



Enrolment No. _____

HASMUKH GOSWAMI COLLEGE OF ENGINEERING, VAHELAL

MID SEMESTER EXAMINATION, SEPTEMBER-2016

Subject Code: 2151002

Subject Name: Engineering Electromagnetics

Time: 10:00 TO 10:50

Date: 24/09/16

Sem: 5TH

Total Marks: 20

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

QUE.1 (A) 3

Transform the given vector $\mathbf{A} = r^2 \mathbf{a}_r + \sin \theta \mathbf{a}_\phi$ into rectangular coordinate.

OR

(B) 3

Derive the expression for the electric field due to infinitely long line char located on the z axis at any arbitrary point P (ρ, ϕ, z).

QUE.2 (A) 3

“The electric flux passing through any closed surface is equal to the total charge enclosed by that surface.” Justify and prove.

(B) 4

Evaluate both side of divergence theorem for the field $\mathbf{D} = 2xy \mathbf{a}_x + x^2y \mathbf{a}_y$ and the rectangular parallel piped formed by the planes $x=0$, and $x=1$, $y=0$ and $y=2$, $z=0$, and $z=3$.

OR

(B) 4

Explain stoke theorem.

QUE.3 (A) 3

Point charges of 120nc are located at A(0,0,1) and B (0,0,-1) in free space find E at P(0.5,0,0)

(B) 4

Calculate the total electric flux leaving the cubical surface formed by six planes $x, y, z = \pm 5$ if the charge distribution is: (i) two point charges, $0.56 \mu\text{C}$ at (2.5, -3.6, -4.7) and $1/7 \mu\text{C}$ at (-3, 4.5, -4.9); (ii) a uniform line charge of $\pi \mu\text{C}/\text{m}$ at $x = 3, y = 4.5$; (iii) a uniform surface charge of $0.1 \mu\text{C}/\text{m}^2$ on the plane $y = 4x$.

OR

(A) 3

Find the force on a $100\mu\text{C}$ charge at (0, 0, 3) m if four like charges of $20 \mu\text{C}$ are located on the x and y axis at $\pm 4\text{m}$.

(B) 4

Evaluate work done in bringing a charge of $5 \mu\text{C}$ from origin to P(2,-1,4) through field $\hat{\mathbf{E}} = 2xyz \mathbf{a}_x + x^2z \mathbf{a}_y + x^2y \mathbf{a}_z$ (v/m) through the path Straight line segments (0,0,0) to (2,0,0) to (2,-1,0) to P.

***** ALL THE BEST *****