Code No: RR220403 **RR** **Set No. 2**

**II B.Tech II Semester Examinations,December 2010**
**EM WAVES AND TRANSMISSION LINES**
**Common to Electronics And Telematics, Electronics And Communication Engineering**

**Time: 3 hours** **Max Marks: 80**

**Answer any FIVE Questions**
**All Questions carry equal marks**
⋆⋆⋆⋆⋆

1. (a) What is a Smith chart and point out its applications. [8]
   (b) A transmission line of length 0.40 $\lambda$ has a characteristic impedance of 100 $\Omega$ is terminated in a load impedance of 200 + j180 $\Omega$ . Find out [8]
      i. voltage reflection coefficient
      ii. voltage standing wave ratio
      iii. input impedance of the line.

2. (a) What is a distortion line and derive expression for characteristic impedance, propagation constant and velocity of propagation. [8]
   (b) A distortion less transmission line has $Z_0 = 100\ \Omega$ , $\alpha = 0.5$ dB/m, $\upsilon = 0.8\ \upsilon_0$ . Find out R, L, G, C and wavelength at 0.1 GHz. [8]

3. (a) In a perfect dielectric medium, the electric field progressing in the Z-direction is given by the equation $\mathrm{E_x = E_{xo}Cos(wt-\beta Z)}$ and the associated magnetic field by Hy = Ex/$\eta$ where $E_{xo}$ is the Peak Value of $E_x$ at t = 0 and Z=0 and $\eta$ is the intrinsic impedance of the dielectric. Prove that the average power flowing through an area S normal to the Z-axis is given by $Pz, a_x = \frac{E_{x0}^2 S}{2\eta}$ [8]
   (b) In a non-magnetic medium, $\overline{E} = 4Sin(2\pi 10^7 t - 0.8x)\widehat{Z}V/m$. Determine $\overline{H}$ , dielectric constant, intrinsic impedance and the time average power carried by the wave. [8]

4. (a) Explain the causes for attenuation in Parallel plane wave guides. [4]
   (b) Define and explain the significance of the following terms as applicable to parallel plane guides: [12]
      i. Wave impedance.
      ii. Phase and group velocities
      iii. Principal wave and its characteristics

5. (a) Define polarization of an electromagnetic wave and explain different type of polarizations with examples. [8]
   (b) Represent a typical left circularly polarized wave by an expression. [8]

6. (a) In free space $\overline{D} = D_m$ Sin (wt $+\beta$ z)$a_x$. Determine $\overline{B}$ and displacement current density. [8]

(b) Region 1, for which $\mu_{r1} = 3$ is defined by $X < 0$ and region 2, $X < 0$ has $\mu_{r2} = 5$ given $H_1 = 4\ a_x + 3a_y\ \ 6\ a_z$ (A/m). Determine $H_2$ for $X > 0$ and the angles that $H_1$ and $H_2$ make with the interface. [8]

7. (a) Find the magnetic vector potential and hence the magnetic field due to a long straight wire carrying a current I in + $\widehat{Z}$ direction. [8]

   (b) Compare the utility, requirements and applications of Ampere's Circuital Law for static magnetic fields, with those of Gausss Law for electro static fields. [8]

8. (a) Explain the following terms: [8]

   i. Homogeneous and isotropic medium and

   ii. Line, surface and volume charge distributions.

   (b) A circular ring of radius 'a' carries uniform charge $\rho_L$ C/m and is in xy-plane. Find the Electric Field at Point (0, 0, 2) along its axis. [8]

⋆⋆⋆⋆⋆

Code No: RR220403 **RR** **Set No. 4**

**II B.Tech II Semester Examinations,December 2010**
**EM WAVES AND TRANSMISSION LINES**
**Common to Electronics And Telematics, Electronics And Communication Engineering**

