

SECTION A (40 Marks)

(Attempt all questions from this Section.)

Question 1

Choose the correct answers to the questions from the given options.

(Do not copy the questions, write the correct answers only.)

- (i) The given quadratic equation $3x^2 + \sqrt{7}x + 2 = 0$ has:
- (a) two equal real roots.
 - (b) two distinct real roots.
 - (c) more than two real roots.
 - (d) no real roots.
- (ii) Mr. Anuj deposits ₹500 per month for 18 months in a recurring deposit account at a certain rate. If he earns ₹570 as interest at the time of maturity, then his matured amount is:
- (a) ₹(500 × 18 + 570)
 - (b) ₹(500 × 19 + 570)
 - (c) ₹(500 × 18 × 19 + 570)
 - (d) ₹(500 × 9 × 19 + 570)
- (iii) Which of the following **cannot** be the probability of any event?
- (a) $\frac{5}{4}$
 - (b) 0.25
 - (c) $\frac{1}{33}$
 - (d) 67%

(iv)

The equation of the line passing through origin and parallel to the line $3x + 4y + 7 = 0$ is:

- (a) $3x + 4y + 5 = 0$
- (b) $4x - 3y - 5 = 0$
- (c) $4x - 3y = 0$
- (d) $3x + 4y = 0$

(v)

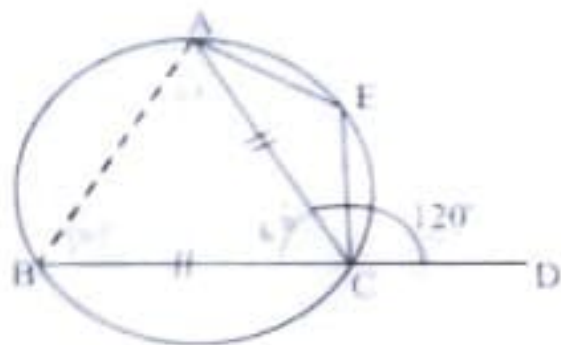
If $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$, then A^2 is equal to:

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

(vi)

In the given diagram, chords AC and BC are equal. If $\angle ACD = 120^\circ$, then $\angle AEC$ is:

- (a) 30°
- (b) 60°
- (c) 90°
- (d) 120°



(vii) The factor common to the two polynomials $x^2 - 4$ and $x^3 - x^2 - 4x + 4$ is:

- (a) $(x + 1)$
- (b) $(x - 1)$
- (c) $(x + 2)$
- (d) $(x - 2)$

(viii) A man invested in a company paying 12% dividend on its share. If the percentage return on his investment is 10%, then the shares are:

- (a) at par
- (b) below par
- (c) above par
- (d) cannot be determined

(ix) **Statement 1:** The point which is equidistant from three non-collinear points **D**, **E** and **F** is the **circumcentre** of the **DEF**.

Statement 2: The **incentre** of a triangle is the point where the bisector of the angles intersect.

- (a) Both the statements are true.
- (b) Both the statements are false.
- (c) Statement 1 is true, and Statement 2 is false.
- (d) Statement 1 is false, and Statement 2 is true.

(37) Assertion(A): If $\sin^2 A + \sin A = 1$ then $\cos^4 A + \cos^2 A = 1$

Reason(R): $1 - \sin^2 A = \cos^2 A$

- (a) (A) is true, (R) is false.
(b) (A) is false, (R) is true.
(c) Both (A) and (R) are true, and (R) is the correct reason for (A).
(d) Both (A) and (R) are true, and (R) is the incorrect reason for (A).

(38) In the given diagram $\triangle ABC \sim \triangle EFG$. If $\angle ABC = \angle EFG = 60^\circ$, then the length of the side FG is:

- (a) 15 cm
(b) 20 cm
(c) 25 cm
(d) 30 cm



(39) If the volume of two spheres is in the ratio 27 : 64, then the ratio of their radii is:

- (a) 1 : 4
(b) 4 : 3
(c) 9 : 16
(d) 16 : 9

(11)

Mrs. Rao deposited ₹150 per month in a recurring deposit account for a period of 3 years. She received ₹18,150 at the time of maturity. Find

(a) the rate of interest.

(b) how much more interest Mrs. Rao would receive if she had deposited ₹50 more per month at the same rate of interest and for the same time.

