(15)

$= \int \frac{2v}{1+v^2}\, dv = \int \frac{1}{x}\, dx + c$

$= \ln|1+v^2| = \ln x + \ln c$

= Take "e" on both sides..

$= e^{\ln|1+v^2|} = e^{\ln|xc|}$

$= 1+v^2 = xc$

$= 1+v^2 = xc$

= put $v = y/x$

$= 1+(y/x)^2 = xc$

$= \frac{x^2+y^2}{x^2} = xc$

$= x^2+y^2 = x^{3}c \rightarrow (A)$

= put $x=2$, $y=6$ in eq (A)

$= (4)+(35) = 8c$

$= c = 4/8$

= $c=5 \rightarrow$ put it in eq.. (A)

= so, $x^2+y^2 = 5x^3$

$= y^2 = 5x^3 - x^2$

$= y^2 = x^2(5x-1)$

= Taking $\sqrt{\ }$ on both sides..

$= y = +x\sqrt{5x-1}$, $y = -x\sqrt{5x-1}$ or..

$= \boxed{y = \pm x\sqrt{5x-1}} \rightarrow$ Ans..

(13)

Question No#03

$= (x^2+3y^2)\,dx - 2xy\,dy = 0$

where, $x=2$, $y=6$

soll:

$= (x^2+3y^2)\,dx - 2xy\,dy = 0$

$= (x^2+3y^2)\,dx = 2xy\,dy$

= Divide both side by $2xy\,dx$

= there for we got

$= \frac{dy}{dx} = \frac{x^2+3y^2}{2xy}$

$= \frac{dy}{dx} = \frac{x^2}{2xy} + \frac{3y^2}{2xy}$

$= \frac{dy}{dx} = \frac{1}{2}\left[\frac{x}{y} + \frac{3y}{x}\right] \longrightarrow (i)$

= let $y = vx$

= Differientiate, by

$= dy = v\,dx + x\,dv$

= By the division of dx

= Put a in equation → (1)

= $v + x\frac{dv}{dx} = \frac{1}{2}\left[\frac{x}{xv} + 3\frac{vx}{x}\right]$

= $v + x\frac{dv}{dx} = \frac{1}{2}\left[\frac{1}{v} + 3v\right]$

= multiply both sides with "2"..

= $2v + 2x\frac{dv}{dx} = \frac{1}{v} + 3v$

= $2x\frac{dv}{dx} = \frac{1}{v} + 3v - 2v$

= $2x\frac{dv}{dx} = \frac{1}{v} + v$

= $2x\frac{dv}{dx} = \frac{1+v^2}{v}$

= multiplying both sides by $\frac{dx}{dv}$ we got

= $2x\,dv = \frac{1+v^2}{v}dx$

= multiplying both sides by $\frac{v}{x(1+v^2)}$

= then, $\frac{v}{1+v^2}dv = \frac{1}{x}dx$

= Take $\int$ on both sides...

$= -\lambda^2 - 5\lambda - 5 - 3 + \lambda$

$= -\lambda^2 + 6\lambda - 8 \rightarrow (b)$

$= -1\begin{vmatrix} -1 & 3-\lambda & -1 \\ -1 & -1 & -1 \\ 0 & -1 & 2-\lambda \end{vmatrix}$

= Expanding by colomn one...

$= -\left[-1\begin{vmatrix} -1 & -1 \\ -1 & 2-\lambda \end{vmatrix} - (-1)\begin{vmatrix} 3-\lambda & -1 \\ -1 & 2-\lambda \end{vmatrix} + 0\right]$

$= -[-(-2+\lambda-1) + 1(6 - 3\lambda - 2\lambda + \lambda^2 - 1)$

$= -(3 - \lambda + \lambda^2 - 5\lambda + 5)$

$= -\lambda^2 + 5\lambda - 5 - 3 + \lambda$

$= -\lambda^2 + 6\lambda - 8 \rightarrow (c)$

= put a, b, c in eavuation (B)....

$= (2-\lambda)\left[-\lambda^3 + 8\lambda^2 - 36\lambda + 16 + \lambda^4 - 8\lambda^3 + 18\lambda^2 - 8\lambda\right.$

$= -\lambda^2 + 6\lambda - 8 - \lambda^2 + 16\lambda - 8$

$= \lambda^4 - 2\lambda^3 - 8\lambda^2 + 16\lambda^2 + 16\lambda^2 - \lambda^2 - \lambda^2$

$= -36\lambda - 8\lambda + 6\lambda + 6\lambda + 16 - 16$

$= \lambda^4 - 10\lambda^2 + 32\lambda^2 - 32\lambda = 0$

= synthatic division we got

$= \lambda(\lambda-2)(\lambda^2 - 3\lambda + 16) = 0$

$= (\lambda = 0)$

$= \lambda - 2 = 0 \Rightarrow \boxed{\lambda = 2}$

$= \lambda^2 - 8\lambda + 16 = 0$

= By factorization method....

