

Code No: 07A3EC04

R07**Set No. 2**

II B.Tech I Semester Examinations, November 2010

ELECTROMAGNETIC FIELDSCommon to Electronics And Control Engineering, Electrical And
Electronics Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Explain the concept of electric field intensity.
(b) A point charges of $500 \mu\text{C}$ each are placed at the corners of a square of $3\sqrt{2}$ m side. The square is located in the $Z = 0$ plane between $x = \pm \frac{3}{\sqrt{2}}$ m and $y = \pm \frac{3}{\sqrt{2}}$ m in free space. Find the force on a point charges of $30 \mu\text{C}$ at $(0, 0, 4)$ m. [8+8]
2. A conductor of length 100 cm moves at right angles to uniform field of strength 10000 lines per cm^2 with a velocity of 50 m/s. Calculate emf induced in it when the conductor moves at an angle 30° to the direction of the field. [16]
3. A parallel plate capacitor has a plate area of 1.5 sq.m. and a plate separation of 5mm. There are two dielectrics in between the plates. The first dielectric has a thickness of 3mm with a relative permittivity of 6 and the second has a thickness of 2mm with relative permittivity 4. Find the capacitance? [16]
4. Explain the concept of vector magnetic potential and derive the expression for the same. [16]
5. A conductor of length 4m, with current held at 10A in the $\bar{a}_y$ direction laid along the y - axis between $y = \pm 2$. If the field is $\bar{B} = 0.05 \bar{a}_x$ T, find the work done in moving the conductor parallel to itself at constant speed to $x = y = 2$ m. Derive the formula used. [16]
6. (a) Using Ampere's Circuital law, find the magnetic field intensity in the case of a closely wound toroidal coil.
(b) A single-phase circuit comprises two parallel conductors A and B, each 1 cm diameter and spaced 1 m apart. The conductors carry currents of +100 and -100 amps respectively. Determine field intensity at the surface of each conductor and also in space exactly midway between A and B. [8+8]
7. (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]
8. Derive an expression for magnetic field intensity at a radial distance 'l' m due to a current carrying wire of finite length. [16]

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R07**Set No. 4**

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1. A parallel plate capacitor has a plate area of 1.5 sq.m. and a plate separation of 5mm. There are two dielectrics in between the plates. The first dielectric has a thickness of 3mm with a relative permittivity of 6 and the second has a thickness of 2mm with relative permittivity 4. Find the capacitance? [16]
2. (a) Explain the concept of electric field intensity.
(b) A point charges of $500 \mu\text{C}$ each are placed at the corners of a square of $3\sqrt{2}$ m side. The square is located in the $Z = 0$ plane between $x = \pm \frac{3}{\sqrt{2}}$ m and $y = \pm \frac{3}{\sqrt{2}}$ m in free space. Find the force on a point charges of $30 \mu\text{C}$ at $(0,0,4)$ m. [8+8]
3. (a) Using Ampere's Circuital law, find the magnetic field intensity in the case of a closely wound toroidal coil.
(b) A single-phase circuit comprises two parallel conductors A and B, each 1 cm diameter and spaced 1 m apart. The conductors carry currents of +100 and -100 amps respectively. Determine the field intensity at the surface of each conductor and also in space exactly midway between A and B. [8+8]
4. A conductor of length 100 cm moves at right angles to uniform field of strength 10000 lines per cm^2 with a velocity of 50 m/s. Calculate emf induced in it when the conductor moves at an angle 30° to the direction of the field. [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. Derive an expression for magnetic field intensity at a radial distance 'l' m due to a current carrying wire of finite length. [16]
7. Explain the concept of vector magnetic potential and derive the expression for the same. [16]
8. A conductor of length 4m, with current held at 10A in the $\bar{a}_y$ direction laid along the y - axis between $y = \pm 2$. If the field is $\bar{B} = 0.05 \bar{a}_x$ T, find the work done in moving the conductor parallel to itself at constant speed to $x = y = 2$ m. Derive the formula used. [16]

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2. Derive an expression for magnetic field intensity at a radial distance 'r' m due to a current carrying wire of finite length. [16]
3. (a) Explain the concept of electric field intensity.
(b) A point charges of $500 \mu\text{C}$ each are placed at the corners of a square of $3\sqrt{2}$ m side. The square is located in the $Z = 0$ plane between $x = \pm \frac{3}{\sqrt{2}}$ m and $y = \pm \frac{3}{\sqrt{2}}$ m in free space. Find the force on a point charges of $30 \mu\text{C}$ at (0,0,4) m. [8+8]
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2. Derive an expression for magnetic field intensity at a radial distance 'r' m due to a current carrying wire of finite length. [16]
3. A parallel plate capacitor has a plate area of 1.5 sq.m. and a plate separation of 5mm. There are two dielectrics in between the plates. The first dielectric has a thickness of 3mm with a relative permittivity of 6 and the second has a thickness of 2mm with relative permittivity 4. Find the capacitance? [16]
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