

SECTION A

(Attempt all questions from this section)

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

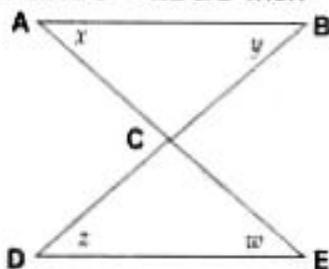
(a) If x , 8, 5 and 16 are in proportion then x is equal to

- (i) 2.5 (ii) 2
(iii) 5 (iv) 1.5

(b) If the n th term of an arithmetic progression is $18 - 5n$, then the 12th term is

- (i) 42 (ii) -42
(iii) 78 (iv) -78

(c) If $\triangle ABC \sim \triangle DEC$ then



- (i) $\angle x = \angle y$ (ii) $\angle x = \angle w$
(iii) $\angle y = \angle z$ (iv) $\angle y = \angle w$

(d) If $kx^3 - 3x^2 + 2x - 16$ has a factor $(x + 2)$, then the value of k is

- (i) 3 (ii) -4
(iii) 4 (iv) -2

(e) If $b^2 - 4ac > 0$, the roots of the quadratic equation are

- (i) real and distinct
(ii) imaginary
(iii) not real
(iv) real and equal

(f) In a right angled triangle with an acute angle A .

Statement 1: $1 + \tan^2 A = \sec^2 A$

Statement 2: $1 + \tan^2 A = \cot^2 A$

Which of the following is valid?

- (i) Both the statements are true.
(ii) Both the statements are false.
(iii) Statement 1 is true, and Statement 2 is false.

(iv) Statement 1 is false, and Statement 2 is true.

(g) If matrix $A = [5 \ 10]$ and matrix $B = \begin{bmatrix} 4 & 2 \\ 1 & 3 \end{bmatrix}$ then AB is

- (i) $\begin{bmatrix} 20 \\ 30 \end{bmatrix}$ (ii) $[20 \ 30]$
(iii) $\begin{bmatrix} 30 \\ 40 \end{bmatrix}$ (iv) $[30 \ 40]$

(h) The solution set of the inequation $4x + 3 \leq 7$ where $x \in W$ is

- (i) $\{2\}$ (ii) $\{0\}$
(iii) $\{0, 1\}$ (iv) $\{1\}$

(i) If $\frac{2x}{3y} = \frac{-15}{9}$ then by componendo and dividendo

(i) $\frac{3y - 2x}{3y + 2x} = \frac{14}{5}$

(ii) $\frac{2x + 3y}{2x - 3y} = \frac{19}{9}$

(iii) $\frac{2x + 3y}{2x - 3y} = \frac{5}{14}$

(iv) $\frac{2x + 3y}{2x - 3y} = \frac{19}{-11}$

(j) The point which is invariant under reflection in the origin is

- (i) $(0, 0)$ (ii) $(0, -1)$
(iii) $(-1, 0)$ (iv) $(1, 1)$

(k) A cylinder of 4 cm diameter and 70 cm height has a volume of

- (i) 80 m^3 (ii) 880 m^3
(iii) 8.8 m^3 (iv) 0.88 m^3

(l) ₹600 is invested in a recurring deposit account for 2 years at 6% per annum simple interest. The interest on maturity is

- (i) ₹900 (ii) ₹1800
(iii) ₹1200 (iv) ₹3600

(m) The median of $(x + 2)$, x , $(x + 4)$, $(x + 6)$ is

- (i) x (ii) $(x + 2)$
(iii) $(x + 3)$ (iv) $(x + 4)$

- (n) If the lines $y = 5 - 6x$ and $2y = 3ax - 5$ are parallel to each other then the value of a is

- (i) 4 (ii) -4
(iii) 2 (iv) -2

- (o) For the probability of an event,

Assertion (A): The maximum probability is 100.

Reason (R): The event will surely occur all the times.

- (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) Find the 52nd term of the sequence 1, 10, 19, 28 ... [4]

- (b) Calculate the maturity amount from a recurring deposit of ₹ 150 per month for 1 year 6 months if the rate of interest is 11% p.a. [4]

- (c) For the given progression, find the 9th term, 2, 6, 18, 54... [4]

3. (a) When $4x^3 - 3x^2 + 7x + k$ is divided by $x + 2$, the remainder is -40. Find k . [4]

- (b) Find the range of values of x which satisfies $-2\frac{2}{3} \leq x + \frac{1}{3} < 3\frac{1}{3}$, $x \in \mathbb{R}$.

Graph these values of x on the number line. [5]

- (c) Find the coordinates of point P which divides the join of A(5, 7) and B(3, -5) in the ratio 2 : 3. [4]

SECTION B

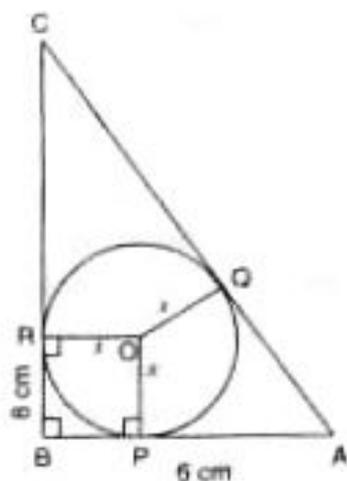
(Attempt any four questions from this section)

