kV/cm, temperature is 38°C and atmospheric pressure is 76cm of mercury. The irregularity factor of the conductor surface is 0.89. Determine the Corona loss in the line. (07 Marks)

OR

- 8 a. Derive the expression for insulation resistance of a underground cable. (06 Marks)
- b. Write a short note on advantages and limitations of underground cables. (07 Marks)
- c. A single core lead covered cable has a conductor diameter of 3cm with insulation diameter of 8.5cm. The cable is insulated with two dielectrics with permittivity 5 and 3 respectively. The maximum stress in the two dielectrics is 38kV/cm and 26kV/cm respectively. Calculate the radial thickness of insulating materials and the working voltage of the cable. (07 Marks)

Module-5

- 9 a. Draw and explain the AC distribution system with a help of a single line diagram. (06 Marks)
- b. With a neat phasor diagram, explain AC distribution with power factor with respect to receiving end voltage. (07 Marks)
- c. If a distribution company is supplying 50,000 customers and if there are two interruption on a particular day as follows : i) for 30 minutes affecting 400 customers ii) for 45 minutes affecting 1000 customers. Find SAIDI, CAIDI, SAIFI, CAIFI reliability indices. (07 Marks)

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OR

- 10 a. Write a short notes on Power Quality problems and its classification. (10 Marks)
- b. A two wire feeder XYZ has a load of 100A at Z and 50A at Y both at 0.8 p.f lagging with respect to receiving end voltage. The impedance of section XY is $(0.03 + j0.06)\Omega$ and that of YZ is $(0.06 + j0.1)\Omega$. If the voltage at the far end Z is to be maintained at 400V, determine voltage at X and Y. (10 Marks)
