# School of Electrical Electronics and Communication Engineering
## Electrical Engineering
### ETE - Jun 2023

Time : 3 Hours                                                                                          Marks : 100

### Sem IV - G2UB406T - Fundamentals of Power Systems
*Your answer should be specific to the question asked*
*Draw neat labeled diagrams wherever necessary*

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| **1.** | Emphasize the role of surge impedance in AC transmission lines? Derive an expression of surge impedance loading. | K1 CO1 (5) |
| **2.** | classify the types of transmission line. Draw the equivalent circuit and phasor diagram of short transmission line. Also derive the formula of voltage regulation. | K2 CO1 (5) |
| **3.** | Derive the expression of the inductance of single phase two wire line and flux linkage of one conductor in a group. | K2 CO1 (5) |
| **4.** | A three-phase transformer is rated 400 MVA, 220 star / 22 delta kV. The Y equivalent short circuit impedance measured on the low voltage side of the transformer is 0.121 ohm and because of the low resistance this value may be considered equal to the leakage reactance. Determine the per unit reactance of the transformer and the value to be used to represent this transformer in a system whose base on the high voltage side of the transformer is 100 MVA, 230 kV. | K3 CO3 (10) |
| **5.** | A two conductors single phase line operates at 50 Hz. The diameter of each conductor is 20 mm and the spacing between the conductor is 3 m. calculate the inductance of each conductor per km. | K2 CO2 (10) |
| **6.** | In different AC and DC systems, analyze and compare the cost of conductors. | K3 CO3 (10) |
| **7)** | Illustrate parabolic curve and derive the expression of tension. | K4 CO3 (10) |

## OR

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| | A three phase, 132 Kv, 50 Hz km long line includes three stranded aluminium conductors spaced triangularly at 3.8 m between centres. Each conductor has a dia of 19.53 mm. the atmosphere is at a temperature of 30 degree C and at pressure of 750 mm of Hg. If the breakdown strength of air is 21.1 kV rms per cm and the surface factor is 0.85, determine the disruptive critical voltage. | K4 CO3 (10) |
| **8.** | Explicate string efficiency. Discuss necessity of high string efficiency for insulators. | K4 CO3 (15) |
| **9.** | Analyze the effect of single line to ground fault on a system with isolated neutral. | K5 CO4 (15) |
| **10)** | Compare the performance of different types of neutral groundings with respect to | K5 CO4 (15) |

      1. Protective relaying
      2. Fault levels
      3. Stability
      4. Voltage levels of power systems

## OR

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| | Depict and illustrate the zig-zag and delta star grounding transformers in details. | K5 CO4 (15) |