Dera Ghazi Khan Board 2024

Objective Type

BUSINESS MATHEMATICS **11th CLASS - 1st Annual 2024** **PAPER CODE - 6641**

TIME: 15 MINUTES **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.

Q1.

No	Questions	A	B	C	D
1.	18 to 30 is same as:	3 : 4	3 : 5	6 : 7	6 : 9
2.	The price of 12 apples is Rs. 50. What is the price of 24 apples?	100	60	70	80
3.	The money borrowed is called:	Amount	Principal	Interest	Future value
4.	A cubic function has degree:	2	1	0	3
5.	The standard form of linear equation is:	$a - bx = 0$	$ac + bd = 0$	$ax + b = 0$	$ax - b = 0$
6.	Solution set of equation $x2 - 5x + 6 = 0$	{2 , 3}	{–2 , –3}	{–2 , 3}	{2 , –3}
7.	The order of the matrix $\begin{bmatrix} 2 & 1 & 5 \\ 3 & 4 & 9 \end{bmatrix}$ is:	2 × 3	2 × 4	3 × 5	4 × 2
8.	Identity matrix is also called:	Infinite matrix	Finite matrix	Zero matrix	Unit matrix
9.	Convert $(111)_2$ in decimal system:	7	9	11	13
10.	$(11)_2 \times (10)_2 =$	$(11)_2$	$(101)_2$	$(110)_2$	$(1101)_2$

Answers:

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

Subjective Type

11th CLASS- 1st Annual 2024

BUSINESS MATHEMATICS

Time: 1.45 Hours **SECTION - I** **Marks: 40**

Q2. **Write short answers of any Six (6) parts of the following.** **6 × 2=12**

(i) **Express in reduced form ; 24 : 64**

Sol. 24 : 64

$12 : 32 \Rightarrow 6 : 16 \Rightarrow 3 : 8$

(ii) **Find x if 14 : 19 : : x : 38 using its equation form.**

Sol. $\frac{14}{19} = \frac{x}{38}$

$14 \times 38 = 19x \Rightarrow x = \frac{14 \times 38}{19} = 28$

(iii) **25% of what number is 200?**

Sol. Here $a = 25$, $b = ?$, $c = 200$

As $ab = 100c$

$(25)(b) = 100(200)$

$25b = 20000$

$b = \frac{20000}{25}$

$b = 800$

(iv) Find the simple interest on Rs. 800 for three years at 5%.

Sol.

$$P = \text{Rs. } 800$$
$$I = 5\% = 0.05$$
$$N = 3 \text{ years}$$
$$\text{As Simple Interest (S.I)} = PIN$$
$$= (800)(0.05)(3)$$
$$S.I = \text{Rs. } 120$$

(v) A watch was sold for Rs. 850 on 5% loss. Find the original cost of watch.

Sol. we are given:

$$\text{Selling price (S)} = \text{Rs. } 850$$
$$\text{Rate of loss (R')} = 5\%$$

As, to find cost

$$\text{Markdow} = R' = \left[\frac{C-S}{C} \times 100\right]\%$$

$$R' = \left[\frac{C-S}{C} \times 100\right]\%$$

$$5\% = \left[\frac{C-S}{C} \times 100\right]\%$$

$$\Rightarrow \quad 5 = \frac{C-S}{C} \times 100$$

$$\Rightarrow \quad \frac{5}{100} = \frac{C-850}{C}$$

$$0.05c = C - 850$$
$$850 = 0.95c$$
$$C = \frac{850}{0.95}$$
$$\text{Cost} = C = 894.74$$

Therefore the origional cast of the watch was 894.74

(vi) Find the Domain and Range of $y = 2x + 1$

Sol.

$$y = 2x + 1$$

As the given linear function is defined for values of real numbers

So Domain = set of real numbers

OR

$= \mathbb{R}$

Range = set of real numbers

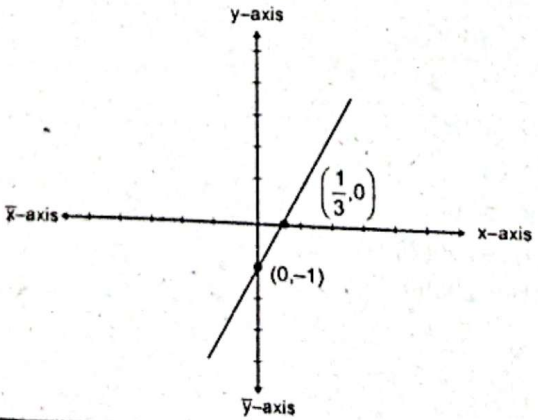
Or

$\mathbb{R}$

(vii) Draw the graph of $y = 3x - 1$

Sol. Given $y = 3x - 1$

The given linear function has x-intercept is $\left(\frac{1}{3}, 0\right)$ and y-intercept is $(0, -1)$, So graph is



(viii) **Solve $x^2 + x - 6 = 0$ by factorization.**

Sol. $x^2 + x - 6 = 0 \Rightarrow x^2 - 2x + 3x - 6 = 0 \Rightarrow x(x-2) + 3(x-2) = 0$

