C **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 54403

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

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. In Cartesian coordinate system the coordinates are _____. CO1- R

   (a) (x,y,z) (b) (r,φ,z) (c) (r,θ,z) (d) (x,θ,φ)

2. The relationship between B and H is _____. CO2- R

   (a) B=H (b) B = μH (c) B = -H (d) H = μB

3. In boundary condition between two dielectrics the normal component of magnetic flux density B is _____. CO3- R

   (a) Unity (b) non-continuous (c) zero (d) continuous

4. The Point form of Maxwell's first equation for the time varying field is obtained from _____. CO4- R

   (a) Ampere's circuital law (b) Gauss's law

   (c) Coulomb's law (d) Faraday's law

5. The propagation constant is expressed as CO5- R

(a) $\gamma = \alpha + \varepsilon\beta$ (b) $\gamma = \alpha + \mu\beta$ (c) $\gamma = \alpha + j\beta$ (d) $\gamma = \alpha + \beta$

PART – B (5 x 3= 15Marks)

6. State Divergence theorem and write mathematical expression for Divergence theorem. CO1- R

7. State Biot-Savart‟s law and also write Lorentz force equation. CO2- R

8. State properties of conductor and dielectric materials. CO3- R

9. What is the significance of displacement current? CO4- R

10. Define Brewster angle and oblique incidence. CO5- R

PART – C (5 x 16= 80Marks)

11. (a) (i) Write shot notes on three co-ordinate systems. CO1- App (4)

(ii) Obtain the expression for electric field intensity on the axis of a uniformly charged circular disc. CO1- App (10)

Or

(b) (i) Derive the electric field due to an infinite uniformly charged sheet. CO1- App (8)

(ii) State and prove Gauss's law. Write applications of Gauss's law. CO1- App (8)

12. (a) Derive an expression for magnetic field intensity due to a linear conductor of infinite length carrying current I at a distance, point P. Assume R to be the distance between conductor and point P. Use Biot-Savart‟s Law. CO2- App (16)

Or

(b) (i) Derive an expression for the force between two current carrying wires. Assume that the currents are in the same direction. CO2- App (8)

(ii) Derive an expression for a torque on a closed rectangular loop carrying current. (8)

13. (a) (i) Derive Poisson's and Laplace's equation. CO3- Ana (8)

		(ii) Obtain the expressions for the energy stored and energy density in a capacitor.	CO3- Ana	(8)
		Or		
	(b)	(i) Derive an expression for inductance of a solenoid with N turns and *l* metre length carrying a current of I amperes.	CO3- Ana	(8)
		(ii) Explain magnetic boundary conditions with neat sketch.	CO3- U	(8)
14.	(a)	Derive the integral and point form of Maxwell‟s equations from Faraday‟s law and Ampere‟s law.	CO4- U	(16)
		Or		
	(b)	Explain the following poynting vector, average power and instantaneous power.	CO4- Ana	(16)
15.	(a)	Derive the wave equation starting from the Maxwell‟s equation for free space.	CO5-App	(16)
		Or		
	(b)	Derive the reflection of uniform plane waves in normal incidence at plane dielectric boundary.	CO5-App	(16)