SECTION A

(Attempt all questions from this Section.)

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

(a) The SGST paid by a customer to the shopkeeper for an article which is priced at ₹500 is ₹15. The rate of GST charged is:

(i) 1.5%   (ii) 3%

(iii) 5%   (iv) 6%

(b) When the roots of a quadratic equation are real and equal then the discriminant of the quadratic equation is:

(i) Infinite   (ii) Positive

(iii) Zero   (iv) Negative

(c) If $(x - 1)$ is a factor of $2x_2 - ax - 1$, then the value of a is

(i) -1 (ii) 1

(iii) 3   (iv) -3

(d) Given $\begin{bmatrix} a & b \\ c & d \end{bmatrix} \times X = \begin{bmatrix} p \\ q \end{bmatrix}$. The order of the matrix X is:

(i) 2×2 (ii) 1×2

(iii) 2×1 (iv) 1×1

(e) 57, 54, 51, 48, ... are in Arithmetic Progression. The value of the 8th term is:

(i) 36   (ii) 78

(iii) -36 (iv) -78

(f) **Statement 1:** The angle in a semi-circle is a right angle.
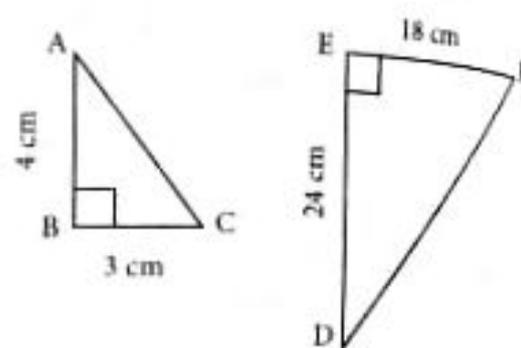
Statement 2: The exterior angle of a cyclic quadrilateral is half of the interior opposite angle.

Which of the following is valid?

(i) only 1   (ii) only 2

(iii) both 1 and 2

(iv) neither 1 nor 2

(g) In the given diagram, the $\triangle ABC$ is similar to $\triangle DEF$ by the axiom:

(i) SSS   (ii) SAS

(iii) AAA   (iv) RHS

(h) The volume of a right circular cone with same base radius and height as that of a right circular cylinder, is 120 cm³. The volume of the cylinder is:

(i) 240 cm³   (ii) 60 cm³

(iii) 360 cm³   (iv) 480 cm³

(i) For a given geometric sequence $x_1, x_2, x_3 ....$

Assertion (A): To find the next term, the preceding term is multiplied or divided by a fixed quantity.

Reason (R): Two consecutive terms have a common ratio.

(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

(j) The probability of the sun rising from the east is P(S). The value of P(S) is

(i) $P(S) = 0$ (ii) $P(S) < 0$

(iii) $P(S) = 1$ (iv) $P(S) > 1$

(k) If $\begin{bmatrix} 2 & x \\ 0 & 1 \end{bmatrix} + 3\begin{bmatrix} 2 & 1 \\ 4 & 0 \end{bmatrix} = \begin{bmatrix} 8 & 8 \\ 12 & 1 \end{bmatrix}$. The value of x is
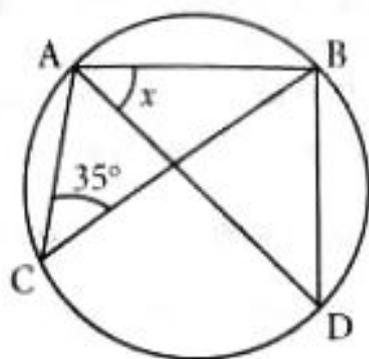
(i) 2   (ii) 3   (iii) 4   (iv) 5

(l) The centroid of a $\triangle ABC$ is G(6, 7). The coordinates of the vertices A, B and C are (a, 5), (7, 9) and (5, 7) respectively.

The value of a is:

(i) 9

(ii) 6

(iii) 3

(iv) 7

(m) In the given diagram, AC is a diameter of the circle and $\angle ADB = 35°$

The degree measure of x is:

(i) 55°

(ii) 35°

(iii) 45°

(iv) 70°

(n) If the nth term of an Arithmetic Progression (A.P.) is $(n + 3)$, then the first three terms of the A.P. are:

(i) 1,2,3

(ii) 2,4,6

(iii) 4,5,6

(iv) 7,8,9

(o) The point A (p, q) is invariant about $x = p$ under reflection.
The coordinates of it's image A' is:

(i) A' $(p, -q)$

(ii) A' $(-p, q)$

(iii) A'(p, q)

(iv) A' $(-p, -q)$

Q2 (a) Salman deposits ₹1200 every month in a recurring deposit account for 2 ½ years. If the rate of interest is 6% per annum, find the amount he will receive on maturity. [4]

(b) 3, 9, m, 81 and n are in continued proportion. Find the values of m and n. [4]

