Sargodha Board 2024

Objective Type

1124 Warning:- Please write your Roll No. in the space provided and sign. Roll No _____

(Inter Part - I) **(Session 2020-22 to 2023-25)** Sig. of Student _____

BUSINESS MATHEMATICS (Commerce Group) 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.

Q1.

1. **25 seconds : 2 minutes --**
   (A) 5 : 12 (B) 24 : 5 (C) 5 : 24 (D) 12 : 5
2. **Formula for compound interest is:**
   (A) $P(1+R)^n$ (B) $P[(1+R)^n - 1]$ (C) PRT (D) $P(1-R)^n$
3. **Commission on the deal of Rs.8000 @ 5% --**
   (A) Rs. 400 (B) Rs. 250 (C) Rs. 500 (D) Rs. 300
4. **If $4x - 5 = 5x - 6$, then x --**
   (A) 1.5 (B) 2.5 (C) 2 (D) 1
5. **Roots of the quadrate equation $3x^2 + 2x - 1 = 0$ are --**
   (A) $-1, \frac{1}{3}$ (B) $1, \frac{-1}{3}$ (C) $1, \frac{1}{3}$ (D) $1, \frac{-1}{3}$
6. **$(1111)_2 - (101)_2$ --**
   (A) $(1000)_2$ (B) $(1001)_2$ (C) $(1010)_2$ (D) $(111)_2$
7. **Point (-5 , -6) lies in quadrant --**
   (A) I (B) III (C) II (D) IV
8. **A square matrix B is said to symmetric. If --**
   (A) $B^t = B$ (B) $B^t - B$ (C) $B^t = B^2$ (D) $B^t = -2B$
9. **If order of matrix A – 3 – 4. Order of Juntrix B = 4 × 3 , then order of BA --**
   (A) 3×3 (B) 4×3 (C) 3×4 (D) 4×4
10. **The decimal number 13 is equal to**
    (A) $(1011)_2$ (B) $(1101)_2$ (C) $(1001)_2$ (D) $(1110)_2$

Answers:

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

Subjective Type

1124 Warning:- Please do not write anything on this question paper except your Roll No.

BUSINESS MATHEMATICS **(Session 2020-22 to 2023-25) (Inter Part - I) Paper (I)**

Time Allowed: 1.45 hours **(Commerce Group)** **Maximum Marks: 40**

SECTION - I

Q2. Answer briefly any Six parts from the following:- 6×2=12

(i) Divide Rs.60000 in the ratio 5 : 7

Sol. Given ratio = 5 : 7

Sum of ratio = 5 + 7 = 12

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

(ii) Define inverse proportion.

Ans. If two quantities are so related that an increase in one causes a corresponding decrease in the other or vice versa, is called inverse or indirect proportion.

(iii) **What percentage of Rs. 120 is 84?**

Sol. Here $a = ?$
$b = 120$
$c = 84$

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

$$a \times 120 = 100 \times 84 \Rightarrow a = \frac{100 \times 84}{120} = 70\%$$

(iv) **What is the Simple interest on Rs. 8000 for two year's at 5%?**

Sol. $P = \text{Rs. } 8000$
$N = 2 \text{ years}$
$I = 5\% = 0.05$

As Simple Interest $= S.I = PIN$
$= (8000)(0.05)(2)$
$= \text{Rs. } 800$

(v) **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.

(vi) **Find the value of x if $\frac{3x-1}{2-x}=2$**

Sol. $\frac{3x-1}{2-x} = 2 \Rightarrow 3x - 1 = 2(2 - x) \Rightarrow 3x - 1 = 4 - 2x$

$3x + 2x = 4 + 1 \Rightarrow 5x = 5 \Rightarrow x = \frac{5}{5} \Rightarrow x = 1$

(vii) **Solve the equation $\frac{1}{x}+\frac{2}{x}=15$**

Sol. $\frac{1}{x} + \frac{2}{x} = 15 \Rightarrow \frac{1+2}{x} = 15 \Rightarrow \frac{3}{x} = 15$

$3 = 15x \Rightarrow x = \frac{3}{15} = \frac{1}{5}$

(viii) **Find the Discriminate of $x^2 + 7x + 10 = 0$**

Sol. $x^2 + 7x + 10 = 0$

Here $a = 1, b = 7, c = 10$

$\text{Disc} = b^2 - 4ac$
$= (7)2 - 4(1)(10)$
$= 49 - 40$

$\text{Disc} = 9$

(ix) **Solve $3x^2 - 9x + 5 = 0$ by using Quadratic formula.**

Sol. $3x^2 - 9x + 5 = 0 \Rightarrow a = 3, b = -9, c = 5$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-9) \pm \sqrt{(-9)^2 - 4(3)(5)}}{2(3)} = \frac{9 \pm \sqrt{81 - 60}}{6}$$

$$x = \frac{9 \pm \sqrt{21}}{6} \Rightarrow S.S = \left\{\frac{9 \pm \sqrt{21}}{6}\right\}$$

