Code: R7310203

R07

III B. Tech I Semester (R07) Supplementary Examinations, May 2012

POWER SYSTEMS - II

(Electrical & Electronics Engineering)

Time: 3 hours Max Marks: 80

Answer any FIVE questions
All questions carry equal marks
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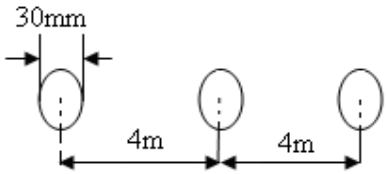
1 (a) Derive the expression for flux linkages of one conductor in a group of n-conductors.
(b) Determine the capacitance and charging current per unit length of the, line when the arrangement of the conductor as shown in figure.



2 Derive the expressions for A, B, C, D parameters of a nominal –T and π of a medium length transmission lines.

3 A 3-Φ, transmission line 300km long has the following parameters:
Resistance/phase/km=0.15Ω.
Reactance/phase/km =0.26Ω.
Shunt admittance/phase/km= 1.4×10^{-6} Siemens.
Calculate by rigorous method the sending end voltage and current when the line is delivering a load of 22MW at 0.8 pf lagging. The receiving end voltage is kept constant at 110 kV.

4 A surge of 200 kV traveling in a line of natural impedance 400 ohms arrives at a junction with two lines of impedances 500 ohms and 300 ohms respectively. Find the surge voltages and currents transmitted into each branch line. Also find the reflected surge voltage and current.

5 Determine the corona characteristics of a 3 - phase line 160 km long, conductor diameter 1.036 cm, 2.44 m delta spacing, air temperature 26.67^{o}C, altitude 2440 m, corresponding to an approximate barometric pressure of 73.15 cm of Mercury, operating voltage 110kv at 50 Hz. Assume data if required.

6 (a) What is an insulator? Where and why the insulators are used in power systems?
(b) In a 33kv overhead line, there are three units in the string of insulators. If the capacitance between each insulator pin and earth is 11% of self capacitance of each insulator, find:
(i) The distribution of voltage over 3 insulators and (ii) String Efficiency.

7 (a) What is a sag in an overhead line? Discuss the disadvantages of providing too small or too large sag on a line.
(b) A 132kv transmission line has the following data: Weight of conductor=680 kg/km; length of span=260 m, ultimate strength=3100 kg, safety factor=2. Calculate the height above the ground at which the conductor should be supported. Ground clearance required is 10 meters.

8 (a) Distinguish between underground cables and overhead lines.
(b) A single-core cable has a conductor diameter of 1 cm and insulation thickness of 0.4 cm. If the specific resistance of insulation is 5×10^{4} Ω-cm, calculate the insulation resistance for a 2 km length of the cable.

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