CODE No.: 19BT40204 SVEC-19

Roll No. | | | | | | | | | | |

# SREE VIDYANIKETHAN ENGINEERING COLLEGE

(An Autonomous Institution, Affiliated to JNTUA, Ananthapuramu)

## II B.Tech II Semester (SVEC-19) Regular Examinations August – 2021

### TRANSMISSION AND DISTRIBUTION

### [ Electrical and Electronics Engineering ]

**Time: 3 hours** **Max. Marks: 60**

**Answer One Question from each Unit**
**All questions carry equal marks**

## UNIT-I

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|---|---|---|---|---|---|---|
| 1. | a) | What is method of images? Derive an expression for the capacitance per unit length of a 3-phase transposed line. What is the effect of earth on the capacitance of the line? | 6 Marks | L2 | CO1 | PO1 |
| | b) | A 3-phase, 50Hz, 66kV overhead transmission line has its conductors arranged at the corners of an equilateral triangle of 3m sides and the diameter of each conductor is 1.5cm. Determine the capacitance per phase, if the length of line is 100 km, and also calculate the charging current. | 6 Marks | L3 | CO1 | PO2 |
| | | **(OR)** | | | | |
| 2. | a) | Derive the expression for capacitance of single core cable with conductor diameter d and inner sheath diameter D. | 6 Marks | L2 | CO1 | PO1 |
| | b) | An 11kV, 50Hz, single phase cable 2.5km long, has a diameter of 20mm and internal sheath radius of 15mm. If the dielectric has a relative permittivity of 2.4, determine i) capacitance ii) charging current iii) total charging kVAR. | 6 Marks | L3 | CO1 | PO2 |

## UNIT-II

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| 3. | a) | Explain the equivalent Π method of solution for the performance of medium transmission lines. Draw a phasor diagram with the receiving end voltage as reference. Comment how this analysis help full in real time power systems. | 6 Marks | L4 | CO2 | PO4 |
| | b) | An overhead 3-phase transmission line delivers 5000 kW at 22kV at 0.8 p.f lagging, the resistance and reactance of each conductor is 4Ω and 6Ω respectively. Determine i) sending end voltage, ii) percentage regulation, iii) Transmission efficiency. | 6 Marks | L3 | CO2 | PO2 |
| | | **(OR)** | | | | |
| 4. | a) | Derive the expressions for reflected voltage and current waves, when the transmission line is terminated by the capacitive load. | 6 Marks | L2 | CO2 | PO1 |
| | b) | A cable with surge impedance of 100Ω is terminated in two parallel connected open wires having surge impedances of 600Ω, and 1000Ω respectively. If a steep fronted voltage wave of 2 kV travels along the cable, find the voltage and current in the cable and the open-wire lines immediately after the travelling wave has reached the transition point. Assume voltage wave to be infinite length. | 6 Marks | L5 | CO2 | PO3 |

## UNIT-III

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| 5. | a) | Derive the expressions for sag and tension when the supports are at unequal heights. Comment how it is useful in power system. | 6 Marks | L2 | CO3 | PO1 |
| | b) | A transmission line has a span of 150m between level supports. The line conductor has a cross-sectional area of 1.25cm$^2$ and it weighs 120kg per 100m. If the breaking stress of copper conductor is 4220 kg per cm$^2$. Calculate the maximum sag for a safety factor of 4. Assume maximum wind pressure of 90 kg per m$^2$. | 6 Marks | L3 | CO3 | PO7 |

**(OR)**

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| 6. | a) | Define string efficiency. Why is it necessary to have high string efficiency? How can it be achieved? | 6 Marks | L4 | CO3 | PO4 |
| | b) | The three bus-bar conductors in an outdoor sub-station are supplied by units of post insulators. Each unit consists of a stack of 3-pin insulators fixed one on the top of the other. The voltage across the lowest insulator is 8·45 kV and that across the next is 7·25 kV. Find the bus-bar voltage of the station. | 6 Marks | L3 | CO3 | PO3 |

**UNIT-IV**

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| 7. | a) | Explain the different types of loads and it's characteristics with realistic examples. | 6 Marks | L1 | CO4 | PO1 |
| | b) | A two conductor main AB, 500m in length is fed from both ends at 250 volts. Loads of 50A, 60A, 40A and 30A are tapped at distance of 100m, 250m, 350m and 400m from end A respectively. If the X-section of conductor be 1cm$^2$ and specific resistance of the material of the conductor is 1·7μΩcm, determine the minimum consumer voltage. | 6 Marks | L3 | CO4 | PO2 |

**(OR)**

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| 8. | a) | Discuss for solving AC distribution problems when power factors referred to receiving end voltage. | 6 Marks | L2 | CO4 | PO3 |
| | b) | A single phase distributor AB has a total impedance of (0·1 + j 0·2)Ω. At the far end B, a current of 80A at 0·8 p.f. lagging and at mid-point C a current of 100A at 0·6 p.f. lagging are tapped. If the voltage of the far end is maintained at 200V, determine: i) Supply end voltage $V_A$ ; ii) Phase angle between $V_A$ and $V_B$ .The load power factors are with respect to the voltage at the far end. | 6 Marks | L3 | CO4 | PO2 |

**UNIT-V**

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| 9. | a) | Explain the various factors to be considered to decide the ideal location of substation. | 6 Marks | L1 | CO5 | PO1 |
| | b) | Show that if the voltage drops are limited, six feeders can carry only 1.25 times as much load as the four feeders. | 6 Marks | L3 | CO5 | PO2 |

**(OR)**

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| 10. | a) | Explain different bus bar arrangements with a neat sketch. | 6 Marks | L1 | CO5 | PO1 |
| | b) | Discuss in detail the present design practice of secondary distribution system. | 6 Marks | L6 | CO5 | PO3 |

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