Code No: 115AG **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, November/December - 2016
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) What is transposition of transmission lines? [3]
c) Define the voltage regulation in transmission lines. [2]
d) Classify the transmission lines based on the voltage. [3]
e) State proximity effect. [2]
f) What is the effect of resistance of solid conductors? [3]
g) Classify the types of insulators. [2]
h) List the methods for improving string efficiency. [3]
i) How are HV cables classified? [2]
j) Give the expression for calculating insulation resistance. [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) What are bundled conductors? Discuss the advantages of bundled conductors, when used for overhead lines. [5+5]

OR

3.a) Briefly discuss the various types of conductor material used for over head transmission lines.
b) Discuss the concept of geometric mean distance. How is this concept used to find the inductance of composite conductor line? [5+5]

4. Derive the expressions for regulation and efficiency of a short transmission line. Draw required cicuit and phasor diagram. [10]

OR

5. What is an equivalent $\prod$ circuit model of long line? Derive expression for parameters of this circuit in terms of line parameters. [10]

6.a) Explain surge impedance loading.
b) Determine the auxiliary constants of a 3-phase, 50Hz. 200km long transmission line having resistance, inductance and capacitance per phase per km of 0.15 ohm, 3.5mH and 0.009μF respectively. [4+6]

OR

7.a) What is a travelling wave? Explain the development of such a wave on an overhead line.
b) An overhead transmission line with surge impedance 400 ohms is 300 km long. One end of this line is short circuited and at the other end a source of 11 kV is suddenly switched in. Calculate the current at the source end 0.005 sec after the voltage is applied. [5+5]

8.a) What are disadvantages of providing too much or too small sag in a transmission line? Name different types of line supports with their place of use.
b) A transmission line conductor with diameter 14.5 mm, cross-sectional area of 125 mm^2 weighing 1118 kg/km has a span of 200 meters. The supporting structures being level. The conductor has an ultimate tensile stress of 42 kg/mm^2 and allowable tension is not to exceed ¼ th of ultimate strength. Determine the following
i) Sag in still air.
ii) Sag with a wind pressure of 60 kg/m^2 and an ice coating of 10 mm.
Also calculate the vertical sag under this condition. Assume density of ice as 0.915 gm/c.c. [4+6]

OR

9.a) Explain the factors affecting the mechanical design.
b) Determine the maximum sag of an overhead line conductor having a diameter of 19mm weighs 0.85 kg/m. The span length is 250 meters; wind pressure is 40 kg/m^2 of projected area with ice coating of 13 mm. The ultimate strength of the conductor is 8000 kg, the factor of safety is 2 and ice weighs 910 kg/m^3. [4+6]

10.a) Describe briefly some commonly used insulating materials for cables.
b) A 12.5 kV single-core cable has an outside diameter of 8 cm. Determine the radius of the core and the electric field strength that must be withstand by the insulating material in the most economical (optimal-ratio) configuration. [4+6]

OR

11.a) Discuss the methods of grading cables. Why are they not used generally?
b) A single core 2 km long cable has a conductor radius of 1.3cm and an insulation thickness of 3.5 mm. If the resistivity of dielectric is 7×1012 ohm-m, determine the insulation resistance of the cable. [5+5]

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