Code No: 07A3EC04 **R07** **Set No. 2**

II B.Tech I Semester Examinations,MAY 2011
ELECTROMAGNETIC FIELDS
Common to Electronics And Control Engineering, Electrical And Electronics Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. If the magnetic field intensity $\bar{H} = (x^2\bar{a}\bar{x} + 2yz\bar{a}\bar{y} - x^2\bar{a}\bar{z})$ A/M. Find the current density at (2, 3, 4). [16]

2. (a) Moist rod has conductivity $10^{-3} mho/m$ and $e_r = 2.5$. Find $\bar{J}_C$ and $\bar{J}_D$ where $E = 6 \times 10^{-6} \sin 9 \times 10^9 t(v/m)$.
   (b) Explain what is meant by displacement current deduce equation of continuity of current $div\left(\bar{J} + \frac{\delta\bar{D}}{\delta t}\right) = 0$. [8+8]

3. (a) State and explain Gauss's law.
   (b) Given $\bar{D} = 2xy\,\bar{\partial}_x + z\,\bar{\partial}_y + yz^2\bar{\partial}_z$, find $\nabla.\bar{D}$ at p(2, -1, 3). [8+8]

4. (a) Derive an expression for force between two straight long parallel conductors carrying currents in the same direction
   (b) A current element 2m in length lies along the y-axis direction centered at the origin. The current is 5 amps in the $\bar{a}_y$ direction. If it experiences a force 1.5 $\left(\frac{\bar{a}_x + \bar{a}_z}{\sqrt{2}}\right)$ N due to a uniform field $\bar{B}$, determine $\bar{B}$. [8+8]

5. (a) What is a dipole? Derive expression for Torque experienced by a dipole in uniform electric field.
   (b) Verify that the potential field given below satisfies the Laplace's equation. $V = 4x^2 - 6y^2 + 2z^2$. [8+8]

6. Derive Neuman's formula for mutual inductance considering two loops carrying currents I_1 and I_2. [16]

7. Derive the expression for capacitance of a parallel plate capacitor with single dielectric. Also derive the expression for the capacitance of a parallel plate capacitor with two dielectric. [16]

8. Find the expression for the magnetic flux density $\bar{B}$ at a distance 'h' above the centre of a rectangular loop of wire 'b' m on one side and 'a' m on the other side. The loop carries a current of I amps. [16]

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Code No: 07A3EC04 **R07** **Set No. 4**

II B.Tech I Semester Examinations,MAY 2011
ELECTROMAGNETIC FIELDS
Common to Electronics And Control Engineering, Electrical And Electronics Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) State and explain Gauss's law.
   (b) Given $\bar{D} = 2xy\,\bar{\partial}_x + z\,\bar{\partial}_y + yz^2\bar{\partial}_z$, find $\nabla.\bar{D}$ at p(2, -1, 3). [8+8]
2. (a) What is a dipole? Derive expression for Torque experienced by a dipole in uniform electric field.
   (b) Verify that the potential field given below satisfies the Laplace's equation. $V = 4x^2 - 6y^2 + 2z^2$. [8+8]
3. (a) Moist rod has conductivity $10^{-3} mho/m$ and $e_r = 2.5$. Find $\bar{J}_C$ and $\bar{J}_D$ where $E = 6 \times 10^{-6} \sin 9 \times 10^9 t(v/m)$.
   (b) Explain what is meant by displacement current deduce equation of continuity of current $div\left(\bar{J} + \frac{\delta\bar{D}}{\delta t}\right) = 0$. [8+8]
4. Derive the expression for capacitance of a parallel plate capacitor with single dielectric. Also derive the expression for the capacitance of a parallel plate capacitor with two dielectric. [16]
5. If the magnetic field intensity $\bar{H} = (x^2\bar{a}\bar{x} + 2yz\bar{a}\bar{y} - x^2\bar{a}\bar{z})$ A/M. Find the current density at (2, 3, 4). [16]
6. Derive Neuman's formula for mutual inductance considering two loops carrying currents I_1 and I_2. [16]
7. Find the expression for the magnetic flux density $\bar{B}$ at a distance 'h' above the centre of a rectangular loop of wire 'b' m on one side and 'a' m on the other side. The loop carries a current of I amps. [16]
8. (a) Derive an expression for force between two straight long parallel conductors carrying currents in the same direction
   (b) A current element 2m in length lies along the y-axis direction centered at the origin. The current is 5 amps in the $\bar{a}_y$ direction. If it experiences a force 1.5 $\left(\frac{\bar{a}_x + \bar{a}_z}{\sqrt{2}}\right)$ N due to a uniform field $\bar{B}$, determine $\bar{B}$. [8+8]