Q3 Answer briefly any Six parts from the following:- **6×2=12**

(i) **If $f(x) = 3x^2 + 4x$ find f(-1) and f(2).**

Sol. $f(x) = 3x^2 + 4x$
put $x = -1$
$f(-1) = 3(-1)^2 + 4(-1) = 3(1) - 4 = 3 - 4 = 1$
put $x = 2$
$f(2) = 3(2)^2 + 4(2) = 3(4) + 8 = 12 + 8 = 20$

(ii) Find x – intercept and y – intercept of the line $x + 3y = 9$

Sol. $x + 3y = 9$

X-intercept	Y-intercept
put $y = 0$	put $x = 0$
$x + 3(0) = 9$	$0 + 3y = 9$
$x = 9$	$y = 3$
$\Rightarrow (9,0)$	$\Rightarrow (0,3)$

(iii) Convert into decimal system $(10001)_2$

Sol. $(10001)_2$

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

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

(iv) Convert 15 into base 2.

Sol.

2	15
2	7 – 1
2	3 – 1
	1 – 1

So, $(15)_{10} = (1111)_2$

(v) Simplify $(10110)_2 + (1000)_2$

Sol: $(10110)_2 + (1000)_2 = (11110)_2$

$$\begin{array}{r} (10110)_2 \\ + \ (1000)_2 \\ \hline (11110)_2 \end{array}$$

(vi) If $A = [1 \ \ 5]$, $B = \begin{bmatrix} 1 \\ 5 \end{bmatrix}$ Find AB

Sol. $A = [1 \quad 5], B = \begin{bmatrix} 1 \\ 5 \end{bmatrix}$

$$AB = [1 \quad 5] \begin{bmatrix} 1 \\ 5 \end{bmatrix} = [1+25] = [26]$$

(vii) Find transpose of $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$

Sol. $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \Rightarrow A^t = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}^t = \begin{bmatrix} 1 & 4 \\ 2 & 5 \\ 3 & 6 \end{bmatrix}$

(viii) Find x so that $\begin{bmatrix} 1 & -2 \\ -3 & x \end{bmatrix}$ is singular

Sol. As the matrix is singular

So, $\begin{vmatrix} 1 & -2 \\ -3 & x \end{vmatrix} = 0 \Rightarrow 1(x) - (-3)(-2) = 0 \Rightarrow x - 6 = 0 \Rightarrow x = 6$

(ix) Find inverse of A if $A = \begin{bmatrix} 3 & 2 \\ 1 & 2 \end{bmatrix}$

Sol. $A = \begin{bmatrix} 3 & 2 \\ 1 & 2 \end{bmatrix}$, then $|A| = \begin{vmatrix} 3 & 2 \\ 1 & 2 \end{vmatrix} = 6 - 2 = 4 \neq 0$

$$\text{Adj } A = \begin{bmatrix} 2 & -2 \\ -1 & 3 \end{bmatrix}$$

Now $A^{-1} = \frac{1}{|A|} \text{Adj} A = \frac{1}{4} \begin{bmatrix} 2 & -2 \\ -1 & 3 \end{bmatrix}$

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

SECTION - II

Note: Attempt any TWO questions. (8×2=16)

Q4. (a) 14 Cows consumes 630 Kgs of hay in 18 days. How many cows will eat 770 Kgs of hay in 28 days at the same rate?

Sol. First we have to find the daily hay consumption per cow.

Daily consumptin for 14 cows

$$= \frac{630}{18} = 35\text{kg}$$

$$\text{Daily consumption per cow} = \frac{35}{14} = 2.5\text{kg}$$

Now we find how many cows will consume 770kg of hay in 28 days.

$$\text{Total daily consumption} = \frac{770}{28} = 27.5\text{kg}$$

$$\text{Number of cows} = \frac{27.5\text{kg/day}}{2.5\text{kg/day}}$$

$$= 11 \text{ cows}$$

So, 11 cows will consume 770kg of hay in 28 days.

(b) Find the Present value of an amount of Rs. 12,000 at the end of 5 Years 5% per year compounded annually.

