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Total Number of Pages: 02

B.Tech  
PCEE4401

7<sup>th</sup> Semester Regular / Back Examination 2017-18  
Electrical Power Transmission and Distribution

BRANCH: EEE

Time: 3 Hours

Max Marks: 70

Q.CODE: B241

Answer Question No.1 which is compulsory and any five from the rest.  
The figures in the right hand margin indicate marks.

**Q1** Answer the following questions : **(2x10)**

- a) What is skin effect? What are the factors responsible for skin effect ?
- b) Give the advantages of bundled conductor in transmission line.
- c) Define the regulation of a transmission line.
- d) What is surge impedance and surge impedance loading ?
- e) Define local corona and corona loss is reduced ?
- f) What do you mean by string efficiency ?
- g) What is GMR of a 3-stranded conductor in terms of the diameter 'd' of an individual strand?
- h) What do you mean by proximity effect ?
- i) Generally, 3-Phase, 4-wires AC system is used for Electrical Power distribution, Why ?
- j) Why grading is done on under-ground cable and what are the types of grading?

**Q2** a) A 3-Phase overhead line is designed with an equilateral spacing of 3.5 mt. **(5)**

With a conductor diameter of 1.2 cm. If the line is constructed with horizontal spacing with suitable transposed conductors, Find the spacing between adjacent conductors which would give the same value of inductance as in the equilateral arrangement.

b) With mathematical expression define visual critical voltage in corona phenomenon. **(5)**

**Q3** a) Explain the Ferranti Effect in along the transmission line with Phasor diagram. **(5)**

b) A 3-Phase, 50 Hz transmission line has resistance, inductance and capacitance per phase are of 10  $\Omega$ , 0.1 H & 0.9  $\mu\text{F}$  respectively and delivers a load of 35 MW at 132 KV and 0.8 p.f. lagging. Determine the efficiency and regulation using nominal T-method. **(5)**

**Q4** a) Show that the inductance per unit length of an overhead line due to internal flux linkages is constant and is independent of the size of the conductor. **(5)**

b) Draw the equivalent circuit and derive the per unit voltage regulation for a short transmission line. **(5)**

**Q5** a) A transmission line conductor at a river crossing is supported from two towers at heights of 45 mt. And 75 mt. above the water level. The span length is 300 meters. Weight of the conductor is 0.85 kg/mt. Determine the clearance between the conductor and water at a point mid-way between towers if the tension in the conductor is 2050 kg. **(5)**

b) Describe any one of the method of improving the string efficiency. **(5)**

**Q6 a)** A single core lead sheathed cable has a conductor of 1cm. diameter and a sheath of 5cm. inside diameter. Two dielectric materials having permittivities of 4 & 2.5 and permissible potential gradient of 60 KV/cm & 50 KV/cm respectively are used. Determine the thickness of the dielectric materials and the maximum working voltage. **(5)**

**b)** A 2-wire dc distributor cable AB is 2 Km. long and supplies loads of 100A,150A,200A & 50A situated at 500mt,1000mt,1600mt & 2000mt from the feeding point A. Each conductor has resistance of 0.01  $\Omega$  per 1000mt. Calculate the voltage at each load point if a voltage of 300V is maintained at point A. **(5)**

**Q7 a)** Explain the different types of distribution system with the help of neat sketches. **(5)**

**b)** State and explain Kelvin's Law. **(5)**

**Q8 Write short answer on any TWO : (5 x 2)**

**a)** Neutral grounding

**b)** GMR and GMD

**c)** String Chart

**d)** FACT devices