Sahiwal Board 2024

Objective Type

Roll No. _____ (To be filled in by the candidate)

BUSINESS MATHEMATICS H.S.S.C (11th)1st-Annual-2024 Time: 15 Minutes

Paper: I (Commerce Group) Marks: 10

Paper Code | 6 | 6 | 4 | 1 |

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number in you answer book. Use marker or pen to fill the circles. Cutting or filling up two or more circles will result no mark.

SECTION – A

Q1.

Sr.	Questions	A	B	C	D
1.	The ratio between 24 kg and 504 kg is:	8:1	10:1	1:21	10:20
2.	The value of x in 2 : 7 :: x : 49	13	14	15	12
3.	Principal = 5000, interest = 10%, period half year. Investment = ?	1000	500	200	250
4.	In function, there is only one:	Independent variable	Dependent variable	Constant	Domain
5.	Solution set of the $x - 4 = 16$	12	20	4	–20
6.	In quadratic equation maximum power of variable is:	One	Two	Three	Four
7.	In binary system, 7 is:	$(111)_2$	$(101)_2$	$(100)_2$	$(11)_2$
8.	$(1010)_2$ in decimal from is:	14	12	8	10
9.	Which to the given is zero matrix?	$\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$	$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$	$\begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$	$\begin{bmatrix} 3 & 0 \\ 0 & 5 \end{bmatrix}$
10.	A rectangular array of elements is called:	Vector	Matrix	Column	Row

Answers:

1. C	2. B	3. D	4. B	5. B	6. B	7. A	8. D	9. A	10. B

Subjective Type

Roll No. _____ (To be filled in by the candidate)

BUSINESS MATHEMATICS H.S.S.C (11th)1st-Annual-2024 Time: 1.45 Hours

(Commerce Group) Paper: I Marks: 40

Note: Section B is compulsory. Attempt any Two Questions from Section C.

SECTION - B

Q2. Write short answers to any Six parts: (6×2=12)

(i) Simplify 12:32

Sol. 12 : 32

$$= \frac{\cancel{12}^{3}}{\cancel{32}^{8}}$$

$$= \frac{3}{8} = 3 : 8$$

(ii) **Find the value of x, $x : 2 :: 6 : 12$**

Sol. $x : 2 :: 6 : 12$

Product of extremes = Product of means

$$(x)(12) = (2)(6)$$

$$12x = 12$$

$$x = 1$$

(iii) **Calculate 35% of 900.**

Sol. $a = 35, b = 900, c = ?$

using the formula of abc

$$(35)(900) = 100c$$

$$\Rightarrow \quad c = \frac{35 \times 900}{100} = 315$$

(iv) **Find the simple interest on Rs.3000 for 2 years at the rate 6% per annum.**

Sol. P = Rs. 3000, I = 6% = 0.06, N = 2 years, S.I = ?

S.I = PIN = $3000 \times 0.06 \times 2$ = Rs. 360

(v) **Find the net amount to be paid, when a discount of 3% was allowed on an amount of Rs. 10,200.**

Sol. Discount rate = DR = 3%

$$= \frac{3}{100} = 0.03$$

Discount Price = DP = ?

State price = SP = 10200

$$DP = SP(1 - DR)$$

Putting values

$$DP = 10200\,(1 - 0.03)$$

$$= 10200\,(0.97) = 9894$$

$$DP = 9894$$

So, the net amount to be paid with 3% discount is 9894.

(vi) **Solve $\frac{y}{3} + 1 = 6$**

Sol.

$$\frac{y}{3} + 1 = 6$$

$$\frac{y+3}{3} = 6$$

$$y + 3 = 6 \times 3$$

$$y + 3 = 18$$

$$y = 18 - 3$$

$$y = 15$$

(vii) **If nine times of a number is 180. Find the number.**

Sol. Let the number be x

According to given condition

$$9x = 180$$

To find x divide both side by 9.

$$x = \frac{180}{9} = 20$$

So, the number is 20.

