Lahore Board 2024

Objective Type

Roll No. ___ (To be filled in by the candidate) (Academic Sessions 2020 - 2022 & 2023 - 2025)

Business Mathematics 224 - 1st Annual - (Inter Part - I) Time : 15 Minutes

Q. Paper (Objective Type) Paper Code = 6642 Maximum Marks: 10

NOTE: Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

Q1

1	**The ratio between 1.5 cm and 4.5 cm is:**			
	(A) 2 : 5	(B) 3 : 1	(C) 1 : 3	(D) 2 : 3
2	**If 40 : 30 : : 20 : x then x = _____.**			
	(A) 15	(B) 10	(C) 20	(D) 25
3	**The simple interest on a loan of Rs.300 for 2 years at 7% is:**			
	(A) Rs.22	(B) Rs.32	(C) Rs.42	(D) Rs.52
4	**If $f(x) = x + 8$ then $f(1)$ is:**			
	(A) 7	(B) 9	(C) 8	(D) 6
5	**If $4x - 6 = 2x + 8$ then x = :**			
	(A) 4	(B) 5	(C) 6	(D) 7
6	**A quadratic equation is also called an equation of degree:**			
	(A) 1	(B) 2	(C) 3	(D) 4
7	**8 in binary system is:**			
	(A) $(1000)_2$	(B) $(1001)_2$	(C) $(1010)_2$	(D) $(1011)_2$
8	**$(1010)_2$ in decimal form is:**			
	(A) 10	(B) 12	(C) 8	(D) 14
9	**$(AB)^t$ is equal to:**			
	(A) A^tB^t	(B) B^tA^t	(C) AB^t	(D) A^tB
10	**The order of the matrix [2 5 8] is:**			
	(A) 3×3	(B) 1×1	(C) 3×1	(D) 1×3

Answers:

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

Subjective Type

Roll No. _____ (To be filled in by the candidate) (Academic Sessions 2020 - 2022 & 2023 - 2025)

BUSINESS MATHEMATICS 224 - 1st Annual - (INTER PART - I) Time Allowed: 1:45 hours

(Essay Type) Maximum Marks: 40

SECTION - I

Q2 **Write short answers to any SIX (6) questions:** 12

(i) **Find the ratio between one hour and 45 minutes.**

Sol. Ratio between one hour and 45 minutes.

1 hour = 60 minutes

$\Rightarrow$ 60 : 45

$\Rightarrow$ 4 : 3

(ii) **Define inverse proportion.**

Ans. If two quantities are so related that an increase in one causes a corresponding decrease in the other or vice versa, is called inverse or indirect proportion.

(iii) **270 is what % of 900?**

Sol. Let the percentage is x. So, $270 = 900 \times \frac{x}{100}$

$$\frac{270}{900} = \frac{x}{100} \Rightarrow 0.3 = \frac{x}{100} \Rightarrow x = (0.3)(100) = 30\%$$

(iv) **Find the simple interest on Rs.15000 for one and a half year at 5% annually.**

Sol. Given that

$$P = \text{Rs. } 15000$$
$$N = 1.5 \text{ years}$$
$$I = 5\%$$
$$= \frac{5}{100} = 0.05 \text{ annually}$$

As we know

$$\text{Simple interest} = S.I = PIN$$
$$= (15000)(0.05)(1.5)$$
$$S.I = \text{Rs. } 1125$$

(v) **Define an Annuity Certain.**

Ans. Annuity certain is an investment that provides a series of payments for a set period to a person or the persons beneficiary or estate.

(vi) **Solve $4x - 3 = 2x + 7$**

Sol. $4x - 3 = 2x + 7 \Rightarrow 4x - 2x = 7 + 3$

$$2x = 10 \Rightarrow x = \frac{10}{2} = 5$$

(vii) **Solve the equation $4(3y - 9) = 7(2 - 5y) + 22y$**

Sol.
$$4(3y - 9) = 7(2 - 5y) + 22y$$
$$12y - 36 = 14 - 35y + 22y$$
$$12y - 36 = 14 - 13y$$
$$12y + 13y = 14 + 36$$
$$25y = 50$$
$$\Rightarrow y = 2$$

(viii) **Solve the equation $5x^2 + 3x = 0$**

Sol.
$$5x^2 + 3x = 0 \Rightarrow x(5x + 3) = 0$$
$$\Rightarrow x = 0, \quad 5x + 3 = 0$$
$$5x = -3$$
$$x = -\frac{3}{5}$$

$$S.S = \left\{0, -\frac{3}{5}\right\}$$

(ix) **Write down the quadratic formula.**

Ans. The solution set $\left[\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}\right]$ is called quadratic formula.

