Hall Ticket No | | | | | | | | | | | Question Paper Code: AEE011

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

Four Year B. Tech V Semester End Examinations (Regular) – November ,2018

Regulation: IARE - R16

TRANSMISSION AND DISTRIBUTION SYSTEMS

(EEE)

Time: 3 hours **Max. Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. a) From the fundamentals derive an expression for inductance of a single phase two-wire Line trans- mission system. **[7M]**
   b) A single phase transmission line has two parallel conductors 3 m apart, the radius of each conductor being 1 cm. calculate the loop inductance per km length of the line if the material of the conductor is (i) copper (ii) steel with relative permeability of 100. **[7M]**

2. a) Explain the factors affecting corona phenomenon. Write any two advantages and disadvantages of corona. **[7M]**
   b) Two conductors of a single phase line each of 1 cm diameter are arranged in a vertical plane with one conductor mounted 1 m above the other. A second identical line is mounted at the same height as the first and spaced horizontally 0.25 m apart from it. The two upper and the two lower conductors are connected in parallel. Determine the inductance per km of the resulting double circuit line. **[7M]**

UNIT – II

3. a) Derive the expression for sending end voltage in nominal T method for medium length transmission lines. **[7M]**
   b) A short 3-Φ transmission line with an impedance of (6+j8)Ω per phase has sending and receiving end voltage of 120 kv and 110 kv respectively for some receiving end load at a p.f of 0.9 lagging. Determine (i) power output and (ii) sending end power factor. **[7M]**

4. a) Explain the Ferranti effect with a phasor diagram and its causes. **[7M]**
   b) Determine the generalized constants of transmission lines for **[7M]**
   (i). Short lines
   (ii). Medium lines

UNIT – III

5. a) Classify cables based on the voltage level and explain Belted cables with suitable sketches. **[7M]**

   b) A single-core cable has a conductor diameter of 1cm and insulation thickness of 0.4 cm. If the specific resistance of insulation is 5×10^{14} Ω -cm, calculate the insulation resistance for a 2 km length of the cable. **[7M]**

6. a) Explain the concept of capacitance grading for overhead transmission lines and cables. **[7M]**

   b) A 66-kV single –core lead sheathed cable is graded by using two dielectrics of relative permittivity 5 and 3 respectively; thickness of each being 1 cm. The core diameter is 2 cm. determine the maximum stress in two dielectrics. **[7M]**

UNIT – IV

7. a) Derive the equation for sag when supports are at equal levels. **[7M]**

   b) For an overhead line, span length is 185m, difference in levels of support is 6.5m, conductor diameter 1.82cm, weight per unit length of conductor 1.5 kg and wind pressure of 39 Kg/m^2 of projected area. if the maximum tensile strength of conductor is 4250kg/cm^2 and safety factor is 5, calculate the sag. **[7M]**

8. a) Write notes on mechanical principles of **[7M]**
   (i) Tower height
   (ii) Conductor clearance to ground
   (iii) Stringing charts

   b) An overhead transmission line at a river crossing is supported from two towers at heights of 40 m and 90 m above water level, the horizontal distance between the towers being 400 m. If the maximum allowable tension is 2000 kg, find the clearance between the conductor and water at a point mid-way between the towers. Weight of conductor is 1 kg/m. **[7M]**

UNIT – V

9. a) Comparison of 3 wire and 2- wire D.C Distribution systems. **[7M]**

   b) A single phase A.C. distributor AB 300 metres long is fed from end A and is loaded as under: (i) 100 A at 0.707 p.f. lagging 200 m from point A (ii) 200 A at 0.8 p.f. lagging 300 m from point A The load resistance and reactance of the distributor is 0.2 Ω and 0.1 Ω per kilometer. Calculate the total voltage drop in the distributor. The load power factors refer to the voltage at the far end. **[7M]**

10. a) Classify distribution feeders in detail. **[7M]**

    b) Consider the three – phase three- wire 416- V secondary system with balanced loads at A, B and C as shown in Figure 1, determine the following: **[7M]**

    (i) Calculate the total voltage drop using approximate method
    (ii) Calculate the real power per phase for each load.

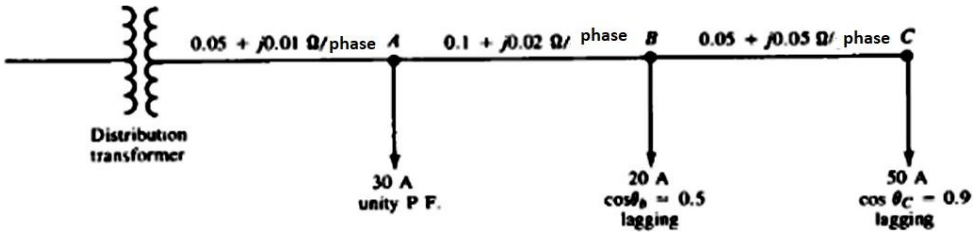
0.05 + j0.01 Ω/phase
A
0.1 + j0.02 Ω/ phase
B
0.05 + j0.05 Ω/ phase
C
Distribution transformer
30 A
unity P F.
20 A
cosθb = 0.5
lagging
50 A
cos θC = 0.9
lagging

Figure: 1