$= \lambda^2 - 4\lambda - 4\lambda + 16 = 0$

$= \lambda(\lambda - 4) - 4(\lambda - 4) = 0$

$= (\lambda - 4)(\lambda - 4)$

$= \lambda = 4, \lambda = 4$

$= \lambda_1 = 0, \lambda_2 = 2, \lambda_3 = 4, \lambda_4 = 4$

again,

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

= Expansion by Row one–

$$= 3-\lambda \begin{vmatrix} 2-\lambda & -1 \\ -1 & 2-\lambda \end{vmatrix} -1(-1) \begin{vmatrix} -1 & -1 \\ -1 & 2-\lambda \end{vmatrix}$$

$$= -1 \begin{vmatrix} -1 & 3-\lambda \\ -1 & -1 \end{vmatrix}$$

$$= (3-\lambda)[(3-\lambda)(2-\lambda)\cdot(-1)(-1)] + 1(-1)(2-\lambda)$$

$$= -1(-1)(-1) - 1[(-1)(-1) - (-1)(3-\lambda)]$$

$$= (3-\lambda)(6-3\lambda-2\lambda+\lambda^2-1) + (-2+\lambda-1) - (1+3-\lambda)$$

$$= (3-\lambda)(\lambda^2-5\lambda+5) + (-3+\lambda) - (4-\lambda)$$

$$= 3\lambda^2-15\lambda+15-\lambda^3+5\lambda^2-5\lambda-3+\lambda-4+\lambda$$

$$= -\lambda^3+8\lambda^2-18\lambda+8 \rightarrow ①$$

$$= +1 \begin{vmatrix} -2 & -1 & -1 \\ -1 & 3-\lambda & -1 \\ 0 & -1 & 2-\lambda \end{vmatrix}$$

= Expanding by colum one...

$$= -1 \begin{vmatrix} 3-\lambda & -1 \\ -1 & 2-\lambda \end{vmatrix} - (-1) \begin{vmatrix} -1 & -1 \\ -1 & 2-\lambda \end{vmatrix} + 0$$

$$= -1(6-3\lambda-2\lambda+\lambda^2-1) + 1(-2+\lambda-1)$$

Question #02 part "A"

⇒ Find the determinant ?

$$= \begin{vmatrix} a & b & c \\ a^2 & b^2 & c^2 \\ a^3 & b^3 & c^3 \end{vmatrix}$$

= as, the product of factor which are linear in a, b, c.

= sol

$$\begin{vmatrix} a & b & c \\ a^2 & b^2 & c^2 \\ a^3 & b^3 & c^3 \end{vmatrix}$$

= Expansion by R1

$$= a \begin{vmatrix} b^2 & c^2 \\ a^3 & c^3 \end{vmatrix} - b \begin{vmatrix} a^2 & c^2 \\ a^3 & c^3 \end{vmatrix} + c \begin{vmatrix} a^2 & b^2 \\ a^3 & b^3 \end{vmatrix}$$

$$= a(b^2c^3 - b^3c^2) - b(a^2c^3 - a^3c^2) - a^3b^2c$$

= common a, b, c

$$= abc(bc^2 - b^2c - ac^2 + a^2c + ab^2 - a^2b)$$

$$= abc[bc(c-b) - ac(c+a) + ab(b-a)] \Rightarrow \text{complete}$$

"Question #02 part B"

$$= \begin{bmatrix} 2 & -1 & -1 & 0 \\ -1 & 3 & -1 & -1 \\ -1 & -1 & 2 & -1 \\ 0 & -1 & -1 & 2 \end{bmatrix}$$

Soll:

$$= \begin{bmatrix} 2 & -1 & -1 & 0 \\ -1 & 3 & -1 & -1 \\ -1 & -1 & 3 & -1 \\ 0 & -1 & -1 & 2 \end{bmatrix}$$

= By the equation $|A-\lambda| = 0 - A$

$= |A - \lambda| = 0$

$$= \begin{vmatrix} 2-\lambda & -1 & -1 & 0 \\ -1 & 3-\lambda & -1 & -1 \\ -1 & -1 & 3-\lambda & -1 \\ 0 & -1 & -1 & 2-\lambda \end{vmatrix}$$

= Expansion of by R1...

$$= 2-\lambda \begin{vmatrix} 3-\lambda & -1 & -1 \\ -1 & 3-\lambda & -1 \\ -1 & -1 & 2-\lambda \end{vmatrix} - (-1) \begin{vmatrix} -1 & -1 & -1 \\ -1 & 3-\lambda & -1 \\ 0 & -1 & 2-\lambda \end{vmatrix}$$

$$= -1 \begin{vmatrix} -1 & 3-\lambda & -1 \\ -1 & 3-\lambda & -1 \\ -1 & -1 & 2-\lambda \end{vmatrix} = 0 \rightarrow R$$

