Syllabus:

(Ch# 1,3,SQ of 7.1,10 , 12(Theourum #1,2,3) Define ch. 1,3,7,10)

Math (Science	9th Punjab Board	Paper - 1
Time : 20 Minutes	OBJECTIVE	Max. Marks :15

1.1 The idea of matrices was given by _________.
(A) Henry Briggs (B) Jost Burgi (C) Arthur Cayley (D) John Napier

2. _________ prepared logarithm with base 10.
(A) Henry Briggs (B) Jost Burgi (C) Arthur Cayley (D) John Napier

3. Antilogarithm table was prepared by _________.
(A) Henry Briggs (B) Jost Burgi (C) Arthur Cayley (D) John Napier

4. if the capacity c of an elevator is at most 1600 pounds, then__________
(A) c<1600 (B) $c \geq 1600$ (C) $c \leq 1600$ (D) $c > 1600$

5. If the bisector of an angle of a triangle bisects the side opposite to it, the triangle is _____
(A) Congruent (B) Isosceles (C) Equilateral (D) None of these

6. A ray has _________ end point(s).
(A) No (B) Three (C) Two (D) One

7. Every scalar matrix is also a _________ matrix.
(A) Identity (B) Square (C) Diagonal (D) Both B and C

8. $\log_b a \times \log_c b$ can be written as
(A) $\log_a c$ (B) $\log_c a$ (C) $\log_a b$ (D) $\log_a c$

9. The logarithm of unity to any base is
(A) 1 (B) 10 (C) e (D) 0

10. If $log_3 x = 5$, then x________
(A) 343 (B) 125 (C) 15 (D) 243

11. If the characteristic of the logarithm of a number is 3, that number will have ______ digits its integral part.
(A) 3 (B) -3 (C) 4 (D) -4

12. If $a^x = n$, then _______.
(A) $a = \log_x n$ (B) $x = \log_n a$ (C) $x = \log_a n$ (D) $a = \log_n x$

13. $3\text{-}4x \leq 11$?________________
(A) -8 (B) -2 (C) $-\frac{14}{4}$ (D) None of these

14. Which is order of a square matrix?
(A) 1-by-1 (B) 2-by-2 (C) 3-by-3 (D) All

15. If $\begin{bmatrix} x & 3 \\ -2 & 2 \end{bmatrix} = 0$,then x is equals to
(A) 0 (B) 3 (C) 6 (D) -3

	A B C D		A B C D		A B C D		A B C D		A B C D
1	A B C D	4	A B C D	7	A B C D	10	A B C D	13	A B C D
2	A B C D	5	A B C D	8	A B C D	11	A B C D	14	A B C D
3	A B C D	6	A B C D	9	A B C D	12	A B C D	15	A B C D

نوٹ: معروضی سوال نامے کو توجہ سے پڑھیں اور ہر MCQ کی درست آپشن A,B,C,D کو پین کی سیاہی یا مارکر سے اس طرح پُر کریں کہ سیاہی دائرے سے باہر نہ نکلے۔ ایک سے زیادہ دائروں کو پُر کرنے یا کاٹ کر پُر کرنے کی صورت میں مذکورہ جواب غلط تصور ہوگا۔

Syllabus:

(Ch# 1,3,SQ of 7.1,10 , 12 (Theorem #1,2,3) Define ch. 1,3,7,10)

Math (Science	9th Punjab Board	Paper - 1
Time : 2:10 Hours	(ESSAY TYPE)	Max. Marks :60

(PART – I)

2 Answer briefly any SIX parts from following. 12

(i) Define Skew-Symmetric Matrix and Identity Matrix.

(ii) Define Matrix and Equal Matrices.

(iii) Solve $x+\frac{1}{3}=2\left(x-\frac{2}{3}\right)-6x$.

(iv) If $A=\begin{bmatrix}1 & 2\\4 & 6\end{bmatrix}$ then find determinant and adjoint of A.

(v) Prove that $\log_a(mn)=\log_a m+\log_a n$

(vi) Calculate $\log_3 2\times\log_2 81$

(vii) Find the value of 'x', if $\log_{64}8=\frac{x}{2}$

(viii) Evaluate $\log 512$ to the base $2\sqrt{2}$

(ix) Evaluate with the help of logarithm: 0.29×0.004236

3. Answer briefly any SIX parts from following. 12

(i) If $A=\begin{bmatrix}1 & 2\\0 & 1\end{bmatrix}$, then verify that $A+A^t$ is symmetric.

