MATHEMATICS

Std X

Time :2$\frac{1}{2}$ hrs

Marks: : 80

Section A (Answer all Questions)

Question 1

a) Determine K so that K+2, 4K−6 and 3K − 2 are three consecutive terms of A.P.

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b) Find the equation of line perpendicular to $5x - 2y = 8$ and which passes through the mid-point of the line joining (2,3) and (4,5)

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c) A man deposits Rs. 3200 per month in a RD account for 3 years at the rate of 9% per annum. Find (i) the interest earned (ii) the maturity value of the account.

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Question 2

a) Prove that sec A (1+ sin A) (sec A − tan A) = 1

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b) Solve $3x - \frac{1}{x} = 5$ and give your answer *correct to 3 significant figures.*

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c) A man holds 1800 hundred-rupee shares of a company that pays 15% dividend annually. Calculate his annual dividend. If he bought these shares at 40% premium, what percentage return would he have got on his investment ? Give your answer to the nearest integer.

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Question 3

a) Solve the following inequation and graph the solution set on the number line. $-3 + x \le \frac{8x}{3} + 2 \le \frac{14}{3} + 2x$, $x \in I$

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b) What number must be added to each of the numbers 6, 15, 20 and 43 to make them proportional ?

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c) How many terms of an A.P 36, 32, 28, 24, ...must be taken so that their sum is 168 ?

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Question 4

a) Find the values of a, b, c and d, if

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$$6\begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} a & 6 \\ -1 & 2d \end{bmatrix} + \begin{bmatrix} 2 & a-b \\ c+d & 3 \end{bmatrix}$$

b) Two vertices of a triangle are A(3, −5) and B (−7, 4). If the centroid of the triangle is (2, −1), Find the third vertex 'c' of the triangle. Also find the equation of the line through 'c' and parallel to AB.

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c) Factorize completely $x^3 + 13x^2 + 31x - 45$.

Question 5

a) The 2nd and 5th terms of a G.P are $-\frac{1}{2}$ and $\frac{1}{16}$ respectively. Find the sum of the series up to 8 terms.

b) Find the equation of the line perpendicular to $3x + 4y = 7$ and having the same Y- intercept of the line $x - 3y + 9 = 0$

c) By increasing the speed of car by 10 km/hr, the time of journey for a distance of 72 km is reduced by 36 minutes. Find the original speed of the car.

Question 6

a) Solve the following in equation and write down the solution set:
$2 + 4x < 2x - 5 \le 3x$, $x \in z$. Represent the solution on a real number line.

b) Rs. 100 shares of a company are available at 20% $discount$ If the rate of return on his investment is 15%, find the rate of dividend given by the company.

c) Find two number such that the mean proportional between them is 9 and the third proportional to them is 243.

Question 7

a) For what values of p will the equation $x^2 - 2px + 7p - 12 = 0$ has real and equal roots ?

b) A man deposited Rs 400 at the beginning of every month in a recurring deposit account and received Rs 16398 at the end of 3 years. Find the rate of interest given by the bank.

c) Using properties of proportion solve for x, given $\dfrac{\sqrt{5x} + \sqrt{2x-6}}{\sqrt{5x} - \sqrt{2x-6}} = 4$

Question 8

a) $\begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$ M = 6 I,

Where M is a matrix and I is a unit matrix of order 2 X 2.
(i) state the order of matrix M   (ii) Find the matrix M.

b) Prove that $\dfrac{sec\theta}{1-sin\theta} = \dfrac{1+sin\theta}{cos^3\theta}$

c) If $x^3 + ax^2 + bx + 6$ has a factor $x-2$ and leaves a remainder 3 when divided by $x - 3$, find the values of a and b.

Question 9

a) If $\dfrac{3x+5y}{3x-5y} = \dfrac{7}{3}$, use properties of proportion to find (i) $x : y$ (ii) $\dfrac{x^2+y^2}{x^2-y^2}$

b) The sum of the first n terms of an A.P is $4n - n^2$.

Find   (i) first term of the A.P   (ii) the sum of first two terms.

          (iii) the second term   (iv) the A.P.

c) A man standing on the bank of a river observes that the angle of elevation of a tree on the opposite bank is $60°$. When he moves 50 m away from the bank, he finds the angle of elevation to be $30°$. Calculate

   (i) the width of the river   (ii) the height of the tree.

Question 10

a) If $\dfrac{3}{2}$ is one root of the quadratic equation $2x^2 - 3(5x + p) = 0$, find the value of p and the other root.

b) Let $A = \begin{bmatrix} 4 & -2 \\ 6 & -3 \end{bmatrix}$ $B = \begin{bmatrix} 0 & 2 \\ 1 & -1 \end{bmatrix}$ $C = \begin{bmatrix} -2 & 3 \\ 1 & -3 \end{bmatrix}$. Find $A^2 - A + BC$.

c) Write down the co-ordinates of the point P that divides the line joining A $(-4, 1)$ and B $(17, 10)$ in the ratio 1:2. Also find in what ratio does the y axis divide the line AB ?

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