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**Question Paper Code: 54403**

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Fourth Semester

Electronics and Communication Engineering

15UEC403–ELECTROMAGNETIC FIELDS

(Regulation 2015)

Duration: 1.15 hrs

Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

**(Answer any six of the following questions)**

- Find the dot product of the vectors CO1- R  
 $\vec{A} = 2\vec{a}_x - 3\vec{a}_y + \vec{a}_z$  and  $\vec{B} = 3\vec{a}_x + \vec{a}_y + 2\vec{a}_z$   
(a) 5                                      (b) 30                                      (c) 40                                      (d) 56
- 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
- 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
- What will be the shape of Equi-potential lines due to a point charge around it. CO2- R  
(a) Circle    (b) Concentric Circle                                      (c) both a and b                                      (d) None
- For boundary between conductor and free space the field intensity inside a conductor is\_ CO3- R  
(a) 1                                      (b) infinity                                      (c) zero                                      (d) constant
- Which of the following is a ferromagnetic material? CO3- R  
(a) Tungsten                                      (b) Aluminium                                      (c) Copper                                      (d) Nickel

7. 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
8. Identify the current density produced by time varying electrostatic field CO4 -U  
 (a)  $J_D$  (b)  $J$  (c)  $D$  (d)  $V \cdot J_D$
9. The unit of attenuation constant is \_\_\_\_\_. CO5- R  
 (a) Nepers (b) meter (c) Nepers/meter (d) none of the above
10. Electromagnetic waves carry CO5- R  
 (a) Positive charge (b) Negative charge (c) No charge (d) Both (a) & (b)

PART – B (3 x 8= 24 Marks)

**(Answer any three of the following questions)**

11. Obtain the expression for the volume of a sphere of radius R from the differential volume. CO1- App (8)
12. Using Biot Savart Law, Formulate the  $\vec{H}$  due to infinitely long straight conductor. CO2- App (8)
13. Find the capacitance of a parallel plate capacitor having 2 layers of dielectrics in between them with a surface area of  $1 \text{ m}^2$ . The first layer has a relative permittivity of 5 and thickness of 1mm where as the second layer has relative permittivity of 10 with a thickness of 4mm. CO3- U (8)
14. A capacitor with air as the dielectric medium has a plate area of  $1 \text{ cm}^2$  with a plate separation of 0.1mm. Find the displacement current and displacement current density for an applied voltage of  $100 \sin (3.14 * 10^6) t$ . CO4- U (8)
15. Derive the wave equation starting from the Maxwell's equation for free space. CO5- U (8)