(ii) Define Characteristics.

(iii) Find product $\begin{bmatrix}1 & 2\\3 & 4\\-1 & 1\end{bmatrix}\begin{bmatrix}1 & 2 & 3\\4 & 5 & 6\end{bmatrix}$.

(iv) Find the multiplicative inverse $A=\begin{bmatrix}-1 & 3\\2 & 0\end{bmatrix}$

(v) If $A=\begin{bmatrix}1 & -2\\3 & 4\end{bmatrix}$ and $B=\begin{bmatrix}0 & 7\\-3 & 8\end{bmatrix}$ then find $2A^t-3B^t$

(vi) Define Congruency of triangles.

(vii) Express $\log x-2\log x+3\log(x+1)-\log(x^2-1)$

(viii) If $\log 2 = 0.3010$, $\log 3=0.4771$, $\log 5=0.6990$ the find value of.

(ix) If $v=\frac{1}{3}\pi r^2 h$, find v, when $\pi=\frac{22}{7}$, $r=2.5$ and $h=4.2$

4. Answer briefly any SIX parts from following. 12

(i) Solve $\sqrt{\frac{x+1}{x+5}}=2$

(ii) What is logarithm of a Real Number?

(iii) Solve $\sqrt[3]{2x+3}=\sqrt[3]{x-2}$

(iv) Find a,b,c and d, if $\begin{bmatrix}a+c & a+2b\\c-1 & 4d-6\end{bmatrix}=\begin{bmatrix}0 & -7\\3 & 2d\end{bmatrix}$

(v) If $A=\begin{bmatrix}1 & 2\\ 0 & 1\end{bmatrix}$ then verify that $\left(A^t\right)^t = A$

(vi) Given $A = A_0e^{-kd}$, if k = 2, what should be the value of 'd' to make $A = \frac{A_0}{2}$?

(vii) Use Logarithm tables to find the value of 0.8176×13.64.

(viii) Use Cramer's rule to solve: $2x-2y=4$; $3x+2y=6$

(ix) Write in ordinary notation 23.07×10^{-3} and 0.000478×10^{7}

(PART – II)

Note : Attempt THREE questions in all. But question No.9 is compulsory.

5. **(a)** One acute angle of a triangle is 12^0 more than twice the other acute angle. Find the acute angles of the right triangle. **4**

(b) Prove: $\log_a n = \log_b n \times \log_a b$ **4**

6. **(a)** Show that $7\log\frac{16}{15}+5\log\frac{25}{24}+3\log\frac{81}{80}=\log 2$. **4**

(b) If $A=\begin{bmatrix}0 & 1\\ 2 & -3\end{bmatrix}$, $B=\begin{bmatrix}-3 & 4\\ 5 & -2\end{bmatrix}$ and $C=\begin{bmatrix}0 & 6\\ -2 & -5\end{bmatrix}$ then prove that $A(BC)=(AB)C$ **4**

7. **(a)** If $A=\begin{bmatrix}3 & 2\\ 1 & -1\end{bmatrix}$ and $B=\begin{bmatrix}2 & 4\\ -3 & -5\end{bmatrix}$ then verify $(AB)^{-1}=B^{-1}A^{-1}$ **4**

(b) Use matrices to solve: $2x-2y=4$; $-5x-2y=-10$ **4**

8. **(a)** Use log tables to solve $\frac{(438)^3\sqrt{0.056}}{388}$ **4**

(b) The length of a triangle is 4 times its width. The perimeter of the rectangle is 150cm. Find dimensions of the rectangle. **4**

9. **Prove that any point equidistant from the end points of a line segment is on the right bisector of it.** **8**

OR

Prove that the right bisectors of the sides of a triangle are concurrent.

MATHEMATICS (SCIENCE)

(PART - I)

Question : 2

Answer briefly any six parts from following.

(i) Define skew - Symmetric Matrix and Identity Matrix.

Skew - Symmetric Matrix :-

A square matrix A is said to be skew-symmetric if $A^t = -A$

Identity Matrix :-

A diagonal matrix is called identity matrix if all diagonal entries are 1 and it is denoted by I.

(ii) Define Matrix and Equal Matrices.

Matrix :-

A rectangular layout or a formation of a collection of real numbers, say 0,1,2,3,4 and 7 such as

$\begin{matrix} 1 & 3 & 4 \\ 7 & 2 & 0 \end{matrix}$ and then enclosed by brackets '[ ]' is said to form a matrix. $\begin{bmatrix} 1 & 3 & 4 \\ 7 & 2 & 0 \end{bmatrix}$

Equal Matrices :-

Let A and B be two ~~numbers~~ matrices then A is said to be equal to B, and denoted by A = B if and only if

1- the order of A = the order of B

2- their corresponding entries are equal.