(c) Prove that: $\dfrac{\cos A}{1 + \sin A} + \dfrac{1 + \sin A}{\cos A} = 2 \sec A$ [4]

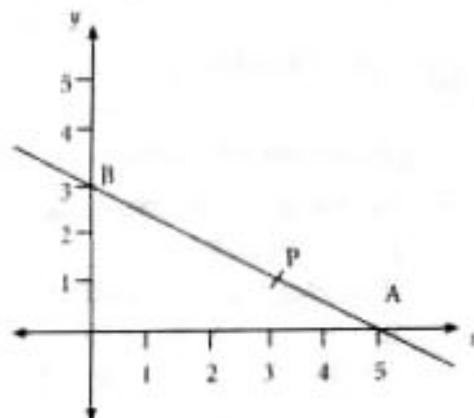**Q3 (a)** The inner circumference of the rim of a circular metal tub is 44 cm. [4]
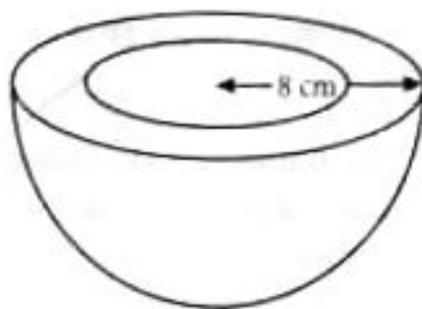
Find:

(i) The inner radius of the tub.

(ii) The volume of the material of the tub if its outer radius is 8 cm.

Use $\pi = \dfrac{22}{7}$

Give your answer correct to three significant figures.

(b) From the given figure: [4]

(i) Write down the coordinates of A and B.

(ii) If P divides AB in the ratio 2:3, find the coordinates of the point P.

(iii) Find the equation of a line parallel to line AB and passing through origin.

(c) Use a graph sheet for this question. Take 2 cm = 1 unit along the axes. [5]
Plot the $\triangle OAB$, where 0 (0, 0), A (3, –2), B (2, –3).

(i) Reflect the $\triangle OAB$ through the origin and name it as $\triangle OA'B'$.

(ii) Reflect the $\triangle OA'B'$ on the y-axis and name it as $\triangle OA''B''$.

(iii) Reflect the $\triangle OA'B'$ on the x-axis and name it as $\triangle OA'''B'''$.

(iv) Join the points AA''B''B'A'A'''B'''B and give the geometrical name of the closed figure so formed.

(Attempt any four questions from this Section.)

Q.4 (a) The following bill shows the GST rates and the marked price of articles: [3]

BILL: COMPUTERS

Articles	Marked price	Rate of GST
Graphic card	Rs 15,500.00	18%
Laptop adapter	Rs 1900.00	28%

Find the total amount to be paid for the above bill

(b) Solve the following quadratic equation

$$7x^2 + 2x - 2 = 0$$

Give your answer correct to two places of decimal.

(c) Use a graph sheet for this question. Draw a histogram for the daily earning of 54 medical stores in the following table and hence estimate the mode for the following distribution. Take 2 cm = ₹500 units along the x-axis and 2 cm = 5 stores along the y-axis. [4]
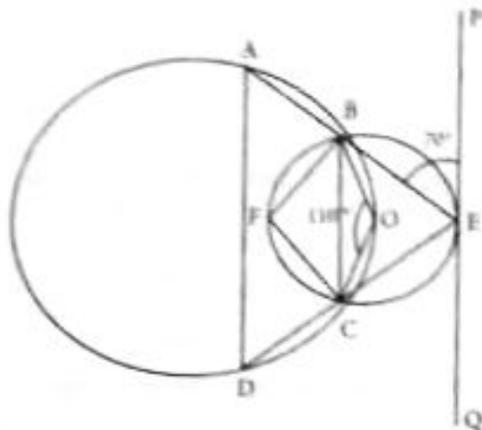
Daily earnings (₹)	4500 — 5000	5000 — 5500	5500 — 6000	6000 — 6500	6500 — 7000
No. of medical stores	20	14	12	5	3

Q.5 (a) $A = \begin{bmatrix} 3 & -2 \\ -1 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 6 \\ 1 \end{bmatrix}$ and $C = \begin{bmatrix} -4 \\ 5 \end{bmatrix}$, Evaluate $AB - 5C$ [3]

(b) In the given figure, O is the centre of the circle. The tangent PT meets the diameter RQ produced at P. [3]

(i) Prove $\triangle PQT \sim \triangle PTR$

(ii) If $PT = 6$ cm, $QR = 9$ cm, find the length of PQ
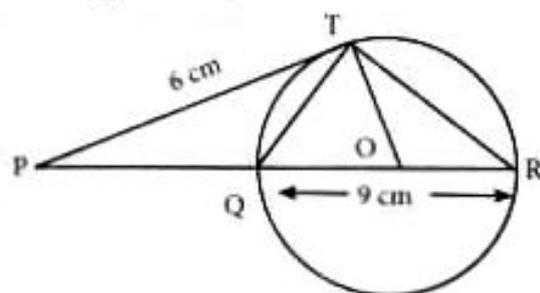
(c) Factorise the given polynomial completely, using Remainder Theorem:

$6x^3 + 25x^2 + 31x + 10$ [4]

Q.6 (a) ABCD is a square where B (1, 3), D (3, 2) are the end points of the diagonal BD. Find: [3]

(i) the coordinates of the point of intersection of the diagonals AC and BD

(ii) the equation of the diagonal AC

(b) Mr. Sharma receives an annual income of ₹ 900 in buying ₹ 50 shares selling at ₹ 80. If the dividend declared is 20%, find the

(i) amount invested by Mr. Sharma

(ii) percentage return on his investment [3]

(c) The first term, the last term and the common difference of an Arithmetic Progression are 98, 1001 and 7 respectively. Find the following for the given Arithmetic Progression:

(i) number of terms 'n'.
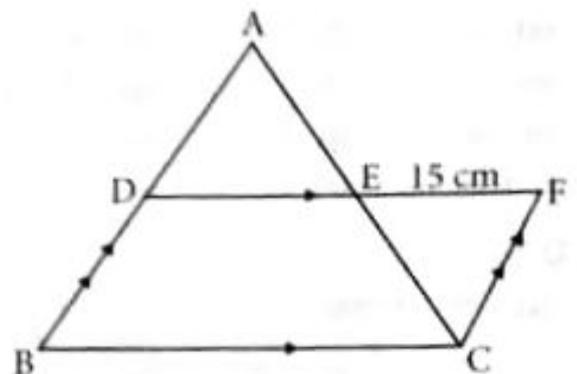
(ii) sum of the 'n' terms. [4]

Q.7 (a) A box contains some green, yellow and white tennis balls. The probability of selecting a green ball is $\frac{1}{4}$ and the probability of selecting a yellow ball is $\frac{1}{3}$. If the box contains 10 white balls, then find:

(i) total number of balls in the box.

(ii) probability of selecting a white ball [3]

(b) A cone and a sphere having the same radius are melted and recast into a cylinder. The radius and height of the cone are 3 cm and 12 cm respectively. If the radius of the cylinder so formed is 2 cm, find the height of the cylinder. [3]

(c) In the given diagram, ABCD is a cyclic quadrilateral and PQ is a tangent to the smaller circle at E. Given $\angle AEP = 7$... $\angle BOC = 110°$. Find:

(i) ∠ECB   (ii) ∠BEC

(iii) ∠BFC   (iv) ∠DAB   [4]

Q.8 (a) Solve the following inequation:

$$-\frac{x}{3} - 4 \le \frac{x}{2} - \frac{7}{3} < -\frac{7}{6}, \; x \in R$$

Represent the solution set on a number line. [3]

(b) The following table gives the petrol prices per litre for a period of 50 days.

Price (₹)	85 – 90	90 – 95	95 – 100	100 – 105	105 – 110
No. of days	12	10	8	15	5

Find the mean price of petrol per litre to the nearest rupee using the step-deviation method. [3]

Wages (₹)	250 – 300	300 – 350	350 – 400	400 – 450	450 – 500	500 – 550	550 – 600
No. of workers	8	15	20	30	25	15	7

(i) the median wages

(ii) the inter-quartile range of wages

(iii) percentage of workers whose daily wage is above ₹475

Q.10 (a) Solve for x, using the properties of proportion. [3]

$$\frac{\sqrt{2+x} + \sqrt{3-x}}{\sqrt{2+x} - \sqrt{3-x}} = 3$$

(b) Using ruler and compasses, construct a regular hexagon of 4.5 cm side. Hence construct a circle circumscribing the

(c) In the given diagram, ABC is a triangle and BCFD is a parallelogram. AD : DB = 4 : 5 and EF = 15 cm. [4]
Find:

(i) AE : EC   (ii) DE   (iii) BC

Q.9 (a) Amit takes 12 days less than the days taken by Bijoy to complete a certain work. If both, working together, take 8 days to complete the work, find the number of days taken by Bijoy to complete the work, working alone. [5]

(b) Use a graph sheet for this question. The daily wages of 120 workers working at a site are given below: [5]

Use 2 cm = ₹50 and 2 cm = 20 workers along the x-axis and y-axis respectively, draw an ogive and hence estimate:

hexagon. Measure and write down the length of the circum-radius. [3]

(c) An observer standing on the top of a lighthouse 150 m above the sea level watches a ship sailing away. As he observes, the angle of depression of the ship changes from 50° to 30°. Determine the distance travelled by the ship during the period of observation. Give your answer correct to the nearest meter. (Use mathematical tables for this question.) [4]

$$\frac{10}{500} \quad 0.02$$