(SE) 3A

National University of Computer and Emerging Sciences, Lahore Campus				
	Course:	Linear Algebra	Course Code:	
	Program:	BS SE 3A	Semester:	
	Duration:		Total Marks:	4
	Paper Date:	11/11/2021	Weight	4
	Section:	BS SE 3A	Page(s):	
	Exam:	2nd Quiz	Roll No:	
Instruction/Notes:	Attempt All Questions			

1. Find k, such that $\|k\underline{v}\| = 7$, $\underline{v} = (4, 3, -\frac{1}{2})$

$$|k|\|v\| = 7$$

$$|k|\sqrt{4^2+3^2+(-1/2)^2} = 7$$

$$|k|\left(\frac{\sqrt{101}}{2}\right) = 7$$

$$k = \pm 1.393$$

0.9

2.9/4.0

2. Find $\underline{u} \times (\underline{v} \times \underline{w})$, where $\underline{u} = (1,1,1)$, $\underline{v} = (-1,-1,-1)$, $\underline{w} = (4,3,-2)$

$$(u \cdot w)v - (u \cdot v)w$$

$$[(1,1,1)\cdot(4,3,-2)](-1,-1,-1) - [(1,1,1)\cdot(-1,-1,-1)](4,3,-2)$$

$$(4+3-2)(-1,-1,-1) - [(-1-1-1)(4,3,-2)]$$

$$(5)(-1,-1,-1) - [(-3)(4,3,-2)]$$

$$(-5,-5,-5) - (-12,-9,-6)$$

$$= (7, 4, +1)$$

$$= (+7, 4, 1)$$

0.7

Q③ Find distance between parallel planes

$3x - y + 2z = 1$ & $9x - 3y + 6z = 2$

↳ Plane 1 ↳ Plane 2

↓

Point on Plane 1

$x = y = 0$

$z = 1/2$

$(0, 0, 1/2)$ with Plane 2 ↗

$9x - 3y - 6z - 2 = 0$

Formula

$$D = \frac{|9(0) + (-3)(0) + (-6)(\frac{1}{2}) - 2|}{\sqrt{9^2 + (-3)^2 + (-6)^2}}$$

$$= \frac{5}{3\sqrt{14}}$$

0.7

Q④ Find the volume of tetrahedron given by vectors $\underline{u} = (1, 2, 3)$, $\underline{v} = 2\underline{i} + 3\underline{j} + \underline{k}$

$\underline{w} = (-1, -3, -2)$.

$$\begin{vmatrix} u_1 & u_2 & u_3 \\ v_1 & v_2 & v_3 \\ w_1 & w_2 & w_3 \end{vmatrix}$$

$$\begin{vmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \\ -1 & -3 & -2 \end{vmatrix} \begin{matrix} 1 & 2 & 3 \\ 2 & 3 & 1 \\ -1 & -3 & -2 \end{matrix}$$

$$= \left| (1)(3)(-2) + (2)(1)(-1) + 3(2)(-3) - \left[(3)(3)(-1) + (2)(2)(-2) + (1)(1)(-3) \right] \right|$$

$$= |(-6 - 2 - 18) - (-20)|$$

$$= |-6|$$

$$= 6$$

0.6

diff