(iii) Solve $x + \frac{1}{3} = 2\left(x - \frac{2}{3}\right) - 6x$

$$x + \frac{1}{3} = 2x - \frac{4}{3} - 6x$$

$$x - 2x = -\frac{4}{3} - \frac{1}{3} - 6x$$

$$-x = \frac{-4-1}{3} - 6x$$

$$-x = \frac{-5}{3} - 6x$$

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

$$5x = -\frac{5}{3}$$

$$x = -\frac{\cancel{5}}{3} \times \frac{1}{\cancel{5}}$$

$\boxed{x = -\frac{1}{3}}$ Ans.

(iv) If $A=\begin{bmatrix}1 & 2\\ 4 & 6\end{bmatrix}$ then find determinant and adjoint of A.

$$|A| = \begin{vmatrix}1 & 2\\ 4 & 6\end{vmatrix}$$

$$= 1\times 6 - 2\times 4$$

$$= 6 - 8$$

$$= -2 \neq 0$$

$$\text{Adj } A = \begin{bmatrix}6 & -2\\ -4 & 1\end{bmatrix}$$

(v) Prove that $\log_a(mn) = \log_a m + \log_a n$

Let

$\log_a m = x$ and $\log_a n = y$

writing in exponential form

$$a^x = m \quad \text{and} \quad a^y = n$$

$$a^x \times a^y = mn$$

$$a^{x+y} = mn$$

$$\log_a(mn) = x+y$$

$$\log_a(mn) = \log_a m + \log_a n$$

Hence proved.

(vi) Calculate $\log_3 2 \times \log_2 81$

$$\log_3 2 \times \log_2 81 = \frac{\cancel{\log 2}}{\log 3} \times \frac{\log 81}{\cancel{\log 2}}$$

$$= \frac{\log 81}{\log 3}$$

$$= \frac{\log 3^4}{\log 3}$$

$$= \frac{4\cancel{\log 3}}{\cancel{\log 3}}$$

$$= 4 \quad \text{Ans.}$$

(vii) Find the value of x if $\log_{64} 8 = \frac{x}{2}$

$$\log_{64} 8 = \frac{x}{2}$$

Exponential form

$$64^{x/2} = 8$$

$$(8^{\cancel{2}})^{\frac{x}{\cancel{2}}} = 8$$

$$\cancel{8}^x = \cancel{8}$$

$$\boxed{x = 1} \quad \text{Ans.}$$

(viii) Evaluate log 512 to the base $2\sqrt{2}$.

log 512 to the base $2\sqrt{2}$

Let $\log_{2\sqrt{2}} 512 = x$

$$(2\sqrt{2})^x = 512$$

$$(2^{3/2})^x = 2^9$$

$$x^{\frac{3}{2}x} = x^{9}$$

$$\frac{3}{2}x = 9$$

$$x = \cancel{9}^{3} \times \frac{2}{\cancel{3}}$$

$\boxed{x = 6}$ Ans.

(ix) Evaluate with the help of logarithm

0.29×0.004236

Let $y = 0.29 \times 0.004236$

Taking log on both sides

$\log y = \log(0.29 \times 0.004236)$

$\log y = \log 0.29 + \log 0.004236$

$\log y = \bar{1}.4643 + \bar{3}.6269$

$\log y = \bar{3}.0912$

Taking Antilog on both sides

$y = \text{Antilog}(\bar{3}.0912)$

$\boxed{y = 0.001234}$ Ans.

Question : 3

Answer briefly any six parts from following.

(i) If $A = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$, then verify that $A + A^t$ is symmetric.

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

$$A^t = \begin{bmatrix} 1 & 0 \\ 2 & 1 \end{bmatrix}$$

$$A + A^t = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix} + \begin{bmatrix} 1 & 0 \\ 2 & 1 \end{bmatrix}$$

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

$$= \begin{bmatrix} 2 & 2 \\ 2 & 2 \end{bmatrix}$$

$$(A + A^t)^t = \begin{bmatrix} 2 & 2 \\ 2 & 2 \end{bmatrix}^t$$

$$= \begin{bmatrix} 2 & 2 \\ 2 & 2 \end{bmatrix}$$

$$(A + A^t)^t = A + A^t$$

Hence $A + A^t$ is symmetric.

