

Q1: [25 marks]

JANUARY 2026 PAPER 1 SOLUTIONS

$$\begin{aligned} \text{i) } x + 2y - 2z - 5x - 4y + 3z \\ = -4x - 2y + z \end{aligned} \quad [5]$$

$$\begin{aligned} \text{(ii) } x(x-2) - x(x-4) \\ = \cancel{x^2} - 2x - \cancel{x^2} + 4x \\ = 2x \end{aligned} \quad [5]$$

$$\begin{aligned} \text{(iii) } p^5 q^1 r^1 \times 2p^1 q^4 \times 3p^1 r^3 \\ = 6p^7 q^5 r^4 \end{aligned} \quad [5]$$

$$\text{(iv) } \frac{6p^5 q^1 r^1}{2p^3 q^2 r^{-2}} = 3p^2 q^{-1} r^3 \quad [5]$$

$$\begin{aligned} \text{v) } \frac{fg}{h} \times \frac{gh^2}{fh} \times \frac{fh^3}{f^7} &= \frac{f^2 g^2 h^5}{f^8 h^2} \\ &= f^{-6} g^2 h^3 \end{aligned} \quad [5]$$

Q2: [20 marks]

$$i) \quad 5(x+2) = 2(x-3)$$

$$5x + 10 = 2x - 6$$

$$5x - 2x = -16$$

$$3x = -16$$

$$x = \underline{\underline{-\frac{16}{3}}}$$

[8]

$$(ii) \quad \frac{(x-1)}{3} = \frac{(x+2)}{4}$$

$$4(x-1) = 3(x+2)$$

$$4x - 4 = 3x + 6$$

$$4x - 3x = 4 + 6$$

$$\underline{\underline{x = 10}}$$

[12]

Q3 [10 marks]

$$x + y = 3 \quad \text{--- (A) } \times 3$$

$$2x - 3y = 1 \quad \text{--- (B)}$$

$$3x + 3y = 9$$

$$2x - 3y = 1$$

Add $5x = 10$

$$x = \frac{10}{5}$$

$$\underline{x = 2}$$

Sub $x=2$ into (A) $\Rightarrow$

$$2 + y = 3$$

$$y = 3 - 2$$

$$\underline{y = 1}$$

[10]

Q4: [15 marks]

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

Determinant of A $\equiv |A|$

$$|A| = +1 \begin{vmatrix} -1 & 1 \\ 2 & -1 \end{vmatrix} - 1 \begin{vmatrix} 2 & 1 \\ 1 & -1 \end{vmatrix} + 1 \begin{vmatrix} 2 & -1 \\ 1 & 2 \end{vmatrix}$$

$$= +1 \{ +1 - 2 \} - 1 \{ -2 - 1 \} + 1 \{ 4 - (-1) \}$$

$$= 1(-1) - 1(-3) + 1(5)$$

$$= -1 + 3 + 5$$

$$= \underline{7}.$$

Matrix of Co-factors. - C

$$C = \begin{bmatrix} + \begin{vmatrix} -1 & 1 \\ 2 & -1 \end{vmatrix} & - \begin{vmatrix} 2 & 1 \\ 1 & -1 \end{vmatrix} & + \begin{vmatrix} 2 & -1 \\ 1 & 2 \end{vmatrix} \\ - \begin{vmatrix} 1 & 1 \\ 2 & -1 \end{vmatrix} & + \begin{vmatrix} 1 & 1 \\ 1 & -1 \end{vmatrix} & - \begin{vmatrix} 1 & 1 \\ 1 & 2 \end{vmatrix} \\ + \begin{vmatrix} 1 & 1 \\ -1 & 1 \end{vmatrix} & - \begin{vmatrix} 1 & 1 \\ 2 & 1 \end{vmatrix} & + \begin{vmatrix} 1 & 1 \\ 2 & -1 \end{vmatrix} \end{bmatrix}$$

$$C = \begin{bmatrix} -1 & 3 & 5 \\ 3 & -2 & -1 \\ 2 & 1 & -3 \end{bmatrix}$$

$$C^T = \begin{bmatrix} -1 & 3 & 2 \\ 3 & -2 & 1 \\ 5 & -1 & -3 \end{bmatrix}$$

The Inverse Matrix - A^{-1}

$$A^{-1} = \frac{1}{|A|} \cdot C^T$$

$$= \frac{1}{7} \begin{bmatrix} -1 & 3 & 2 \\ 3 & -2 & 1 \\ 5 & -1 & -3 \end{bmatrix}$$

Q5: [10 marks]

$$x + y + z = 3$$

$$2x - y + z = 2$$

$$x + 2y - z = 2$$

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

$$\underline{A} \underline{x} = \underline{b}$$

$$\underline{A}^{-1} \underline{A} \underline{x} = \underline{A}^{-1} \underline{b}$$

$$\underline{I} \underline{x} = \underline{A}^{-1} \underline{b}$$

$$\underline{x} = \underline{A}^{-1} \underline{b}$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \frac{1}{7} \begin{bmatrix} -1 & 3 & 2 \\ 3 & -2 & 1 \\ 5 & -1 & -3 \end{bmatrix} \begin{bmatrix} 3 \\ 2 \\ 2 \end{bmatrix}$$

$$x = \frac{1}{7} [-3 + 6 + 4]$$

$$\underline{x = 1}$$

$$y = \frac{1}{7} [9 - 4 + 2]$$

$$\underline{y = 1}$$

$$z = \frac{1}{7} [15 - 2 - 6]$$

$$\underline{z = 1}$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$$

Q6 [20 marks]

$$\begin{aligned}f(x) &= \frac{x+1}{x^2+5x+6} \\&= \frac{(x+1)}{(x+2)(x+3)}\end{aligned}$$

$$\frac{(x+1)}{(x+2)(x+3)} = \frac{A}{(x+2)} + \frac{B}{(x+3)}$$

Mult. Through by Denominator $\Rightarrow$

$$(x+1) = A(x+3) + B(x+2)$$

to find A, let $x = -2$

$$-2+1 = A(-2+3)$$

$$-1 = A(1)$$

$$\underline{-1 = A}$$

to find B let $x = -3$

$$-3+1 = B(-3+2)$$

$$-2 = -1B$$

$$\underline{2 = B}$$

$$\therefore f(x) = \frac{-1}{(x+2)} + \frac{2}{(x+3)}$$

[20]