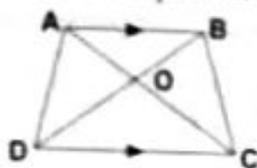## SECTION A

(Attempt all questions from this section)

1. Choose the correct answers to the questions from the given options: [15]

(a) A man deposited ₹500 per month for 6 months and received ₹3300 as the maturity value. The interest received by him is:

   (i) ₹1950   (ii) ₹300

   (iii) ₹2800   (iv) none of these

(b) ABCD is a trapezium with

   AB parallel to DC.

   Then the triangle similar to $\triangle AOB$ is

   (i) $\triangle ADB$ (ii) $\triangle ACB$

   (iii) $\triangle COD$ (iv) $\triangle COB$

(c) If the first three terms of an arithmetic progression A.P. are 1, 9, 17, then the next two terms are

   (i) 25 and 35   (ii) 27 and 37

   (iii) 25 and 33   (iv) none of these

(d) If $x \in W$, then the solution set of the inequation $-x > -7$, is

   (i) {8, 9, 10...}

   (ii) {0, 1, 2, 3, 4, 5, 6}

   (iii) {0, 1, 2, 3 ...}

   (iv) {-8, -9, -10...}

(e) If a polynomial $2x^2 - 7x - 1$ is divided by $(x + 3)$, then the remainder is

   (i) -4   (ii) 38

   (iii) -3   (iv) 2

(f) Statement 1: $\sec^2 A - \tan^2 A = 1$.

   Statement 2: $\sin^2 A - \cos^2 A = 1$.

   Which of the following is valid?

   (i) only 1   (ii) only 2

   (iii) both 1 and 2   (iv) neither 1 nor 2

(g) A man deposited ₹1200 in a recurring deposit account for 1 year at 5% per annum simple interest. The interest earned by him on maturity is

   (i) ₹14,790   (ii) ₹390

   (iii) ₹4680   (iv) ₹780

(h) If $x^2 - 4$ is a factor of the polynomial $x^3 + x^2 - 4x - 4$, then its factors are

   (i) $(x - 2)(x + 2)(x + 1)$

   (ii) $(x - 2)(x + 2)(x - 1)$

   (iii) $(x - 2)(x - 2)(x + 1)$

   (iv) $(x - 2)(x - 2)(x - 1)$

(i) The following bill shows the GST rates and the marked prices of articles A and B:

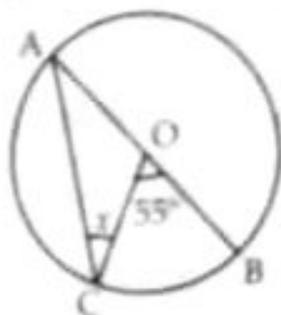| BILL : GENERAL STORE		
Article	Marked price	Rate of GST
A	₹ 300	12%
B	₹ 1200	5%

   The total amount to be paid for the above bill is:

   (i) ₹1548   (ii) ₹1596

   (iii) ₹1560   (iv) ₹1536

(j) If 73 is the nth term of the arithmetic progression 3, 8, 13, 18...., then n is

   (i) 13   (ii) 14

   (iii) 15   (iv) 16

(k) In the given figure, AB is a diameter of the circle with centre 'O'. If $\angle COB = 55°$ then the value of x is:

(i) 27.5°   (ii) 55°

(iii) 110°   (iv) 125°

(l) The roots of the quadratic equation $4x^2 - 7x + 2 = 0$ are 1.390 and 0.359. The roots correct to 2 significant figures are

(i) 1.39 and 0.36   (ii) 1.3 and 0.35

(iii) 1.4 and 0.36   (iv) 1.390 and 0.360

(m) The value of $\cot\theta \times \sqrt{1 - \cos^2\theta}$ is equal to

(i) $\sin\theta$ (ii) $\tan\theta$

(iii) $\cos\theta$ (iv) $\cot\theta$

(n) The probability of getting a prime number on a single throw of a six-sided die is

(i) $\dfrac{1}{3}$ (ii) $\dfrac{1}{2}$

(iii) 0 (iv) 1

(o) For the given 30 variables $x_1, x_2, x_3 \ldots x_{30}$

Assertion (A): To find lower quartile of the given data, the variate needs to be arranged in ascending or descending order.

Reason (R): The lower quartile is the central most score of the arranged data.

(i) A is true, R is false

(ii) A is false, R is true

(iii) both A and R are true

(iv) both A and R are false

2. (a) Calculate the coordinates of the point B if P(-1, -2) divides the join of A(-3, 3) and B internally in the ratio of 2 : 3. [4]

(b) 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 a, b and c. [4]

(c) A 2 m tall man is 50 m away from a 40 m high building. What is the angle of elevation of the top of the building from his eyes? [4]

3. (a) The mean of 1, 7, 5, 3, 4 and 4 is m. The numbers 3, 2, 4, 2, 3, 3 and p have mean $m - 1$ and median q. Find p and q. [4]

(b) Determine C if the line $5x - 4y = C$ intersects the x-axis at the point (2, 0). What are the coordinates of the point of intersection with the y-axis? [4]

(c) A person invests ₹ 2500 per month in a recurring deposit account and gets ₹ 31625 as maturity amount. If the rate of interest is 10%, find the time in years till the maturity of the account. [5]

SECTION B

(Attempt any four questions from this section)

