KONERU LAKSHMAIAH EDUCATION FOUNDATION
(DEEMED TO BE UNIVERSITY)
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I/IV B. Tech. (CE,EEE and ME) ODD Semester, 2024-25

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

CO-4

Home Assignment Problems

1. Find the gradient of the function $f = 4x^2 + 3y^2 + 2z^2$ at the point (1, 1, 1).
2. Obtain the value of divergence of the vector field $\overline{f} = 2x^2\overline{i} + 4y^2\overline{j} + 6z^2\overline{k}$ at the point (1, 1, 2).
3. Illustrate a unit normal vector to the surface $2x^2y + +3y^2z + 2xz = 9$ at the point (2,-1,2).
4. Compute the directional derivative of $f = x^2yz + 4xz^2 + (x+z)$ at (1, -2, -1) in the direction $2\overline{i} - \overline{j} - 2\overline{k}$.
5. Calculate the angle between the normals to the surfaces $2xz = y^2 - 1$, $3x^2y = 2 - z$ at the points (1,1,1).
6. Compute the divergence and curl of $\vec{f} = \left(5x^2yz\right)\vec{i} + \left(3xy\right)\vec{j} + 2xy^2z\,\vec{k}$ at (1, -1, 3).
7. Obtain the divergence and curl of $\vec{f} = \left(3x^2yz\right)\vec{i} + \left(2xy\right)\vec{j} + xy^2z\,\vec{k}$ at (1, -1, 3).
8. A vector field is given by $\vec{F} = (y - 3x)i - (xy + z)j - \left(yz - x^2\right)k$. Evaluate $\int_C \vec{F}.\overrightarrow{dr}$ along with the path C is $x = 2t,\ y = t,\ z = t^3$ from $t = 0$ to $t = 1$.
9. Evaluate $\int_C \vec{F}.d\vec{r}$, 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).
10. Apply Green's theorem to evaluate the integral $\int_C \left[\left(3x - 8y^2\right)dx + (4y - 6xy)\,dy\right]$, where C is the boundary of the region bounded by $x = 0, y = 0\ and\ x + y = 1$.
11. 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).