Code: EE5T5

III B.Tech - I Semester – Regular/Supplementary Examinations
March – 2021

TRANSMISSION AND DISTRIBUTION
(ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours   Max. Marks: 70

PART – A

Answer *all* the questions.   All questions carry equal marks
   11 x 2 = 22 M

1.
   a) What is Skin effect in power transmission system?
   b) Can you write Self GMD and Mutual GMD of an overhead line conductor?
   c) Can you draw the nominal T & π representation of a transmission line?
   d) What is Surge impedance loading?
   e) What is string efficiency?
   f) List any two causes of failure of insulators.
   g) List any two factors affecting sag in a transmission line.
   h) List any two advantages of ring main distribution system.
   i) What is the propagation constant?
   j) Can you write the definition of reflection and refraction of travelling waves?
   k) List any two differences of underground cable and overhead distribution system.

PART – B

Answer any *THREE* questions.   All questions carry equal marks.
$$3 \times 16 = 48 \text{ M}$$

2. a) Determine the inductance of a single-phase transmission line operating at 50 Hz and conductors are arranged as shown in figure. The conductor diameter is 0.8 cm.   8 M

0.4 cm   0.4 cm

a   a1   b   b1

0.8 cm
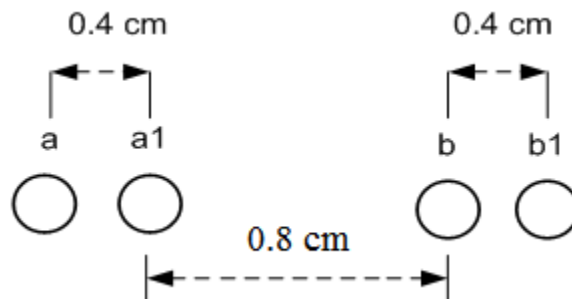
b) Calculate the capacitance of a 100 km long 3-phase, 50 Hz overhead transmission line consisting of 3 conductors each of diameter 2 cm and spaced 2.5 m apart at the corners of an equilateral triangle.   8 M

3. a) Explain the general construction of underground cable with neat sketch and description of each part.   8 M

b) A 3-phase, 50-Hz overhead transmission line 100 km long has the following constants :
Resistance/km/phase $= 0.1 \ \Omega$
Inductive reactance/km/phase$= 0{\cdot}2 \ \Omega$
Capacitive susceptance/km/phase$=0{\cdot}04 \times 10^{-4}$ siemen
   Determine: i) the sending end current   ii) sending end

voltage   iii) sending end power factor   and
iv) transmission efficiency when supplying a balanced load
of 10,000 kW at 66 kV, p.f. 0·8 lagging. Use nominal T
method.   8 M

4. a) Explain the methods to improve the string efficiency of
   overhead line insulators.   8 M

   b) A 33 kV transmission line has the following data:
      weight of the conductor =680 kg/km ; span length =260 m;
      working tension= 2000 kg.
      Calculate the height above the ground at which the
      conductor should be supported when ground clearance
      required is 15 meters.   8 M

5. a) Explain the effect of travelling wave when a long
   transmission line is terminated with a resistance.   8 M

   b) What is a travelling wave? Show that the velocity of a
      travelling wave can be given by $v = \dfrac{1}{\sqrt{(LC)}}$ 8M

6. a) A 2-wire d.c distributor cable AB is 2 km long and supplies
   loads of 100A, 150A, 200A and 50A situated at 500m,
   1000m, 1600m and 2000m from the feeding point A. Each
   conductor has a resistance of 0.01Ω per 1000m. Calculate
   the p.d at each load point if a p.d of 300V is maintained at
   point A.   8 M

b) Explain the method of solving A.C distribution system when power factor referred to the receiving end voltage with a phasor diagram.   8 M