(12)

In $\triangle ABC$, $\angle ABC = 90^\circ$, $AB = 20$ cm, $AC = 25$ cm. DE is perpendicular to AC such that $\angle DEA = 90^\circ$ and $DE = 3$ cm as shown in the given figure.

(a) Prove that $\triangle ABC \sim \triangle AED$.

(b) Find the lengths of BC , AD and AE .

(c) If $BCED$ represents a plot of land on a map whose actual area on ground is 576 m^2 , then find the **scale factor** of the map.



Question 3

Use ruler and compass for the following construction. Construct a $\triangle ABC$ where $AB = 6$ cm, $AC = 4.5$ cm and $\angle BAC = 120^\circ$. Construct a circle circumscribing the $\triangle ABC$. Measure and write down the length of the radius of the circle.

(13) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 1 \\ 4 & 2 \end{bmatrix}$ and $C = \begin{bmatrix} -5 & 1 \\ 7 & -4 \end{bmatrix}$

Find

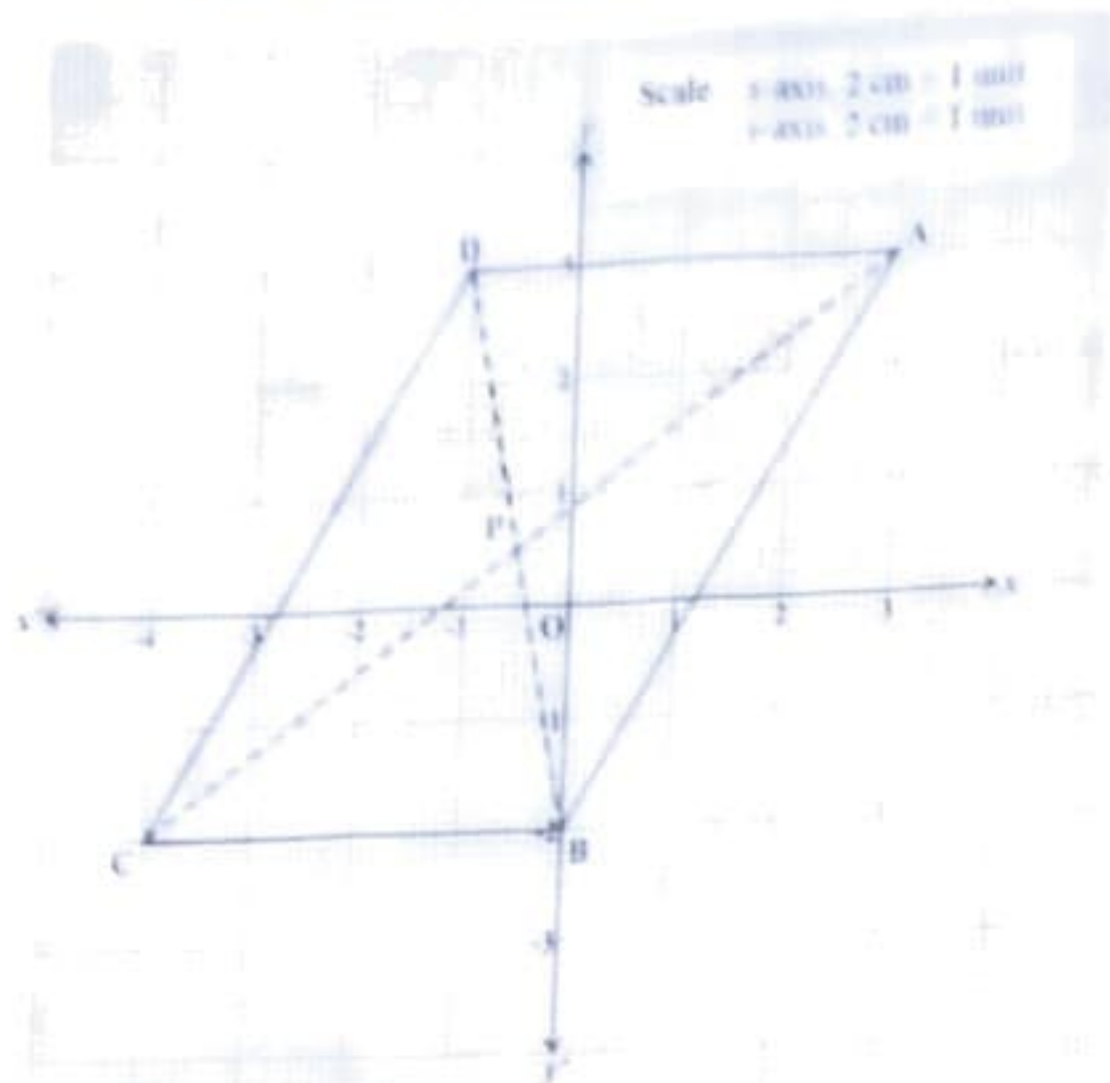
(a) $A + C$

(b) $B(A+C)$

(c) $5B$

(d) $B(A+C) - 5B$

(iii) In the given graph ABCD is a parallelogram.



