## Section – A (40 Marks )
## (Attempt all questions)

Question.1. Choose the correct answers to the questions from the given options. (Do not copy the question. Write the correct answer only) [1x15 = 15]

(i) If .25, .5, x and .15 are in proportion, the value of x is

(a) .03 (b) 7.5 (c) .75 (d) .075

(ii) If x, 4 and 9 are in continued proportion, the value of x is

(a) $\frac{16}{9}$ (b) $\frac{4}{3}$ (c) 12 (d) $\frac{3}{4}$

(iii) If $2x - 1$ is factor of a polynomial $f(x)$, then

(a) $f(1) = 0$ (b) $f(-\frac{1}{2}) = 0$ (c) $f(\frac{1}{2}) = 0$ (d) $f(-2) = 0$

(iv) If roots of a quadratic equation $ax^2 + bx + c = 0$ are not real, then

(a) $\sqrt{b^2 - 4ac} = 0$ (b) $\sqrt{b^2 - 4ac} < 0$ (c) $b^2 - 4ac < 0$ (d) $b^2 - 4ac = 0$

(v) The solution set for the inequation $4\frac{1}{2} \leq x + 1 < 9$, $x \in w$ is

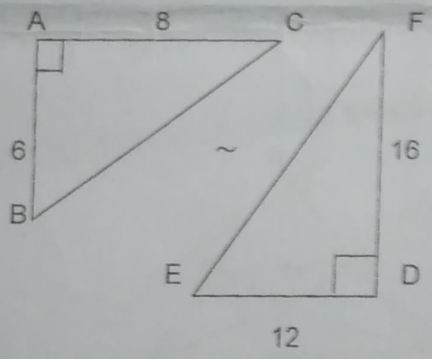
(a) {4, 5, 6} (b) {5, 6, 7, 8} (c) {5, 6, 7} (d) {4, 5, 6, 7}

(vi) The $n^{th}$ term of a sequence in AP is $2n - 3$, then the first three terms of AP are

(a) -1, 0, 1 (b) -1, 1, 3 (c) -3, -1, 1 (d) 1, 3, 5

(vii) In the adjacent diagram $\Delta ABC \sim \Delta DEF$ *by*

(a) AAA (b) ASA (c) RHS (d) SAS




(viii) The centroid of $\Delta ABC$ is G (6, 7) and the co – ordinates of vertex A is (6, 5) then co – ordinates of the middle point of side BC is

(a) (6, 6) (b) (6, 11) c. (6, 8) (d) (6, 4)

(ix) Median of the following distribution is

| observation | 12 | 15 | 16 | 20 |
|---|---|---|---|---|
| frequency | 3 | 2 | 4 | 5 |

(a) 15 (b) 16 (c) 20 (d) 5

(x) If the mean of 4, 6, 7, a and 13 is 8, value of 'a' is

(a) 8 (b) 10 (c) 9 (d) 2

(xi) If $M \times \begin{bmatrix} a & b \\ c & d \end{bmatrix} = [p \quad q]$, the order of matrix M is

(a) 2 x 1 (b) 1 x 2 (c) 2 x 2 (d) 1 x 1

(xii) The Unit Matrix I is

(a) $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ (c) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$

(xiii) Slope of the Y – axis is

(a) $90^0$ (b) 0 (c) 1 (d) none of these

(xiv) Slope of a line parallel to the line $x - 3y + 6 = 0$ is

(a) - 3 (b) $\frac{1}{3}$ (c) $\frac{-1}{3}$ (d) 2

(xv) $\{-2, 3\}$ is solution of Quadratic Equation

(a) $x^2 + x - 6 = 0$ (b) $x^2 - 5x + 6 = 0$ (c) $x^2 - x + 6 = 0$ (d) $x^2 - x - 6 = 0$

Question.2.

(i) Prove that $\sqrt{\sec^2\theta + cosec^2\theta} = \tan\theta + \cot\theta$ [4]

(ii) If $(k-3), (2k+1)$ and $(4k+3)$ are the consecutive terms of an A.P. Find the value of $k$. [4]

(iii) Evaluate $\begin{bmatrix} 2\cos 60° & -2\sin 30° \\ -\tan 45° & \cos 0° \end{bmatrix} \begin{bmatrix} \cot 45° & -\operatorname{cosec} 30° \\ \sec 60° & \sin 90° \end{bmatrix}$ [4]

Question.3.

(i) Solve the following in equation, write down the solution set and represent it on the real number line: [4]

$-2 + 10x \leq 13x + 10 < 24 + 10x, X \in Z.$

(ii) If the straight line $3x - 5y = 7$ and $4x + ay + 9 = 0$ are perpendicular to one another, find the value of $a$. [4]

(iii) Solve $x^2 + 7x = 7$ and give your answer correct to two decimal places. [5]

## Section - B(40 Marks)

**(Attempt any four questions)**

Question.4..

