Multan Board 2024

Objective Type

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	21 in binary number system is:	$(1011)_2$	$(10111)_2$	$(10001)_2$	$(10101)_2$
2	$(1101)_2 \times (10)_2 = $ ____	$(11010)_2$	$(10110)_2$	$(10011)_2$	$(101011)_2$
3	The value of λ if $A = \begin{bmatrix} \lambda & 4 \\ 3 & 2 \end{bmatrix}$ is singular.	$\lambda = 2$	$\lambda = 4$	$\lambda = 6$	$\lambda = 8$
4	If $A = \begin{bmatrix} -1 & -2 \\ 3 & 4 \end{bmatrix}$ then Adjoint of A is:	$\begin{bmatrix} 3 & 4 \\ -1 & -2 \end{bmatrix}$	$\begin{bmatrix} 4 & 2 \\ -3 & -1 \end{bmatrix}$	$\begin{bmatrix} -4 & -2 \\ 3 & 1 \end{bmatrix}$	$\begin{bmatrix} 4 & 2 \\ -3 & 1 \end{bmatrix}$
5	The ratio between 3.5kg and 10.5kg is:	$1:8$	$1:3$	$1:21$	$3:4$
6	Using fundamental principle of proportion, what is value of x in $12:x::28:21$	12	10	9	16
7	The simple interest on a loan of Rs.3000 for 2 years at 7% is:	Rs.220	Rs.320	Rs.520	Rs.420
8	if $f(x) = x^2 - 4$, then $f(-2)$ is equal to:	0	4	-4	8
9	If 5 times a number of 190, then the number will be:	40	39	38	36
10	The solution set of the equation $2x^2 + 11x + 5 = 0$ is:	$\left\{\frac{1}{2}, 5\right\}$	$\left\{-\frac{1}{2}, -5\right\}$	$\{1, 5\}$	$\{-1, -5\}$

Answers:

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

Subjective Type

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

SECTION - I

$6 \times 2 = 12$

Q2 Attempt any six parts.

(i) If 15 dozens of eggs cost Rs.600. How much will cost 5 dozens of eggs?

Sol. Place the given value in the form of table.

Eggs(dozens)   Cost (Rs)

↑ 15   ↑ 600

5   x(say)

By proportion $5 : 15 :: x : 600$

Product of extremes = Product of extremes
$$(15)(x) = (600)(5)$$
$$x = \frac{(600)(5)}{15} \quad \Rightarrow \quad x = 200$$

So, the cost of 5 dozen eggs is 200.

(ii) **The ratio of boys and girls in a school is 9 : 5. If total number of students is 1050. Find the number of boys.**

Sol. Ratio of boys and girls = 9 : 5

Total number os students = 1050

Let: Number of boys = 9x

And Number of girls = 5x

According to given condition
$$9x + 5x = 1050$$
$$14x = 1050$$
$$x = \frac{1050}{14} = 75$$

So, number of boys in school are = 9x = 9 (75) = 675

(iii) **Calculate Zakat on amount of Rs.2500000?**

Sol.
$$\text{Totl amount} = Rs.2500,000$$
$$\text{Rate of zakat} = 2\frac{1}{2}\% = 2.5\% = 0.025$$
$$\text{Zakat} = 25,00,000 \times 0.025$$
$$\text{Zakat} = 62500$$

(iv) **Define Annuity due.**

Ans. An annuity is considered as to be annuity due if every payment is made at the beginning of each payment period and continues for a definite period. This annuity is also called beginning mode annuity.

(v) **Solve** $\dfrac{3x+2}{4} = \dfrac{2x+6}{5}$

Sol. $5(3x + 2) = 4(2x + 6) \quad \Rightarrow \quad 15x + 10 = 8x + 24$
$$15x - 8x = 24 - 10 \quad \Rightarrow \quad 7x = 14 \quad \Rightarrow \quad x = \frac{14}{7} = 2$$

(vi) **Find the domain and range of** $y = 2x + 3$

Sol. $y = 2x + 3$

As the given function can be defined for all value of real numbers

So, Domain = set of real number
$$= OR$$
$$= \mathbb{R}$$
Range = set of real number
OR
$$\mathbb{R}$$

