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Programme : BSCS {2^{nd} Samester “2020”}

Subject : Linear Algebra

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Final Exams 2020

“Iqra National University”

Answer no 1.

$$V_1 = \begin{bmatrix} ID1 \\ ID2 \\ ID3 \end{bmatrix} \begin{bmatrix} ID2 \\ ID3 \\ ID4 \end{bmatrix} \begin{bmatrix} ID3 \\ ID4 \\ ID5 \end{bmatrix}$$

Solution

$$V_1 = \begin{bmatrix} ID1 \\ ID2 \\ ID3 \end{bmatrix}, V_2 \begin{bmatrix} ID1 \\ ID2 \\ ID4 \end{bmatrix}, V_3 \begin{bmatrix} ID3 \\ ID4 \\ ID5 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

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combine all the vectors
and denoted by x

$$x = \begin{bmatrix} 1 & 1 & 0 & 0 \\ 6 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 \end{bmatrix}$$

$$x = \begin{bmatrix} 1 & 1 & 0 & 0 \\ 6 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 \end{bmatrix}$$

Multiply 6 with R_1 and subtract with R_2

$$x = \begin{bmatrix} 1 & 1 & 0 & 0 \\ 6-6 & 0-6 & 1-0 & 0-0 \\ 0 & 1 & 1 & 0 \end{bmatrix}$$

$$x = \begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & -6 & 0 & 0 \\ 0 & 1 & 1 & 0 \end{bmatrix}$$

divid $\frac{1}{-6}$ with R_2 and subtract with R_3

$$\begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & -6 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$$

it is linearly independ-ent.

Ans 2 Question 2

Total cost per unit of product X = material per unit of X + labour per unit of x + overhead per unit of x

putting the values

= Rs 450 + Rs 250 + Rs 150

= Rs 850

total cost per unit of product Y = material per unit of Y + labour per cost of Y + overhead per unit of Y

= Rs 400 + Rs 350 + 150

= Rs 900

Find total cost.

Production vector is given as $X = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$

Price of total units of Product X = no. of units of X × price per unit of X.

Price of total units of product $X = 1000 \times 850$

$= Rs\ 850000$

Price of total units of product Y = no. of unit of Y × price unit of product Y

Price of total unit of product $Y = 500 \times 900$

$= Rs\ 450000$

total cost = price of total unit of Product X

$= 85000 + 45000$

$= 1300000$ Ans

Question no 3 :

What are four main things we need to define for a vector space? -------?

Definition

A vector space is a set V on which two operation "+" and "." are defined, called vector addition and scalar multiplication

* The operation (vector addition must satisfy the following condition
1; commutative law
2; Associative law
3; Addition Identity
4; Addition inverse

* The operation (scalar multiplication) is defined between real number and vectors and must satisfy the following condition
1; Distributive law
2; Associative law
3; Unitary law

Question no 4

let $M = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is a 2x2 matrix

a) For which values of det M does M have an inverse?

Answer.

if we take 2x2 matrix as $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

$= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

first we will find out the determinant.

$M = [(1)(1) - (0)(0)]$

$M = 1$

For Inverse $M^{-1} = \frac{1}{\text{Deter}} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

$$M^{-1} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$ Ans

(b) Write down all 2x2 bit matrix with determinat 1

Solution

if we take $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ matrix then its deter-minant will be 1

let's solve it.

$$= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$= ((1)(1) - (0)(0))$$

$$= 1$$ Ans.

(c) Write down 2x2 matric with determinant 0

Taking null matric.

$$\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

$= (0)(0) - (0)(0)$

$= 0$ Ans.

(d) compute de A for below 3x3 matrix

$$A = \begin{bmatrix} ID1 & ID1 & ID1 \\ ID2 & ID3 & ID2 \\ ID4 & ID1 & ID5 \end{bmatrix}$$

Solution

$$A = \begin{bmatrix} ID1 & ID1 & ID1 \\ ID2 & ID3 & ID2 \\ ID4 & ID1 & ID5 \end{bmatrix}$$

$$A = \begin{bmatrix} ID1 & ID1 & ID1 \\ ID2 & ID3 & ID2 \\ ID4 & ID1 & ID5 \end{bmatrix}$$

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$$A = \begin{bmatrix} 1 & 1 & 1 \\ 6 & 0 & 6 \\ 1 & 1 & 1 \end{bmatrix}$$

$$= 1 \begin{vmatrix} 0 & 6 \\ 1 & 1 \end{vmatrix} - 1 \begin{vmatrix} 6 & 6 \\ 1 & 1 \end{vmatrix} + 1 \begin{vmatrix} 6 & 0 \\ 1 & 1 \end{vmatrix}$$

$$A = 1\left((0)(1) - (6)(1)\right) - 1\left((6)(1) - (6)(1)\right) + 1\left((6)(1) - (0)(1)\right)$$

$$= 1(-6) - 1(6-6) + 1(6-0)$$

$$A = -6-(0)+6$$

$$A = -\cancel{6}+\cancel{6}$$

$$A = 0 \quad \text{Ans}$$