**Time: 3 hours** **Max Marks: 80**

**Answer any FIVE Questions**
**All Questions carry equal marks**
⋆ ⋆ ⋆ ⋆ ⋆

1. (a) What is a distortion line and derive expression for characteristic impedance, propagation constant and velocity of propagation. [8]
   (b) A distortion less transmission line has $Z_0 = 100\ \Omega$ , $\alpha = 0.5$ dB/m, $\upsilon = 0.8\ \upsilon_0$ . Find out R, L, G, C and wavelength at 0.1 GHz. [8]
2. (a) In free space $\overline{D} = D_m$ Sin (wt $+\beta$ z)$a_x$. Determine $\overline{B}$ and displacement current density. [8]
   (b) Region 1, for which $\mu_{r1} = 3$ is defined by $X < 0$ and region 2, $X < 0$ has $\mu_{r2} = 5$ given $H_1 = 4\ a_x + 3a_y\ \ 6\ a_z$ (A/m). Determine $H_2$ for $X > 0$ and the angles that $H_1$ and $H_2$ make with the interface. [8]
3. (a) Define polarization of an electromagnetic wave and explain different type of polarizations with examples. [8]
   (b) Represent a typical left circularly polarized wave by an expression. [8]
4. (a) Find the magnetic vector potential and hence the magnetic field due to a long straight wire carrying a current I in + $\widehat{Z}$ direction. [8]
   (b) Compare the utility, requirements and applications of Ampere's Circuital Law for static magnetic fields, with those of Gausss Law for electro static fields. [8]
5. (a) What is a Smith chart and point out its applications. [8]
   (b) A transmission line of length 0.40 $\lambda$ has a characteristic impedance of 100 $\Omega$ is terminated in a load impedance of 200 + j180 $\Omega$ . Find out [8]
      i. voltage reflection coefficient
      ii. voltage standing wave ratio
      iii. input impedance of the line.
6. (a) Explain the causes for attenuation in Parallel plane wave guides. [4]
   (b) Define and explain the significance of the following terms as applicable to parallel plane guides: [12]
      i. Wave impedance.
      ii. Phase and group velocities
      iii. Principal wave and its characteristics

7. (a) In a perfect dielectric medium, the electric field progressing in the Z-direction is given by the equation $E_x = E_{xo}Cos(wt-\beta Z)$ and the associated magnetic field by Hy = Ex/$\eta$ where $E_{xo}$ is the Peak Value of $E_x$ at t = 0 and Z=0 and $\eta$ is the intrinsic impedance of the dielectric. Prove that the average power flowing through an area S normal to the Z-axis is given by $Pz, a_x = \frac{E_{x0}^2 S}{2\eta}$ [8]

   (b) In a non-magnetic medium, $\overline{E} = 4Sin(2\pi 10^7 t - 0.8x)\widehat{Z}V/m$. Determine $\overline{H}$ , dielectric constant, intrinsic impedance and the time average power carried by the wave. [8]

8. (a) Explain the following terms: [8]
   i. Homogeneous and isotropic medium and
   ii. Line, surface and volume charge distributions.

   (b) A circular ring of radius 'a' carries uniform charge $\rho_L$ C/m and is in xy-plane. Find the Electric Field at Point (0, 0, 2) along its axis. [8]

⋆⋆⋆⋆⋆

Code No: RR220403 **RR** **Set No. 1**

**II B.Tech II Semester Examinations,December 2010**
**EM WAVES AND TRANSMISSION LINES**
**Common to Electronics And Telematics, Electronics And Communication Engineering**

**Time: 3 hours** **Max Marks: 80**

**Answer any FIVE Questions**
**All Questions carry equal marks**

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) In free space $\overline{D} = D_m$ Sin (wt $+\beta$ z)$a_x$. Determine $\overline{B}$ and displacement current density. [8]
   (b) Region 1, for which $\mu_{r1} = 3$ is defined by $X < 0$ and region 2, $X < 0$ has $\mu_{r2} = 5$ given $H_1 = 4\ a_x + 3a_y\ \ 6\ a_z$ (A/m). Determine $H_2$ for $X > 0$ and the angles that $H_1$ and $H_2$ make with the interface. [8]

2. (a) In a perfect dielectric medium, the electric field progressing in the Z-direction is given by the equation $E_x = E_{xo}Cos(wt-\beta Z)$ and the associated magnetic field by Hy = Ex/$\eta$ where $E_{xo}$ is the Peak Value of $E_x$ at t = 0 and Z=0 and $\eta$ is the intrinsic impedance of the dielectric. Prove that the average power flowing through an area S normal to the Z-axis is given by $Pz, a_x = \frac{E_{x0}^2 S}{2\eta}$ [8]
   (b) In a non-magnetic medium, $\overline{E} = 4Sin(2\pi 10^7 t - 0.8x)\widehat{Z}V/m$. Determine $\overline{H}$ , dielectric constant, intrinsic impedance and the time average power carried by the wave. [8]

3. (a) Find the magnetic vector potential and hence the magnetic field due to a long straight wire carrying a current I in + $\widehat{Z}$ direction. [8]
   (b) Compare the utility, requirements and applications of Ampere's Circuital Law for static magnetic fields, with those of Gausss Law for electro static fields. [8]

4. (a) Explain the causes for attenuation in Parallel plane wave guides. [4]
   (b) Define and explain the significance of the following terms as applicable to parallel plane guides: [12]
      i. Wave impedance.
      ii. Phase and group velocities
      iii. Principal wave and its characteristics

5. (a) What is a distortion line and derive expression for characteristic impedance, propagation constant and velocity of propagation. [8]
   (b) A distortion less transmission line has $Z_0 = 100\ \Omega$ , $\alpha = 0.5$ dB/m, $\upsilon = 0.8\ \upsilon_0$ . Find out R, L, G, C and wavelength at 0.1 GHz. [8]

6. (a) What is a Smith chart and point out its applications. [8]
   (b) A transmission line of length 0.40 $\lambda$ has a characteristic impedance of 100 $\Omega$ is terminated in a load impedance of 200 + j180 $\Omega$ . Find out [8]

i. voltage reflection coefficient
ii. voltage standing wave ratio
iii. input impedance of the line.

