Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U3304

B.E./B.Tech. DEGREE EXAMINATION, APRIL 2024

Third Semester

Electrical and Electronics Engineering

21UEE304 – ELECTROMAGNETIC FIELDS

(Regulations 2021)

Duration: Three hours | Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1.	Write the theorem which converts surface integral into volume integral	CO1- U
2.	State Gauss Divergence theorem	CO1- U
3.	Define Electric Field Intensity	CO2- U
4.	What is the difference between electric flux density and Current density?	CO2- U
5.	State ampere circuital law	CO3- U
6.	What is the relation between poisons and laplace equations?	CO3- U
7.	Define conduction current density	CO5- U
8.	Find the maximum torque on a 100 turn square loop of a wire of 10 cm on a side that carries 15 A of current in a 2 tesla field.	CO5- App
9.	Define Intrinsic Impedance	CO6- U
10.	Define skin depth	CO5- U

PART – C (5 x 16= 80 Marks)

11.	(a)	(i) Using Divergence theorem, evaluate $\iint E.ds = 4xz\ a_x - y2\ a_y + yz\ a_z$ over the cube bounded by x=0,x=1,y=0,y=1,z=0,z=1.	CO1- App	(8)
		(ii) Find the coordinate system which don't have any angle as its variable, and also explain the differential elements of the coordinate system with neat diagram.	CO1- App	(8)

Or

	(b)	(i) For a vector field A, show explicitly that $\Delta.\Delta \times A=0$: that is the divergence of the curl of any vector field is zero.	CO1- Ana	(8)
		(ii) Find the coordinate system which consist of two angles and radius r as its parameters, and also explain the differential elements of the coordinate system with neat diagram.	CO1- Ana	(8)
12.	(a)	Two small identical conducting sphere have charges of 2nc and -1nc respectively. When they are separated by 4cm apart, find the magnitude of the force between them. If they are brought into contacts and then again separated by 4cm, find the force between them.	CO2- App	(16)
		Or		
	(b)	Apply Coulomb's law to determine the electric field intensity due to infinite line of uniform charged wire.	CO2- App	(16)
13.	(a)	Apply Biot Savart law and find the magnetic field intensity at the point p located in y axis from distance r from the origin, for infinite long straight conductor placed in Z axis.	CO3- Ana	(16)
		Or		
	(b)	At an interface separating two different magnetic materials show that the tangential component of magnetic field intensity is continuous across the boundary, whereas the normal component of magnetic field intensity is discontinuous at the boundary.	CO3- App	(16)
14.	(a)	With necessary explanation, derive the Maxwell's equation in differential and integral forms for static fields	CO4- App	(16)
		Or		
	(b)	State and explain Faraday's law of electromagnetic induction and derive the expressions for statically and dynamically induced emf.	CO5- App	(16)
15.	(a)	Obtain the electromagnetic wave equation for free space in terms of electric field and explain the wave propagation with necessary parameters	CO6- App	(16)
		Or		
	(b)	Derive an expression for pointing theorem in integral and pointing form	CO6- U	(16)