

This Question Paper contains 12 printed pages.
(Section - A, B, C & D)

Sl.No. 032926

12 (E)
(MARCH, 2023)

Time : 3 Hours]

[Maximum Marks : 80

Instructions :

- 1) Write in a clear legible handwriting.
- 2) This question paper has four Sections A, B, C & D and Question Numbers from 1 to 39.
- 3) All Sections are compulsory. General options are given.
- 4) The numbers to the right represent the marks of the question.
- 5) Draw neat diagrams wherever necessary.
- 6) New sections should be written in a new page. Write the answers in numerical order.
- 7) Calculator is not allowed.

SECTION-A

- Answer the following as directed. (1 to 16) (1 mark each) [16]
- State whether the following statements are true or false.

1) $8\sec^2\theta - 8\tan^2\theta = 8$ [1]

2) $7 \times 11 \times 13 + 13$ is a prime number. [1]

3) $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \dots$ is an arithmetic progression. [1]

4) If one of the root of quadratic equation $x^2 - 4x + m = 0$ is 3 then $m = 3$. [1]

■ Fill in the blanks to make each statement true.

5) If H.C.F. $(12, k) = 6$ and L.C.M. $(12, k) = 36$ then $k =$ _____ . [1]

6) If α and β are zeros of quadratic polynomial $3x - x^2 + 8$ then $\alpha\beta =$ _____ . [1]

7) $27x + 63y = 45$ and $63x + 27y = 135$ then $x + y =$ _____ . [1]

8) Co-ordinates of mid point M of line segment AB joining the points A $(2a - b, b)$ and B $(b, 2a - b)$ is _____ . [1]

■ Answer in one sentence, one word or in one number.

9) Which is the median class for the following frequency distribution? [1]

Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
Frequency	7	15	13	17	10

10) If $P(A) - P(\bar{A}) = 0.8$ then find the value of $P(A)$. [1]

11) Find the diameter of a circle whose circumference and area are equal in number. [1]

12) For what value of an acute angle θ , $\cot 2\theta \cdot \cot 7\theta = 1$? [1]

■ Select the proper alternatives to make each statement true.

13) If a sphere of radius r is divided in four equal parts then total surface area of each part is _____. [1]

(A) πr^2

(B) $2\pi r^2$

(C) $3\pi r^2$

(D) $\frac{1}{2}\pi r^2$

14) If the pair of equations $2x + 2y + 2 = 0$ and $4x + ky + 8 = 0$ has unique solution then $k \neq$ _____. [1]

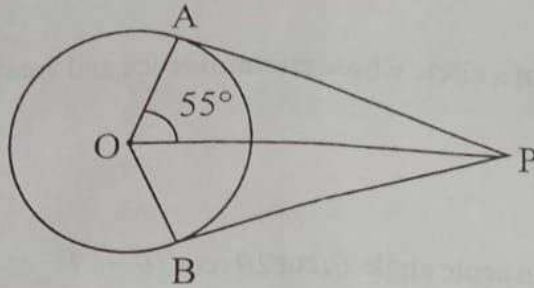
(A) 4

(B) 2

(C) -4

(D) 8

- 15) In a figure given below, PA and PB are tangents to the circle with centre O. $\angle AOP = 55^\circ$ then $\angle APB =$ _____ . [1]



- (A) 35° (B) 70°
 (C) 125° (D) 110°
- 16) An unbiased coin is tossed thrice. What is the probability of getting at least two heads? [1]

- (A) $\frac{3}{8}$ (B) $\frac{1}{8}$
 (C) $\frac{1}{2}$ (D) $\frac{2}{3}$

SECTION - B

- Solve the following questions showing calculation. (17 to 26) (2 marks each)[20]

- 17) Prove that $5 + 2\sqrt{7}$ is irrational. [2]

18) Find the zeros of the quadratic polynomial $6x^2 - 13x + 6$. [2]

19) Verify whether the pair of linear equations : $\frac{4}{3}x + 2y = 8$ and $2x + 3y = 12$ is consistent or not. [2]

OR

19) Solve the pair of equations by substitution method: [2]

$$x + y = 4 \text{ and } 2x = 8 + 3y.$$

20) If P, Q and R are interior angles of a triangle PQR then show that

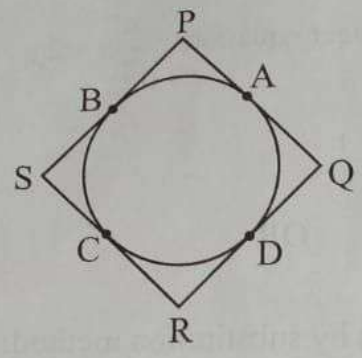
$$\sec\left(\frac{P+Q}{2}\right) = \operatorname{cosec}\frac{R}{2}. \quad [2]$$

21) If $2\sin\theta + \cos\theta = 2$, find $\tan\theta$. ($\cos\theta \neq 0$) [2]

OR

21) If $2\tan^2 45^\circ + x - \sin^2 60^\circ = 2$, find the value of x. [2]

22) As shown in the figure, a quadrilateral PQRS is drawn to circumscribe a circle. Prove that $PQ + RS = QR + PS$. [2]



OR

22) Two concentric circles are of radii 29 cm and 21 cm. Find the length of the chord of the larger circle which touches the smaller circle. [2]

23) For the following grouped frequency distribution find the mode. [2]

