Gujranwala Board 2023

Objective Type

Roll No. Candidate: _____

Business Mathematics (Intermediate Part-I, Class 11th (1st A-323-I) Paper I

Time : 15 Minutes Code = 6641 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 circle, Cutting or filling two or more circles will result in zero mark in that question.

Q1.

1. **What is the ratio between 128 kg and 16 kg?**
   (A) 8:1 (B) 9:1 (C) 28:6 (D) 64:16
2. **What percent of 300 is 30?**
   (A) 20% (B) 10% (C) 5% (D) 2%
3. **At what rate Rs 500 double itself in 1 year?**
   (A) 20% (B) 50% (C) 100% (D) 10%
4. **A linear function is of degree:**
   (A) 1 (B) 2 (C) 3 (D) 10
5. **If $5x + 60 = 0$ then $x = ?$**
   (A) -15 (B) -14 (C) -13 (D) -12
6. **The discriminant in quadratic formula is:**
   (A) $b^2 - ac$ (B) $\sqrt{b^2 - 4ad}$ (C) $\sqrt{4ac - b^2}$ (D) $b^2 - 4ac$
7. **In binary number system, 2 is equal to:**
   (A) $(10)_2$ (B) $(11)_2$ (C) $(101)_2$ (D) $(100)_2$
8. **What is the conversion of $\frac{14}{2}$ into binary number system?**
   (A) $(10)_2$ (B) $(111)_2$ (C) $(101)_2$ (D) $(100)_2$
9. **The determinant of an identity matrix is:**
   (A) -1 (B) 0 (C) 1 (D) 2
10. **If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ then adj A = :**
    (A) $\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$ (B) $\begin{bmatrix} d & c \\ b & a \end{bmatrix}$ (C) $\begin{bmatrix} a & c \\ b & d \end{bmatrix}$ (D) $\begin{bmatrix} -a & c \\ b & -d \end{bmatrix}$

Answers:

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

Subjective Type

Business Mathematics (Intermediate Part-I, Class 11th) 1st A323 Paper I

Time : 1:45 Hours Marks: 40

Note: Section-I is compulsory. Attempt any Two (2) questions from Section-II.

SECTION - I

Q2. **Write short answers to any SIX questions:** **(6×2=12)**

(i) **Divide Rs. 60,000 in the ratio 5:7**

Sol. Given ratio = 5 : 7

Sum of ratio = $5 + 7 = 12$

1st share = $\frac{5}{12} \times 60000 = 25000$, 2nd share = $\frac{7}{12} \times 60000 = 35000$

(ii) Find x from the proportion 8:2 :: x:40

Sol. $8 : 2 :: x : 40$

Product of means = Product of extremes

$(2)(x) = (8)(40)$

$2x = 320$

$x = 160$

(iii) Find the number whose 45% is 3000

Sol. So, using the formula of abc.

$$ab = 100c$$

$$45 \times b = 100 \times 3000 = 300000$$

$$b = \frac{300000}{45}$$

$$b = \text{Rs. } 6667$$

(iv) Find simple interest on Rs. 700 invested for three years at 6% per annum.

Sol. P = Rs. 700, I = 6% = 0.06, N = 3 years, S.I = ?

S.I = PIN = $700 \times 0.06 \times 3$ = Rs. 126

(v) The marked price of a ceiling fan is Rs. 3225 and the shopkeeper allows a discount of 6% on it. Find selling price of the fan.

Sol. Selling price = marked price – 6% of marked price

= Rs. 3225 – 6% of Rs. 3225 = Rs. 3225 – 6% (3225)

= Rs. 3225 – 0.06 (3225) = Rs. 3225 – Rs. 194 = Rs. 3031

(vi) Define linear equation and give an example.