(viii) **Solve $x^2 - 7x + 12 = 0$ by factorization.**

Sol. $x^2 + 7x + 12 = 0$

By factorization

$$x^2 + 4x + 3x + 12 = 0$$

$$x(x+4) + 3(x+4) = 0$$

$$x + 4 = 0 \quad ; \quad x + 3 = 0$$

$$x = -4 \quad ; \quad x = -3$$

$$S.S = \{-4, -3\}$$

(ix) **Write the roots of $ax^2 - bx + c = 0$; $a \neq 0$**

Sol. $ax^2 + bx + c = 0$

The quadratic formula gives you two roots x, and

$$x_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

$$x_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

Q3. Write short answers to any Six parts: (6×2=1

(i) **Find equation of straight line that passes through (2,7) and its slope $\frac{3}{5}$.**

Sol. Here $x_1 = 2$, $y_1 = 7$ and $m = \frac{3}{5}$

As we know that

$$y - y_1 = m(x - x_1)$$

$$\Rightarrow \quad y - 7 = \frac{3}{5}(x - 2)$$

$$5(y - 7) = 3(x - 2)$$

$$5y - 35 = 3x - 6$$

$$0 = 3x - 5y - 6 + 35$$

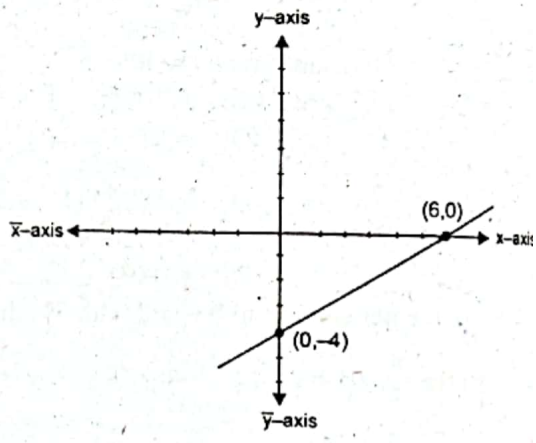
$$\Rightarrow \quad 3x - 5y + 29 = 0$$

Which is required

(ii) **Graph the linear function $2x - 3y = 12$**

Sol. $2x - 3y = 12$

X-intercept	Y-intercept
put $y = 0$	put $x = 0$
$2x - 3(0) = 12$	$2(0) - 3y = 12$
$2x = 12$	$-3y = 12$
$x = 6$	$y = -4$
$\Rightarrow (6,0)$	$\Rightarrow (0,-4)$



(iii) **Subtract $(100)_2$ from $(10110)_2$**

Sol.

$$\begin{array}{r} (10110)_2 \\ - \quad (100)_2 \\ \hline (10010)_2 \end{array}$$

(iv) **Convert 64 from base ten to base two.**

Sol.

2	64
2	32 – 0
2	16 – 0
2	8 – 0
2	4 – 0
2	2 – 0
	1 – 0

So $(64)_{10} = (1000000)_2$

(v) **Simplify $(11101111)_2 - (10001)_2$**

Sol.

$$\begin{array}{r} (11101111)_2 \\ - \quad (10001)_2 \\ \hline (11011110)_2 \end{array}$$

(vi) **Define order of a matrix.**

Ans. The order of matrix is the number of rows and columns present in a matrix.

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

The orderof matrix A is 2-by-2.

(vii) If $A = \begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ then find $3A - 2B$.

Sol. $3A - 2B = 3\begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix} - 2\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 6 & 3 \\ 3 & 3 \end{bmatrix} - \begin{bmatrix} 2 & 2 \\ 0 & 2 \end{bmatrix}$

$= \begin{bmatrix} 6-2 & 3-2 \\ 3-0 & 3-2 \end{bmatrix} = \begin{bmatrix} 4 & 1 \\ 3 & 1 \end{bmatrix}$

(viii) **Define singular matrix.**

Ans. A square matrix A is said to be a singular matrix if $|A| = 0$. Where $|A|$ is the determinant of said matrix A.

Example: $A = \begin{bmatrix} 5 & 2 \\ 10 & 4 \end{bmatrix}$

$|A| = \begin{vmatrix} 5 & 2 \\ 10 & 4 \end{vmatrix} = (5 \times 4) - (2 \times 10) = 20 - 20 = 0$

(ix) If $A = \begin{bmatrix} 4 & 6 \\ 10 & 8 \end{bmatrix}$ then find $|A^t|$.

Sol. $A = \begin{bmatrix} 4 & 6 \\ 10 & 8 \end{bmatrix} \Rightarrow A^t = \begin{bmatrix} 4 & 10 \\ 6 & 8 \end{bmatrix}$

$|A^t| = \begin{bmatrix} 4 & 10 \\ 6 & 8 \end{bmatrix} = 32 - 60 = -28$

$|A^t| = -28$

SECTION - C

Note: Attempt any TWO questions. Each question carries EIGHT (4+4=8) marks. (8×2=16)

Q4 (a) **Ten men complete a task in 18 days. How long would it take 12 men to complete the same task.**

Sol.

