

Q1(a) Find the values of x , which satisfy the inequation

$$-2\frac{5}{6} < \frac{1}{2} - \frac{2x}{3} \leq 2, x \in W.$$

Graph the solution set on the number line.

(b) Sonia had a recurring deposit account in a bank and deposited ₹600 per month for $2\frac{1}{2}$ years. If the rate

of interest was 10% p.a., find the maturity value of her account.

(c) Given $A = \begin{bmatrix} 2 & 0 \\ -1 & 7 \end{bmatrix}$, $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

and $A^2 = 9A + mI$, find m

Q2(a) Show that $(x-1)$ is a factor of $x^3 - 7x^2 + 14x - 8$. Hence, completely factorise the above expression.

(b) If $x = \frac{\sqrt{a+3b} + \sqrt{a-3b}}{\sqrt{a+3b} - \sqrt{a-3b}}$, prove that $3bx^2 - 2ax + 3b = 0$

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Q3(a) Solve the equation $3x^2 - x - 7 = 0$ and give your answer correct to two decimal places.

(b) If $2 \begin{bmatrix} 3 & 4 \\ 5 & x \end{bmatrix} + \begin{bmatrix} 1 & 4 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 7 & 0 \\ 10 & 5 \end{bmatrix}$

(c) Given that $(x+2)$ and $(x+3)$ are factors of $2x^3 + ax^2 + 7x - b$. Determine the values of a and b .

Q4(a) Find the values of m so that the equation $(3m+1)x^2 + 2(m+1)x + m = 0$ has real and equal roots.

(b) Solve the following inequation and graph the solution on the number line.

$$2 + 4x < 2x - 5 \leq 3x, x \in \mathbb{Z}$$

(c) A shopkeeper buy goods worth ₹4000 and sells these at a profit of 20% to a consumer in the same state.

If G.S.T. is charged at 5% find the selling price (excluding tax) of the goods, CGST and SGST paid by the consumer and the total amount paid by the consumer.

Q5(a) Use factor theorem to factorise completely $x^3 + x^2 - 4x - 4$

(b) Given matrix $B = \begin{bmatrix} 1 & 1 \\ 8 & 3 \end{bmatrix}$. Find matrix X

if $X = B^2 - 4B$. Find a and b given

$$X \begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} 5 \\ 50 \end{bmatrix}$$

(c) If $2x^3 + ax^2 + bx - 2$ has a factor $(x+2)$ and leaves a remainder 7 when divided by $2x-3$, find a and b .

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Q6(a) Solve the following inequation and represent your solution on the real number line

$$-5\frac{1}{2} - x \leq \frac{1}{2} - 3x \leq 3\frac{1}{2} - x, x \in \mathbb{R}$$

(b) Find the 16th term of the A.P.
7, 11, 15, 19, ---

Find the sum of the first 6 terms.

(c) For what value of 'k' will the following quadratic equation:-

$(k+1)x^2 - 4kx + 9 = 0$ have real and equal roots? Solve the equations.

Q7(a) The 2nd and 45th term of an A.P. are 10 and 96 respectively. Find the first term and the common difference and hence find the sum of the first 15 terms.

(b) The difference of the squares of two natural numbers is 84. The square of the larger number is 25 times the smaller number. Find the numbers.

(c) Using factor theorem, show that $(x-2)$ is a factor of $2x^3 + 5x^2 - 4x - 3$.

Q8(a) Given $\begin{bmatrix} 8 & -2 \\ 1 & 4 \end{bmatrix} X = \begin{bmatrix} 12 \\ 10 \end{bmatrix}$ Write down

(i) the order of the matrix X (ii) matrix X

(b) Solve for x using the properties of proportion.

$$\frac{3x + \sqrt{9x^2 + 5}}{3x - \sqrt{9x^2 + 5}} = 5$$

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(c) How many terms of the AP
7, 11, 15, 19, 23, --- must be taken
to get the sum 250?

Q9(a) Manish deposits ₹ 2000 per month in a
R.D. account for $1\frac{1}{2}$ year at 8% p.a.

Find the amount he will receive at the
time of maturity.

b) The polynomials $(px^3 + 3x^2 - 3)$ and
 $(2x^3 - 5x + p)$ when divided by $(x-4)$
leave the same remainder. Find the
value of p .

c) Find the sum $(-5) + (-8) + (-11) + \dots + (-62)$

Q10(a) If
$$\begin{bmatrix} a & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 4 & 3 \\ -3 & 2 \end{bmatrix} = \begin{bmatrix} b & 11 \\ 4 & c \end{bmatrix}$$

find the values of a, b and c

(c) Show that $(x-5)$ is a factor
of $x^3 - x^2 - 17x - 15$. Hence, factorise
completely.

Q11(a) Construct a (2×3) matrix $[a_{ij}]_{2 \times 3}$ for
which $a_{ij} = i \times j$

(b) A retailer purchases an air conditioner for
₹ 35,000 from a company. He sold it to
a consumer at a profit of ₹ 5000.
Calculate the tax liability of the retailer,
if the GST rate on air conditioner is 28%.