Ans. It is an algebraic equation of the 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.

e.g. $x - 4 = 6$, $2x + 5 = 0$

(vii) Solve the linear equation $100 - 7[3x - 3(4 - 3)] = x$

Sol.

$$100 - 7[3x - 3(4 - 3)] = x$$

$$100 - 7[3x - 3(1)] = x$$

$$100 - 7[3x - 3] = x$$

$$100 - 21x + 21 = x$$

$$100 + 21 = 21x + x$$

$$21x + x = 100 + 21$$

$$22x = 121$$

$$2x = 11$$

$$x = \frac{11}{2}$$

(viii) Solve the equation by factorization $9x^2 - 6x - 8 = 0$

Sol.

$$9x^2 - 6x - 8 = 0$$

$$9x^2 - 12x + 6x - 8 = 0$$

$$3x(3x - 4) + 2(3x - 4) = 0$$

$$(3x - 4)(3x + 2) = 0$$

$3x - 4 = 0$; $3x + 2 = 0$

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

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

(ix) Write down solution set of the quadratic equation $ax^2 + bx + c = 0$

Sol. $$S.S = \left\{\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}\right\}$$

Q3 **Write short answers to any SIX questions:** **(6×2=12)**

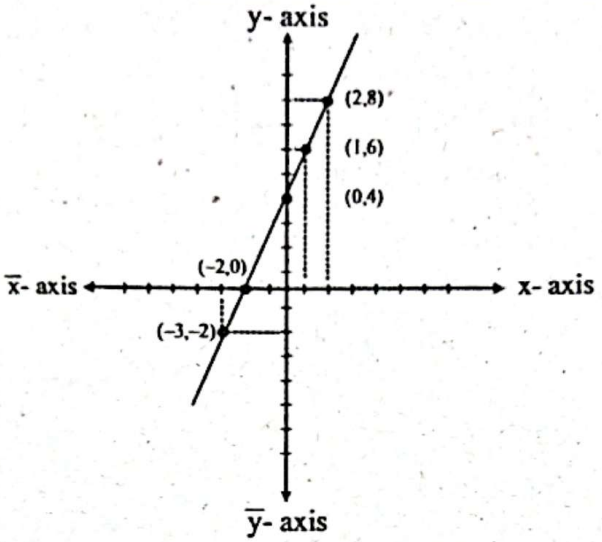
(i) **Define range of y=f(x)**

Ans. The range of a function is defined as the set of all definite output values.

(ii) **Draw the graph of f(x) = 2x + 4**

Sol. f(x) = 2x + 4

x	–3	–2	0	1	2
y = f(x)	–2	0	4	6	8



(iii) **Convert 63 into binary number system.**

Sol.

2	63
2	31 – 1
2	15 – 1
2	7 – 1
2	3 – 1
	1 – 1

So, $63 = (111111)_2$

(iv) **Simplify $(101)_2 \times (11)_2$**

Sol. $(101)_2 \times (11)_2 = (1111)_2$

$$\begin{array}{r} (101)_2 \\ \times (11)_2 \\ \hline 101 \\ 101\times \\ \hline (1111)_2 \end{array}$$

(v) **Convert $(1110)_2$ into decimal base system.**

Sol. $(1110)_2$

$= 1 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 0 \times 2^0$

$= 1 \times 8 + 1 \times 4 + 1 \times 2 + 0 = 8 + 4 + 2 = 14$

(vi) **Define row matrix.**

Ans. A matrix which have only one row is called a row matrix.

Example: $A = [2 \quad 3 \quad 4]$

(vii) **If $A = \begin{bmatrix} 3 & 1 \\ 2 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & -1 \\ 2 & 3 \end{bmatrix}$, Find A+B**

Sol. $A = \begin{bmatrix} 3 & 1 \\ 2 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & -1 \\ 2 & 3 \end{bmatrix}$