$(x+3)(x-2) = 0 \Rightarrow x+3 = 0 \ , \ x-2 = 0 \Rightarrow x = -3 \ , \ x = 2 \Rightarrow S.S = \{(2, -3)\}$

(ix) **If $f(x) = x^2 - 1$, then find $f(\sqrt{3})$ and $f(\sqrt{2})$**

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

put $x = \sqrt{3}$; $f(\sqrt{3}) = (\sqrt{3})^2 - 1 = 3 - 1 = 2$

put $x = \sqrt{2}$; $f(\sqrt{2}) = f(\sqrt{2})^2 - 1 = 2 - 1$

$= 1$

Q3. Write short answers of any Six (6) parts of the following. **$6 \times 2 = 12$**

(i) **If $f(x) = \frac{x}{x+8}$; find $f\left(\frac{3}{4}\right)$**

Sol. $f(x) = \frac{x}{x+8}$

put $x = \frac{3}{4}$ on both side

$$f\left(\frac{3}{4}\right) = \frac{\frac{3}{4}}{\frac{3}{4}+8} = \frac{\frac{3}{4}}{\frac{3+32}{4}}$$

$$f\left(\frac{3}{4}\right) = \frac{3}{35}$$

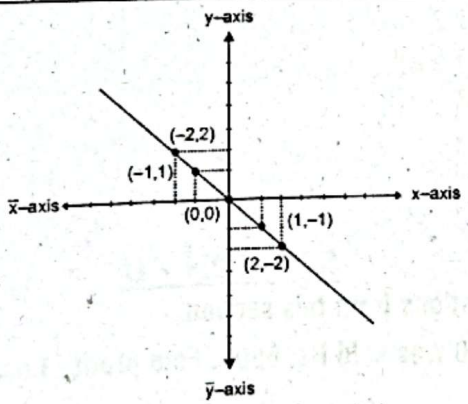
(ii) **Sketch the graph of $x + y = 0$**

Sol. $x + y = 0$

As the linear function has a straight line

$y = -x$

x	2	1	0	−1	−2
y	−2	−1	0	1	2



(iii) **Convert $(1001)_2$ into decimal number.**

Sol. $(1001)_2 = 1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$

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

$= 8 + 0 + 0 + 1$

$(1001)_2 = (9)_{10}$

(iv) **Define binary number system.**

Ans. A number system that based on only two digits 0 and 1 is called binary number system.

(v) **Evaluate $(11010)_2 + (1100)_2$**

Sol.

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

(vi) Write $\begin{matrix} 3x+2y=12 \\ x+5y=17 \end{matrix}$ **in matrix form**

Sol. Given: $3x + 2y = 12$

$x + 5y = 17$

The matrix form is

$$\begin{bmatrix} 3 & 2 \\ 1 & 5 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 12 \\ 17 \end{bmatrix}$$

(vii) Find inverse of $A = \begin{bmatrix} 4 & 9 \\ 7 & 6 \end{bmatrix}$

Sol. $|A| = \begin{vmatrix} 4 & 9 \\ 7 & 6 \end{vmatrix} = (4 \times 6 - 9 \times 7) = (24 - 63) = -39$, $\text{Adj}(A) = \begin{bmatrix} 6 & -9 \\ -7 & 4 \end{bmatrix}$

$$A^{-1} = \frac{\text{Adj}(A)}{|A|} = \frac{\begin{bmatrix} 6 & -9 \\ -7 & 4 \end{bmatrix}}{-39} = \begin{bmatrix} -\frac{6}{39} & \frac{9}{39} \\ \frac{7}{39} & \frac{-4}{39} \end{bmatrix} = \begin{bmatrix} \frac{-2}{13} & \frac{3}{13} \\ \frac{7}{39} & \frac{-4}{39} \end{bmatrix}$$

(viii) Find x **of** $A = \begin{bmatrix} x & 2 \\ 6 & 3 \end{bmatrix}$ **is singular**

Sol. $A = \begin{bmatrix} x & 2 \\ 6 & 3 \end{bmatrix}$

As A is singular, so $|A| = 0$

$$\begin{vmatrix} x & 2 \\ 6 & 3 \end{vmatrix} = 0$$

$$3x - 12 = 0$$

$$3x = 12$$

$$\Rightarrow \quad x = 4$$

(ix) Find transpose of matrix $A = [1\ 2\ 3\ 4]$

Sol. $A = [1\ 2\ 3\ 4]$

$A^t = [1\ 2\ 3\ 4]^t$

$$A^t = \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix}$$

SECTION - II

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

Q4. (a) A TV costing Rs. 6000 was sold Rs. 6500. Find profit / Loss percentage.