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Code No: 07A3EC04 **R07** **Set No. 1**

II B.Tech I Semester Examinations,MAY 2011
ELECTROMAGNETIC FIELDS
Common to Electronics And Control Engineering, Electrical And Electronics Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Find the expression for the magnetic flux density $\bar{B}$ at a distance 'h' above the centre of a rectangular loop of wire 'b' m on one side and 'a' m on the other side. The loop carries a current of I amps. [16]

2. (a) Moist rod has conductivity $10^{-3} mho/m$ and $e_r = 2.5$. Find $\bar{J}_C$ and $\bar{J}_D$ where $E = 6 \times 10^{-6} \sin 9 \times 10^9 t(v/m)$.
   (b) Explain what is meant by displacement current deduce equation of continuity of current $div\left(\bar{J} + \frac{\delta \bar{D}}{\delta t}\right) = 0$. [8+8]

3. Derive the expression for capacitance of a parallel plate capacitor with single dielectric. Also derive the expression for the capacitance of a parallel plate capacitor with two dielectric. [16]

4. (a) Derive an expression for force between two straight long parallel conductors carrying currents in the same direction
   (b) A current element 2m in length lies along the y-axis direction centered at the origin. The current is 5 amps in the $\bar{a}_y$ direction. If it experiences a force 1.5 $\left(\frac{\bar{a}_x + \bar{a}_z}{\sqrt{2}}\right)$ N due to a uniform field $\bar{B}$, determine $\bar{B}$. [8+8]

5. If the magnetic field intensity $\bar{H} = (x^2 \bar{a}\bar{x} + 2yz\bar{a}\bar{y} - x^2 \bar{a}\bar{z})$ A/M. Find the current density at (2, 3, 4). [16]

6. (a) What is a dipole? Derive expression for Torque experienced by a dipole in uniform electric field.
   (b) Verify that the potential field given below satisfies the Laplace's equation. $V = 4x^2 - 6y^2 + 2z^2$. [8+8]

7. (a) State and explain Gauss's law.
   (b) Given $\bar{D} = 2xy\,\bar{\partial}_x + z\,\bar{\partial}_y + yz^2\bar{\partial}_z$, find $\nabla.\bar{D}$ at p(2, -1, 3). [8+8]

8. Derive Neuman's formula for mutual inductance considering two loops carrying currents I_1 and I_2. [16]

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Code No: 07A3EC04 **R07** **Set No. 3**

II B.Tech I Semester Examinations,MAY 2011
ELECTROMAGNETIC FIELDS
Common to Electronics And Control Engineering, Electrical And Electronics Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Derive Neuman's formula for mutual inductance considering two loops carrying currents I_1 and I_2. [16]
2. Find the expression for the magnetic flux density $\bar{B}$ at a distance 'h' above the centre of a rectangular loop of wire 'b' m on one side and 'a' m on the other side. The loop carries a current of I amps. [16]
3. (a) Derive an expression for force between two straight long parallel conductors carrying currents in the same direction
   (b) A current element 2m in length lies along the y-axis direction centered at the origin. The current is 5 amps in the $\bar{a}_y$ direction. If it experiences a force 1.5 $\left(\frac{\bar{a}_x+\bar{a}_z}{\sqrt{2}}\right)$ N due to a uniform field $\bar{B}$, determine $\bar{B}$. [8+8]
4. Derive the expression for capacitance of a parallel plate capacitor with single dielectric. Also derive the expression for the capacitance of a parallel plate capacitor with two dielectric. [16]
5. (a) What is a dipole? Derive expression for Torque experienced by a dipole in uniform electric field.
   (b) Verify that the potential field given below satisfies the Laplace's equation. $V = 4x^2 - 6y^2 + 2z^2$. [8+8]
6. (a) Moist rod has conductivity $10^{-3} mho/m$ and $e_r = 2.5$. Find $\bar{J}_C$ and $\bar{J}_D$ where $E = 6 \times 10^{-6} \sin 9 \times 10^9 t (v/m)$.
   (b) Explain what is meant by displacement current deduce equation of continuity of current $div\left(\bar{J} + \frac{\delta \bar{D}}{\delta t}\right) = 0$. [8+8]
7. (a) State and explain Gauss's law.
   (b) Given $\bar{D} = 2xy\,\bar{\partial}_x + z\,\bar{\partial}_y + yz^2\bar{\partial}_z$, find $\nabla.\bar{D}$ at p(2, -1, 3). [8+8]
8. If the magnetic field intensity $\bar{H} = (x^2\bar{a}\bar{x} + 2yz\bar{a}\bar{y} - x^2\bar{a}\bar{z})$ A/M. Find the current density at (2, 3, 4). [16]

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