Code No: 125AG

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, May - 2018

POWER SYSTEMS-II

(Electrical and Electronics Engineering)

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

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

1.a) List different types of conductors. [2]
b) Briefly explain about the effect of ground on capacitance. [3]
c) What are ABCD constants in a medium transmission line? [2]
d) Classify the transmission lines based on the voltage. [3]
e) What is the sketch effect? [2]
f) Distinguish between reflected and refracted waves? [3]
g) State different types of insulators. [2]
h) Define string efficiency. What are the various methods to improve string efficiency? [3]
i) What are the different types of cables? [2]
j) What are the advantages of cables compared to overhead transmission lines? [3]

PART - B

(50 Marks)

2.a) 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?
b) Briefly discuss the various types of conductor material used for over head transmission lines. [5+5]

OR

3.a) Derive the inductance of 2-wire transmission line.
b) Derive the expression for capacitance of three phase transmission line with asymmetrical spacing. [5+5]

4.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 3 phase, 50Hz, 100km long transmission line delivers a load of 20000KW at 110KV at 0.9 power factor lagging. The copper conductors of the line are 1.2 cm in diameter and are spaced equilaterally, so that the distance between them is 2 m. Using nominal π method, calculate the sending end voltage, current, power factor, regulation and efficiency of the line. Neglect the leakage. [5+5]

OR

5.a) A single phase over head 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.

b) Discuss the propagation of surges in transmission lines. [5+5]

6.a) Give brief about power loss due to corona.

b) Determine the auxiliary constants of a 3-phase, 50 Hz. 200 km long transmission line having resistance, inductance and capacitance per phase per km of 0.15 ohm, 3.5 mH and 0.009 μF respectively. [5+5]

OR

7.a) What is a travelling wave? Explain the development of such a wave on an overhead line.

b) Explain about Bewley's Lattice Diagram. [5+5]

8.a) What is a sag-template? Explain how this is useful for location of towers and stringing of power conductors.

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) What is a stringing chart? Explain clearly the procedure adopted for stringing the power conductors on the supports.

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 an expression for the capacitance of a single core cable.

b) With neat sketch explain about construction of underground cable. [5+5]

OR

11.a) Derive the expression for the insulation resistance of a single core cable.

b) The insulation resistance of a single core cable is 495 MΩ/km. If the core diameter is 2.5cm and resistivity of insulation is 4.5×10^{14} Ω-cm. Find the insulation thickness.[5+5]

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