(vii) **Solve by factorization** $4x^2 + 4x - 3 = 0$

Sol.
$$4x^2 + 4x - 3 = 0$$
$$4x^2 + 6x - 2x - 3 = 0$$
$$2x (x + 3) - 1 (x + 3) = 0$$
$$(x + 3)(2x - 1) = 0$$
$$x + 3 = 0 \quad ; \quad 2x - 1 = 0$$
$$x = -3 \quad ; \quad 2x = 1$$
$$; \quad x = \frac{1}{2}$$
$$S.S = \left\{-3, \frac{1}{2}\right\}$$

(viii) Find the discriminate of $4x^2 - 13x + 3 = 0$

Sol. $4x^2 - 13x + 3 = 0 \Rightarrow a = 4, b = -13, c = 3$

Discriminant $= b^2 - 4ac = (-13)^2 - 4(4)(3) = 169 - 48 = 121$

(ix) What is the simple interest on Rs.180000 for two years at 5%?

Sol. Given the

$\qquad P = \text{Rs. } 180000$

$\qquad N = 2 \text{ years}$

$\qquad I = 5\% = 0.05$

$\qquad \text{Simple Interest} = \text{S.I} = PIN$

$\qquad = (180000)(0.05)(2)$

$\qquad \text{S.I} = \text{Rs. } 18000$

Q3 Attempt any six parts. $\qquad 6 \times 2 = 12$

(i) Define odd function.

Ans. A function is called an odd function if $f(-x) = -f(x)$

Example: $f(x) = x^3$

(ii) If $f(x) = \dfrac{x^2 + 3x - 2}{x + 4}$, find $f(0)$

Sol.

$\qquad f(x) = \dfrac{x^2 + 3x - 2}{x + 4}$

$\qquad \text{put } x = 0$

$\qquad f(0) = \dfrac{(0)^2 + 3(0) - 2}{0 + 4}$

$\qquad = \dfrac{0 + 0 - 2}{4} = \dfrac{-2}{4}$

$\qquad f(0) = \dfrac{-1}{2}$

(iii) Convert $(35)_{10}$ into binary system.

Sol.

$$
\begin{array}{c|c}
2 & 35 \\
\hline
2 & 17 - 1 \\
\hline
2 & 8 - 1 \\
\hline
2 & 4 - 0 \\
\hline
2 & 2 - 0 \\
\hline
& 1 - 0
\end{array}
$$

So, $35 = (100011)_2$

(iv) Convert $(1011)_2$ into decimal system.

Sol. $(1011)_2$

$= 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0 = 1 \times 8 + 0 \times 4 + 1 \times 2 + 1 \times 1 = 8 + 0 + 2 + 1 = 11$

(v) Simplify $(1011)_2 - (1000)_2$

Sol.

$$
\begin{array}{r}
(1011)_2 \\
- \quad (1000)_2 \\
\hline
(0011)_2
\end{array}
$$

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

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

$AB = \begin{bmatrix} 2 & 1 \\ 3 & 1 \end{bmatrix}\begin{bmatrix} 2 \\ 1 \end{bmatrix} = \begin{bmatrix} 4 + 1 \\ 6 + 1 \end{bmatrix} = \begin{bmatrix} 5 \\ 7 \end{bmatrix}$

(vii) Define rectangular matrix.

Ans. A rectangular matrix is a matrix in which number of rows is not equal to number of columns.

e.g. $\begin{bmatrix} 1 & 2 & 1 \\ 0 & 1 & 3 \end{bmatrix}$

(viii) Find the value of x if $A = \begin{bmatrix} 2 & 1 \\ 3 & x \end{bmatrix}$ is singular.

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

If A is singular

So $|A| = 0$

$$\begin{vmatrix} 2 & 1 \\ 3 & x \end{vmatrix} = 0 \Rightarrow 2x - 3 = 0$$

$$2x = 3 \qquad \Rightarrow x = \frac{3}{2}$$

(ix) If $A = \begin{bmatrix} 4 & -4 \\ 6 & -5 \end{bmatrix}$, then find $|A|$ and Adj A.

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

$$|A| = \begin{vmatrix} 4 & -4 \\ 6 & -5 \end{vmatrix} = -20 + 24 = 4$$

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

SECTION - II

NOTE Attempt any TWO questions. $\qquad\qquad 2 \times 8 = 16$

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

Sol.