Sol. It is given that

$$A = \text{Rs. } 12000$$
$$r = 5\% = 0.05$$
$$n = 5 \text{ years}$$

Using the formula $A = P(1+r)^n$

$$\Rightarrow \quad P = \frac{A}{(1+r)^n}$$

$$= \frac{12000}{(1+0.05)^5} = \frac{12000}{1.2763}$$

$$P = 9402.31$$

Hence the amount 12000 received after 3 years has present value equal to Rs. 9402.31

Q5. (a) Find the domain and Range of x = y + 5 and draw the graph

Sol. $x = y + 5$ _____(i)

As the given function is linear, which can defined for all values of set of real number,

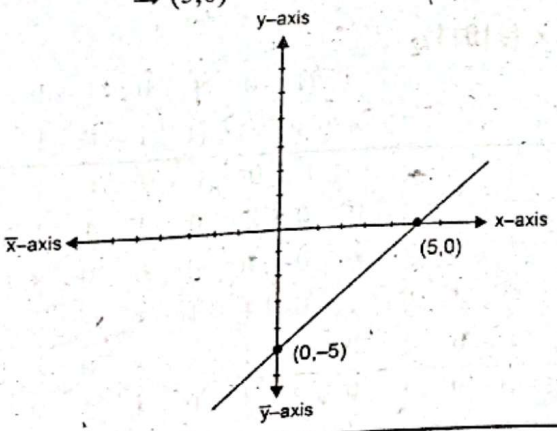
So Domain = set of real numbers

Range = set of real numbers

To draw graph

X - Intercept	Y - Intercept
put y = 0 in (i)	put x = 0 in (i)
x = 5	y = – 5
⇒ (5,0)	⇒ (0, –5)

Graph



(b) Solve the equation $x^{\frac{1}{3}} - 2x^{\frac{1}{3}} = 8$

Sol. $x^{\frac{1}{3}} - 2x^{\frac{1}{3}} = 8$

Let $y = x^{\frac{1}{3}}$

$\Rightarrow$ $y^2 = x^{\frac{2}{3}}$

So $y^2 - 2y = 8 \Rightarrow y^2 - 2y - 8 = 0$

$y^2 + 2y - 4y - 8 = 0 \Rightarrow y(y+2) - 4(y+2) = 0$

$(y+2)(y-4) = 0$

$y + 2 = 0 \Rightarrow y = -2$	$y - 4 = 0 \Rightarrow y = 4$
put $y = x^{\frac{1}{3}}$	put $y = x^{\frac{1}{3}}$
$x^{\frac{1}{3}} = -2$	$x^{\frac{1}{3}} = 4$
$\left(x^{\frac{1}{3}}\right)^3 = (-2)^3$	$\left(x^{\frac{1}{3}}\right)^3 = (4)^3$
$x = -8$	$x = 64$

S.S = {−8, 64}

Q6. (a) Solve the system of equations by matrices $2x+5y=30$, $3x-2y=7$

Sol. $2x + 5y = 30$, $3x - 2y = 7$

The matrix fom is

$$\begin{bmatrix} 2 & 5 \\ 3 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 30 \\ 7 \end{bmatrix}$$

Let $AX = B$ _____(i)

Here $A = \begin{bmatrix} 2 & 5 \\ 3 & -2 \end{bmatrix}, B = \begin{bmatrix} 30 \\ 7 \end{bmatrix}, X = \begin{bmatrix} x \\ y \end{bmatrix}$

From (i) $X = A^{-1}B$ _____(ii)

As $|A| = \begin{vmatrix} 2 & 5 \\ 3 & -2 \end{vmatrix} = -4 - 15 = -19$

$$\text{Adj}A = \begin{bmatrix} -2 & -5 \\ -3 & 2 \end{bmatrix}$$

$$A^{-1} = \frac{1}{|A|}\text{Adj}A = \frac{1}{-19}\begin{bmatrix} -2 & -5 \\ -3 & 2 \end{bmatrix}$$

putting values in (ii), $\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{-19}\begin{bmatrix} -2 & -5 \\ -3 & 2 \end{bmatrix}\begin{bmatrix} 30 \\ 7 \end{bmatrix} = \frac{1}{-19}\begin{bmatrix} -60-35 \\ -90+14 \end{bmatrix}$

$$\begin{bmatrix} x \\ y \end{bmatrix} = -\frac{1}{19}\begin{bmatrix} -95 \\ -76 \end{bmatrix} = \begin{bmatrix} \frac{-95}{-19} \\ \frac{-76}{-19} \end{bmatrix} = \begin{bmatrix} 5 \\ 4 \end{bmatrix}$$

$\Rightarrow$ $x = 5$, $y = 4$

(b) Evaluate $(1010111)_2 \times (11011)_2$

Sol.

$$\begin{array}{rrrrrrrrrr} & & & (1 & 0 & 1 & 0 & 1 & 1 & 1)_2 \\ & & \times & & & (1 & 1 & 0 & 1 & 1)_2 \\ \hline & & & 1^2 & 0^2 & 1^1 & 0^1 & 1^1 & 1 & 1 \\ & & 1^2 & 0 & 1 & 0 & 1 & 1 & 1 & \times \\ & & 0^2 & 0 & 0 & 0 & 0 & 0 & 0 & \times & \times \\ & 1^1 & 0 & 1 & 0 & 1 & 1 & 1 & \times & \times & \times \\ 1^1 & 0 & 1 & 0 & 1 & 1 & 1 & \times & \times & \times & \times \\ \hline (1 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 1 & 1 & 0 & 1)_2 \end{array}$$