KONERU LAKSHMAIAH EDUCATION FOUNDATION
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I/IV B. Tech. (CSE,ECE,CSIT,AI&DS and IOT) EVEN Semester, 2024-25

Subject Code: 23MT1001 TITLE: Linear Algebra & Calculus for Engineers

CO-4

Tutorial -10

1. If T is the temperature field given by $T=x^3-y^3+xz^2$, compute the gradient of temperature T at the point (1, -1, 2).
2. Compute the divergence and curl of $\vec{f}=(2xyz)\vec{i}-(x^2y)\vec{j}-3y^2z\vec{k}$ at (1, 1, 1).
3. Obtain the value of divergence and curl of the vector field $\bar{f}=2x^2y\,\bar{i}+3y^2z\,\bar{j}-4z^2x\,\bar{k}$ at the point (1, 1, 2).
4. Develop the directional derivative of $f=(3x+2y)-2z$ in the direction of vector $2\bar{i}+\bar{j}+3\bar{k}$ at the point (1,1,1).
5. Compute the directional derivative of $f=xy^2-2y^3z$ in the direction of vector $\bar{i}+2\bar{j}+2\bar{k}$ at the point (2, -1,1).
6. Identify the angle between the normal to the surface $xy=2z^2$ at the points (1, 2,3) and (2,2,2).
7. Illustrate a unit normal vector to the surface $x^3y-4xz=2$ at the point (1,-1,3).

Tutorial -11

1. A vector field is given by $\vec{F}=(2y+3)i-2xz\,j-3(yz-x)k$. Evaluate $\int_C \vec{F}.\vec{dr}$ along with the path C is $x=2t,\ y=t,\ z=t^3$ from $t=0$ to $t=1$.
2. If $\vec{F}=3xy\vec{i}-y^2\vec{j}$ evaluate $\int_C \vec{F}.d\vec{r}$, where C is the curve $y=2x^2$ in the xy- plane from (0,0) to (1,2).
3. If $\vec{F}=(x^2+y^2)\vec{i}-2xy\vec{j}$, evaluate $\int_C \vec{F}.d\vec{r}$, where curve C is the rectangle in xy plane bounded by x = 0, x = a, y =0, y = b.
4. Find $\int_C \vec{F}.d\vec{r}$, where $\vec{F}=x^2y^2\vec{i}+y\vec{j}$ and the curve $y^2=4x$ in the xy- plane from (0,0) to (4,4).

Tutorial -12

1. Apply Green's theorem to evaluate the integral $\int_C\left[x^2(1-y)\,dx-(x^3-y^3)\,dy\right]$, where C is the square formed by $x=\pm1\,and\ y=\pm1$.
2. Apply Green's theorem to evaluate the integral $\int_C\left[(2xy-x^2)\,dx+(x^2+y^2)\,dy\right]$, where C is bounded by $y=x^2\ and\ y^2=x$.

3. Apply Green's theorem to evaluate $\int_C \left[\left(xy+y^2\right)dx + x^2 dy\right]$,where C is bounded by $y = x$ and $y = x^2$.
4. Apply Green's theorem in the plane for $\int_C \left(x^2 - xy^3\right)dx + \left(y^2 - 2xy\right)dy$, where C is a square with vertices (0,0), (2,0), (2,2). (0,2).
5. Apply Green's theorem to evaluate the integral $\int_C \left[\left(y - \sin x\right)dx + \cos x\, dy\right]$, where C is the plane triangle enclosed by the lines $y = 0,\ x = \pi/2, and\ y = \frac{2}{\pi}x.$