Q3 Write short answers to any SIX (6) questions: **12**

(i) **If $f(x) = 4x - 3$, then find $f(0)$ and $f(1)$.**

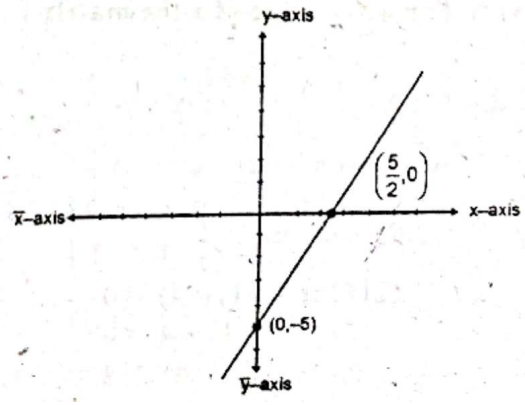
Sol.
$$f(x) = 4x - 3$$
$$\text{put } x = 0$$
$$f(0) = 4(0) - = -3$$
$$\text{put } x = 1$$
$$f(1) = 4(1) - 3 = 4 - 3$$
$$f(1) = 1$$

(ii) **Draw the graph of $y = 2x - 5$**

Sol. Given $y = 2x - 5$

X-intercept	Y-intercept
put $y = 0$	put $x = 0$
$0 = 2x - 5$	$y = 2(0) - 5$
$x = \frac{5}{2}$	$y = -5$
$\Rightarrow \left(\frac{5}{2}, 0\right)$	$\Rightarrow (0, -5)$

Graph:



(iii) Find the value in decimal system $(945)_{10} + (111)_2 = ?$

Sol. $(945)_{10} + (111)$

$$(111)_2 = 1 \times 2 + 1 \times 2 + 1 \times 2$$

As,
$$1 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$$
$$= 1 \times 4 + 1 \times 2 + 1 \times 1$$
$$= 4 + 2 + 1$$
$$= 7$$

Now
$$(945)_{10} + (111)_2 = 945 + 7$$
$$= 952$$

(iv) Evaluate $(1101)_2 - (111)_2 = ?$

Sol. $(1101)_2 - (111)_2$

Thus $(1101)_2 - (111)_2 = (110)_2$

$$\begin{array}{rcccc} & (1 & 1 & 0 & 1)_2 \\ - & (1 & 1 & 1)_2 & \\ \hline & (1 & 1 & 0)_2 & \end{array}$$

(v) Convert 37 into binary number system.

Sol.

2	37		
2	18	–	1
2	9	–	0
2	4	–	1
2	2	–	0
	1	–	0

$(37)_{10} = (100101)_2$

(vi) Find AB if $A = \begin{bmatrix} 1 \\ 7 \end{bmatrix}$ and $B = [7 \quad 1]$

Sol. Given that

$$A = \begin{bmatrix} 1 \\ 7 \end{bmatrix} \text{ and } B = [7 \quad 1]$$

$$AB = \begin{bmatrix} 1 \\ 7 \end{bmatrix} [7 \quad 1] = \begin{bmatrix} 1\times7 & 1\times1 \\ 7\times7 & 7\times1 \end{bmatrix}$$

$$AB = \begin{bmatrix} 7 & 1 \\ 49 & 7 \end{bmatrix}$$

(vii) Define diagonal matrix, give an example.

Ans. A square matrix in which all other elements except the principal diagonal elements are zero and there is atleast one element in the principal diagonal which is non-zero is called diagonal matrix.

For example:

$$A = \begin{bmatrix} -1 & 0 \\ 0 & 2 \end{bmatrix} \text{ is a diagonal matrix.}$$

(viii) For what value of x the matrix $\begin{bmatrix} 2x & -4 \\ -1 & 2 \end{bmatrix}$ will be singular.

Sol. Let $A = \begin{bmatrix} 2x & -4 \\ -1 & 2 \end{bmatrix}$

As A is singular

So $|A| = 0 \Rightarrow \begin{bmatrix} 2x & -4 \\ -1 & 2 \end{bmatrix} = 0$

$$(2)(2x) - (-1)(-4) = 0$$
$$4x - 4 = 0$$
$$4x = 4 \Rightarrow x = 1$$

So for x = 1, the given matrix is singular.

(ix) **Show that the inverse of matrix** $\begin{bmatrix} 3 & 6 \\ 7 & 14 \end{bmatrix}$ **does not exist.**

Sol. Let $A = \begin{bmatrix} 3 & 6 \\ 7 & 14 \end{bmatrix} \Rightarrow |A| = \begin{bmatrix} 3 & 6 \\ 7 & 14 \end{bmatrix} = 42 - 42 = 0$

As A is singular so inverse of A not exists.

