Code No: 125AG

**R15**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**
**B. Tech III Year I Semester Examinations, September - 2021**
**POWER SYSTEMS - II**
**(Electrical and Electronics Engineering)**

**Time: 3 hours** **Max. Marks: 75**

**Answer any five questions**
**All questions carry equal marks**
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1.a) Write a short note on geometric mean distance and geometric mean radius.
b) Two conductors of a single phase line, each of 1cm diameters, are arranged in a vertical plane with one conductor mounted 1m above the other. A second identical line is mounted at the same height as the first and spaced horizontally 0.25 m apart from it. The two upper and the two lower conductors are connected in parallel. Determine the inductance per km of the resulting double circuit line. [6+9]

2.a) Derive an expression for the capacitance per km of a three phase line taking into account the effect of ground.
b) A three-phase overhead transmission line has its conductors arranged at the corners of an equilateral triangle of 2m side. Calculate the capacitance of each line conductor per km. if the diameter of the conductor is 1.25 cm. [9+6]

3.a) Derive the expression for A, B, C, D parameters of nominal-π medium length transmission line.
b) A 3-ϕ transmission line has the following parameters per km: R=0.1Ω, L=1.117mH and C = 0.01 μF. Determine regulation and the efficiency of the line using nominal-T method if the line is 80km long and delivers 20 MW at 66 kV, 0.8 p.f lagging. [6+9]

4.a) Define the regulation and efficiency of transmission line.
b) A single circuit 50 Hz, 3-ϕ transmission line has the following parameters per km: R=0.2 Ω, L=1.3 mH and C=0.01μF. Determine regulation and the efficiency of the line if the line is 120 km long and delivers 40MW at132 kV and 0.8 p.f. lagging. [6+9]

5.a) Discuss about the reflection and refraction at T-junction in a travelling wave.
b) A surge of 200 kV traveling in a line of natural impedance 400 ohms arrives at a junction with two lines of impedances 500 ohms and 300 ohms respectively. Find the surge voltages and currents transmitted into each branch line. Also find the reflected surge voltage and current. [8+7]

6.a) Define and derive the expression for the critical disruptive voltage.
b) Explain Ferranti effect. [9+6]

7.a) Derive the expression for sag when the supports are at unequal heights.
b) In a 33kV overhead line, there are three units in the string of insulators. If the capacitance between each insulator pin and earth is 11% of self capacitance of each insulator, find (i) The distribution of voltage over 3 insulators and (ii) String Efficiency [8+7]

8.a) Explain in detail the construction of cables.
b) The maximum and minimum stresses in the dielectric of a single core cable are 40 kV/cm and 10 kV/cm respectively. If the conductor diameter is 2 cm find thickness of insulation and operating voltage. [8+7]

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