(ii) Define Characteristic.

Characteristic :-

The integral part of the logarithm of any number is called the characteristic.

For example 1.02 Characteristic of logarithm is 0.

(iii) Find product $\begin{bmatrix} 1 & 2 \\ 3 & 4 \\ -1 & 1 \end{bmatrix} \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$.

$$= \begin{bmatrix} (1)(1)+(2)(4) & (1)(2)+(2)(5) & (1)(3)+(2)(6) \\ (3)(1)+(4)(4) & (3)(2)+(4)(5) & (3)(3)+(4)(6) \\ (-1)(1)+(1)(4) & (-1)(2)+(1)(5) & (-1)(3)+(1)(6) \end{bmatrix}$$

$$= \begin{bmatrix} 1+8 & 2+10 & 3+12 \\ 3+16 & 6+20 & 9+24 \\ -1+4 & -2+5 & -3+6 \end{bmatrix}$$

$$= \begin{bmatrix} 9 & 12 & 15 \\ 19 & 26 & 33 \\ 3 & 3 & 3 \end{bmatrix}$$ Ans.

(iv) Find the multiplicative inverse

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

$$A^{-1} = \frac{\text{Adj } A}{|A|} \quad \text{---} \; (1)$$

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

$$= (-1)(0) - (2)(3)$$

$$= 0 - 6$$

$$= -6 \neq 0$$

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

putting values in eq (1)

$$\text{Adj } A = \frac{\begin{bmatrix} 0 & -3 \\ -2 & -1 \end{bmatrix}}{-6}$$

$$= \begin{bmatrix} 0/-6 & \cancel{+3}/\cancel{+6}^{2} \\ \cancel{+2}/\cancel{+6}^{3} & +1/+6 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & 1/2 \\ 1/3 & 1/6 \end{bmatrix} \quad \underline{\underline{\text{Ans}}}$$

(v) If $A = \begin{bmatrix} 1 & -2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 7 \\ -3 & 8 \end{bmatrix}$ then find $2A^t - 3B^t$

$$A^t = \begin{bmatrix} 1 & -2 \\ 3 & 4 \end{bmatrix}^t = \begin{bmatrix} 1 & 3 \\ -2 & 4 \end{bmatrix}$$

$$B^t = \begin{bmatrix} 0 & 7 \\ -3 & 8 \end{bmatrix}^t = \begin{bmatrix} 0 & -3 \\ 7 & 8 \end{bmatrix}$$

$$2A^t - 3B^t = 2\begin{bmatrix} 1 & 3 \\ -2 & 4 \end{bmatrix} - 3\begin{bmatrix} 0 & -3 \\ 7 & 8 \end{bmatrix}$$

$$= \begin{bmatrix} 1\times 2 & 3\times 2 \\ -2\times 2 & 4\times 2 \end{bmatrix} - \begin{bmatrix} 0\times 3 & -3\times 3 \\ 7\times 3 & 8\times 3 \end{bmatrix}$$

$$= \begin{bmatrix} 2 & 6 \\ -4 & 8 \end{bmatrix} - \begin{bmatrix} 0 & -9 \\ 21 & 24 \end{bmatrix}$$

$$= \begin{bmatrix} 2-0 & 6-(-9) \\ -4-21 & 8-24 \end{bmatrix}$$

$$= \begin{bmatrix} 2 & 15 \\ -25 & -16 \end{bmatrix} \quad \underline{\underline{\text{Ans}}}$$

(vi) Define Congruency of triangles.

Congruency of Triangles:-

Two triangles are said to be congruent written symbolically as $\cong$, if there exists a correspondence between them that all the corresponding sides and angles are congruent.

(vii) Express $\log x - 2\log x + 3\log(x+1) - \log(x^2-1)$.

$= \log x - 2\log x + 3\log(x+1) - \log(x^2-1)$

$= \log x - \log x^2 + \log(x+1)^3 - \log(x^2-1)$

$= \log \frac{\cancel{x}}{x^{\cancel{2}}} + \log \frac{(x+1)^3}{(x^2-1)}$

$= \log \frac{1}{x} + \log \frac{(x+1)^{\cancel{3}\,2}}{\cancel{(x+1)}(x-1)}$

$= \log \frac{1}{x} + \log \frac{(x+1)^2}{(x-1)}$

$= \log \left[\frac{1}{x} \times \frac{(x+1)^2}{(x-1)} \right]$

$= \log \left(\frac{(x+1)^2}{x(x-1)} \right)$ Ans

(viii) If $\log 2 = 0.3010$, $\log 3 = 0.4771$, $\log 5 = 0.6990$ then find value of $\log \frac{8}{3}$.

