Multan Board 2023

Objective Type

Paper Code Number: 2645 | 2023 (1st-A) | Roll No: _____

INTERMEDIATE PART - I (11th CLASS)

BUSINESS MATHEMATICS PAPER- I

TIME ALLOWED: 15 Minutes 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 bubble in front of that question number on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question.

Q1.

Sr.	Questions	(A)	(B)	(C)	(D)
1	The graph of a linear function is:	Parabola	Straight line	Circle	Curve
2	The quadratic formula for $ax^2+bx+c=0$:	$\frac{-b\pm\sqrt{b^2-4ac}}{2a}$	$\frac{-b\pm\sqrt{c^2-4ac}}{2a}$	$\frac{-b\pm\sqrt{b^2-4bc}}{2a}$	$\frac{-b\pm(b^2-4ac)^2}{2a}$
3	A binary number $(101)_2$, in decimal number system is equal to:	4	5	6	3
4	$(101)_2+(11)_2$ is equal to :	$(101)_2$	$(111)_2$	$(110)_2$	$(1000)_2$
5	If $A=\begin{bmatrix}1&2&4\\3&1&0\end{bmatrix}$ then order of A^t will be:	3×2	2×3	3×3	2×2
6	Inverse of the matrix will be possible if the matrix is:	Singular	Null matrix	Non-singular	Row matrix
7	The missing term x in the proportion x : 5 :: 15 : 25 is:	3	5	15	25
8	What percent Rs. 50 is of Rs. 250?	5%	50%	10%	20%
9	In which case more interest is earned if interest rate is compounded?	Annully	Monthly	Quarterly	Semi-annually
10	A cubic function is of degree:	2	1	3	0

Answers:

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

Subjective Type

INTERMEDIATE PART - I (11th CLASS) 2023 (1st- A) Roll No. _____

BUSINESS MATHEMATICS TIME ALLOWED: 1.45 Hours

PART-I MAXIMUM MARKS: 40

NOTE: Write same question number and its parts number on answer book, as given in the question paper.

SECTION - I

Q2. Attempt any six parts. 6×2=12

(i) **Define Ratio with example.**

Ans. The relation of two homogenous quantities usually expressed in a similar units is called ratio.
e.g., 3.5kg : 7.5kg

(ii) **Define Proportion.**

Ans. Proportion is the equality of two ratios. The first and last terms are called extremes, while two middle terms are called means. In every proportion product of extremes is always equal to product of means.

(iii) **300 is what percentage of 1000.**

Sol. Required percentage $= \frac{300}{1000} \times 100\% = 0.3 \times 100\% = 30\%$

(iv) **Find the simple interest on Rs. 5000 for 10 years at 8% per annum.**

Sol. Principal amount (P) = 5000, Interest rate (I) $= \frac{8}{100} = 0.08$, N = 10 years

S.I $= PIN = 5000 \times 0.08 \times 10 = 4000$

(v) **Write the formula of compound interest.**

Sol. Compound interest $= P[(1 + i)^n - 1]$

(vi) **Solve for x : $2x + 20 - 5x = x - 6 + 9x$**

Sol.
$$2x + 20 - 5x = x - 6 + 9x$$
$$-3x + 20 = 10x - 6$$
$$-3x - 10x = -6 - 20$$
$$x = 2$$

(vii) **Solve the equation $x + 2[3x + 8] - 7 = 16$**

Sol.
$$x + 2[3x + 8] - 7 = 16$$
$$x + 6x + 16 - 7 = 16$$
$$7x + 9 = 16$$
$$7x = 16 - 9$$
$$7x = 7$$
$$x = 1$$

