Code No: 07A31001 **R07** **Set No. 2**

II B.Tech I Semester Examinations,MAY 2011
ELECTROMAGNETIC WAVES AND TRANSMISSION LINES
Electronics And Instrumentation Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Define electric dipole moment, **p** and mention its units.
   (b) What are the magnitudes of P and D for a dielectric material in which E = 1.0 V/m and $\chi_e = 5.0$. [6+10]
2. Derive the propagation parameters of TE and TM modes in guide waves. [10]
3. (a) What is a Toroid and obtain an expression for its inductance.
   (b) A Toroid has air core and has a cross-sectional area of 10 mm^2. It has 1000 turns and it's mean radius is 10 mm. Find its inductance. [8+8]
4. (a) Derive the expression for input impedance of a line when it is terminated by:
      i. Z_0
      ii. Shorted line
      iii. Open line.

      Also draw the variation of the impedance with respect to electrical lamps of the line for the above cases.
   (b) Express the maximum & minimum input impedance of a line in terms of VSWR. [10+6]
5. What is Brewster Angle? Derive the Brewster angle for parallel polarization? [10]
6. Determine the following for an EM wave of amplitude, $E = 10.5\, e^{-x/\delta}$:
   (a) 10 % penetration depth
   (b) 60 % penetration. [16]
7. For a transmission line with load Z_L, derive the expressions for series impedance, shunt admittance, characteristic impedance and reflection coefficient. [16]
8. (a) The electric field of an EM wave is $\mathbf{E} = 15 \cos \omega\left(t - \frac{z}{v_0}\right) a_y$, find **H**.
   (b) The interface between two different regions is normal to one of the three Cartesian axis. If $B_1 = \mu_o\,(12\,a_x + 10\,a_z)$ and $B_2 = \mu_o\,(6\,a_x + 10\,a_z)$, find $\tan\theta_1/\tan\theta_2$. [8+8]

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Code No: 07A31001 **R07** **Set No. 4**

II B.Tech I Semester Examinations,MAY 2011
ELECTROMAGNETIC WAVES AND TRANSMISSION LINES
Electronics And Instrumentation Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Derive the expression for input impedance of a line when it is terminated by:
   i. Z_0
   ii. Shorted line
   iii. Open line.

   Also draw the variation of the impedance with respect to electrical lamps of the line for the above cases.

   (b) Express the maximum & minimum input impedance of a line in terms of VSWR. [10+6]

2. For a transmission line with load Z_L, derive the expressions for series impedance, shunt admittance, characteristic impedance and reflection coefficient. [16]

3. (a) Define electric dipole moment, **p** and mention its units.

   (b) What are the magnitudes of P and D for a dielectric material in which E = 1.0 V/m and $\chi_e = 5.0$. [6+10]

4. Determine the following for an EM wave of amplitude, $E = 10.5\,e^{-x/\delta}$:

   (a) 10 % penetration depth

   (b) 60 % penetration

   [16]

5. (a) What is a Toroid and obtain an expression for its inductance.

   (b) A Toroid has air core and has a cross-sectional area of 10 mm^2. It has 1000 turns and it's mean radius is 10 mm. Find its inductance. [8+8]

6. Derive the propagation parameters of TE and TM modes in guide waves. [10]

7. What is Brewster Angle? Derive the Brewster angle for parallel polarization? [10]

8. (a) The electric field of an EM wave is $\mathbf{E} = 15\cos\omega\left(t - \frac{z}{v_0}\right)\mathrm{a}_y$, find **H**.

   (b) The interface between two different regions is normal to one of the three Cartesian axis. If $B_1 = \mu_o\,(12\,a_x + 10\,a_z)$ and $B_2 = \mu_o\,(6\,a_x + 10\,a_z)$, find $\tan\theta_1/\tan\theta_2$. [8+8]

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Code No: 07A31001 **R07** **Set No. 1**

II B.Tech I Semester Examinations,MAY 2011
ELECTROMAGNETIC WAVES AND TRANSMISSION LINES
Electronics And Instrumentation Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) The electric field of an EM wave is $\mathbf{E} = 15 \cos \omega\left(t - \frac{z}{v_0}\right) a_y$, find **H**.
   (b) The interface between two different regions is normal to one of the three Cartesian axis. If $B_1 = \mu_o (12\,a_x + 10\,a_z)$ and $B_2 = \mu_o (6\,a_x + 10\,a_z)$, find $\tan\theta_1/\tan\theta_2$. [8+8]

2. Determine the following for an EM wave of amplitude, $E = 10.5\,e^{-x/\delta}$:
   (a) 10 % penetration depth
   (b) 60 % penetration.
   [16]

3. (a) Define electric dipole moment, **p** and mention its units.
   (b) What are the magnitudes of P and D for a dielectric material in which E = 1.0 V/m and $\chi_e = 5.0$. [6+10]

4. For a transmission line with load Z_L, derive the expressions for series impedance, shunt admittance, characteristic impedance and reflection coefficient. [16]

5. What is Brewster Angle? Derive the Brewster angle for parallel polarization? [10]

6. (a) What is a Toroid and obtain an expression for its inductance.
   (b) A Toroid has air core and has a cross-sectional area of 10 mm^2. It has 1000 turns and it's mean radius is 10 mm. Find its inductance. [8+8]

7. Derive the propagation parameters of TE and TM modes in guide waves. [10]

8. (a) Derive the expression for input impedance of a line when it is terminated by:
      i. Z_0
      ii. Shorted line
      iii. Open line.

      Also draw the variation of the impedance with respect to electrical lamps of the line for the above cases.
   (b) Express the maximum & minimum input impedance of a line in terms of VSWR. [10+6]

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Code No: 07A31001 **R07** **Set No. 3**

II B.Tech I Semester Examinations,MAY 2011
ELECTROMAGNETIC WAVES AND TRANSMISSION LINES
Electronics And Instrumentation Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Define electric dipole moment, **p** and mention its units.
   (b) What are the magnitudes of P and D for a dielectric material in which E = 1.0 V/m and $\chi_e = 5.0$. [6+10]

2. (a) What is a Toroid and obtain an expression for its inductance.
   (b) A Toroid has air core and has a cross-sectional area of 10 mm^2. It has 1000 turns and it's mean radius is 10 mm. Find its inductance. [8+8]

3. For a transmission line with load Z_L, derive the expressions for series impedance, shunt admittance, characteristic impedance and reflection coefficient. [16]

4. (a) Derive the expression for input impedance of a line when it is terminated by:
      i. Z_0
      ii. Shorted line
      iii. Open line.

      Also draw the variation of the impedance with respect to electrical lamps of the line for the above cases.
   (b) Express the maximum & minimum input impedance of a line in terms of VSWR. [10+6]

5. (a) The electric field of an EM wave is $\mathbf{E} = 15 \cos \omega\left(t - \frac{z}{v_0}\right) a_y$, find **H**.
   (b) The interface between two different regions is normal to one of the three Cartesian axis. If $B_1 = \mu_o (12\,a_x + 10\,a_z)$ and $B_2 = \mu_o (6\,a_x + 10\,a_z)$, find $\tan\theta_1 / \tan\theta_2$. [8+8]

6. Determine the following for an EM wave of amplitude, $E = 10.5\,e^{-x/\delta}$:
   (a) 10 % penetration depth
   (b) 60 % penetration.

   [16]

7. Derive the propagation parameters of TE and TM modes in guide waves. [10]

8. What is Brewster Angle? Derive the Brewster angle for parallel polarization? [10]

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