Code No: RR210204 **RR** **Set No. 2**

II B.Tech I Semester Examinations,November 2010
ELECTROMAGNETIC FIELDS
Electrical And Electronics Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. A uniform plane wave at 1 MHz travels in air in a direction that makes 30^0 with x-axis, 60^0 with Y-axis and 90^0 with Z-axis. It has a Z-directed electric field of magnitude 5 V/m. Express the electric and magnetic fields in vector form. [16]

2. What is the value of the E field at the surface of a flat conducting sheet which has placed on it a surface charge density of $\rho_s = 10^{-2}$ C/m^2. [16]

3. Derive an expression for energy density in a magnetic field and use this formula for computing energy density in a magnetic field having flux density equal to 1 Tesla. [16]

4. Explain the Faradays disc generator and derive an expression for finding the unknown magnetic field. [16]

5. (a) Obtain an expression for the energy stored in Electrostatic fields, state the units employed in each case.
   (b) Given $\bar{J} = 10^3 sin\theta\, \bar{a}_r\, A/m^2$ in Spherical Co-ordinates, Find the current across the spherical shell r=0.02 m. [8+8]

6. (a) Find an expression for force and torque on closed circuits carrying current in the magnetic field.
   (b) Two long parallel wires carrying 5,000 A and 10,000 A are separated by 1.5 m. Find the force between them. Derive the basic equation used for the calculation. [8+8]

7. A uniform wire is bent into the form of a square of side 2a and a current I flows round it. Prove that the magnetic field strength at a point on the perpendicular to the plane of the square through its centre and distance d from the plane is $\frac{2\,I_a^2}{\pi(a^2+d^2)\sqrt{2a^2+d^2}}$. [16]

8. A parallel plate capacitor has a plate area of 1.5 Sq.m. and a plate separation of 5 mm. There are two dielectrics in between the plates. The first dielectric has a thickness of 3 mm with a relative permittivity of 6 and the second has a thickness of 2 mm with relative permittivity 4. Find the capacitance. Derive the formula uses. [16]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: RR210204 **RR** **Set No. 4**

II B.Tech I Semester Examinations,November 2010
ELECTROMAGNETIC FIELDS
Electrical And Electronics Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. A uniform plane wave at 1 MHz travels in air in a direction that makes 30^0 with x-axis, 60^0 with Y-axis and 90^0 with Z-axis. It has a Z-directed electric field of magnitude 5 V/m. Express the electric and magnetic fields in vector form. [16]

2. What is the value of the E field at the surface of a flat conducting sheet which has placed on it a surface charge density of $\rho_s = 10^{-2}$ C/m^2. [16]

3. Explain the Faradays disc generator and derive an expression for finding the unknown magnetic field. [16]

4. A parallel plate capacitor has a plate area of 1.5 Sq.m. and a plate separation of 5 mm. There are two dielectrics in between the plates. The first dielectric has a thickness of 3 mm with a relative permittivity of 6 and the second has a thickness of 2 mm with relative permittivity 4. Find the capacitance. Derive the formula uses. [16]

5. (a) Obtain an expression for the energy stored in Electrostatic fields, state the units employed in each case.
   (b) Given $\bar{J} = 10^3 sin\theta\, \bar{a}_r\, A/m^2$ in Spherical Co-ordinates, Find the current across the spherical shell r=0.02 m. [8+8]

6. (a) Find an expression for force and torque on closed circuits carrying current in the magnetic field.
   (b) Two long parallel wires carrying 5,000 A and 10,000 A are separated by 1.5 m. Find the force between them. Derive the basic equation used for the calculation. [8+8]

7. Derive an expression for energy density in a magnetic field and use this formula for computing energy density in a magnetic field having flux density equal to 1 Tesla. [16]

8. A uniform wire is bent into the form of a square of side 2a and a current I flows round it. Prove that the magnetic field strength at a point on the perpendicular to the plane of the square through its centre and distance d from the plane is $\frac{2\,I_a^2}{\pi(a^2+d^2)\sqrt{2a^2+d^2}}$. [16]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: RR210204 **RR** **Set No. 1**

