U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

April 2024 Semester End Main Examinations

Programme: B.E. **Semester: III**
ES Cluster (EEE/ET/ECE/EIE/MD) **Duration: 3 hrs.**
Course Code: 19ES3GCFTH **Max Marks: 100**
Course: FIELD THEORY

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1	a)	Develop an expression for electric flux density ($\overline{D}$) due to various charge distribution.	**06**
	b)	Develop and analyses an expression for the Electric field intensity due to infinite long straight conductor.	**06**
	c)	Analyses and evaluate both sides of the Divergence theorem precisely for the region: $if\ the\ flux\ density\ \overline{D} = x^2\bar{a}_x + y^2\bar{a}_y + z^3\bar{a}_z; 0 < x < 2m, 0 < y < 2m\ ,0 < z < 4\ m.$	**08**

UNIT - II

2	a)	Estimate and analyses the work done in carrying a -2 C charge from P_1(2 1 -1) to P_2 (8 2 -1) in the field $\overline{\boldsymbol{E}}$= y $\overline{\boldsymbol{a}}_{\mathbf{x}}$ + x $\overline{\boldsymbol{a}}_{\mathbf{y}}$ V/m. i) Along parabola $x=2y^2$ ii) Along the straight line joining P_1 and P_2	**06**
	b)	Show that electric field intensity is equal to negative potential gradient.	**06**
	c)	Develop an expression for electric boundary condition between conductor and free space.	**08**

OR

3	a)	Show that $\nabla.J = \frac{-\partial\rho_v}{\partial t}$ as per continuity of current equation	**07**
	b)	List out the properties of conductor	**05**
	c)	Develop an expression for electric boundary condition between conductor and dielectrics.	**08**

UNIT - III

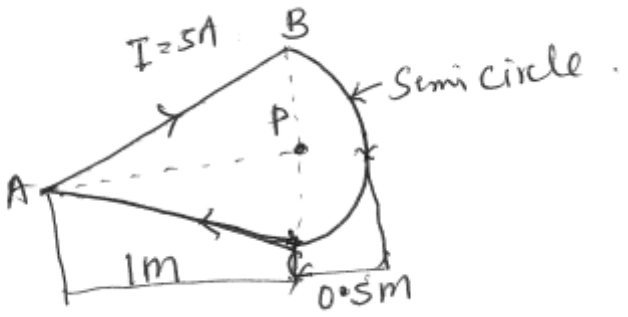
4	a)	Write a Laplace equation in spherical coordinate system, using this equation evaluate an expression for potential distribution between concentric spherical shell. Also evaluate the capacitance of the same.	**10**

b) Write Laplace's equation in cylindrical co-ordinates. Using this equation evaluate and analyses an expression for potential difference between Co-axial cable. Also find the capacitance of the same. **10**

UNIT - IV

5 a) Derive an expression for magnetic field intensity at the center of a circular conductor. **06**

b) Evaluate the magnetic field intensity at point 'P', using Biot-sarvast law **08**



c) Derive an expression for Lorentz force equation. **06**

UNIT - V

6 a) State and explain Faraday's Law. **06**

b) Develop and expression for relationship between $\bar{E}$ & $\bar{H}$ in free space. **06**

c) Analyze and develop an expression for electromagnetic waves in free space. **08**

OR

7 a) Write a Maxwell's equations applied for Time varying field in both point and Integral form. **06**

b) Analyze and develop an expression for electromagnetic waves in good conductor. **08**

c) State and explain poynting theorem. **06**

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