7. (a) Explain the following terms: [8]
   i. Homogeneous and isotropic medium and
   ii. Line, surface and volume charge distributions.
   (b) A circular ring of radius 'a' carries uniform charge $\rho_L$ C/m and is in xy-plane. Find the Electric Field at Point (0, 0, 2) along its axis. [8]

8. (a) Define polarization of an electromagnetic wave and explain different type of polarizations with examples. [8]
   (b) Represent a typical left circularly polarized wave by an expression. [8]

⋆⋆⋆⋆⋆

Code No: RR220403 **RR** **Set No. 3**

**II B.Tech II Semester Examinations,December 2010**
**EM WAVES AND TRANSMISSION LINES**
**Common to Electronics And Telematics, Electronics And Communication Engineering**

**Time: 3 hours** **Max Marks: 80**

**Answer any FIVE Questions**
**All Questions carry equal marks**

⋆ ⋆ ⋆ ⋆ ⋆



1. (a) What is a Smith chart and point out its applications. [8]
   (b) A transmission line of length 0.40 $\lambda$ has a characteristic impedance of 100 $\Omega$ is terminated in a load impedance of 200 + j180 $\Omega$ . Find out [8]
      i. voltage reflection coefficient
      ii. voltage standing wave ratio
      iii. input impedance of the line.

2. (a) What is a distortion line and derive expression for characteristic impedance, propagation constant and velocity of propagation. [8]
   (b) A distortion less transmission line has $Z_0 = 100\ \Omega$ , $\alpha = 0.5$ dB/m, $\upsilon = 0.8\ \upsilon_0$ . Find out R, L, G, C and wavelength at 0.1 GHz. [8]

3. (a) Explain the causes for attenuation in Parallel plane wave guides. [4]
   (b) Define and explain the significance of the following terms as applicable to parallel plane guides: [12]
      i. Wave impedance.
      ii. Phase and group velocities
      iii. Principal wave and its characteristics

4. (a) In a perfect dielectric medium, the electric field progressing in the Z-direction is given by the equation $E_x = E_{xo}Cos(wt-\beta Z)$ and the associated magnetic field by Hy = Ex/$\eta$ where $E_{xo}$ is the Peak Value of $E_x$ at t = 0 and Z=0 and $\eta$ is the intrinsic impedance of the dielectric. Prove that the average power flowing through an area S normal to the Z-axis is given by $Pz, a_x = \frac{E_{x0}^2 S}{2\eta}$ [8]
   (b) In a non-magnetic medium, $\overline{E} = 4Sin(2\pi 10^7 t - 0.8x)\widehat{Z}V/m$. Determine $\overline{H}$ , dielectric constant, intrinsic impedance and the time average power carried by the wave. [8]

5. (a) Find the magnetic vector potential and hence the magnetic field due to a long straight wire carrying a current I in + $\widehat{Z}$ direction. [8]
   (b) Compare the utility, requirements and applications of Ampere's Circuital Law for static magnetic fields, with those of Gausss Law for electro static fields. [8]

6. (a) Explain the following terms: [8]

i. Homogeneous and isotropic medium and

ii. Line, surface and volume charge distributions.

(b) A circular ring of radius 'a' carries uniform charge $\rho_L$ C/m and is in xy-plane. Find the Electric Field at Point (0, 0, 2) along its axis. [8]

7. (a) Define polarization of an electromagnetic wave and explain different type of polarizations with examples. [8]

(b) Represent a typical left circularly polarized wave by an expression. [8]

8. (a) In free space $\overline{D} = D_m$ Sin (wt $+\beta$ z)$a_x$. Determine $\overline{B}$ and displacement current density. [8]

(b) Region 1, for which $\mu_{r1} = 3$ is defined by $X < 0$ and region 2, $X < 0$ has $\mu_{r2} = 5$ given $H_1 = 4\ a_x + 3a_y\ \ 6\ a_z$ (A/m). Determine $H_2$ for $X > 0$ and the angles that $H_1$ and $H_2$ make with the interface. [8]

⋆⋆⋆⋆⋆