

## Objective Type

1123 Warning:- Please write your Roll No. in the space provided and sign. Roll No. \_\_\_\_\_  
 (Inter Part - I) (Session 2019-21 to 2022-24) Sig. of Student \_\_\_\_\_  
**BUSINESS MATHEMATICS** Paper (I)  
 Time Allowed: 15 minutes PAPER CODE 2641 Maximum Marks: 10

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. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write PAPER CODE, which is printed on this question paper, on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

01

1. The ratio between 7.5 kg and 3.5 kg is:  
 (A) 7 : 15 (B) 7 to 15 (C)  $7 \div 15$  (D)  $\frac{15}{7}$
2. Rs. 88 is what percent of Rs. 400?  
 (A) 22% (B) 21% (C) 23% (D) 25%
3. Simple interest on Rs. 10,000 at the rate of 10% in 10 years is:  
 (A) 100 (B) 1000 (C) 10000 (D) 100000
4. A first degree equation is called:  
 (A) Quadratic Equation (B) Linear Equation (C) Non-Linear Equation (D) Constant
5. Discriminant of a quadratic equation is:  
 (A)  $b^2 + 4ac$  (B)  $b^2 - 4ac$  (C)  $-b^2 - 4ac$  (D)  $-b^2 + 4ac$
6. The point (-2, -3) lies in the quadrant:  
 (A) III (B) II (C) I (D) IV
7. In the binary number system, 2 is equal to:  
 (A)  $(10)_2$  (B)  $(11)_2$  (C)  $(101)_2$  (D)  $(110)_2$
8.  $(100)_2 + (10)_2$   
 (A)  $(111)_2$  (B)  $(011)_2$  (C)  $(110)_2$  (D)  $(100)_2$
9. If  $A = \begin{bmatrix} 2 & -1 \\ 4 & 3 \end{bmatrix}$  then  $|A| = ?$   
 (A) 11 (B) 10 (C) 6 (D) 8
10. The matrix  $\begin{bmatrix} 2 & 0 \\ 0 & 3 \end{bmatrix}$  is:  
 (A) Scalar (B) Diagonal (C) Identity (D) Null

Answers:

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

1123 Warning:- Please do not write anything on this question paper except your Roll No. \_\_\_\_\_  
 (Inter Part - I) Paper (I)  
**BUSINESS MATHEMATICS** (Session 2019-21 to 2022-24) Maximum Marks: 40  
 Time Allowed: 1.45 hours

## SECTION - I

6 × 2 = 12

02 Write short answers to any Six parts.

- (i) Divide 20 pens between Ahmad and Ali in the ratio 3:2  
 Sol. Sum of ratio =  $3 + 2 = 5$

$$\text{Share of Ahmad} = \frac{3}{5} \times 20 = 4 \times 3 = 12 \text{ pen}$$

$$\text{Share of Ali} = \frac{2}{5} \times 20 = 4 \times 2 = 8 \text{ pen}$$

(ii) Define direct proportion.

Ans. Key point of direct proportion is that both the quantities in consideration move in same direction i.e., both are either increasing or decreasing.

(iii) A radio was sold for Rs. 400 on 10% loss. Find the cost price of radio.

Sol.

$$\text{Sale price} = \text{Rs. } 400$$

$$\text{Rate of loss} = 10\% = 0.1$$

$$\text{Cost} = ?$$

$$\text{Cost} = \frac{\text{Sale price}}{1 - \text{Rate of loss}} = \frac{400}{1 - 0.1} = \frac{400}{0.95} = \text{Rs. } 444$$

(iv) What must be rate of interest on Rs. 4000 to produce Rs. 200 in 8 months?

Sol.

$$\text{Principal amount (P)} = 400$$

$$\text{Simple interest (S.I)} = 200$$

$$\text{Number of year (N)} = \frac{8}{12} = \frac{2}{3}$$

Using formula

$$\text{S.I} = \text{PIN}$$

$$200 = 4000 \times I \times \frac{2}{3}$$

$$600 = 4000 \times I \times 2$$

$$300 = 4000 \times I$$

$$\frac{3}{40} = I$$

$$\text{Interest rate} = I = \frac{3}{40} = 0.075 = 7.5\%$$

(v) 320 is what % of 800?

Sol. Using the formula of abc,  $ab = 100c$

$$a \times 800 = 100 \times 320 \Rightarrow a = \frac{32000}{800} = 40\%$$

(vi) Define linear equation.

Ans. It is an algebraic equation of following form:  $ax + b = 0$  where:  $a$  and  $b$  are constant and  $x$  is the variable and  $a \neq 0$ . The power of  $x$  must be one.

(vii) Solve for  $x$ :  $\frac{3x}{4} - 2 = \frac{x}{3} - 3$

Sol.

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

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

$$\frac{3(3x) - 4(x)}{12} = 5$$

$$9x - 4x = 5 \times 12$$

$$5x = 5 \times 12$$

$$x = 12$$

(viii) The sum of a number and its reciprocal is 20. Find the quadratic equation in standard form.