Using the graph, answer the following:

- write down the coordinates of A, B, C and D.
- calculate the coordinates of 'P', the point of intersection of the diagonals AC and BD.
- find the slope of sides CB and DA and verify that they represent parallel lines.
- find the equation of the diagonal AC.

SECTION B (40 Marks)

(Answer any four questions from this Section.)

Question 4

- (i) Solve the following inequality, write the solution set and represent it on the real number line. [7]

$$2x - \frac{5}{3} \leq \frac{3x}{5} + 10 \leq \frac{4x}{5} + 11; x \in \mathbb{R}$$

- (ii) The first term of an Arithmetic Progression (A.P.) is 1, the last term is 59 and their sum is 440. Find

- (a) the number of terms
(b) common difference

- (iii) Prove that

$$\frac{(\cot A + \tan A - 1)(\sin A + \cos A)}{\sin^2 A + \cos^2 A} = \sec A \operatorname{cosec} A$$

Question 5

- (i) Using properties of proportion, find the value of 'x'. [3]

$$\frac{6x^2 + 3x - 5}{3x - 5} = \frac{9x^2 + 2x + 5}{2x + 5} \quad x \neq 0$$

- (ii) It is given that $(x - 2)$ is a factor of polynomial $2x^3 - 7x^2 + kx - 2$. [3]

Find

- (a) the value of 'k'
(b) hence, factorise the resulting polynomial completely

- (iii) A solid wooden capsule is shown in **Figure 1**. The capsule is formed of a cylindrical block and two hemispheres.

Find the sum of total surface area of the three parts as shown in **Figure 2**. Given, the radius of the capsule is 3.5 cm and the length of the cylindrical block is 14 cm.

(Use $\pi = \frac{22}{7}$)



Figure 1

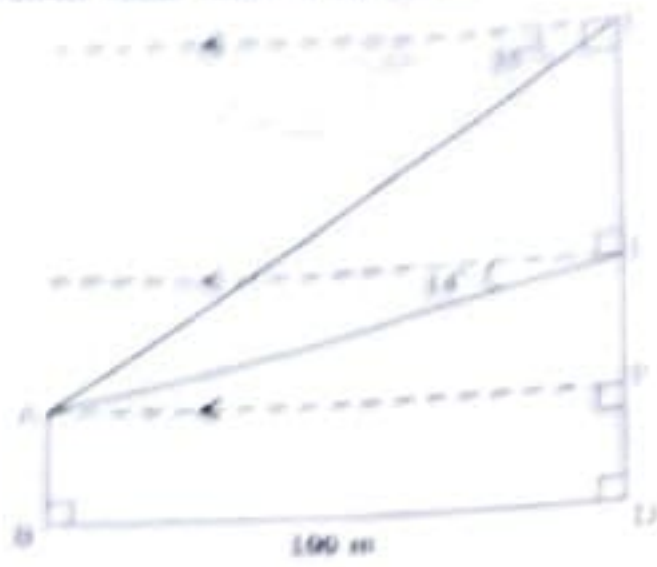


Figure 2

Question 6

- (i) Use a graph paper for this question taking 2 cm = 1 unit along both axes.
- Plot A(1, 3), B(1, 2) and C(3, 0).
 - Reflect A and B on the *x*-axis and name their images as E and D respectively. Write down their coordinates.
 - Reflect A and B through the origin and name their images as F and G respectively.
 - Reflect A, B and C on the *y*-axis and name their images as J, I and H respectively.
- (c) Join all the points A, B, C, D, E, F, G, H, I and J in order and name the closed figure so formed.

- 10) In the given diagram, AB is a vertical tower 100 m away from the foot of a 30 m vertical building ED . The angles of depression from the point C and E , to the mid-point of ED , are 30° and 14° respectively. Find the height of the tower AB .