SECTION - II

Note: Attempt any TWO questions. $2 \times 8 = 16$

Q4 (a) A bus travels 200 km in 3 hours. How much time is needed for a journey of 480 km? 4

Sol. Let x be required time to travel 480 km.

Distance (km)	Time (hours)
200	3
480	x

By proportion method

$$200 : 480 :: 3 : x$$

$$\Rightarrow \quad \frac{200}{480} = \frac{3}{x} \quad \Rightarrow \quad x = \frac{3 \times 480}{200}$$

So, 7.2 hour be x the required time.

(b) The amount of simple interest for Rs. 15,000 for 2 years is Rs. 1000. Find the rate of interest. 4

Sol. Principal = P = Rs. 15000

Simple Interest = S.I = Rs. 1000

Number of years = N = 2

Let I be the required rate interest using

$$S.I = PIN$$

Putting values $1000 = 15000\,(I)\,(2) = 30000\,I$

$$\frac{1000}{30000} = I \Rightarrow I = 0.0333$$

$$I = 0.0333 \times 100\% = 3.33\%$$

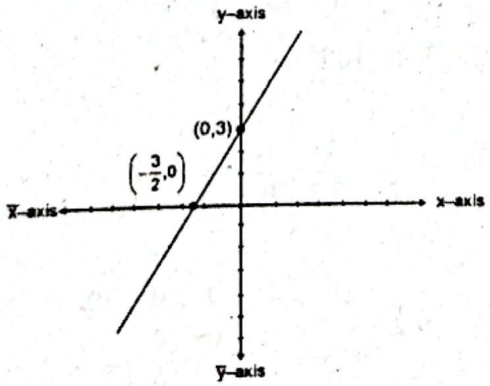
Q5 (a) Draw a graph defined by the function $y = 2x + 3$ 4

Sol. $y = 2x + 3$ _____(i)

As the given function is a linear function and its graph will be a straight line, so we can draw that straight line just by taking two points only. The most suitable two points are the intercepts forms.

X-intercept	Y-intercept
put y = 0 in (i)	put x = 0 in (i)
$0 = 2x + 3$	$y = 2(0) + 3$
$x = -\frac{3}{2}$	$y = 3$
$\Rightarrow \left(-\frac{3}{2}, 0\right)$	$\Rightarrow (0, 3)$

Graph:



(b) Solve $8x^2 - 14x - 15 = 0$ by the quadratic equation. 4

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

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

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

$$x = \frac{-(-14) \pm \sqrt{(-14)^2 - 4(8)(-15)}}{2(8)}$$

$$= \frac{14 \pm \sqrt{196 + 480}}{16}$$

$$= \frac{14 \pm \sqrt{676}}{16} = \frac{14 \pm 26}{16}$$

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

$$x = \frac{40}{16} \quad ; \quad x = \frac{-12}{16}$$

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

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

Q6. (a) Solve the following system of liner equations by Cramer's rule $3x+2y=5$, $2x-y=1$ 4

Sol. Given

$$3x + 2y = 5$$
$$2x - y = 1$$

The matrix form is

$$\begin{bmatrix} 3 & 2 \\ 2 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$$

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

Then by cramer's rule

$$x = \frac{|A_x|}{|A|} = \frac{\begin{vmatrix} 5 & 2 \\ 1 & -1 \end{vmatrix}}{\begin{vmatrix} 3 & 2 \\ 2 & -1 \end{vmatrix}} = \frac{-5-2}{-3-4} = \frac{-7}{-7} = 1 \quad \Rightarrow \quad x = 1$$

And $$y = \frac{|A_y|}{|A|} = \frac{\begin{vmatrix} 3 & 5 \\ 2 & 1 \end{vmatrix}}{\begin{vmatrix} 3 & 2 \\ 2 & -1 \end{vmatrix}}$$

$$= \frac{3-10}{-3-4} = \frac{-7}{-7} = 1 \quad \Rightarrow \quad y = 1$$

(b) Evaluate : $\{(1011)_2 + (1101)_2\} + (1001)_2$ 4

Sol. $\{(1011)_2 + (1101)_2\} + (1001)_2$

$= (11000)_2 + (1001)_2$

$= (100001)_2$

$$\begin{array}{cccccc} & (1^1 & 0^1 & 1^1 & 1)_2 \\ + & (1 & 1 & 0 & 1)_2 \\ \hline (1 & 1 & 0 & 0 & 0)_2 \end{array}$$

$$\begin{array}{cccccc} & (1^1 & 1 & 0 & 0 & 0)_2 \\ + & & (1 & 0 & 0 & 1)_2 \\ \hline (1 & 0 & 0 & 0 & 0 & 1)_2 \end{array}$$