Hall Ticket No | | | | | | | | | | | Question Paper Code: AEC007

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech IV Semester End Examinations (Regular) - May, 2018

Regulation: IARE – R16

ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

Time: 3 Hours **(ECE)** **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) Deduce the equation for force due to the n number of charges. **[7M]**
   (b) A charge of 1 Coloumb is at(2,0,0), what charge must be placed at(-2,0,0) which will make y component of total 'E' is equal to zero at the point(1,2,2). **[7M]**
2. (a) Discuss in detail about four different types of charge distribution. **[7M]**
   (b) A uniform line charge in $2.5\mu c/m^2$ lies along the Z-axis and a concentric circular cylinder of radius 3m has a surface charge of –$0.12\mu c/m^2$. Both the distributions are infinite in extent with respect to Z-axis using Gauss's law find D in all regions, the region is free space. **[7M]**

UNIT – II

3. (a) Prove that the line integral of $\vec{H}$ about any closed path is equal to the current enclosed by the path. **[7M]**
   (b) A Solenoid of 10cm diameter and 30cm length in wound with 150 turns and carries a current of 5A. Find the magnetic flux density at a point on the axis at a distance of 10cm from the midpoint of the solenoid. **[7M]**
4. (a) Represent the four Maxwell's equation in integral form . **[7M]**
   (b) An electric field enters from air into a dielectric slab at an oriented of θ_1. Show that the electric field leaves the dielectric slab at the same orientation of θ_1 to define boundary conditions. **[7M]**

UNIT – III

5. (a) Establish the relation between E and H for a travelling uniform plane wave. **[7M]**
   (b) Determine: **[7M]**
      i. Attenuation Constant
      ii. Phase Constant
      iii. Propagation Constant
      iv. Wavelength
      v. Phase Velocity
      vi. Intrinsic impedance for damp soil at frequency of 1MHz.

   given that ε_r=12,μ_r=1 and conductivity $\sigma = 20X10^3 siemens/m$.

6. (a) Define polarization. Explain the types of polarizations in detail. **[7M]**

   (b) A 10 GHZ uniform plane wave travelling in free space in x-direction has E_x=1 v/m. Find the value of magnetic field and the propagation constant when α =0. **[7M]**

UNIT – IV

7. (a) State the various types of transmission lines used in practice. **[7M]**

   (b) A generator of IV 1 KHz supplies power to a 100 km open wire line transmitted in 200Ω resistance. The line parameters are R=10Ω/m, L=3.8mH/km, G=$1X10^6$mho/km, C=0.0085μF/km, calculate the input impedance, reflection, co-efficient, the input power, the output power and transmission efficiency. **[7M]**

8. (a) For a cable it is decided to provide lumped loading, the primary constant of cable are R=40 Ω/km, L=1mH/km,G=1μ mho/km, C=0.05μF/km. Find the new value of inductance required to achieve the distortion less condition, By what factor the inductance required to be revised. **[7M]**

   (b) Derive voltage and current equations for a transmission line. **[7M]**

UNIT – V

9. (a) What is the need for stub matching in transmission line? Discuss briefly the different types of stub matching? **[7M]**

   (b) What are standing waves? Determine the VSWR for a 50Ω line which is terminated with load 90+j60Ω. **[7M]**

10. (a) Derive the equations for quarter and half-wave lines as circuit elements. **[7M]**

    (b) If VSWR of a line is 1.5 then calculate its reflection co-efficient. **[7M]**