Registration no: | | | | | | | | | | |

Total Number of Pages:02 **B.TECH**

PCEE4401

7th Semester Regular / Back Examination 2016-17

ELECTRICAL POWER TRANSMISSION AND DISTRIBUTION

BRANCH : EEE

Time: 3 Hours

Max Marks: 70

Q.CODE: Y341

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:** **(2 x 10)**

a) Compare overhead line with underground cable as medium of power transmission.

b) The insulation resistance of a cable of length 10 km is 1MΩ, what will be its resistance for 50 km length?

c) How can the corona loss be minimized in transmission lines?

d) What is the difference between a feeder and distributor?

e) What are the functions of a substation? What are the different types of substations?

f) How does dielectric loss vary with the change in voltage, frequency of supply and capacitance of cable?

g) Draw the phasor diagram of medium transmission line for Nominal T method.

h) What do you understand by transposition in overhead lines? Explain why transposition is done in such lines.

i) Calculate the capacitance of a 100km long 3-Φ,50 Hz overhead transmission line consisting of 3 conductors, each of diameter 2cm and spaced 2.5metres at corners of an equilateral triangle. Given that ε_0=8.854X10-12 F/m.

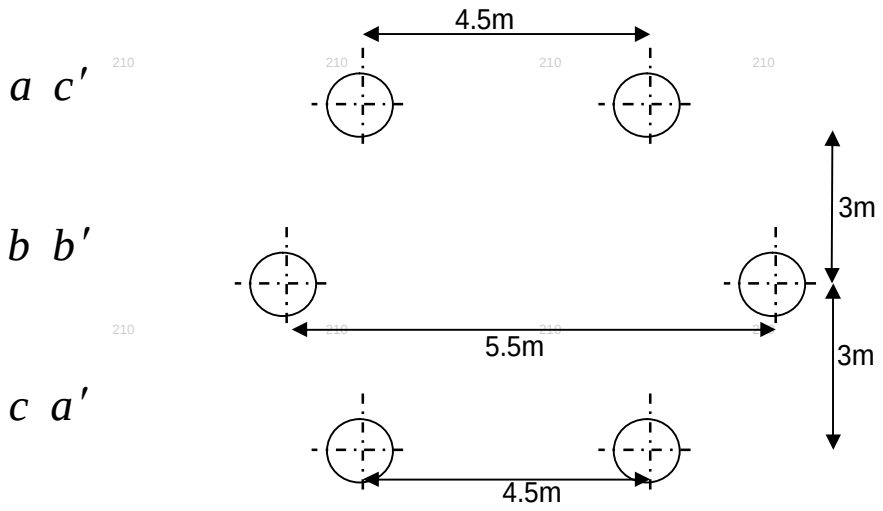
j) A transmission line has a span of 240 meters. Find the weight of conductor per metre length if the sag, ultimate tensile strength and factor of safety are 1.6 metre,5200kg and 2 respectively.

Q2 **a)** Explain different types of earthings the neutral point of a power system. Derive an expression for reactance of the Peterson coil in terms of the capacitance of the protected line. **(5)**

b) A 2 wire d.c. distributor AB, 900 metres long is fed at 410V. The loads are tapped of as under: **(5)**

50A at 200m from A, 100A at 500mfrom A,150A at 800m from A. The distributor is also loaded uniformly at the rate of 0.5A/mt. If the resistance of the distributor per metre (goes and return) is 0.0001Ω. Calculate the voltages at points B and D.

Q3 **a)** Find the inductance per phase per km of double-circuit 3-phase line shown below. The conductors are transposed and are of radius 0.8 cm each. **(6)**



b) Deduce an expression for line to neutral capacitance for a 3-Φ overhead transmission line when the conductors are symmetrically placed. **(4)**

Q4 **a)** What is meant by string efficiency? What causes the string efficiency to be less than 100%? Explain one method of improving string efficiency. **(5)**

b) The following data refer to a 3-Φ overhead line: **(5)**
Voltage between lines =220kv, Total series impedance per phase =200<80oΩ,total shunt admittance per phase 0.0013<90o mho,load delivered =100 MW at 0.8 p.f lagging ,Using rigorous method , determine (i) sending end voltage(ii)sending end current.

Q5 **a)** Describe the reasons for grading of the cable. Explain briefly the capacitance grading method of grading of the cables. **(5)**

b) A transmission line conductor crossing a river is supported from two towers at heights 30m and 80m above the water level. The horizontal distance between the towers is 450metres. If the tension in the conductor is 500kg and weight of conductor is 1.4 kg/m length, find the minimum clearance of the conductor and water and clearance mid-way between the supports. **(5)**

Q6 **a)** What is Kelvin's Law? What are the Limitations of Kelvin's Law? **(5)**

b) A 3-Φ , 220 kv, 50Hz transmission line consists of 30mm diameter conductor spaced 2.5 meters apart in the form of an equilateral triangle. If the temperature is 380 C and atmospheric pressure is 76 cm, calculate the corona loss per km of the line.Assume the irregularity factor as 0.83 and g0=21.21 kv/cm(rms). **(5)**

Q7 **a)** Why HVDC transmission is superior to EHVAC transmission for very long distances? Give the applications of HVDC transmission. **(5)**

b) Determine ABCD constants for a 3 – phase 50 Hz transmission line 200 km long having the following distributed parameters: **(5)**

$$l = 1.3 \times 10^{-3} \frac{H}{km} \quad , \quad c = 9 \times 10^{-9} \frac{F}{km}$$

$$r = 0.20 \frac{\Omega}{km} \quad , \quad g = 0$$

Q8 **Write Short Notes (Any Two):** **(5 x 2)**

a) stringing chart
b) Reactive Compensation of Transmission Line
c) Testing of Insulators
d) Capacitance Calculations for Bundled Conductors