Code No: 125AG

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, January/February - 2023
POWER SYSTEMS - II
(Electrical and Electronics Engineering)

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

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a) State the concept of GMR. [2]
b) What is the need of double circuit transmission line? [3]
c) Why the distributed parameters will result the accurate analysis than the lumped parameters? [2]
d) What is the significance of a T- model of a transmission line? [3]
e) What is skin effect? What are its effects? [2]
f) What is meant by radio Interference? [3]
g) What is the effect of wind on Sag calculations? [2]
h) Write short notes on stringing chart. [3]
i) What is capacitance grading of cables? [2]
j) Draw the neat sketch of a cable diagram and specify different parts of it. [3]

PART – B

(50 Marks)

2.a) Explain the effect of earth on the capacitance of a transmission line by using the method of images.
b) In a 3 phase transmission line the conductors are placed at the corners of an equilateral triangle of each side 2.5cm. If the radius of each conductor is 0.8cm find the inductance per phase per kilometer. [4+6]

OR

3.a) Derive the inductance of a conductor due to internal flux.
b) A single phase, two wire transmission line 20km long, is made up of round conductors each 0.9cm in diameter, separated from each other by 45cm. Calculate the equivalent diameter of a fictitious hollow, thin-walled conductor having the same inductance as the original line. What is the value of this inductance? [5+5]

4. Derive the A, B, C and D constants of long transmission lines using Rigorous solution. [10]

OR

5.a) What is an equivalent π-circuit model of long line? Derive expression for parameters of this circuit in terms of line parameters.
b) A single phase overhead transmission line is transmitting 1200kW power to factory at 11kV at 0.8 P.F lag. The line resistance and loop reactance of the line are 3 ohm and 5 ohm phase. Determine i) Source voltage ii) Percentage regulation iii) Efficiency.[5+5]

6.a) Explain about Bewley's Lattice Diagram.
b) What is Ferranti effect? Explain with a vector diagram. [5+5]

OR

7.a) Discuss how the line voltage and the line spacing will effects the corona in the lines?
b) Prove that the voltage and current waves are get attenuated when travelling over the line. [4+6]

8.a) Explain about the various methods to improve the string efficiency.
b) A transmission line conductor at a river crossing is supported from two towers at height of 50 and 80 metres above water level. The horizontal distance between the towers is 300 metres. If the tension in the conductor is 2000Kg, find the clearance between the conductor and water at a point midway between the towers. Weight of conductor per metre = 0.844Kg. Assume that the conductor takes the shape of parabolic curve. [5+5]

OR

9.a) With neat sketch explain about suspension type and strain type insulators.
b) An overhead transmission line has a span of 220m, the conductor weighing 804 kg/km. Calculate the maximum sag if the ultimate tensile strength of the conductor is 5,758 kg. Assume safety factor 2. [5+5]

10.a) Derive the expression for the insulation resistance of a single core cable.
b) The insulation resistance of a single core cable is 495 M Ω/km. If the core diameter is 2.5cm and resistivity of insulation is 4.5×10^{4} Ω-cm. Find the insulation thickness. [6+4]

OR

11.a) Derive the formula of a capacitance of a single core cable.
b) A single core 11 kV, 50Hz, 6 km long cable has a core diameter of 2.2 cm and diameter of under sheath 3.0 cm. The relative permittivity of the insulating material is 3. The power factor on open circuit is 0.04. Determine
i) The capacitance of the cable
ii) Charging per conductor
iii) Dielectric loss
iv) The equivalent insulation resistance. [4+6]

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