

Reg. No.

Question Paper Code

11655

**B.E./B.Tech. - DEGREE EXAMINATIONS, NOV/DEC 2022**

Fourth Semester

**Electrical and Electronics Engineering**

**20EEPC402 - TRANSMISSION AND DISTRIBUTION**

(Regulations 2020)

Duration: 3 Hours

Max. Marks: 100

**PART - A (10 × 2 = 20 Marks)**

Answer ALL Questions

- |  | <i>Marks,<br/>K-Level, CO</i> |
|--|-------------------------------|
| 1. Point out the advantages of bundled conductor.  | 2,K2,CO1                      |
| 2. Discriminate between self and Mutual GMD.   | 2,K2,CO1                      |
| 3. Identify what is meant by natural loading of transmission lines.  | 2,K1,CO2                      |
| 4. Describe Visual critical voltage and Disruptive critical voltage.   | 2,K1,CO2                      |
| 5. A single core cable, 1.7 km long, has a conductor radius of 13mm and insulation thickness of 5.8mm. The dielectric has a relative permittivity of 2.8. Calculate the capacitance per meter length of cable. | 2,K3,CO3                      |
| 6. Define string efficiency.   | 2,K1,CO3                      |
| 7. Give the expression for the insulation resistance of a single core cable.   | 2,K1,CO4                      |
| 8. Give two methods for elimination of void formation in the cable.  | 2,K1,CO4                      |
| 9. Discuss why the transmission lines are 3 phase, 3 wire systems and the distribution lines are 3 phase 4 wire system.  | 2,K2,CO5                      |
| 10. Draw the single line diagram of ring main distributor.   | 2,K2,CO5                      |

**PART - B (5 × 13 = 65 Marks)**

Answer ALL Questions

11. a) Derive the expression to calculate the internal and external flux linkages for a conductor carrying current. Use these expressions to derive the equation for the inductance of a single phase transmission line. 13,K3,CO1

**OR**

- b) A 220kV, 50Hz, 200km long three phase line has its conductors on the corners of a triangle with sides 6m, 6m and 12m. The conductor radius is 1.81cm. Find the capacitance per phase per km. Capacitive reactance per phase, Charging current and Charging Mega volt-amperes. 13,K3,CO1

12. a) Draw the nominal T circuit of a medium length transmission line and derive expression for sending end voltage and current. Also draw the respective phasor diagram. 13,K3,CO2

**OR**

- b) Using rigorous method, derive expression for sending end voltage and current for a long transmission line. 13,K3,CO2

13. a) (i) Discuss how string efficiency is improved by capacitance grading suspension insulators. 5,K3,CO3  
(ii) A string of eight suspension insulator is to be graded to obtain uniform distribution of voltage across the string. If the capacitance of the top unit is 10 times the capacitance to ground of each unit, determine the capacitance of the remaining seven units. 8,K3,CO3

**OR**

- b) Draw the neat sketches and explanation of pin and suspension type insulators. Compare their merits and demerits. 13,K3,CO3

14. a) Derive an expression for the insulation resistance, capacitance and the electrostatic stress of a single core cable. 13,K3,CO4

**OR**

- b) With neat diagram, explain the various methods of grading of underground cables. 13,K3,CO4

15. a) Describe the different types of bus bar arrangements used in substations? Illustrate your answer with suitable diagrams. 13,K3,CO5

**OR**

- b) A 3 phase 4 wire distributor supplies a balanced voltage of 400/230 V to a load consisting of 100A at 0.84 power factor lagging and 60A at unity power factor on phases R, Y, B respectively. The resistance of each core is  $0.3\Omega$ . Determine the voltage at the supply end of R-phase relative to the load voltage. 13,K3,CO5

**PART - C (1 × 15 = 15 Marks)**

16. a) Assume that the shape of an overhead line can be approximated by a parabola; Deduce expression for calculating sag and conductor length. How can the effect of wind and ice loading are taken into account. 15,K4,CO3

**OR**

- b) A 2 wire D.C street mains AB, 600m long if fed from both ends at 220V. Loads of 20A,40A,50A, and 30A are tapped at distances of 100m, 250m, 400m and 500m from the end A respectively. If the area of X- section of distributor conductor is 1 square centimeter, find the minimum consumer voltage, Take  $\rho = 1.7 \times 10^{-6} \Omega\text{-cm}$  15,K4,CO3