Question 3

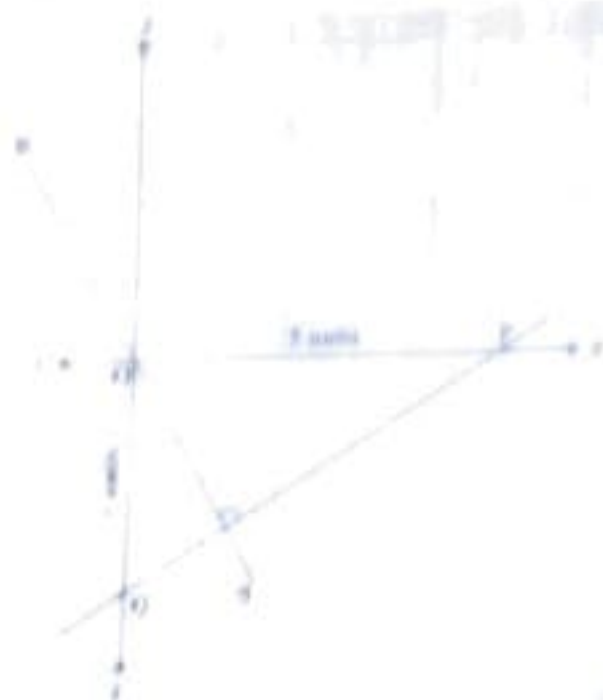
- 1) Use a graph paper for this question.
 (Take $2 \text{ cm} = 10 \text{ Marks}$ along one axis and $2 \text{ cm} = 10 \text{ students}$ along another axis)
 Draw a histogram for the following distribution which gives the marks obtained by 164 students in a particular class and hence find the Mode

Marks	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
Number of Students	10	26	40	54	34

- (ii) In the given graph, P and Q are points such that PQ cuts off intercepts of 3 units and 1 unit along the x -axis and y -axis respectively. If the RS is perpendicular to PQ and passes through the origin. Find the:

(a) coordinates of P and Q

(b) equation of line RS



- (iii) Refer to the given bill

[4]

A customer paid ₹2000 (rounded off to the nearest ₹10) to clear the bill.

Note: 5% discount is applicable on an article if 10 or more such articles are purchased.

BILL			
Article	M.P. (₹)	Quantity	G.S.T
A	100	06	12%
B	50	12	18%

Check whether the total amount paid by the customer is correct or not. Justify your answer with necessary working.

Question 8

- (i) A man bought ₹200 shares of a company at 25% premium. If he received a return of 8% on his investment. Find the

- (a) market value
(b) dividend percent declared
(c) number of shares purchased, if annual dividend is ₹1000.

- (ii) For the given frequency distribution, find the:

- (a) mean, to the nearest whole number
(b) median

x	10	11	12	13	14	15	16
f	1	2	2	6	3	8	1

- (iii) Mr and Mrs Das were travelling by car from Delhi to Kasauli for a holiday. Distance between Delhi and Kasauli is approximately 350 km (via NH 152E). Due to heavy rain they had to slow down. The average speed of the car was reduced by 20 km/hr and time of the journey increased by 2 hours. Find

- (a) the original speed of the car
(b) with the reduced speed, the number of hours they took to reach their destination

(xiii) The marked price of an article is ₹1375. If the CGST is charged at a rate of 4%, then the price of the article including GST is:

- (a) ₹55
- (b) ₹110
- (c) ₹1430
- (d) ₹1485

(xiv) The solution set for $0 < -\frac{x}{3} < 2, x \in \mathbb{Z}$ is:

- (a) $\{-5, -4, -3, -2, -1\}$
- (b) $\{-6, -5, -4, -3, -2, -1\}$
- (c) $\{-5, -4, -3, -2, -1, 0\}$
- (d) $\{-6, -5, -4, -3, -2, -1, 0\}$

(xv) **Assertion(A):** The mean of first 9 natural numbers is 4.5.

Reason(R): Mean = $\frac{\text{Sum of all the observations}}{\text{Total number of observations}}$

- (a) (A) is true, (R) is false.
- (b) (A) is false, (R) is true.
- (c) Both (A) and (R) are true, and (R) is the correct reason for (A).
- (d) Both (A) and (R) are true, and (R) is the incorrect reason for (A).

Question 2

(i) Solve the following quadratic equation $2x^2 - 5x - 4 = 0$

Give your answer correct to three significant figures.

(Use mathematical tables for this question)