CBCS SCHEME

USN | | | | | | | | | |

17EE43

Fourth Semester B.E. Degree Examination, Feb./Mar. 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. Discuss the special feature of Reinforced Concrete Pole (RCP) and the advantages of HTLS conductors? **(08 Marks)**

b. An overhead transmission line conductor having a parabolic configuration weighs 1.925 kg per metre of length. The area of the cross section of the conductor is $2.2cm^2$. The ultimate strength is $8000kg/cm^2$. The supports are 600m apart and having 15m difference of levels. Calculate the sag from the taller of the two supports which must be allowed so that the factor of the safety shall be 5. Assume ice load is 1kg per metre run and there is no wind pressure. **(12 Marks)**

OR

2 a. What are the advantages of composite insulators over glass and porcelain insulators? **(08 Marks)**

b. An insulator string consists of 3 units, each having a safe working voltage of 15kV. The ratio of self-capacitance to shunt capacitance of each unit is 8:1. Find the maximum safe working voltage of the string and string efficiency. **(12 Marks)**

Module-2

3 a. Define distributed constants. What is the need for transposition in a 3 phase unsymmetrical transmission line? **(08 Marks)**

b. The figure shows the arrangement of a double circuit single phase line. Calculate the inductance per km of the line (go and return). The radius of the conductor is 1.25cm. Assume aa′ - one group bb′ - one group. **(12 Marks)**

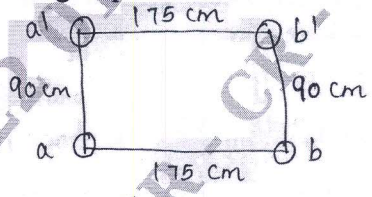

Fig.Q.3(b)

OR

4 a. What are the advantages of a double circuit line over single circuit line? **(08 Marks)**

b. A single circuit, 3φ, 25km long transmission line is arranged as shown in Fig.Q.4(b). If the conductor diameter is 0.8cm, find the capacitance and capacitive reactance of the transmission line. **(12 Marks)**

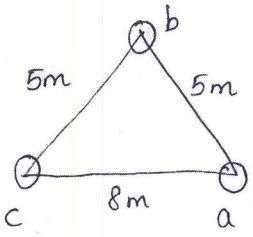

Fig.Q.4(b)

Module-3

5 a. What are the generalized circuit constants of the transmission line? Determine the ABCD constants of the short transmission line with appropriate phasor diagram and prove AD-BC = 1. **(10 Marks)**

b. A three phase, short transmission line delivers 3MW, at a power factor of 0.8 lagging to a load, if the sending end voltage is 33kV. Find: i) Receiving and voltage ii) Line current iii) Transmission efficiency iv) regulation. The resistance and reactance of each conductor are 5Ω and 8Ω respectively. **(10 Marks)**

OR

6 a. Discuss the nominal π model of a transmission line with appropriate circuit diagram and phasor diagram, and hence obtain the expression for ABCD constants for the same. **(10 Marks)**

b. A 110KV, 50Hz, 3 phase transmission line delivers a load of 40MW at 0.85 lagging power factor at the receiving end. The generalized constants of the line are $A = D = 0.95\angle 1.4^\circ$, $B = 96\angle 78^\circ\ \Omega$, $C = 0.0015\angle 90^\circ\ \mho$. Calculate the regulation of the line and charging current using nominal T method. **(10 Marks)**

Module-4

7 a. Discuss the disadvantages of the corona and how to overcome it. **(10 Marks)**

b. In a 3φ line, the conductors have each a diameter of 30mm, and are arranged in the form of an equilateral triangle. Assume, $\delta = 0.95$, $M_0 = 0.95$, find the minimum spacing between the conductors if disruptive critical voltage is not to exceed 230 kV between the lines. **(10 Marks)**

OR

8 a. With a neat cross sectional view of a gas pressured cable, explain its construction features and advantages. **(10 Marks)**

b. A single core lead sheath cable is graded by using three dielectrics of relative permittivities 5, 4 and 3 respectively. The conductor diameter is 2cm and overall diameter is 8cm. If the three insulating materials are worked at the same maximum potential gradient of 40kV/cm, find the safe working voltage of the cable. **(10 Marks)**

Module-5

9 a. Explain in detail the influence of voltage on the size of a feeder and a distributor line. **(10 Marks)**

b. Explain the concept of ring main distribution system. Discuss its advantages and disadvantages. **(10 Marks)**

OR

10 a. Explain with a neat sketch, the different failure modes of the bath tub curves. **(10 Marks)**

b. What are the limitations of the distribution system? **(10 Marks)**

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