II B.Tech I Semester Examinations,November 2010
ELECTROMAGNETIC FIELDS
Electrical And Electronics Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. Derive an expression for energy density in a magnetic field and use this formula for computing energy density in a magnetic field having flux density equal to 1 Tesla. [16]

2. A parallel plate capacitor has a plate area of 1.5 Sq.m. and a plate separation of 5 mm. There are two dielectrics in between the plates. The first dielectric has a thickness of 3 mm with a relative permittivity of 6 and the second has a thickness of 2 mm with relative permittivity 4. Find the capacitance. Derive the formula uses. [16]

3. A uniform wire is bent into the form of a square of side 2a and a current I flows round it. Prove that the magnetic field strength at a point on the perpendicular to the plane of the square through its centre and distance d from the plane is $\frac{2\,I_a^2}{\pi(a^2+d^2)\sqrt{2a^2+d^2}}$. [16]

4. (a) Obtain an expression for the energy stored in Electrostatic fields, state the units employed in each case.
   (b) Given $\bar{J} = 10^3 sin\theta\,\bar{a}_r\ A/m^2$ in Spherical Co-ordinates, Find the current across the spherical shell r=0.02 m. [8+8]

5. (a) Find an expression for force and torque on closed circuits carrying current in the magnetic field.
   (b) Two long parallel wires carrying 5,000 A and 10,000 A are separated by 1.5 m. Find the force between them. Derive the basic equation used for the calculation. [8+8]

6. Explain the Faradays disc generator and derive an expression for finding the unknown magnetic field. [16]

7. A uniform plane wave at 1 MHz travels in air in a direction that makes 30^0 with x-axis, 60^0 with Y-axis and 90^0 with Z-axis. It has a Z-directed electric field of magnitude 5 V/m. Express the electric and magnetic fields in vector form. [16]

8. What is the value of the E field at the surface of a flat conducting sheet which has placed on it a surface charge density of $\rho_s = 10^{-2}$ C/m^2. [16]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: RR210204 **RR** **Set No. 3**

II B.Tech I Semester Examinations,November 2010
ELECTROMAGNETIC FIELDS
Electrical And Electronics Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. A parallel plate capacitor has a plate area of 1.5 Sq.m. and a plate separation of 5 mm. There are two dielectrics in between the plates. The first dielectric has a thickness of 3 mm with a relative permittivity of 6 and the second has a thickness of 2 mm with relative permittivity 4. Find the capacitance. Derive the formula uses. [16]

2. (a) Obtain an expression for the energy stored in Electrostatic fields, state the units employed in each case.
   (b) Given $\bar{J} = 10^3 sin\theta\, \bar{a}_r\, A/m^2$ in Spherical Co-ordinates, Find the current across the spherical shell r=0.02 m. [8+8]

3. (a) Find an expression for force and torque on closed circuits carrying current in the magnetic field.
   (b) Two long parallel wires carrying 5,000 A and 10,000 A are separated by 1.5 m. Find the force between them. Derive the basic equation used for the calculation. [8+8]

4. A uniform wire is bent into the form of a square of side 2a and a current I flows round it. Prove that the magnetic field strength at a point on the perpendicular to the plane of the square through its centre and distance d from the plane is $\frac{2\,I_a^2}{\pi(a^2+d^2)\sqrt{2a^2+d^2}}$. [16]

5. What is the value of the E field at the surface of a flat conducting sheet which has placed on it a surface charge density of $\rho_s = 10^{-2}$ C/m^2. [16]

6. Derive an expression for energy density in a magnetic field and use this formula for computing energy density in a magnetic field having flux density equal to 1 Tesla. [16]

7. A uniform plane wave at 1 MHz travels in air in a direction that makes 30^0 with x-axis, 60^0 with Y-axis and 90^0 with Z-axis. It has a Z-directed electric field of magnitude 5 V/m. Express the electric and magnetic fields in vector form. [16]

8. Explain the Faradays disc generator and derive an expression for finding the unknown magnetic field. [16]

⋆ ⋆ ⋆ ⋆ ⋆