$\log \frac{8}{3} = \log \frac{2^3}{3}$

$= \log 2^3 - \log 3$

$= 3\log 2 - \log 3$

$= 3(0.3010) - 0.4771$

$= 0.903 - 0.4771$

$= 0.4259$ Ans.

(ix) If $V = \frac{1}{3}\pi r^2 h$, find V when $\pi = \frac{22}{7}$, $r = 2.5$ and $h = 4.2$.

$$V = \frac{1}{3}\pi r^2 h$$

Taking log on both sides

$\log V = \log 1 - \log 3 + \log \pi + \log r^2 + \log h$

$= 0 - 0.4771 + 0.4973 + 2(0.3979) + 0.6232$

$\log V = 1.4392$

Taking Antilog on both sides

$\text{Antilog}(\log V) = \text{Antilog}(1.4392)$

$\boxed{V = 27.492}$ Ans.

Question: 4

Answer briefly any six parts from following.

(i) Solve ~~and~~ $\sqrt{\frac{x+1}{x+5}} = 2$

$$\sqrt{\frac{x+1}{x+5}} = 2$$

Taking square on both sides

$$\left(\sqrt{\frac{x+1}{x+5}}\right)^{\cancel{2}} = (2)^2$$

$$\frac{x+1}{x+5} = 4$$

$$x+1 = 4(x+5)$$

$$x+1 = 4x+20$$

$$x-4x = 20-1$$

$$-3x = 19$$

$$\boxed{x = -\frac{19}{3}}$$ Ans

(ii) What is logarithm of a real number?

Logarithm of a Real Number:-

If $a^x = y$ then x is called the logarithm of y to the base a and is written as $\log_a y = x$, where $a>0$, $a \neq 1$ and $y>0$.

(iii) Solve $\sqrt[3]{2x+3} = \sqrt[3]{x-2}$

$$\sqrt[3]{2x+3} = \sqrt{x-2}$$

$$(2x+3)^{1/3} = (x-2)^{1/3}$$

Taking cube on both sides

$$\left[(2x+3)^{1/\cancel{3}}\right]^{\cancel{3}} = \left[(x-2)^{1/\cancel{3}}\right]^{\cancel{3}}$$

$$2x+3 = x-2$$

$$2x - x = -2 - 3$$

$$\boxed{x = -5} \quad \text{Ans}$$

(iv) Find a, b, c and d if

$$\begin{bmatrix} a+c & a+2b \\ c-1 & 4d-6 \end{bmatrix} = \begin{bmatrix} 0 & -7 \\ 3 & 2d \end{bmatrix}$$

$$a + c = 0 \quad \text{—— (1)}$$

$$a + 2b = -7 \quad \text{—— (2)}$$

$$c - 1 = 3 \quad \text{—— (3)}$$

$$4d - 6 = 2d \quad \text{—— (4)}$$

From eq (3)

$$c = 3 + 1$$

$$\boxed{c = 4}$$

From eq (4)

$$4d - 2d = 6$$

$$2d = 6$$

$$d = \frac{\cancel{6}^{3}}{\cancel{2}}$$

$$\boxed{d = 3}$$

put $c = 4$ in eq (1)

$$a + 4 = 0$$

$$\boxed{a = -4}$$

put $a = -4$ in eq (2)

$$-4 + 2b = -7$$

$$2b = -7 + 4$$

$$2b = -3$$

$$\boxed{b = \frac{-3}{2}}$$ Ans

(V) If $A = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$ then verify that

$(A^t)^t = A$

$L.H.S = (A^t)^t$

$$A^t = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}^t$$

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

$$(A^t)^t = \begin{bmatrix} 1 & 0 \\ 2 & 1 \end{bmatrix}^t$$

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

$R.H.S = A$

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

$L.H.S = R.H.S$

Hence proved.

(Vi) Given $A = A_0 e^{-kd}$, if $k = 2$, What should be the value of 'd' to make $A = \frac{A_0}{2}$?

$$A = A_0 e^{-kd}$$

$$\frac{A}{A_0} = e^{-kd}$$

Substituting $k = 2$ and $A = \frac{A_0}{2}$

$$\frac{A_0/2}{A_0} = e^{-2d}$$

$$\frac{1}{2} = e^{-2d}$$

Taking common log on both sides

$$\log_{10}\left(\frac{1}{2}\right) = \log_{10}\left(e^{-2d}\right)$$

$$\log_{10} 1 - \log_{10} 2 = -2d \log_{10} e$$

$$0 - 0.3010 = -2d(0.4343)$$

$$-0.3010 = -2d(0.4343)$$

$$\frac{\cancel{-}0.3010}{\cancel{-}2 \times 0.4343} = d$$

$$0.3465 = d$$

$\Rightarrow$ $\boxed{d = 0.3465}$ Ans.