(viii) **Solve $9x^2 = 81$**

Sol.
$$9x^2 = 81$$
$$x^2 = 9$$
$$\sqrt{x^2} = \sqrt{9}$$
$$x = \pm 3$$

(ix) **Solve by factorization $x^2 + 9x + 18 = 0$**

Sol.
$$x^2 + 9x + 18 = 0$$
$$x^2 + 6x + 3x + 18 = 0$$
$$x(x + 6) + 3(x + 6) = 0$$
$$(x + 6)(x + 3) = 0$$
$$x + 6 = 0 \quad ; \quad x + 3 = 0$$
$$x = -6 \quad ; \quad x = -3$$

S.S = {–3, –6}

Q3 Attempt any six parts. **6×2=12**

(i) **Differentiate between Even and Odd function.**

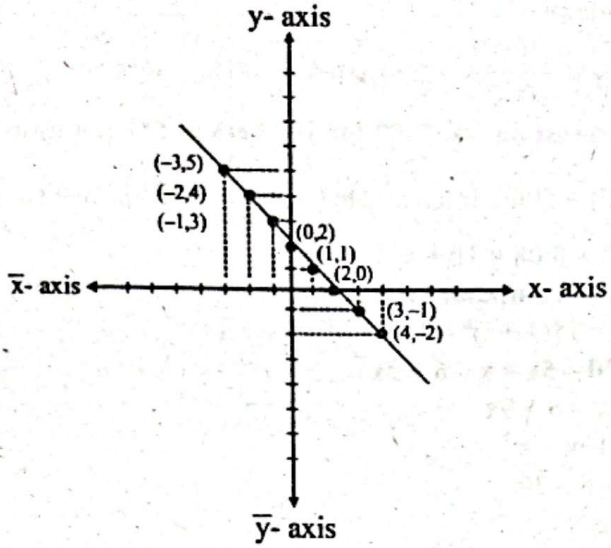
Sol.

Even function	Odd function
A function is said to be even if $f(-x) = f(x)$	A function is said to be odd if $f(-x) = -f(x)$
Example: $f(x) = x^2$ $f(-x) = (-x)^2 = x^2$ $f(-x) = x^2$ $f(-x) = f(x)$	**Example:** $f(x) = x^3$ $f(-x) = (-x)^3 = -x^3$ $f(-x) = -f(x)$

(ii) **Draw the graph of linear equation $\frac{x}{2} + \frac{y}{4} = 1$**

Sol.
$$\frac{x}{2} + \frac{y}{2} = 1$$
$$\frac{x + y}{2} = 1$$
$$x + y = 2$$
$$y = 2 - x$$

x	–3	–2	–1	0	1	2	3	4
y	5	4	3	2	1	0	–1	–2



(iii) Convert 35 into binary system.

Sol.

2	35
2	17 – 1
2	8 – 1
2	4 – 0
2	2 – 0
	1 – 0

So, $35 = (100011)_2$

(iv) Convert $(10001)_2$ into decimal number.

Sol. $(10001)_2$

$= 1 \times 2^4 + 0 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$

$= 1 \times 16 + 0 \times 8 + 0 \times 4 + 0 \times 2 + 1 \times 1 = 16 + 0 + 0 + 0 + 1 = 17$

(v) Solve $(10000) - (1011)_2$

Sol.

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

$= (101)_2$

(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 2×1 column matrix.

(vii) Find AB if $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 2 \\ 4 \end{bmatrix}$

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

$$AB = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}\begin{bmatrix} 2 \\ 4 \end{bmatrix} = \begin{bmatrix} 1\times2+2\times4 \\ 3\times2+4\times4 \end{bmatrix} = \begin{bmatrix} 2+8 \\ 6+16 \end{bmatrix} = \begin{bmatrix} 10 \\ 22 \end{bmatrix}$$

(viii) Find $|A|$ if $A = \begin{bmatrix} 1 & 5 \\ 3 & 2 \end{bmatrix}$

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

$$|A| = \begin{vmatrix} 1 & 5 \\ 3 & 2 \end{vmatrix}$$

$= (1)(2) - (3)(5) = 2 - 15 = -13$

(ix) **Find B–A if** $A=\begin{bmatrix}1 & 2\\ 3 & 2\end{bmatrix}$, $B=\begin{bmatrix}-3 & -2\\ 4 & 2\end{bmatrix}$

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

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

SECTION - II

NOTE **Attempt any TWO questions.** **2×8=16**

Q4 **(a) 15 men can finish a job in 8 days. How many men are required to do the same job in 5 days?** **4**

Sol. Let x be the required no. of men. Place the given information in the form of table.

