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Daffodil International University

Department of Electrical and Electronic Engineering

Faculty of Engineering

Final Examination, Fall – 2024

Course Code: 0541-211 | Course Title: Coordinate Geometry and vector analysis

Section: A ,B ,C,D,E,F | Level-Term: L1-T1 | Teacher's Initial: IJM

Full Marks: 40 | Exam Date: December 19, 2024 | Time: 2 Hours

[Notes: Answer all the Questions]

Q1. (a) **Interview** about cross product of two vectors. CO-3 (C3) **[02]**

(b) Applying cross product , **Recognize** a unit vector perpendicular to the plane of A=2i-6j-3k and B=4i+3j-k. CO-3 (C3) **[03]**

Q2. (a)**Select** the direction in which directional derivative is maximum from the point (2,-1,3) and **show** the directional derivative of $\psi(x, y, z) = x^2 + y^2 + xz$ at the point (2, -1, 3) in the direction of A = i + 2j + k.. CO-3 (C3) **[05]**

(b) **Evaluate** the constant a so that the following vector is a solenoidal V=(3x-2y+3z)i+(-2x-3y+5z)j+(4x+3y+az)k. CO-3 (C3) **[03]**

Q3. (a) **Identify** the equation of the plane passing through the intersection of the planes $x + 2y + 3z + 4 = 0$ and $4x + 3y + 2z = 1$ through the point **(1, 2, 3)**. CO-2 (C2) **[06]**

(b) **Identify** the equation of the plane which is parallel to the plane 4x-4y+7z-3=0 and distance of 4 units from the points (3, 1,-2). CO-2 (C2) **[06]**

Q4. Plane is drawn through the line of intersection of the planes x+2y+2z=1, x+y-z+1=0 and is at distance of unit from the point (4,-2 , 1) . **Demonstrate** that there are two such planes and find their equations. CO-2 (C2) **[07]**

Q5. (a) **Compute** the value of the constants α, β *and* γ so that $V = (-4x - 3y + az)\boldsymbol{i} + (\beta x + 3y + 5z)\boldsymbol{j} + (4x + \gamma y + 3z)\boldsymbol{k}$ is irrotational. CO-3 (C3) **[04]**

(b) Suppose $\boldsymbol{A} = \boldsymbol{i} - 2\boldsymbol{j} - 3\boldsymbol{k}$, $\boldsymbol{B} = 2\boldsymbol{i} + \boldsymbol{j} - \boldsymbol{k}$, $\boldsymbol{C} = \boldsymbol{i} + 3\boldsymbol{j} - 2\boldsymbol{k}$. **Calculate** the volume of the parallelepiped whose sides are denoted by the three vectors $\boldsymbol{A}$, $\boldsymbol{B}$ and $\boldsymbol{C}$. **[04]**