

NOTE: Attempt all Questions.

6.5.1423

Question: 1 . Let  $x + 2y + 3z = 5$

$$x + 3y + 4z = 2$$

$$x + 4y + 3z = -1$$

- (a) Write the above system of linear equations in the form  $AX=B$  ,  
(b) Find  $A^{-1}$  by method of cofactors,  
(c) Use  $A^{-1}$  to solve the above system of equation.

[10]

Question: 2 . Solve the system by Gaussian Elimination

$$x + y + z = 2$$

$$2x + 3y + z = 3$$

$$x - y - 2z = -6$$

[7]

Question: 3. Use properties to find determinant of matrix

$$A = \begin{bmatrix} -3 & 1 & 1 & 1 \\ 1 & -3 & 1 & 1 \\ 1 & 1 & -3 & 1 \\ 1 & 1 & 1 & -3 \end{bmatrix}$$

[5]

Question: 4 . . Find the value of  $\lambda$  if the system of equations has non-trivial solutions

$$\lambda x + y + 2z = 0$$

$$x + \lambda y + 3z = 0$$

$$x + 3y + \lambda z = 0.$$

[5]

Question: 5. Use properties to show that

$$\begin{vmatrix} a_1 + b_1 & a_2 + b_2 & a_3 + b_3 \\ b_1 + c_1 & b_2 + c_2 & b_3 + c_3 \\ c_1 + a_1 & c_2 + a_2 & c_3 + a_3 \end{vmatrix} = 2 \begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix}$$

[8]

Question: 5 . The magnitude and direction of a constant force is given by  $F = -5i - 3j + k$  .  
Find the WORK DONE if the point of application of the force moves from  
P ( 3, -4 , 5) to Q ( 1 -3 , 6) .

[5]

Question: 6 . Given the points P ( 1, -1, 0 ) , Q ( 2, 1, 1 ) and R ( -1 , 1, 2 ) be points ,

(a) Find the angle between PQ and PR,

(b) Determine the area of triangle PQR, and

(c) Find a unit vector perpendicular to the plane determined by P, Q and R. [10]

Question:7. Use Scalar product to verify that  $a = \langle 2, 3, 1 \rangle$ ,  $b = \langle 1, -1, 0 \rangle$  and  $c = \langle 7, 3, 2 \rangle$   
lie in the same plane.

[5]

Question: 8 .Use Cross product to find the distance of the point P ( 2 , 3 , -1 ) from the line  
passing through points R ( 3,4, 0) and S ( 5,2,1)

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