Code No: 135BJ

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, October - 2020
POWER SYSTEMS-II
(Electrical and Electronics Engineering)

Time: 2 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

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1.a) What is transposition and derive an expression for inductance of 3-phase double circuit line with transposition.
b) A 3-phase, 50 Hz, 132 kV overhead line has conductors placed in a horizontal plane 4 m apart. Conductor diameter is 2 cm. If the line length is 100 km, calculate the charging current per phase assuming complete transposition. [7+8]

2. Determine the efficiency and regulation of a 3-phase, 50 Hz, 150 km long transmission line having three conductors spaced 3.5 meters delta formation when the receiving end delivers 25 MVA at 120 kV and p.f. 0.9 lagging. The resistance of the conductor is 0.25 ohm per km and the effective dia is 0.75 cm. Neglect leakage and use (a) nominal-T (b) nominal-π methods. [15]

3. Determine A, B, C, D parameters of a 3-phase, 50 Hz, 400 km long line having per unit impedance of (0.15 + j0.78) ohm per km and a shunt admittance of $j5.0 \times 10^{-6}$ ohm per km. [15]

4. An overhead line with inductance and capacitance per km of 1.24 mH and 0.087 μF respectively are connected in series with an underground cable having inductance and capacitance of 0.185 mH/km and 0.285 μF/km. Calculate the values of transmitted and reflected waves of voltage and current at the junction due to a voltage surge of 110 kV traveling to the junction (a) along the line towards the cable, and (b) along the cable towards the line. [15]

5.a) What is skin effect? Why is it absent in the d.c. system?
b) What are the factors affecting corona? [7+8]

6. Discuss the advantages and disadvantages of (a) pin-type insulators (b) suspension type insulators. [15]

7.a) Derive the expressions for sag and tension when the supports are at equal heights.
b) A transmission line conductor having a diameter of 19.5 mm weights 0.85 kg/m. The span is 275 metres. The wind pressure is 39 kg/m^2 of projected area with ice coating of 13 mm. The ultimate strength of the conductor is 8000 kg. Calculate the maximum sag if the factor of safety is 2 and ice weighs 910 kg/m^3. [8+7]

8.a) Derive an expression for the insulation resistance of a single-core cable.
b) The capacitance per kilometre of a 3-phase belted cable is 0.3 μ F between the two cores with the third core connected to the lead sheath. Calculate the charging current taken by five kilometres of this cable when connected to a 3-phase, 50 Hz, 11 kV supply. [7+8]

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