Men		Days
↓ 10	:	↑ 18
↓ 12	:	↑ x(say)

By proportion

$10 : 12 :: x : 18$

Product of means = Product of extremes

$(12)(x) = (10)(18)$

$12x = 180$

$x = 15$

So, 15 days requested to complete the task.

(b) **Find simple interest on Rs.10,000 at the rate of 5% for 5 years. Also find the amount for 5 years.**

Sol.

Principal = P = Rs. 10000

Interest Rate = I = 5% = 0.05

N = 5 years

Now, Simple interes = S.I = PIN

$= (10000)(0.05)(5)$

S.I = Rs. 2500

Amount = A $= p(1 + IN)$

$= 10000\,[1 + 0.05(N)]$

$= 10000\,[1 + 0.05 \times 5]$

$= 10000\left[1 + \frac{1}{4}\right]$

$= 10000\left[\frac{5}{4}\right]$ = Rs. 12500

Q5. **(a) If $g(x) = 2x + 1$ then find the values of $g(0)$, $g(1)$ $g(-3)$ and $g(10)$.**

Sol.

$$g(x) = 2x + 1$$

put $x = 0$

$$g(0) = 2(0) + 1 = 0 + 1 = 1$$

put $x = 1$, , $g(1) = 2(1) + 1 = 2 + 1 = 3$

put $x = -3$, $g(-3) = 2(-3) + 1 = 6 + 1 = -5$

put $x = 10$, , $g(10) = 2(10) + 1 = 20 + 1 = 21$

(b) Solve $8x^2 - 14x - 15 = 0$ by quadratic formula.

Sol. $8x^2 - 14x - 15 = 0$

Compare it with $ax^2 + bx + c = 0$

Here $a = 8, b = -14, c = -15$

By quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Putting values $$x = \frac{-(-14) \pm \sqrt{(-14)^2 - 4(8)(-15)}}{2(8)} = \frac{14 \pm \sqrt{196 + 480}}{16} = \frac{14 \pm \sqrt{676}}{16}$$

$$x = \frac{14 \pm 26}{16}$$

$$x = \frac{14 + 26}{16} \qquad x = \frac{14 - 26}{16}$$

$$x = \frac{40}{16} \qquad x = \frac{-12}{16}$$

$$x = \frac{5}{2} \qquad x = \frac{-3}{4}$$

$$S.S = \left\{-\frac{3}{4}, \frac{5}{2}\right\}$$

Q6. **(a) If $A = \begin{bmatrix} 5 & 6 \\ 2 & 3 \end{bmatrix}$, then find A^{-1} and prove that $AA^{-1} = I_2$**

Sol.

$$A = \begin{bmatrix} 5 & 6 \\ 2 & 3 \end{bmatrix}$$

As $$A^{-1} = \frac{1}{|A|} AdjA \quad \text{\_\_\_\_\_(i)}$$

$$|A| = \begin{vmatrix} 5 & 6 \\ 2 & 3 \end{vmatrix} = 15 - 12 = 3$$

$$AdjA = \begin{bmatrix} 3 & -6 \\ -2 & 5 \end{bmatrix}$$

So, (i) becoms

$$A^{-1} = \frac{1}{3}\begin{bmatrix} 3 & -6 \\ -2 & 5 \end{bmatrix}$$

Now $$AA^{-1} = \begin{bmatrix} 5 & 6 \\ 2 & 3 \end{bmatrix}\left(\frac{1}{3}\begin{bmatrix} 3 & -6 \\ -2 & 5 \end{bmatrix}\right) = \frac{1}{3}\begin{bmatrix} 5 & 6 \\ 2 & 3 \end{bmatrix}\begin{bmatrix} 3 & -6 \\ -2 & 5 \end{bmatrix}$$

$$= \frac{1}{3}\begin{bmatrix} 15-12 & -30+30 \\ 6-6 & -12+15 \end{bmatrix} = \frac{1}{3}\begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = I_2$$

(b) Evaluate $(111101)_2 - (111)_2$

Sol.

$$\begin{array}{r} (1\ 1\ 1\ 1\ 0\ 1)_2 \\ -\quad\quad\ (1\ 1\ 1)_2 \\ \hline (1\ 1\ 0\ 1\ 1\ 0)_2 \end{array}$$

So, $(111101)_2 - (111)_2 = (110110)_2$