Total No. of Questions – [4] Total No. of Printed Pages 1

G.R. No.	

Paper Code : U359-134 (T1)

OCTOBER 2019/ INSEM (T1)

T. Y. B. TECH. (E&TC) (SEMESTER - I)

COURSE NAME: Electromagnetic Engineering

COURSE CODE: ETUA31174

(PATTERN 2017)

Time: [**1 Hour**] [Max. Marks: **30**]

(*) Instructions to candidates:

1) **Answer Q.1 OR Q.2 and Q.3 OR Q.4.**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed**
4) **Use suitable data where ever required**

Q.1) a) Given $\mathbf{A} = 10\sin^2\Phi\mathbf{a}_\rho + \rho\mathbf{a}_\Phi + [(z^2/\rho)\cos^2\Phi]\mathbf{a}_z$. Find $\nabla.\mathbf{A}$ at $(2,\Phi,5)$ [6 marks]

b) Given $\mathbf{B}=(2/\rho)\mathbf{a}\varphi$. Evaluate both sides of Stoke's theorem for the surface defined by $0.5\leq\rho\leq2.5$m and $0\leq z\leq2$m. [6 marks]

c) Find the distance(scalar value) between points A(5,3 Π/2,0) and B(5,Π/2,10) [4 marks]

OR

Q.2) a) Given $\mathbf{B} = 5e^{-\rho}\cos\Phi\mathbf{a}_\rho - 5\cos\Phi\mathbf{a}_z$. Find $\nabla \times \mathbf{B}$ at (2,3 Π/2,0) [6 marks]

b) Given $\mathbf{F} = 30e^{-\rho}\mathbf{a}_\rho - 2z\mathbf{a}_z$. Evaluate both sides of divergence theorem for the volume enclosed by $\rho=2$, $0\leq z\leq5$m. [6 marks]

c) Show that $\mathbf{A}=4\mathbf{a}_x-2\mathbf{a}_y-\mathbf{a}_z$ and $\mathbf{B}=\mathbf{a}_x+4\mathbf{a}_y-4\mathbf{a}_z$ are perpendicular. [4 marks]

Q.3) a) Two point charges, $Q1$=50 μC and $Q2$=10 μC, are located at (-1, 1, -3)m and (3, 1, 0)m, respectively. Find the force on $Q1$. [6 marks]

b) State Gauss's law and express in point form. [4 marks]

c) Derive relationship between **E**(electric field intensity) & **V**(potential). [4 marks]

OR

Q.4) a) Derive electric field intensity due to infinite line charge using Gauss's Law [6 marks]

b) Explain different types of charge distributions. [4 marks]

c) On the line described by x=2m, y= -4m there is a uniform charge distribution of density ρ=20 nC/m. Determine the electric field **E** at Point P(-2, -1, 4) m. [4 marks]