Sol. Let be a number  $= x$  and its reciprocal  $= \frac{1}{x}$

$$\text{sum} = x + \frac{1}{x} = 20$$

$$\frac{x^2 + 1}{x} = 20$$

$$x^2 + 1 = 20x$$

$$x^2 - 20x + 1 = 0$$

Which is required quadratic equation in standard form.



(ix) Solve  $5x^2 + 3x = 0$

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

**Q3. Write short answers to any Six parts.**

**6×2=12**

(i) Define 'Domain' of function  $y = f(x)$

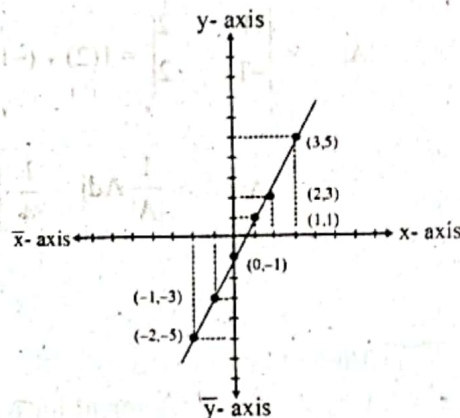
Ans. The set of all possible input value of the function is called domain of a function.

(ii) Draw the graph of  $f(x) = 2x - 1$ .

Sol.  $f(x) = 2x - 1$

x	y = f(x)
-2	-5
-1	-3
0	-1
1	1
2	3
3	5

Graph:



(iii) Convert 32 into binary number system.

Sol. 
$$\begin{array}{r|l} 2 & 32 \\ \hline 2 & 16 - 0 \\ 2 & 8 - 0 \\ 2 & 4 - 0 \\ 2 & 2 - 0 \\ & 1 - 0 \end{array}$$

$32 = (100000)_2$

(iv) Simplify  $(1110)_2 - (101)_2$

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

(v) Convert  $(101)_2$  into Decimal base system.

Sol.  $(101)_2 = 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 = 1 \times 4 + 0 + 1 = 4 + 0 + 1 = 5$

(vi) Define Column Matrix.

Ans. A matrix having single column but having any number of rows is called column matrix.

For example,

$\begin{bmatrix} 2 \\ 12 \end{bmatrix}$  is a  $2 \times 1$  column matrix.

(vii) If  $A = \begin{bmatrix} 2 & -1 \\ 2 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 2 \\ 1 & 1 \end{bmatrix}$  Find  $A+B$ .

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

Then  $A+B = \begin{bmatrix} 2 & -1 \\ 2 & 1 \end{bmatrix} + \begin{bmatrix} 1 & 2 \\ 1 & 1 \end{bmatrix} = \begin{bmatrix} 2+1 & -1+2 \\ 2+1 & 1+1 \end{bmatrix} = \begin{bmatrix} 3 & 1 \\ 3 & 2 \end{bmatrix}$

(viii) If  $A = \begin{bmatrix} 3 & 4 \\ 5 & 6 \end{bmatrix}$ , find  $\frac{1}{2}|A|$

Sol.  $|A| = \begin{vmatrix} 3 & 4 \\ 5 & 6 \end{vmatrix} = 3 \times 6 - 4 \times 5 = 18 - 20 = -2$

According to conditions,  $\frac{1}{2}|A| = \frac{1}{2}(-2) \Rightarrow \frac{1}{2}|A| = -1 \neq 0$

(ix) Find  $A^{-1}$ , if  $A = \begin{bmatrix} 1 & 2 \\ -1 & 2 \end{bmatrix}$ .

Sol. Given matrix:  $A = \begin{bmatrix} 1 & 2 \\ -1 & 2 \end{bmatrix}$

$|A| = \begin{vmatrix} 1 & 2 \\ -1 & 2 \end{vmatrix} = 1(2) - (-1 \times 2) = 2 - (-2) = 4$ ,  $\text{adj } A = \begin{bmatrix} 2 & -2 \\ 1 & 1 \end{bmatrix}$

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

## SECTION - II

**Note:** Attempt any TWO questions.

**Q4.** (a) Rs. 4000 are sufficient for a family of 4 members for 40 days. For how many days Rs. 15000 will be sufficient for a family of 5 members. (2×8=16)

Sol.

Rupees	Members	Days
4000	4	40
15000 (Increase)	5 (Increase)	x

$\Rightarrow \frac{x}{40} = \left(\frac{4}{5}\right) \times \left(\frac{15000}{4000}\right) = \left(\frac{4}{5}\right) \left(\frac{15}{4}\right)$

$\frac{x}{40} = 3 \Rightarrow x = 120 \text{ units}$

Which are required 120 days

(b) Compute compound interest on Rs. 5000 for  $6\frac{1}{2}$  years at  $2\frac{1}{2}\%$  compounded semi-annually.

Sol.

