

**TRANSMISSION OF ELECTRIC POWER**

(Electrical and Electronics Engineering)

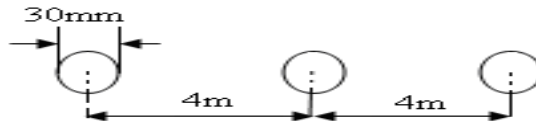
Time: 3 hours

Max Marks: 70

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 A three phase overhead medium transmission line delivers a load of 80 MW at 0.8 pf lagging and 220 kV between the lines. Its total series impedance per phase and total shunt admittance per phase are  $200\angle 80^\circ \Omega$  and  $0.0013\angle 90^\circ$  mho per phase respectively. Using nominal T- method. Determine: (i) A, B, C, D constants of the line. (ii) Sending end voltage. (iii) Sending end current. (iv) Sending end power factor and (v) Transmission efficiency.
- 3 (a) Prove that the current at any point along the long transmission lines is the sum of incident and reflected currents.  
(b) A single circuit 50 Hz, 3- $\Phi$ , 170 km long transmission line has the following parameters per km:  $R = 0.2 \Omega$ ,  $L = 1.3$  mH &  $C = 0.01 \mu\text{F}$ . The voltage at the receiving end is 132 kV. Determine sending end voltage and efficiency using nominal- $\pi$  method.
- 4 (a) How can the analysis of a wave travelling on a line terminated by an inductance be carried out?  
b) ( A surge of 100 kV traveling in a line of natural impedance  $600 \Omega$  arrives at a junction with two lines of impedance  $800 \Omega$  and  $200 \Omega$  respectively. Find the surge voltage and currents transmitted into each branch line.
- 5 Write short notes on:  
(a) Factors affecting corona.  
(b) Radio interference.
- 6 (a) What is an insulator? Where and why the insulators are used in the power system? Explain any one type of insulator.  
b) ( A string of six insulator units has a self-capacitance is equals to 10 times the pin to earth capacitance. Find: (i) voltage distribution across various units as a percentage of total voltage across the string. (ii) the string efficiency.
- 7 (a) Write short notes on stringing charts.  
(b) A 110 kV transmission line has the following data: Weight of conductor = 750 kg/km; length of span = 250 m, ultimate strength = 3000 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 single core 66 kV cable working on 3-phase system has a conductor diameter of 2 cm and a sheath of inside diameter 5.3 cm. If two inter sheaths are introduced in such a way that the stress varies between the same maximum and minimum in the three layers. Find: (i) Positions of intersheaths. (ii) Voltage on the intersheaths. (iii) Maximum and minimum stresses.

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