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**PRESIDENCY UNIVERSITY**

**Bengaluru**

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| **End - Term Examinations –JANUARY 2025** |
| **Date:** 13 – 01- 2025 **Time:** 09.30 am to 12.30 pm |

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| **School:** SOE | **Program:** B. Tech (EEE) | |
| **Course Code :** EEE2021 | **Course Name :** Transmission and Distribution | |
| **Semester**: V | **Max Marks**: 100 | **Weightage**: 50% |

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| **CO - Levels** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| **Marks** | **12** | **22** | **22** | **22** | **22** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Do not write anything on the question paper other than roll number.*

**Part A**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Answer ALL the Questions. Each question carries 2marks. 10Q x2M=20M** | | | | |
| **1** | List any two differences between the AC and DC Transmission system. | **2 Marks** | **L1** | **CO1** |
| **2** | List advantages of typical mesh type and radial power system structure. | **2 Marks** | **L1** | **CO1** |
| **3** | What comes to mind first when you think about the basic aspects of AC power transmission? Can you mention at least one critical factor that defines it? | **2 Marks** | **L1** | **CO1** |
| **4** | Why would a utility firm need to understand the differences between AC and DC distributors? Can you recollect a simple reason why one could be preferred over the other? | **2 Marks** | **L1** | **CO1** |
| **5** | Summarize the reason why the transmission lines are three phase 3 wire circuits while distribution lines are three phase 4 wire circuits | **2 Marks** | **L2** | **CO1** |
| **6** | What are the key differences between primary distribution and secondary distribution systems? | **2 Marks** | **L2** | **CO1** |
| **7** | List the important factors to be considered while deciding the transmission systems. | **2 Marks** | **L2** | **CO2** |
| **8** | Mention the typical range of distances and the voltage range that define a medium transmission line | **2 Marks** | **L2** | **CO3** |
| **9** | Define the disruptive and visual critical voltages. | **2 Marks** | **L1** | **CO4** |
| **10** | Draw the Single line diagram of a typical low tension distribution system. | **2 Marks** | **L2** | **CO5** |

**Part B**

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| **Answer the Questions Total 80 Marks.** | | | | | |
| **11.** | **a.** | Explain the various factors affecting Skin Effect in Transmission Lines and how it can be reduced. | **10 Marks** | **L2** | **CO2** |
|  | **b.** | A 3-phase, 60 Hz, 66 kV overhead line conductors “abc” are placed in a horizontal plane “a to b is 2.5m”, “b to c is 2.5m” and “a to c is 5.0m” . The conductor diameter is 2.0 cm. If the line length is 120 km, calculate (i) capacitance per phase, (ii) charging current per phase, assuming complete transposition of the line. | **10 Marks** | **L3** | **CO2** |
| **or** | | | | | |
| **12.** | **a.** | Identify and list important factors to be considered while deciding the transmission systems. | **10 Marks** | **L2** | **CO2** |
|  | **b.** | A 3-phase, 60 Hz, 220 kV overhead line has conductors placed in a horizontal plane 4 m apart is shown in Fig. 1. Conductor diameter is 2.5 cm. If the line length is 200 km, calculate the charging current per phase assuming complete transposition    Fig. 1 | **10 Marks** | **L3** | **CO2** |
|  |  |  |  |  |  |
| **13.** | **a.** | Describe the importance of the connection between sending-end and receiving-end parameters in relation to the ABCD constants applied to short transmission line. | **08 Marks** | **L2** | **CO3** |
|  | **b.** | A single phase overhead transmission line delivers 1100 kW at 33 kV at 0·8 p.f. lagging. The total resistance and inductive reactance of the line are 10 Ω and 15 Ω respectively. Determine: (i) sending end voltage (ii) sending end power factor and (iii) transmission efficiency. | **12 Marks** | **L3** | **CO3** |
| **or** | | | | | |
| **14.** | **a.** |  | **10 Marks** | **L2** | **CO3** |
|  | **b.** | A Power is transferred from Bengaluru to Mysuru through a 3-phase, which is having line length is 143.6 km long, supply frequency is 50-Hz. The transmission line has following line constants:  Resistance/phase/km = 0·1 Ω  Reactance/phase/km = 0·5 Ω  Susceptance/phase/km = 10 × 10−6 S  If the line supplies load of 20 MW at 0·9 p.f. lagging at 66 kV at the receiving end, Identify the suitable transmission line that required to transfer the power & Compute; Sending end Power factor, Regulation and Transmission efficiency. | **10 Marks** | **L3** | **CO3** |

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| **15.** | **a.** | Explain the disruptive critical voltage and visual critical voltage with necessary equations and usual notations. | **10 Marks** | **L2** | **CO4** |
|  | **b.** | A transmission line has a span of 200 meters between level supports. The conductor has a cross-sectional area of 1·29 cm^2 , weighs 1170 kg/km and has a breaking stress of 4218 kg/cm2 . List all the unknown parameters that could be found from given data and compute the same, take safety factor is 5, allowing a wind pressure of 122 kg per square metre of projected area. What is the vertical sag? | **10 Marks** | **L3** | **CO4** |
| **Or** | | | | | |
| **16.** | **a.** | Explain the major components used in the overhead construction of transmission line. | **10 Marks** | **L2** | **CO4** |
|  | **b.** | In a 33 kV overhead line, there are three units in the string of insulators. If the capacitance between each insulator pin and earth is 12% of self-capacitance of each insulator, find (i) the distribution of voltage over 3 insulators and (ii) string efficiency. | **10 Marks** | **L3** | **CO4** |

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| **17.** | **a.** | Explain the purpose and basic functions of a distribution system in an electrical network with necessary diagram. | **08 Marks** | **L2** | **CO5** |
|  | **b.** | Two tram cars, A and B, located 4 km and 8 km from a substation, respectively, return 60 A and 40 A of current to the rails. The substation operates at 400 V DC. The resistance of the trolley wire is 0.2 Ω per km, while the track resistance is 0.25 Ω per km. Determine the voltage across each tram car. | **12 Marks** | **L3** | **CO5** |
| **Or** | | | | | |
| **18.** | **a.** | Summarize the key requirements of an efficient distribution system. | **08 Marks** | **L2** | **CO5** |
|  | **b.** | The various blocks of Presidency University are supplied through a DC distributor line connected to the main distribution point to meet their load demands. The distributor is a 2-wire system (AB) with a total length of 300 meters and is fed from point A. If the maximum allowable voltage drop is limited to 15 V, determine the cross-sectional area of the distributor conductor. Assume the resistivity of the material,  ρ=1.78×10^−8 Ωm. The positions and loads of the blocks are as follows:   |  |  |  | | --- | --- | --- | | At point | Distance from A in meters | Concentrated load in amperes | | P | 40 | 50 | | F | 100 | 60 | | P | 150 | 120 | | B | 300 | 60 | | **12 Marks** | **L3** | **CO5** |

**\*\*\*\*\* BEST WISHES \*\*\*\*\***