(vii) Use Logarithm tables to find the value of 0.8176×13.64

Let $x = 0.8176 \times 13.64$

Taking log on both sides

$$\log x = \log(0.8176 \times 13.64)$$

$$\log x = \log 0.8176 + \log 13.64$$

$$\log x = -0.0875 + 1.1348$$

$$\log x = 1.0473$$

Taking Antilog on both sides

$x = \text{Antilog}(1.0473)$

$\boxed{x = 11.15}$ Ans.

(viii) Use Crammer's rule to solve

$2x - 2y = 4$

$3x + 2y = 6$

$$\begin{bmatrix} 2 & -2 \\ 3 & 2 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ 6 \end{bmatrix}$$

Let $AX = B$

$$A_x = \begin{bmatrix} 4 & -2 \\ 6 & 2 \end{bmatrix}$$

$$A_y = \begin{bmatrix} 2 & 4 \\ 3 & 6 \end{bmatrix}$$

$$|A| = \begin{vmatrix} 2 & -2 \\ 3 & 2 \end{vmatrix}$$

$= 2\times 2 - (3)(-2)$

$= 4 + 6 = 10 \neq 0$

$$|A_x| = \begin{vmatrix} 4 & -2 \\ 6 & 2 \end{vmatrix}$$

$= 4\times 2 - 6\times(-2)$

$= 8 + 12 = 20 \neq 0$

$$|A_y| = \begin{vmatrix} 2 & 4 \\ 3 & 6 \end{vmatrix}$$

$= 2\times 6 - 3\times 4$

$= 12 - 12 = 0$

$$x = \frac{|A_x|}{A} = \frac{\cancel{20}}{\cancel{10}} = 2$$

$$y = \frac{|A_y|}{A} = \frac{0}{10} = 0$$

(ix) Write in ordinary notation 23.07×10^{-3} and 0.000478×10^{7}.

$$23.07 \times 10^{-3} = \frac{2307}{100} \times 10^{-3}$$

$$= \frac{2307}{10^2} \times 10^{-3}$$

$$= 2307 \times 10^{-3-2}$$

$$= 2307 \times 10^{-5}$$

$$= 0.02307$$

$$0.000478 \times 10^{7} = 0.000478 \times 10^{7}$$

$$= \frac{478}{1000000} \times 10^{7}$$

$$= \frac{478}{10^6} \times 10^{7}$$

$$= 478 \times 10$$

$$= 4780$$

(PART – II)

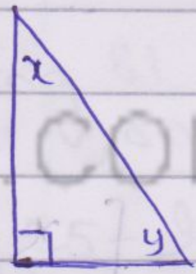
Attempt three questions in all. But question no. 9 is compulsory.

Question: 5(a)

One acute angle of a

triangle is 12° more than twice the other acute angle. Find the acute angles of the right triangle.

$$x = 2y + 12$$



$$x - 2y = 12$$

$$x + y = 90$$

$$\begin{bmatrix} 1 & -2 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 12 \\ 90 \end{bmatrix}$$

Let

$$AX = B$$

$$X = A^{-1}B \quad \text{———} \quad (1)$$

$$A^{-1} = \frac{Adj\,A}{|A|}$$

$$|A| = \begin{vmatrix} 1 & -2 \\ 1 & 1 \end{vmatrix}$$

$$= 1 \times 1 - 1 \times (-2)$$

$$= 1 + 2 = 3 \neq 0$$

$$Adj\,A = \begin{bmatrix} 1 & 2 \\ -1 & 1 \end{bmatrix}$$

$$A^{-1} = \frac{1}{3} \begin{bmatrix} 1 & 2 \\ -1 & 1 \end{bmatrix}$$

putting values in eq (1)

$$X = \frac{1}{3} \begin{bmatrix} 1 & 2 \\ -1 & 1 \end{bmatrix} \begin{bmatrix} 12 \\ 90 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{3} \begin{bmatrix} 1 \times 12 + 2 \times 90 \\ -1 \times 12 + 1 \times 90 \end{bmatrix}$$