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

(viii) Find A^{-1}, if $A = \begin{bmatrix} -1 & 7 \\ 8 & 16 \end{bmatrix}$

Sol. $A = \begin{bmatrix} -1 & 7 \\ 8 & 16 \end{bmatrix}$

$$|A| = \begin{vmatrix} -1 & 7 \\ 8 & 16 \end{vmatrix} = -16 - 56 = -72$$

$$\text{Adj } A = \begin{bmatrix} 16 & -7 \\ -8 & -1 \end{bmatrix}$$

Now

$$A^{-1} = \frac{1}{|A|}(\text{Adj } A) = \frac{1}{-72}\begin{bmatrix} 16 & -7 \\ -8 & -1 \end{bmatrix} = \begin{bmatrix} \frac{16}{-72} & \frac{-7}{-72} \\ \frac{-8}{-72} & \frac{-1}{-72} \end{bmatrix} = \begin{bmatrix} -\frac{2}{9} & \frac{7}{72} \\ \frac{1}{9} & \frac{1}{72} \end{bmatrix}$$

(ix) If $A = \begin{bmatrix} 2 & -1 \\ 3 & 5 \end{bmatrix}$, find $|A^t|$

Sol. $A = \begin{bmatrix} 2 & -1 \\ 3 & 5 \end{bmatrix}$

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

$$|A^t| = \begin{vmatrix} 2 & 3 \\ -1 & 5 \end{vmatrix} = (2)(5) - (3)(-1) = 10 + 3 = 13$$

SECTION - II

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

Q4 (a) A production manager plans to produce 100 units with the help of 25 workers who work 4 hours a day. How many units, 40 workers can make it, they work 3 hours per day? 4

Sol. Let x be the required units by compound proportion

Workers	:	Daily working hours	:	Units
25		4		100
(increase) 40		3 (decrease)		x (increase

$$\Rightarrow \quad \frac{x}{100} = \frac{3}{4} \times \frac{40}{25}$$

$$x = \frac{100 \times 3 \times 40}{4 \times 25} = \frac{12000}{100}$$

$$x = 120 \text{ units}$$

(b) Rs. 55,00 are invested at 8% per annum. Interest is compounded semi-annually for 5 years. Calculate compound interest. 4

Sol. $P = \text{Rs. } 5500$

$i = 8\%$ per annum $= \frac{8\%}{2}$ semi-annually

$= 4\% = 0.04$ semi-annually

$n = 5$ years

$= 5 \times 2 = 10$ semi-years

As $A = p(1 + i)^n = 5500\ (1+0.04)^{10}$

$= 5500(0.04)^{10} = 5500\ (1.4802)$

$= 8141.34$

Compound Interest $= C.I = A - P = 8141.34 - 5500$

$= 2641.34$

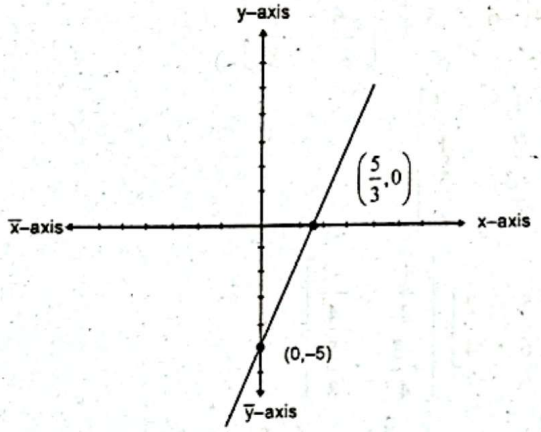
Q5 (a) Draw the graph of $y = 3x - 5$ 4

Sol. $y = 3x - 5$ _____ (i)

As we know that the graph of linear function is a straight line and above given function is linear. So its graph will be a straight line and we can draw straight line by taking two points only. The most suitable two points are inercepts form.