[7]

Q# 010

$$\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} \text{ is a ?}$$

soll:

ANS#10

$$\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix}$$

= Exponsion of Row ONE:

$$\Rightarrow |A| = +1 \begin{vmatrix} b & b^2 \\ c & c^2 \end{vmatrix} - a \begin{vmatrix} 1 & b^2 \\ 1 & c^2 \end{vmatrix} + a^2 \begin{vmatrix} 5 & b \\ 1 & c \end{vmatrix}$$

$$= 1(bc^2 - b^2c) - a(c^2 - b^2) + a^2(c - b)$$

$$= |A| = bc^2 - b^2c - ac^2 + ab^2 + a^2c - a^2b$$

Q#06 Solution of $dy/dx + 2xy = y$?

A#06 $\frac{dy}{dx} + 2xy = y$

$= \frac{dy}{dx} = y - 2xy$

$= \frac{dy}{dx} = y(1-2x)$

$= \frac{1}{y}\,dy = (1-2x)\,dx$

= Taking integral of Both sides

$= \int \frac{1}{y}\,dy = \int (1-2x)\,dx$

$= \ln y = x - \frac{2x^2}{2} + C$

$= \ln y = x - x^2 + C$

Q#07 The order of degree of a diffrential equation?

(5)

ANS#07 $\left(\frac{dy}{dx}\right)^3 = \sqrt{1+\left(\frac{dy}{dx}\right)^2}$ is ?

= The order of diffrential equation is the order of highest derivatives known as diffrential cofficent and degree is the power of highest derivatives so, the

= order = 2

= Degree = 1

Q#08 The order and degree of diffriential equation?

A#08 $\frac{d^2y}{dx^2} - 4xy = \sin\left(\frac{d^2y}{dx^2}\right)$ is ?

= order = 2

= Degree = 1

Q#09 The differential equation, is

$$\frac{2dy}{dx} + x^2 y = 2x+3 \quad , y(0)=5 \quad ?$$

Soll:

ANS#09 $\frac{2dy}{dx} + x^2 y = 2x+3$

$= \int 2dy = \int (2x+3-x^2 y)\, dx$

$= 2y = \frac{2x^2}{2} + 3x - y\frac{x^3}{3} + c$

$= y = \frac{\cancel{2}x^2}{\cancel{2}\times 2} + \frac{3x}{2} - \frac{yx^3}{3\times 2} + c$

$= y = \frac{x^2}{2} + \frac{3x}{2} - \frac{x^3 y}{6} + c$

$=$ Put $x=0$, $y=5$

$= 5 = 0 + 0 - 0 + c$

$= 5 = c$

$=$ Then

$$y = \frac{x^2}{2} + \frac{3x}{2} - \frac{x^3 y}{6} + 5$$

Q#02 The number of NON-Zero rows in Echelon form ? 2

ANS#02 IS ONE

Q#03 If $A = \begin{bmatrix} 2i & i \\ i & -i \end{bmatrix}$ then, $|A| = ?$

Soll

A#03 $A = \begin{bmatrix} 2i & i \\ i & -i \end{bmatrix}$;

$|A| =$ is $\begin{bmatrix} 2i & i \\ i & -i \end{bmatrix}$

$= (2i)(-i) - (i)(i)$

$= -2i^2 - i^2$

= then, $i^2 = -1$

$= -2(-1) - (-1)$

$= 2 + 1$

$\boxed{|A| = 3}$

(3)

Q#04 If $B = \begin{bmatrix} 1 & 4 \\ 2 & a \end{bmatrix}$ is a singular matrix then $a = ?$

ANS#04 For singular matrix $|B| = 0$ then,

$= |B| = 1 \times a - 4 \times 2 = 0$

$= a - 8 = 0$

so, then the value of $a = 8$

Q#05 The matrix $A = \begin{bmatrix} 9 & 0 \\ 0 & 9 \end{bmatrix}$ is ?

ANS#05 It every element of a principal diagonal of a matrix is same non-zero scaler and all other elements are zero then it's a scalar matrix

so,

$A = \begin{bmatrix} 9 & 0 \\ 0 & 9 \end{bmatrix}$ is a scaler matrix...

1

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Paper = Differiental equation

Section = "B" civil

Teacher = Miss, Shomila

Date = ~~17~~ - April - 2020

Objective Questions

1:- The order of matrix A is $m \times p$ and the order of B maxrix is $p \times n$, then the order of matrix AB is ?

ANS:-

Sol:-

→ The order of matrices is equall to the number of the row, multiplying by number of matrices of colom,

so,

→ $A = m \times p$ has "m" no of rows and p number of rows and p no.. of colom,

then, $B = p \times n$,

then, it's p, the number of colom in A is equall to the no.. of rows in B, so matrices are valid for multiplication

→ And it's order are

$\boxed{AB = m \times n}$