4. (a) By selling at ₹ 92, some $2\dfrac{1}{2}$ % shares of ₹ 100 face value and investing the proceeds in 5% shares of face value ₹ 100, selling at ₹ 115, a person increased in the income by ₹ 90 a year. Find

(i) the number of shares sold

(ii) the number of shares bought

(iii) original income [3]

(b) Find the equation of a line passing through the point of intersection of $4x + 2y = 7$ with the y-axis and parallel to $y - 7x + 5 = 0$. [3]

(c) Construct a circle of 3 cm radius. Inscribe a regular hexagon in the circle. [4]

5. (a) A balloon is sent in the atmosphere to collect the information about weather at a certain height. The angle of elevation from a point on the ground is 25°. By moving 100 m away from this point, the angle of elevation changes to 15°. Find the height of the balloon from the ground correct to three significant figures. [4]
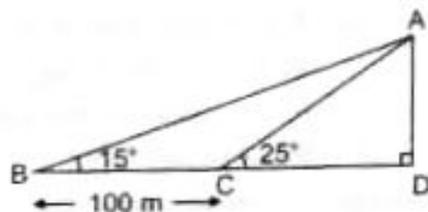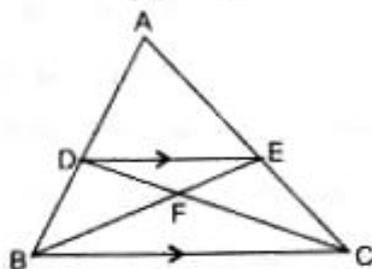
(b) Find the length of canvas required to make a conical tent, 12 m in diameter and 63 m in slant height, if the width of canvas is 2 m. Also, find the cost of canvas at the rate of ₹ 15 per metre. [3]

(c) If $\dfrac{x}{1} = \dfrac{y}{2} = \dfrac{z}{3}$, prove that

$$\sqrt[3]{4x^3 + 5y^3 + 3z^3} = 5x. \qquad [3]$$

6. **(a)** In the given figure, ABC is a triangle. DE ∥ BC and $\dfrac{AD}{BD} = \dfrac{4}{3}$.

(i) Determine the ratios $\dfrac{AD}{AB}, \dfrac{DE}{BC}$.

(ii) Prove that $\triangle DEF \sim \triangle CBF$. [3]

(b) Construct an isosceles $\triangle ABC$ such that AB = 6 cm, BC = AC = 4.5 cm. Bisect $\angle C$ internally and mark a point P on this bisector such that CP = 5 cm. Find the points which are 5 cm from P and also 5 cm from line AB. [3]

(c) The radius of the base of a cone and the radius of sphere are same, each being 8 cm. Given that volumes of these solids are also same. Calculate the height of cone. [4]

7. **(a)** Plot the $\triangle ABC$ where A(6, 4), B(2, 1) and C(7, 0). On the same graph paper, draw (i) the image $A_1B_1C_1$ of $\triangle ABC$ under reflection in the origin, (ii) the image of $\triangle ABC$ under reflection in the y-axis followed by reflection in the x-axis. Compare your result for (i) and (ii) and make a statement connecting the two results. [4]

(b) Midpoint of line segment AB is M. Coordinates of A are (4, 7) and M are (– 3, 5), find the coordinates of B. [3]

(c) The curved surface area of a right circular cone is $\dfrac{26,928}{7}$ cm². The circumference of its base is $\dfrac{1,056}{7}$ cm. Find its volume correct to the nearest cubic cm. [3]

8. **(a)** Prove that $\sec^2(90^\circ - \theta) + \tan^2(90^\circ - \theta) = \operatorname{cosec}^2\theta + \cot^2\theta$. [3]

(b) The shadow of a tower on level ground increases in length by x metres when the altitude of the sun changes from 45° to 30°. Calculate the value of x, given that the height of the tower is 25 m. (Give your answer correct to 3 significant figures.) [4]

(c) For the given progression, find the 9th term, 2, 6, 18, 54... [3]

9. **(a)** Using the data given below, construct the cumulative frequency table and draw the ogive. From the ogive, determine (i) the median, and (ii) the inter-quartile range. [5]

Marks	Frequency
0–10	3
10–20	8
20–30	12
30–40	14
40–50	10
50–60	6
60–70	5
70–80	2

(b) In the figure, BP = 16 cm, CP = 18 cm, DC = 14 cm. Calculate

(i) the length of chord AB

(ii) the length of tangent PT [5]
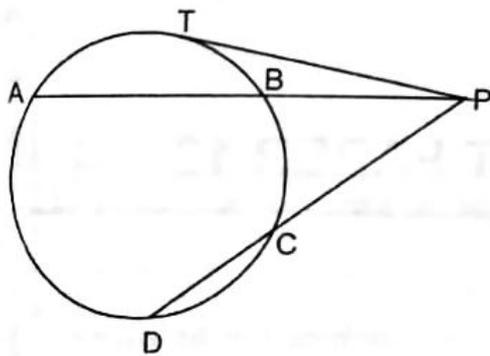
10. **(a)** P and Q have the coordinates (7, –4) and (–3, –4) and Q is the image of P. Find the equation of the mediator. [3]

(b) If $-1 < 3 - 2x \le 7$, $x \in R$, evaluate x and represent it on the number line. [3]

(c) An article has a marked price of ₹ 5,500. If GST is decreased from 18% to 12%, find change in sale price. [4]