	Men		Days
↓	15	:	↑ 8
	x(say)	:	5

By proportion $\qquad\qquad 15 : x :: 5 : 8$

$\Rightarrow \qquad\qquad 5x = 8 \times 15$

$$x = \frac{8 \times 15}{5} = 24$$

(b) Find the compound interest if Rs. 10000 loaned for 5 years @ 8% per annum. $\qquad$ 4

Sol. Given that $\quad$ Principal $= P = $ Rs. 10000

$\qquad\qquad\qquad\qquad n = 5$ years

$\qquad\quad$ Interest Rate $= i = 8\%$ per annum

$\qquad\qquad\qquad\qquad r = 0.08$ per annum

As $\quad$ Compound Interest $=$ C.I $= p(1 + i)^n - P$

$\qquad\qquad\qquad = 10000 (1 + 0.08)^5 - 10000 = 14693.28 - 10000$

$\qquad\qquad\qquad = $ Rs. 4693.28

05 (a) Draw the graph of $y = x^2$ $\qquad$ 4

Sol. $y = x^2$

x	3	2	1	0	-1	-2	-3
$y = x^2$	9	4	1	0	1	4	9
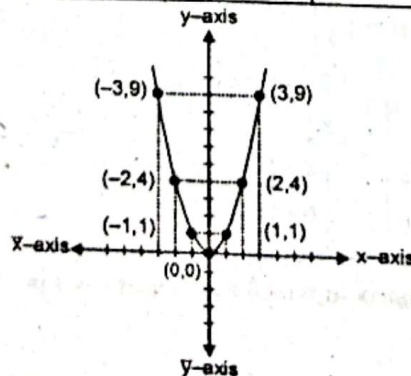
(b) Solve the equation by using quadratic formula $x^2 - 3\left(x + \dfrac{25}{12}\right) = 9x$ **4**

Sol.

$$x^2 - 3\left(x + \frac{25}{12}\right) = 9x$$

$$x^2 - 3x - 3\left(\frac{25}{12}\right) = 9x$$

$$x^2 - 3x - \frac{25}{4} = 9x$$

$$x^2 - 3x - 9x - \frac{25}{4} = 0$$

$$x^2 - 12x - \frac{25}{4} = 0$$

$$4x^2 - 48x - 25 = 0$$

Here $a = 4, \; b = -48, \quad c = -25$

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

$$= \frac{-(-48) \pm \sqrt{(-48)^2 - 4(4)(-25)}}{2(4)}$$

$$= \frac{48 \pm \sqrt{2304 + 400}}{8} = \frac{48 \pm \sqrt{2704}}{8} = \frac{48 \pm 52}{8}$$

$$x = \frac{48 + 52}{8} \qquad ; \qquad x = \frac{48 - 52}{8}$$

$$x = \frac{100}{8} \qquad ; \qquad x = \frac{-4}{8}$$

$$x = \frac{25}{2} \qquad ; \qquad x = \frac{-1}{2}$$

$$\text{S.S} = \left\{\frac{-1}{2}, \frac{25}{2}\right\}$$

06. **(a)** Simplify $\{(100111)_2 + (10101)_2\} - (10111)_2$ **4**

Sol. $[(100111)_2 + (10101)_2] - (10111)_2$

$$= (111100)_2 - (10111)_2$$

$$= (100101)_2$$

	(1	0	0'	1'	1'	1)₂			(1	1	1	1	0	0)₂
+		(1	0	1	0	1)₂		−		(1	0	1	1	1)₂
	(1	1	1	1	0	0)₂			(1	0	0	1	0	1)₂

(b) If $\begin{bmatrix} 1 & 5 \\ 3 & y \end{bmatrix}\begin{bmatrix} z \\ 7 \end{bmatrix} = \begin{bmatrix} 35 \\ 14 \end{bmatrix}$ Find y and z.   **4**

Sol.

$$\begin{bmatrix} 1 & 5 \\ 3 & y \end{bmatrix}\begin{bmatrix} z \\ 7 \end{bmatrix} = \begin{bmatrix} 35 \\ 14 \end{bmatrix}$$

$$\begin{bmatrix} z + 35 \\ 3z + 7y \end{bmatrix} = \begin{bmatrix} 35 \\ 14 \end{bmatrix}$$

By definition of equal matrix

$$z + 35 = 35 \underline{\qquad}(i)$$

$$3z + 7y = 14 \underline{\qquad}(ii)$$

From (i) $z = 35 - 35 = 0$

$$z = 0 \text{ putin (ii)}$$

$$3(0) + 7y = 14$$

$$7y = 14 \Rightarrow y = 2$$