(i) Using properties of proportion, solve for $x$, given that $x$ is positive $\frac{2x+\sqrt{4x^2-1}}{2x-\sqrt{4x^2-1}} = 4$ [3]

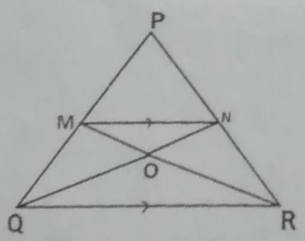
(ii) If the mean of the following distribution is 24, find the value of '$a$' [3]

| Marks | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 |
|---|---|---|---|---|---|
| no. of students | 7 | a | 8 | 10 | 5 |

(iii) In $\Delta PQR, MN$ is parallel to $QR$ and $\frac{PM}{MQ} = \frac{2}{3}$ [4]

(a) Find $\frac{MN}{QR}$

(b) Prove that $\Delta OMN$ and $\Delta ORQ$ are similar




Question.5.

(i) Use remainder theorem to factorize the following polynomial $2x^3 + 3x^2 - 9x - 10$ [3]

(ii) The angle of elevation of the top of the tower QR from the base P of the tower PT is 60° and the angle of elevation of the top T of the tower PT from the base Q of the tower QR is 30°. If height of the tower QR is 50m, find the height of the tower PT correct to the nearest metre. [3]

(iii) The 4th term of an A.P. is 22 and the 15th term is 66. Find the first term and the c.d. Hence, find the sum of the series to 8 terms. [4]

Question.6.

(i) Amit deposits Rs. 1600 per month in a bank for 18 months in a recurring deposit account. If he gets Rs. 31080 at the time of maturity, what is the rate of interest per annum? [3]

(ii) Rs. 7500 were divided equally among a certain number of children. Had there been 20 less children each would have received Rs. 100 more. Find the original number of children. [3]

(iii) $A(2,5), B(-1,2)$ and $C(5,8)$ are the vertices of a triangle ABC, "M" is a point on AB such that AM:MB = 1:2; Find the coordinates of 'M'. Hence find the equation of the line passing through the points 'C' and M. [4]

Question.7

(i) Solve the following inequation and represent your solution on the real number line [3]

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

(ii) 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. [3]

(iii) If $A = \begin{bmatrix} 3 & -1 \\ 0 & 2 \end{bmatrix}$, Find the Matrix B such that $A^2 - 2B = 3A + 5I$, where $I$ is a 2 x 2 identity matrix. [4]

Question.8.

(i) The difference of the squares of two natural number is 84. The square of the larger number is 25 times the smaller. Find the numbers. [3]

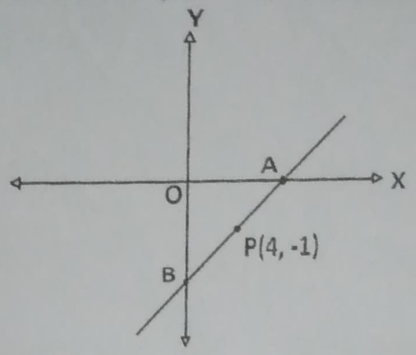
(ii) The marks of 10 students of a class in an examination arranged in ascending order is as follows; 13, 35, 43, 46, $x, x+4$, 55, 61, 71, 80. If the median marks is 48, Find the value of $x$. Hence, find the mode of the given data. [3]

(iii) A line AB meets X-axis at A and Y-axis at B. [4]

$P(4,-1)$ divides AB in the ratio 1:2.

(i) Find the coordinates of A and B.

(ii) Find the equation of the line through P and perpendicular to AB.



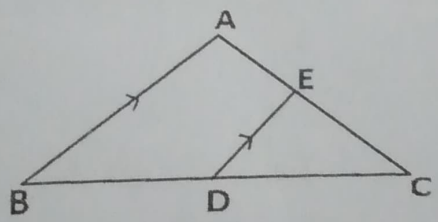

Question.9.

(i) In $\Delta ABC$ and $\Delta EDC, AB$ is parallel to $ED$ [3]

$BD = \frac{1}{3}BC$ and $AB = 12.3$ cm

(a) Prove that $\Delta ABC \sim \Delta EDC$

(b) Find $DE$




(ii) Prove the following identity [3]

$$(\sin A + cosec\ A)^2 + (\cos A + \sec A)^2 = 5 + \sec^2 A + cosec^2\ A$$

(iii) If b is the mean proportion between 'a' and 'c' show that [4]

$$\frac{a^4 + a^2b^2 + b^4}{b^4 + b^2c^2 + c^4} = \frac{a^2}{c^2}$$

Question.10.

(i) ABC is a triangle and $G(4,3)$ is the centroid of the triangle. If vertices of the triangle are $A = (1,3), B(4,b)$ and $C(a,1)$. Find '$a$' and '$b$'. Find the length of side BC. [3]

(ii) Mohit started paying Rs 800 per month in recurring deposit account for 6 years. After 2 years, he started one more R.D. account in which he deposited Rs. 1500 per month. If the bank pays 10% per annum simple interest in both the deposits and both the accounts mature simultaneously. Find which RD will give more money and by how much? [3]

(iii) Draw a histogram for the following:- [4]

| C.I. | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 |
|---|---|---|---|---|---|
| Frequency | 5 | 8 | 13 | 10 | 6 |