X – Intercept	Y – intercept
put $y = o$ in (i)	put $x = 0$ in (i)
$0 = 3x - 5$	$y = 3(0) - 5$
$3x = 5$	
$x = \frac{5}{3}$	$y = 0 - 5$
So $\left(\frac{5}{3}, 0\right)$	$y = -5$
	So $(0, -5)$

Graph:



(b) Solve $x^2 + 5x - 89 = 0$ by completing square. 4

Sol. $x^2 + 5x - 89 = 0$

$x^2 + 5x = 89$

Add $\left(\frac{5}{2}\right)^2 = 89 + \left(\frac{5}{2}\right)^2$

$\left(x + \frac{5}{2}\right)^2 = 89 + \frac{25}{4}$

$\left(x + \frac{5}{2}\right)^2 = \frac{356 + 25}{4}$

$\left(x + \frac{5}{2}\right)^2 = \frac{381}{4}$

Tacking square root on both side

$\sqrt{\left(x + \frac{5}{2}\right)^2} = \sqrt{\frac{381}{4}}$

$\left(x + \frac{5}{2}\right) = \pm\frac{\sqrt{381}}{2}$

$x = -\frac{5}{2} \pm \frac{\sqrt{381}}{2}$

$x = \frac{-5 \pm \sqrt{380}}{2}$

$S.S = \left\{\frac{-5 \pm \sqrt{381}}{2}\right\}$

Q6. (a) If $A=\begin{bmatrix}5 & 2\\ 6 & 4\end{bmatrix}$ find A^{-1} and prove that $AA^{-1}=1$ 4

Sol. $A=\begin{bmatrix}5 & 2\\ 6 & 4\end{bmatrix}$

$$|A|=\begin{vmatrix}5 & 2\\ 6 & 4\end{vmatrix}=20-12=8$$

$$\text{Adj } A=\begin{bmatrix}4 & -2\\ -6 & 5\end{bmatrix}$$

$$A^{-1}=\frac{1}{|A|}\text{adj}A$$

$$=\frac{1}{8}\begin{bmatrix}4 & -2\\ -6 & 5\end{bmatrix}=\begin{bmatrix}\frac{4}{8} & \frac{-2}{8}\\ \frac{-6}{8} & \frac{5}{8}\end{bmatrix}$$

$$A^{-1}=\begin{bmatrix}\frac{1}{2} & \frac{-1}{4}\\ \frac{-3}{4} & \frac{5}{8}\end{bmatrix}$$

Now $$AA^{-1}=\begin{bmatrix}5 & 2\\ 6 & 4\end{bmatrix}\begin{bmatrix}\frac{1}{2} & \frac{-1}{4}\\ \frac{-3}{4} & \frac{5}{8}\end{bmatrix}$$

$$=\begin{bmatrix}5\times\frac{1}{2}+2\left(-\frac{3}{4}\right) & 5\left(\frac{-1}{4}\right)+2\left(\frac{5}{8}\right)\\ 6\left(\frac{1}{2}\right)+4\left(\frac{-3}{4}\right) & 6\left(-\frac{1}{4}\right)+4\left(\frac{5}{8}\right)\end{bmatrix}$$

$$=\begin{bmatrix}\frac{5}{2}-\frac{3}{2} & -\frac{5}{4}+\frac{5}{4}\\ 3-3 & -\frac{3}{2}+\frac{5}{2}\end{bmatrix}$$

$$=\begin{bmatrix}\frac{5-3}{2} & 0\\ 0 & \frac{-3+5}{2}\end{bmatrix}=\begin{bmatrix}\frac{2}{2} & 0\\ 0 & \frac{2}{2}\end{bmatrix}$$

$$=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}=I_2$$

$$AA^{-1}=I_2$$

(b) Simplify $[(111011)_2\times(110001)_2]-(20)_{10}$ 4

Sol. $[(111011)_2\times(110001)_2]-(20)_{10}$

$$(111011)_2=1\times2^5+1\times2^4+1\times2^3+0\times2^2+1\times2^1+1\times2^0$$
$$=32+16+8+0+2+1$$
$$=59$$

$$(110001)_2=1\times2^5+1\times2^4+0\times2^3+0\times2^2+0\times2^1+1\times2^0$$
$$=32+16+0+0+0+1$$
$$=49$$

Now $[(111011)_2\times(110001)_2]-(20)_{10}=[59\times49]-20$
$=2891-20 \quad =2871$