Men		Days
↓ 15	:	↑ 8
x	:	5

By proportion method $15 : x :: 5 : 8$

Product of extremes = Product of means

$(15)(8) = (x)(5)$

$120 = 5x$

$x = 24$

Thus 24 men are required.

(b) Calculate compound interest when Rs. 750 invested for 8 years at 12% per annum. **4**

Sol. It is given that principal

P = Rs. 750

i = 12% per annually

$= \frac{12}{100}$ = per annually

= 0.12 per annually

As Time = $n = 8$ years

$A = P(1+i)^n$

$= 750(1+0.12)$

$= 750(2.4759)$

$= 1856.97$

Compound Interest = C.I = A – P

$= 1856.97 - 750$

$= 1106.97$

Q5 **(a) If $f(x) = ax + 12$ and $f(-3) = 0$ then find the value of 'a'.** **4**

Sol. Given that

$f(x) = ax + 12$ and $f(-3) = 0$

As $f(x) = ax + 12$

put $x = -3$

$f(-3) = a(-3) + 12$

$0 = -3a + 12$

$-12 = -3a$

$a = 4$

(b) Solve the equation $\frac{1}{x} - \frac{1}{x-2} = 3$ $x \neq 0, 2$ by using quadratic formula. **4**

Sol. $\frac{1}{x} - \frac{1}{x-2} = 3, x \neq 0, 2$

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

$$\cancel{x}-2-\cancel{x} = 3[x(x-2)]$$

$$-2 = 3[x^2-2x]$$

$$-2 = 3x^2 - 6x$$

$$0 = 3x^2 - 6x + 2$$

$$\Rightarrow \quad 3x^2 - 6x + 2 = 0$$

Here comparing it with $ax^2 + by + c = 0$

$$a = 3, \quad b = -6, \quad c = 2$$

By quadratic formula

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

Putting values of a,b and c

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(3)(2)}}{2(3)}$$

$$= \frac{6 \pm \sqrt{36-24}}{6} = \frac{6 \pm \sqrt{12}}{6}$$

$$= \frac{6 \pm \sqrt{4 \times 3}}{6} = \frac{3 \pm \sqrt{3}}{3}$$

$$S.S = \left\{\frac{3 \pm \sqrt{3}}{3}\right\}$$

Q6. (a) Solve the system by Crammer's rule. $2x + 3y = 5, x + 2y = 3$ 4

Sol. The given system of linear equation are

$$2x + 3y = 5$$

$$x + 2y = 3$$

The matrix formis

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

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

Then according to cramer rule

$$x = \frac{|A_x|}{|A|} = \frac{\begin{vmatrix} 5 & 3 \\ 3 & 2 \end{vmatrix}}{\begin{vmatrix} 2 & 3 \\ 1 & 2 \end{vmatrix}} = \frac{(10-9)}{(4-3)}$$

$$= \frac{1}{1} = 1$$

And $$y = \frac{|A_y|}{|A|} = \frac{\begin{vmatrix} 2 & 5 \\ 1 & 3 \end{vmatrix}}{\begin{vmatrix} 2 & 3 \\ 1 & 2 \end{vmatrix}} = \frac{(6-5)}{(4-3)}$$

$$= \frac{1}{1} = 1$$

(b) Simplify $(11111)_2 - [(1011)_2 + (1111)_2]$ 4

Sol. $(11111)_2 - [(1011)_2 + (1111)_2]$

$= (11111)_2 - (11010)_2$

$= (00101)_2$

$= (101)_2$

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

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