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**Question Paper Code: 54403**

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Fourth Semester

Electronics and Communication Engineering

15UEC403–ELECTROMAGNETIC FIELDS

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. The electric field intensity at a point situated 4 metres from a point charge is 200 N/C. If the distance is reduced to 2 metres, the field intensity will be CO1- R  
(a) 400 N/C                      (b) 600 N/C                      (c) 800 N/C                      (d) 1200 N/C
2. The Biot-savart's law is a general modification of CO2- R  
(a) Kirchhoff's law              (b) Lenz's law                      (c) Ampere's law                      (d) Ampere's law
3. Which of the following is a ferromagnetic material? CO3- R  
(a) Tungsten                      (b) Aluminium                      (c) Copper                      (d) Nickel
4. The law that the induced e.m.f. and current always oppose the cause producing them is due to CO4- R  
(a) Faraday                      (b) Lenz                      (c) Newton                      (d) Coulomb
5. Electromagnetic waves carry CO5- R  
(a) Positive charge      (b) Negative charge      (c) No charge      (d) Both (a) & (b)

PART – B (5 x 3= 15 Marks)

6. A point charge +2nC is located at the origin. What is the value of potential at P (1, 0, 0) m? CO1- App
7. For a current distribution in free space, CO2- App  
 $\vec{A} = (2x^2y + yz) \hat{a}_x + (xy^2 - xz^3) \hat{a}_y - (6xyz - 2x^2y^2) \hat{a}_z$  (Wb/m).  
Calculate magnetic flux density.

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|-----|---|--------|
| 8.  | Compare Poisson's and Laplace's equation.   | CO3- U |
| 9.  | Derive point form of Ampere's Circuital law.                                      | CO4- U |
| 10. | Compare the skin depth of a conductor? How it is related to attenuation constant. | CO5- U |

PART – C (5 x 16= 80 Marks)

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| 11. | (a) Obtain a formula for the electric field intensity on the axis of a Circular disc of radius 'b' and carries uniform charge density 'ρ'.             | CO1- App | (16) |
|     | Or   |          |      |
|     | (b) Determine the electric field intensity at P (-0.2, 0,-2.3) due to a point charge of +5nC at Q (0.2, 0.1,-2.5) in air. All dimensions are in meter. | CO1- App | (16) |
| 12. | (a) Discuss about the forces and torques acting on a current carrying conductor in a uniform magnetic field.   | CO2- App | (16) |
|     | Or   |          |      |
|     | (b) Discuss about the forces and torques acting on a current carrying conductor in a uniform magnetic field.   | CO2- App | (16) |
| 13. | (a) Describe about magnetic boundary condition at the interface between two magnetic medium.   | CO3- U   | (16) |
|     | Or   |          |      |
|     | (b) State about magnetization? Describe the classification of magnetic materials with examples.  | CO3- U   | (16) |
| 14. | (a) State and explain the poynting theorem and derive the expression for poynting vector.  | CO4- U   | (16) |
|     | Or   |          |      |
|     | (b) Illustrate the integral and point form of Maxwell's equations from Faraday's law and Ampere's law.   | CO4- U   | (16) |
| 15. | (a) Examine the general expression of the attenuation and phase constant for conducting medium.  | CO5- U   | (16) |
|     | Or   |          |      |
|     | (b) Obtain the electromagnetic wave equation for free space in terms of electric field and magnetic field.   | CO5- U   | (16) |