Sol. Given:

Cost price = Rs. 6000

Selling price = 6500

Profit = Selling price – Cost price

= 6500 – 6000

= 500

$$\text{Percent profit} = \frac{500}{600} \times 100\%$$

$$= 8.33\%$$

$$= 8\frac{1}{3}\%$$

(b) **Hazim deposited Rs. 150 into a bank at the end of each month for 5 years at a rate of 7% compounded monthly find the Future Value of annuity.**

Sol. Given:

$$\text{Installment} = R = \text{Rs. } 150$$

$$\text{Time} = n = 5 \text{ years}$$

$$= 5 \times 12 \text{ months (1 years = 12 month)}$$

$$= 60 \text{ months}$$

$$\text{Rate of interest} = 6 = 7\% \text{ per annum}$$

$$= \frac{7\%}{12} \text{ per month}$$

$$= \frac{0.07}{12} = 0.005833 \text{ per month}$$

Using the formula

$$S = R\left[\frac{(1+r)^n - 1}{r}\right]$$

$$= 150\left[\frac{(1+0.005833)^{60} - 1}{0.005833}\right]$$

$$= 150\,(71.5921)$$

$$= 10738.82$$

Therefore, the future value of hazimis annuity is approximately Rs. 10738.82

Q5 (a) **If $f(x) = 8 - 2x - x^2$. Find $f(1)$, $f(-1)$, $f(2)$, $f(-2)$.**

Sol.

$$f(x) = 8 - 2x - x^2$$

put $x = 1$

$$f(1) = 8 - 2(1) - (1)^2 = 8 - 2 - 1 = 5$$

put $x = -1$

$$f(-1) = 8 - 2(-1) - (-1)^2 = 8 + 2 - 1 = 9$$

put $x = 2$

$$f(2) = 8 - 2(2) - (2)^2 = 8 - 4 - 4 = 0$$

put $x = -2$

$$f(-2) = 8 - 2(-2) - (-2)^2$$

$$= 8 + 4 - 4 = 8$$

(b) **Find solution set of by method of $2x^2 - 1 = -x$ completions square.**

Sol.

$$2x^2 - 1 = -x$$

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

Divide by 2 on both side

$$x^2 + \frac{x}{2} = \frac{1}{2} \qquad \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

Add $\left(\frac{1}{4}\right)^2$ on b.s

$$x^2 + \frac{x}{2} + \left(\frac{1}{4}\right)^2 = \frac{1}{2} + \left(\frac{1}{4}\right)^2$$

$$\left(x + \frac{1}{4}\right)^2 = \frac{1}{2} + \frac{1}{16}$$

$$\left(x + \frac{1}{4}\right)^2 = \frac{8+1}{16}$$

$$\left(x + \frac{1}{4}\right)^2 = \frac{9}{16}$$

Tacking square root on both side

$$\sqrt{\left(x + \frac{1}{4}\right)^2} = \sqrt{\frac{9}{16}}$$

$$\left(x+\frac{1}{4}\right)=\pm\frac{3}{4}$$

$$x+\frac{1}{4}=\frac{3}{4}$$
$$x=\frac{3}{4}-\frac{1}{4}$$
$$=\frac{2}{4}$$
$$x=\frac{1}{2}$$

$$x+\frac{1}{4}=-\frac{3}{4}$$
$$x=-\frac{3}{4}-\frac{1}{4}$$
$$=\frac{-3-1}{4}$$
$$=-\frac{4}{4}$$
$$=-1$$

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

Q6. (a) If $A=\begin{bmatrix}3 & -3\\ 4 & 1\end{bmatrix}$, then prove that $A^{-1}A=1$

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

As $$A^{-1}=\frac{1}{|A|}AdjA \quad \text{_____(i)}$$

$$|A|=\begin{vmatrix}3 & -3\\ 4 & 1\end{vmatrix}=3+12=15\neq 0$$

$$AdjA=\begin{bmatrix}1 & 3\\ -4 & 3\end{bmatrix}$$

So, (i) becomes

$$A=\frac{1}{15}\begin{bmatrix}1 & 3\\ -4 & 3\end{bmatrix}$$

Now $$A^{-1}A=\frac{1}{15}\begin{bmatrix}1 & 3\\ -4 & 3\end{bmatrix}\begin{bmatrix}3 & -3\\ 4 & 1\end{bmatrix}$$

$$=\frac{1}{15}\begin{bmatrix}3+12 & -3+3\\ -12+12 & 12+3\end{bmatrix}$$

$$=\frac{1}{15}\begin{bmatrix}15 & 0\\ 0 & 15\end{bmatrix}$$

$$=\begin{bmatrix}\frac{15}{15} & \frac{0}{15}\\ \frac{0}{15} & \frac{15}{15}\end{bmatrix}$$

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

(b) Simplify $(11011)_2\times(1101)_2$

Sol. $(11011)_2\times(1101)_2$

$$\begin{array}{rrrrrrrrr}
 & & & & (1 & 1 & 0 & 1 & 1)_2\\
 & & & & \times & (1 & 1 & 0 & 1)_2\\
\hline
 & & & & 1^1 & 1 & 0 & 1 & 1\\
 & & & 0^1 & 0 & 0 & 0 & 0 & \times\\
 & & 1^1 & 1 & 0 & 1 & 1 & \times & \times\\
 & 1^1 & 1 & 0 & 1 & 1 & \times & \times & \times\\
\hline
(1 & 0 & 1 & 0 & 1 & 1 & 1 & 1 & 1)_2
\end{array}$$