

Section A (Answer all questions)

Question 1

- (a) Solve the following inequation and represent your solution on the real number line: $-5\frac{3}{4} - x \leq \frac{1}{4} - 3x \leq 3\frac{1}{4} - x$, $x \in \mathbb{W}$ [3]
- (b) How many terms of the A.P, 9, 17, 25, must be taken to get a sum of 450 ? [3]
- (c) ABCD is a cyclic quadrilateral. The tangent at B meets DC produced at F and DA produced at E. If $\angle BED = 45^\circ$, $\angle BAE = 100^\circ$ and $\angle BFC = 50^\circ$ find, (i) $\angle CAB$ (ii) $\angle ABC$ (iii) $\angle BDC$. [4]

Question 2

- (a) A bag contains identical discs marked 1 to 15. One disc is selected at random, find the probability (i) it is multiple of 3 (ii) it is a prime number (iii) it is neither divisible by 3 nor by 5. [3]
- (b) Calculate the median and mode for the following distribution [3]
- | | | | | | |
|-----------------|----|----|----|----|----|
| Marks | 36 | 48 | 84 | 90 | 98 |
| No. of Students | 3 | 4 | 3 | 5 | 2 |
- (c) The curved surface area of a cylinder is 4400 cm^2 and the circumference of its base is 110 cm. Find (i) the height of the cylinder. (ii) the volume of the cylinder. [4]

Question 3

- (a) Prove the following identity. $\frac{\sec^2 \theta - \sin^2 \theta}{\tan^2 \theta} = 1 + \cot^2 \theta - \cos^2 \theta$ [3]
- (b) Find a, b, c if $\begin{bmatrix} a & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 4 & 3 \\ -3 & 2 \end{bmatrix} = \begin{bmatrix} b & 17 \\ 4 & c \end{bmatrix}$ [3]
- (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. [4]

Question 4

- (a) If -5 is the remainder when $2x^3 - mx^2 + 9$ is divided by $2x + 1$, find m. [3]
- (b) Amit has a two years recurring deposit account in a bank and deposits Rs 2000 per month. If he receives Rs 52000 at the time of maturity, find the rate of interest. [3]
- (c) Use graph paper for this question. Draw a histogram for the following data and find the mode. [4]

Weight in Kg	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80
No. of Students	5	17	22	45	51	31	20	9

Section B (40 Marks) Answer any four Questions.

Question 5

(a) $A = \begin{bmatrix} 1 & 3 \\ -2 & 0 \end{bmatrix}$ $B = \begin{bmatrix} 2 & 4 \\ 5 & 1 \end{bmatrix}$ $C = \begin{bmatrix} -3 & 4 \\ 6 & 0 \end{bmatrix}$ and $D = \begin{bmatrix} 7 & 3 \\ -4 & 2 \end{bmatrix}$. Find $AB + BC - 5D$. [3]

(b) The sum of first 8 terms of an A.P is 140 and the sum of first 24 terms is 996. Find the A.P

(c) Use graph paper for this question. A (1, 1), B (5, 1), C (4, 2) and D (2, 2) are the co-ordinates of the vertices of a quadrilateral ABCD. A, B, C, D are reflected in the X-axis and the images are respectively A', B', C', D'. [3]

(i) Write down the co-ordinates of A', B', C', D'

(ii) Name the figure CDAA'D'C'B'B

(iii) Write down the coordinates of the reflection of A, B, C, D in the origin and name the figure A''B''C''D'' (iv) What single reflection will transform A' B' C' D' to A'' B'' C'' D'' [4]

Question 6

(a) Solve the following quadratic equation and give your answer correct to three significant figures. $6x^2 - 14x + 1 = 0$ [3]

(b) Show that the points A (-1, 1), B (5, 7) and C (8, 10) are collinear. Also find the equation of the line. [3]

(c) Anil possessed 400, Rs.100 shares paying 20% dividend. He sold these shares at a discount of 20% and invested the proceeds in Rs.100 shares paying 35% dividend at a premium of 25%. Find, (i) the sale proceeds. [4]

(ii) Number of new shares bought (iii) his change of income.

Question 7

(a) Following are the marks obtained by 120 students in ICSE Mathematics paper.

Marks	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of Students	1	3	11	21	43	32	9

Represent the above data by means of an ogive and use it to find (i) Median (ii) Upper Quartile (iii) Lower Quartile

(iv) Interquartile Range (v) Percentage of students who gets more than 65 marks [6]

(b) A boy is standing on the deck of ship, 10m above the water level observes the angle of elevation of the top of a hill as 60° and the angle of depression of the base of the hill as 30° , Calculate the distance of the hill from the ship and the height of the hill. [4]

Question 8

(a) A bag contains total of 50 balls of two colours- white and black. One ball is drawn at random. If the probability of getting a white ball is $\frac{2}{5}$, find the no. of white balls, also find the probability of drawing a black ball. [3]

(b) Prove the following identity . [3]

$$(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 5 + \sec^2 A \cdot \operatorname{cosec}^2 A$$

(c) The mean of the following distribution is 49. Find the missing frequency 'a' [4]

Class	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100
Frequency	15	20	30	a	10

Question 9

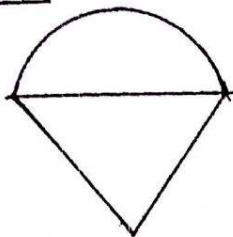
- (a) Which term of the G.P 2, 8, 32,..... up to n terms is 131072 ?
Find the sum to 6 terms. [5]
- (b) Construct a ΔPQR having given $PQ = 4.8\text{cm}$, $PR = 4\text{cm}$ and $\angle P = 75^\circ$.
Find a point 'X' (i) inside the triangle PQR.
(ii) outside the ΔPQR equidistant from Q and R and at a distance of 1.2 cm from QR. [5]

Question 10

- (a) If $\frac{4x^2 + 3y^2}{4x^2 - 3y^2} = \frac{11}{5}$, use properties of proportion to prove that $x^2 = 2y^2$ [3]
- (b) Find the co-ordinates of a point which divides internally the line segment joining the points (3, -4) and (8, -7) in the ratio 7 : 5. Hence find the equation of the line passing through this point and perpendicular to the line segment. [3]
- (c) A train covers a distance of 60 km at x km/hr. Had the speed been (x+20)km/hr the time taken to cover the distance would have been reduced by 5 hours. Write down an equation in x and solve it to evaluate 'x'. [4]

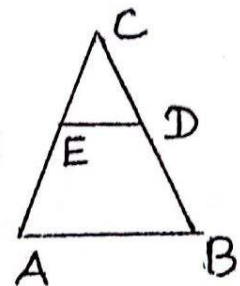
Question 11

(a)



Find the volume of the solid in the figure. Radius of cone is 7 cm and the total height of the solid is 31 cm. Give your answer correct to the nearest whole number.

- (b) In ΔABC and ΔEDC , AB is parallel to ED. $BD = \frac{1}{3} BC$ and $AB = 12.3\text{ cm}$. (i) Prove that $\Delta ABC \sim \Delta EDC$ (ii) find DE
(iii) Find $\frac{\text{area of } \Delta EDC}{\text{area of } \Delta ABC}$



- (c) Prove that two tangents drawn from an external point to a circle are of equal length. [4]