A **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 53303

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2023

Third Semester

Electrical and Electronics Engineering

15UEE303 - FIELD THEORY

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The maximum space rate of charge of that function is CO1- R

   (a) Gradient (b) Divergence (c) Curl (d) Del operator

2. Under what condition the vectors are said to be in parallel CO1- R

   (a) A.B=0 (b) AxB=0 (c) Δ.A=0 (d) ΔxA=0

3. Relation between electric field intensity and electric flux density CO2- R

   (a) ε/σ (b) εσ (c) E ε (d) σ /ε

4. All the charges on a conducting body remains on_____ of the body CO2- R

   (a) Inside (b) Outside (c) Surface (d) All the above

5. Polarization is defined as CO3- R

   (a) Dipole moment / volume (b) Dipole moment / Area

   (c) Volume/ dipole moment (d) Dipole moment / length

6. Relation between B&H is CO3- R

   (a) B=μH (b) H=μB (c) B=μ/H (d) None of the above

7. The concept of displacement current was a major contribution attributed to CO4- R

   (a) Faraday (b) Lenz (c) Maxwell (d) Lorentz

8. Circuit theory is CO4- R

(a) Three dimensional analysis (b) Reference frequency

(c) Simple to understand (d) Voltage is not directly involved

9. For a uniform plane wave E and H is at CO5- R

(a) Parallel to each other (b) Perpendicular to each other

(c) Different frequency (d) Different phase

10. The characteristic impedance of free space is given by_____ Ohms CO5- R

(a) 377 (b) 375 (c) 376 (d) 378

PART – B (5 x 2= 10 Marks)

11. Give the physical significance of Divergence. CO1 R

12. Recall the formula for finding force between two charges in vector form. CO2 R

13. State Gauss law for magnetic field. CO3 R

14. Compare Transformer and Motional EMF CO4 A

15. Write the velocity of wave propogation in lossless medium CO5 R

PART – C (5 x 16= 80Marks)

16. (a) Explain in detail the basics of different co-ordinate system and derive its relevant equations CO1- App (16)

Or

(b) Verify the divergence theorem for the following vector $A=xy^2\ ax+y^3\ ay+y^2z\ az$ and the surface is a cuboid defined by $0<x<1$, $0<y<1$, $0<z<1$. CO1- App (16)

17. (a) State and explain the boundary conditions for electric field CO2- App (16)

Or

(b) (i) Derive poisson's and Laplace equation? CO2- App (8)

(ii) Find the electric field field intensity at a distance *x* above an infinite straight wire . CO2- App (8)

18.	(a)	(i) State and Explain Biot savarts law.	CO3- App	(6)
		(ii) Obtain the flux density and field intensity for circular coil.	CO3- App	(10)
		Or		
	(b)	(i)Establish the relation of force between current carrying parallel conductors	CO3 - App	(8)
		(ii) Determine the force between two long parallel wires of 200m length separated by 5cm in air and carrying currents of 40A same direction and in opposite direction	CO3 - App	(8)
19.	(a)	State and derive the Maxwell's equation in Integral form and point form for conducting medium	CO4- U	(16)
		Or		
	(b)	(i) Develop the equation for conduction current density.	CO4- U	(8)
		(ii) Compare Field Theory and Circuit Theory	CO4- U	(8)
20.	(a)	Deduce the Wave equation for time varying fields in free space	CO5- App	(16)
		Or		
	(b)	State poynting theorem. Derive the expression for it	CO5- App	(16)

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