4. (a) By selling at ₹ 92, some $2\frac{1}{2}\%$ 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]

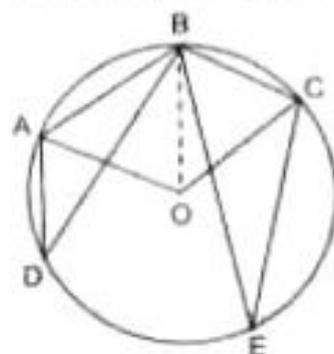
- (b) ABC is a right-angled triangle with $AB = 6$ cm and $BC = 8$ cm. A circle with centre O has been inscribed inside the triangle. Calculate the value of x , the radius of the inscribed circle. [3]



- (c) Two unbiased coins are tossed simultaneously. Find the probability of getting

- (i) two heads
(ii) one head
(iii) at least one head
(iv) at most one head [4]

5. (a)



In the given figure, $\angle ADB = 20^\circ$, $\angle BEC = 30^\circ$; find $\angle ABC$. [3]

- (b) Solve the following quadratic equation

$$\frac{1}{x} - \frac{1}{8-x} = \frac{2}{15} \quad [3]$$

- (c) The following numbers, $K + 3$, $K + 2$, $3K - 7$ and $2K - 3$ are in proportion. Find K . [4]

6. (a)

If $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$, find the value of $A^2 - 2A - 3I$, where I is a unit matrix. [3]

- (b) The points (2, 1), (4, 2) and (6, a) are collinear. Find the value of a . [4]

- (c) Raj has a cumulative time deposit account in a bank. His monthly

instalment is ₹ 250 and receives ₹ 8275 at the time of maturity. If the time period was 2 years and 6 months, find the rate of interest per annum paid by the bank. [3]

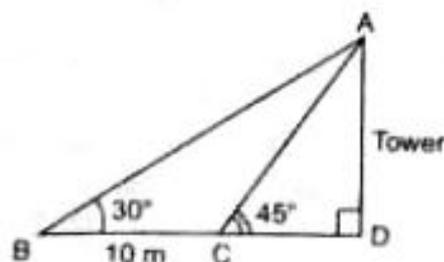
7. (a) Construct an isosceles $\triangle ABC$ such that $AB = 6$ cm, $BC = AC = 4.5$ cm. Bisect $\angle C$ internally and mark a point P on this bisector such that $CP = 5$ cm. Find the points which are 5 cm from P and also 5 cm from line AB . [3]
- (b) A circle is drawn to touch the four sides of a quadrilateral $PQRS$. If O is the centre of the circle, prove that $\angle POQ + \angle ROS = 180^\circ$. [3]
- (c) (Use a graph paper for this question.) The daily pocket expenses of 200 students in a school are given below:

Pocket expenses (in ₹)	Number of students (frequency)
0-5	10
5-10	14
10-15	28
15-20	42
20-25	50
25-30	30
30-35	14
35-40	12

Draw a histogram representing the above distribution and estimate the mode from the graph. [4]

8. (a) Prove that $\frac{\sqrt{1-\cos\theta}}{\sqrt{1+\cos\theta}} = \operatorname{cosec}\theta - \cot\theta$ [3]

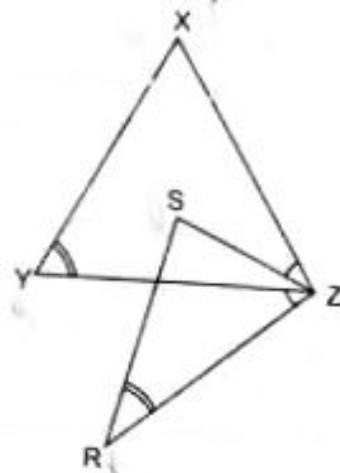
- (b) The shadow of a vertical tower on level ground increases by 10 m, when the altitude of the sun changes from 45° to 30° . Using the given figure, find the height of the tower correct to one place of decimal. [3]



- (c) A shopkeeper buys an article for ₹ 7200 and pays GST 12%. The shopkeeper

makes it at ₹ 9000 and charges GST at 12% from the consumer. Find (i) GST paid by shopkeeper (ii) profit per cent made by the shopkeeper. [4]

9. (a) In the given figure, $\angle XZS = \angle YZR$, $\angle XYZ = \angle SRZ$, $XY = 10.4$ cm and $RS = 7.8$ cm. Find the ratio of ar. ($\triangle XYZ$) : ar. ($\triangle ZSR$). [3]



- (b) A train covers 400 km at a certain speed. If its speed is decreased by 10 km/hr it would take 2 hours more. Find its original speed. [4]
- (c) A bus covers a distance of 240 km at a uniform speed. Due to heavy rain, its speed gets reduced by 10 km/h and as such, it takes two hours longer to cover the total distance. Assuming the uniform speed to be 'x' km/h, form an equation and solve it to evaluate 'x'. [3]

10. (a) Draw and describe the locus of the following:
- Midpoints of radii of circle of 5 cm radius
 - Centre of a football, rolling along a straight line on a level floor [5]

- (b) The marks of 200 students in a test were recorded as follows:

Marks	No. of students
10-19	7
20-29	11
30-39	20
40-49	46
50-59	57
60-69	37
70-79	15
80-89	7

Draw the cumulative frequency curve
and use it to find

(i) the median

(ii) the number of students who scored
more than 35% marks [5]