Code: 15A02502 **R15**

B.Tech III Year I Semester (R15) Supplementary Examinations June 2018

ELECTRICAL POWER TRANSMISSION SYSTEMS

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Expand the terms GMD and GMR.
(b) Define skin effect.
(c) Define regulation of a line.
(d) What is surge impedance loading? Give an expression for power transmitted under these conditions.
(e) Write the names of different types of insulators.
(f) Write the expression for power loss due to corona.
(g) What is Bewley's lattice diagram?
(h) Write an expression for surge impedance of the line.
(i) Give the expression for electrostatic stress in single core cables.
(j) Derive an expression for the capacitance of a single core cable.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) Derive an expression for the inductance of a single phase two wire line.
(b) A single phase line of 230 V has conductor spacing of 135 cm. The radius of conductor is 0.8 cm. Calculate the loop inductance in mH of the line per km.

OR

3 (a) Explain the effect of earth on the capacitance of single phase transmission line.
(b) Three conductors of a three phase overhead line are arranged in horizontal plane, six meters apart. The diameter of each conductor is 1.24 cm. Find the capacitance per 100 km of the line in microfarads.

UNIT – II

4 (a) Write the ABCD constants for a short line.
(b) A single phase transmission line delivers 2 MW of power at the receiving end at a voltage of 33 kV and 0.9 pf lagging. The total resistance of the line is 10Ω and the total inductive reactance is 18Ω. Determine: (i) Percentage voltage regulation. (ii) Sending end power factor.

OR

5 (a) Write the expressions for ABCD constants of nominal-T line.
(b) A three phase, 50 Hz overhead transmission line, 100 km long with 132 kV has line voltage at the receiving end. The line has following constants:
(i) Resistance = 0.7 Ω /km/phase.
(ii) Inductance = 1.1 mH/km/phase.
(iii) Capacitance = 0.0082 μF/km/phase
Build nominal tree model.

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UNIT – III

6 (a) Name the methods of increasing string efficiency.

(b) Each line of a three phase system is suspended by a string of 3 similar insulators. If the voltage across the line unit is 17.5 kV, calculate the line to neutral voltage. Assume that the shunt capacitance between each insulator and earth is $1/8^{th}$ of the capacitance of the insulator itself.

OR

7 (a) Explain any four factors affecting corona loss.

(b) A single phase overhead line consists of two conductors of diameter 2 cm with a spacing of 1.5 m between centers. Determine line voltage for commencing of corona. Dielectric strength of air = 21 kV/cm.

UNIT – IV

8 Discuss in detail the reflection of travelling wave at a short circuit and at an open circuit.

OR

9 Show that the current and voltage waves get attenuated exponentially as they travel over the line.

UNIT – V

10 What are the main requirements of the insulating materials used for cables? Elaborate on the type of materials used for insulation.

OR

11 (a) Explain the intersheath grading of the cables.

(b) Determine the economic overall diameter of a single core cable metal sheathed for a working voltage of 85 kV if the dielectric strength of the insulating material is 65 kV/cm.

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