

Code: EE4T3

**II B.Tech - II Semester – Regular Examinations - JUNE 2014**

**TRANSMISSION AND DISTRIBUTION  
(ELECTRICAL & ELECTRONICS ENGINEERING)**

Duration: 3 hours

Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1. a) Derive the expression for inductance of a 3-phase double circuit line. 7 M
  
- b) Calculate the capacitance of a three-phase, three-wire system with triangular configuration with sides  $D_{12} = 3.2\text{m}$ ,  $D_{23} = 4.1\text{ m}$  and  $D_{31} = 4.8\text{ m}$ . The diameter of the conductor is 2.2cm. 7 M
  
2. a) Explain skin effect, proximity effect and corona loss. 7 M
  
- b) Using nominal-T method, find the sending-end voltage and voltage regulation of a 200km, three phase, 50 Hz, transmission line delivering 25MVA at 0.8pf(lagging) to a balanced load at 132 KV. The line inductance is 1.25mH/Km, Capacitance is 0.01 $\mu$ F/Km and conductor resistance is 0.15 ohm/Km. 7 M

3. a) Show that a travelling wave moves along an overhead line with a velocity of light and its speed is proportional to  $1/(\sqrt{\epsilon})$  in case of cable with dielectric material of relative permittivity  $\epsilon_r$ . 7 M

b) A three – phase overhead transmission line has series impedance per phase of  $120 \angle 75$  ohms and a total shunt admittance of  $0.002 \angle 90$  Siemens per phase. The line delivers a load of 125MW at 0.85 p.f lagging and 132kV between the lines. Determine the Sending end line Voltage and current by rigorous method. 7 M

4. Explain how to control voltage by using:

- a) Shunt capacitors 5 M
- b) Synchronous capacitors 5 M
- c) Series capacitors. 4 M

Also comment on their location in power system. Discuss their application to power networks and state merits and demerits if any?

5. a) Explain construction and operation of pin type insulator. 7 M

b) Derive the expression for string efficiency of a string of 3- insulators. 7 M

6. a) Derive an expression for sag of a line supported between two supports of unequal heights. 7 M

b) A transmission line has a span of 150 m between level supports. The conductor has a cross-sectional area of  $2\text{cm}^2$ . The tension in the conductor is 2000 kg. If the specific gravity of the conductor material is  $9.9\text{ g/cm}^3$  and wind pressure is  $1.5\text{kg/m}$  length, calculate the sag. 7 M

7. a) Prove that a uniformly loaded DC distributor fed at one end yields a total voltage drop equal to that produced by the whole of the load assumed to be concentrated at the center. 7 M

b) A dc 2-wire distributor supplies the following loads.

Load in Amperes	20	30	80	50
Distance from supply end (in meters)	50	100	200	300

If the supply end voltage is 250V, calculate the voltage at different load points. The resistance of distributor is  $0.0001\ \Omega$  per conductor per meter. 7 M

8. a) Derive expression for the capacitance of 3-core cables. 7 M

b) Compare the merits and demerits of underground system versus over-head system? 7 M