Class	10 - 25	25 - 40	40 - 55	55 - 70	70 - 85
Frequency	2	3	7	6	6

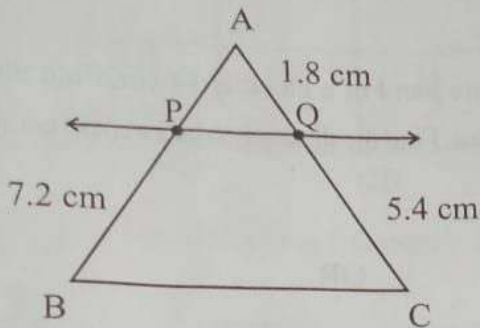
24) Salma and Mona are friends. What is the probability that both will have [2]
 i) different birthdays?
 ii) the same birthday in the year 2019?

25) Find the roots of the quadratic equation $5x = 6 + \frac{2}{x}$ by the method of completing the square. [2]

OR

25) Find the roots of quadratic equation $\sqrt{2}x^2 + 7x + 5\sqrt{2} = 0$ by the method of factorisation. [2]

- 26) In the given figure if $PQ \parallel BC$ then find AB. [2]



SECTION - C

- Answer the following questions showing calculations. (27 to 34) (3 marks each)

[24]

- 27) On dividing $3x^3 + x^2 + 2x + 5$ by a polynomial $g(x)$, the quotient and remainder were $3x - 5$ and $9x + 10$ respectively. Find $g(x)$. [3]

- 28) Sum of the areas of two squares is 468 m^2 . If the difference of their perimeters is 24 m, find the sides of the two squares. [3]

- 29) For what value of n , are the n^{th} terms of two APs : 65, 67, 69, and 10, 17, 24, equal? [3]

OR

- 29) Find the sum of all the terms of the AP : $-2, -5, -8, \dots, -227$. [3]

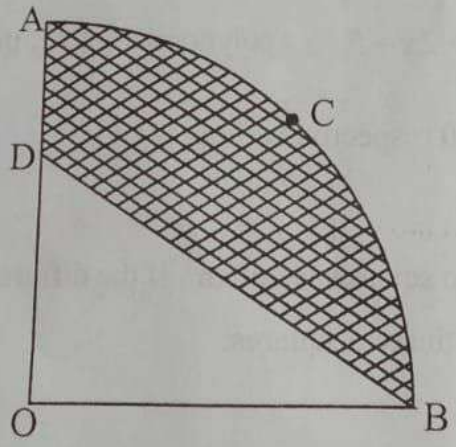
30) If $P(2, 3)$, $Q(3, -2)$, $R(-3, -5)$ and $S(-4, -2)$ are the vertices of a quadrilateral, find the area of the quadrilateral PQRS. [3]

31) The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 15 minutes. Find the distance to be swept to complete one revolution. [3]

OR

31) In the given figure OACB is quadrant of a circle with centre O and diameter 7 cm. If $OD = 2$ cm, find the area of the [3]

- i) quadrant OACB
- ii) shaded region



32) A vessel is in the form of a hollow hemisphere mounted by a hollow cylinder. The diameter of the hemisphere is 28 cm and the total height of the vessel is 26 cm. Find the inner surface area of the vessel. [3]

- 33) The following frequency distribution shows the ages of 100 persons. Find the median of the data. [3]

Age (in years)	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
No. of persons	15	16	38	15	9	7

OR

- 33) The mean of the following frequency distribution is 18. Find the missing frequency f . [3]

Class	11 - 13	13 - 15	15 - 17	17 - 19	19 - 21	21 - 23	23 - 25
Frequency	7	6	f	13	20	5	4

- 34) Prove that the lengths of tangents drawn from an external point to a circle are equal. [3]

SECTION - D

- Answer the following questions as required by showing calculations. (35 to 39)
(4 marks each) [20]

- 35) A boat goes 40 km upstream and 49 km downstream in 15 hours. In the same river it can go 25 km upstream and 35 km downstream in 10 hours. Determine the speed of the stream and that of the boat in still water. [4]
- 36) As observed from the top of a 100 m high hill the angle of depressions of the top of a tower is 30° and the angle of depressions of the bottom of a tower is 45° . Find the height of the tower and the distance between base of a tower and base of a hill. [4]

$$\left(\text{Take } \frac{1}{\sqrt{3}} = 0.58 \right)$$

[4]

- 37) A container shaped like a right circular cylinder having radius 6 cm and height 15 cm is full of ice cream. The ice cream is to be filled into cones of height 12 cm and radius 3 cm, having a hemispherical shape on the top. Find the number of such cones which can be filled with ice cream. [4]

- 38) In $\triangle XYZ$ if $XY^2 + XZ^2 = YZ^2$, prove that $\angle X = 90^\circ$. [4]

OR

- 38) BL and CM are medians of a triangle ABC right angled at A. Prove that $4(BL^2 + CM^2) = 5BC^2$. [4]

- 39) Draw a right triangle in which the sides (other than hypotenuse) are of lengths 4 cm and 3 cm. Then construct another triangle whose sides are $\frac{5}{3}$ times the corresponding sides of the given triangle. Write steps of construction. [4]

OR

- 39) Draw a circle of radius 4.5 cm. From a point 7.5 cm away from its centre, construct the pair of tangents to the circle and measure their lengths. Write steps of construction. [4]