$p = \text{Rs. } 5000$

$r = 2\frac{1}{2}\% \text{ per annual} = \frac{5}{2}\% = 2.5\% \text{ per annual}$

$= 0.025 \text{ per annual}$

$= \frac{0.025}{2} \text{ per half annual}$

$= 0.0125 \text{ per half annual}$

$n = 6\frac{1}{2} \text{ years} = \frac{13}{2} \text{ years}$

$= \frac{13}{2} \times 2 \text{ half years}$

$n = 13 \text{ half years}$

$A = p(1+r)$

$= 5000 (1+0.0125)^{13}$

$= 5000 (1.1752) = 5876.32$

Compound Interest  $= C.I = A - P$

$= 5876.32 - 5000$

$= 876.32$

05. (a) If  $y = 3x - 6$  then find  $x$ -intercept and  $y$ -intercept and draw the graph.

Sol.  $y = 3x - 6$  (i)

Graph:

$X$ -intercept

For  $x$ -intercept put  $y = 0$  in (i)

$$0 = 3x - 6$$

$$3x = 6$$

$$x = 2$$

$$\Rightarrow (2, 0)$$

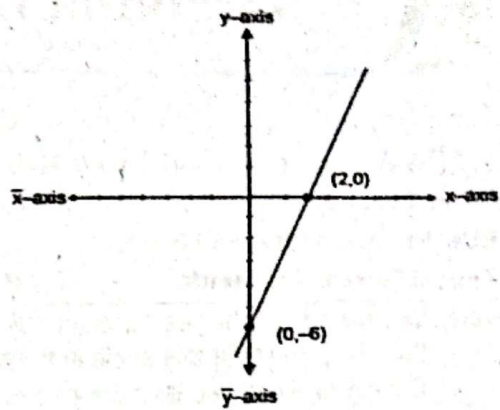
$Y$ -intercept

For  $y$ -intercept put  $x = 0$  in (i)

$$y = 3(0) - 6$$

$$y = -6$$

$$\Rightarrow (0, -6)$$



(b) Solve  $\frac{x+2}{x-3} + \frac{x-3}{x+2} = \frac{5}{2}$  for  $x \neq 3, -2$

Sol.  $\frac{x+2}{x-3} + \frac{x-3}{x+2} = \frac{5}{2}$

Take L.C.M on left side

$$\frac{(x+2)^2 + (x-3)^2}{(x-3)(x+2)} = \frac{5}{2}$$

$$\frac{x^2 + 4x + 4 + x^2 - 6x + 9}{x^2 + 2x - 3x - 6} = \frac{5}{2}$$

$$\frac{2x^2 - 2x + 13}{x^2 - x - 6} = \frac{5}{2}$$

By cross multiplication

$$2(2x^2 - 2x + 13) = 5(x^2 - x - 6)$$

$$4x^2 - 4x + 26 = 5x^2 - 5x - 30$$

$$4x^2 - 5x^2 - 4x + 5x + 26 + 30 = 0$$

$$-x^2 + x + 56 = 0$$

$$\Rightarrow x^2 - x - 56 = 0$$

By the method of factorization

$$x^2 - 8x + 7x - 56 = 0$$

$$x(x-8) + 7(x-8) = 0$$

$$(x-8)(x+7) = 0$$

$$x-8=0 \quad ; \quad x+7=0$$

$$x=8 \quad ; \quad x=-7$$

$$S.S = \{-7, 8\}$$

06. (a) Solve by Cramer's rule  $4x - y = 13$  ,  $3x - 2y = 6$

Sol. Given  $4x - y = 13$

$$3x - 2y = 6$$

The matrix form is

$$\begin{bmatrix} 4 & -1 \\ 3 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 13 \\ 6 \end{bmatrix}$$

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

By Cramer's rule

$$x = \frac{|A_x|}{|A|} = \frac{\begin{vmatrix} 13 & -1 \\ 6 & -2 \end{vmatrix}}{\begin{vmatrix} 4 & -1 \\ 3 & -2 \end{vmatrix}} = \frac{-26+6}{-8+3} = \frac{-20}{-5} = 4$$

$$y = \frac{|A_y|}{|A|} = \frac{\begin{vmatrix} 4 & 13 \\ 3 & 6 \end{vmatrix}}{\begin{vmatrix} 4 & -1 \\ 3 & -2 \end{vmatrix}} = \frac{84-39}{-8+3} = \frac{45}{-5} = -9$$

(b) Evaluate  $(100111)_2 \times (111)_2$

Sol.  $(100111)_2 \times (111)_2$

		(1	0	0	1	1	1) <sub>2</sub>
	x				(1	1	1) <sub>2</sub>
		1 <sup>1</sup>	0 <sup>2</sup>	0 <sup>2</sup>	1 <sup>1</sup>	1	1
		1 <sup>1</sup>	0	0	1	1	x
		1 <sup>1</sup>	0	0	1	1	x
		(1	0	0	0	1	0