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

Sl.No.

12 (E)

(FEBRUARY-MARCH, 2025)

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 54. All Sections are compulsory.**
3) **General options are given but for blind students internal option is given for figure/graph based questions.**
4) **The numbers to the right represent the marks of the Section.**
5) **New Sections should be written on a new page. Write the answers in numerical order.**
6) **Draw neat diagrams wherever necessary.**
7) **Calculator, digital watch or smart watch is not allowed.**

SECTION - A

■ **Answer the following as per instruction given : (Questions : 1 to 24)**
(Each correct answer carries 1 mark.) **[24]**

■ **Choose the correct option for the questions given below: (Questions : 1 to 6)**

1) If HCF $(96, k) = 4$ and LCM $(96, k) = 9696$ then $k =$ _____. **[1]**

(A) 96 (B) 440
(C) 404 (D) 4

2) If α and β are zeros of Quadratic polynomial $6x^2 - 3 - 7x$ then $\frac{1}{\alpha} + \frac{1}{\beta} =$ _____. **[1]**

(A) $-\frac{7}{3}$ (B) $\frac{3}{6}$

(C) $-\frac{7}{6}$ (D) 2

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

(A) 90 (B) 180

(C) 2 (D) $\frac{1}{2}$

4) If the discriminant of $2x^2 + 5x - k = 0$ is 81 then $k =$ _____. [1]

(A) 5 (B) 7

(C) -7 (D) -5

5) Statement P : The sum of first n odd natural numbers is n^2. [1]

Statement Q : The sum of first n even natural numbers is $n(n + 1)$.

(A) Statement P is correct and Q is incorrect.

(B) Statement Q is correct and P is incorrect.

(C) Both Statements P and Q are correct.

(D) Both Statements P and Q are incorrect.

6) PQ || RS in trapezium PQRS and PR and QS intersect at point O. If OP = 6, OQ = 9 and OR = 8 then OS = _____. [1]

(A) $\frac{58}{9}$ (B) 12

(C) $\frac{58}{8}$ (D) 11

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6) For Δ ABC and Δ PQR, $\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR}$. Δ ABC and Δ PQR are similar by _____ condition. [1]

(A) ASA (B) AAA

(C) SAS (D) SSS

■ **Fill in the blanks with correct option as to make the given statement correct: (Questions : 7 to 12)**

7) The distance between origin and point P (36, 15) is _____. (39, 51, 21) [1]

8) $\tan^2\theta - \sec^2\theta =$ _____. (1, –1, 0) [1]

9) A quadrilateral ABCD circumscribes a circle. If AB = 6, BC = 8, CD = 5 then AD = _____. (3, 11, 8) [1]

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9) _____ tangents can be drawn to a circle from its centre. (0, 1, 2) [1]

10) The length of the minute hand of a clock is 14 cm. The area swept by the minute hand in 5 minutes is _____ sq.cm. $(154, \frac{154}{3}, 77)$ [1]

11) If the ratio of areas of two spheres is 1:2 then the ratio of their volumes will be _____. $(2:\sqrt{2},\ 1:2\sqrt{2},\ 3:2\sqrt{2})$ [1]

12) $Z - M =$ _____ $\times (M - \bar{x})$. (2, 3, 4) [1]

■ **State whether the following statements are true or false: (Questions : 13 to 16)**

13) If $P(A) = (0.8)^2$ then $P(\bar{A}) = (0.2)^2$. [1]

14) The graph of pair of linear equations $x + 2y - 4 = 0$ and $2x + 4y - 12 = 0$ is parallel lines. [1]

15) $x^2 + 3x + 1 = (x - 2)^2$ is a quadratic equation. [1]

16) The distance of point (3, – 4) from Y - axis is 3. [1]

■ **Answer the following in one sentence or word or figure : (Questions : 17 to 20)**

17) If Curved surface area of cylinder $= \frac{1}{3} \times$ Total surface area of cylinder then what is the relation between its height and radius? [1]

18) If $Z + M = 40$ and $Z - M = 4$ then find the mean. [1]

19) If p, q, r are prime numbers then what will be their LCM? [1]

20) If the roots of quadratic equation $6x^2 - 13x + m = 0$ are reciprocals of each other then find the value of m. [1]

■ **Match the following : (Questions : 21 to 24)** [4]

Table - 1 :

	A - Polynomial	B - Number of Zeros
21)	$P(x) = x^3 + x^2$	(a) 1
22)	$P(x) = x^3 - x$	(b) 2
		(c) 3

Table - 2 :

	A	B
23)	$\tan\theta \times \cos\theta$	(a) $2\cos^2\theta - 1$
24)	$\cos^2\theta - \sin^2\theta$	(b) 1
		(c) $\sin\theta$

SECTION - B

Answer any 9 (Nine) out of 13 (Thirteen) questions given below with calculation : (Questions : 25 to 37)

(Each correct answer carries 2 marks.) **[18]**

25) Prove that $2+3\sqrt{5}$ is irrational. **[2]**

26) Solve $2x + 3y = 11$ and $x - 2y = -12$ and hence find the value of 'm' for which $y = mx + 3$. **[2]**

27) Find the value of k for the quadratic equation $kx(x-2)+6=0$ if it has two equal roots. **[2]**

28) Find two numbers whose sum is 27 and product is 182. **[2]**

29) Find the 10^{th} term from the last term of the A.P. : 3, 8, 13, ..., 253. **[2]**

30) If $\sin(A-B)=\frac{1}{2}$ and $\cos(A+B)=\frac{1}{2}$, $0° < A+B \leq 90°$, $A > B$, find A and B. **[2]**

31) Prove that $(\sin A + \text{cosec } A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$. **[2]**

32) Two concentric circles are of radii 5 cm and 13 cm. Find the length of the chord of the larger circle which touches the smaller circle. **[2]**

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[2]

32) Define

i) Concentric Circles

ii) Length of a Tangent

33) 2 cubes each of volume 64 cm^3 are joined end to end. Find the total surface area of the resulting cuboid. [2]

34) If the mean of observations $x, x+3, x+6, x+9$ and $x+12$ is 10 then find x. [2]

35) Find median if $n = 53$, $l = 60$, $f = 7$, $cf = 22$ and $h = 10$. [2]

36) It is given that in a group of 3 students, the probability of 2 students not having the same birthday is 0.992. What is the probability that the 2 students have the same birthday? [2]

37) A lot consists of 144 ball pens of which 20 are defective and the others are good. Heer will buy a pen if it is good, but will not buy if it is defective. The shopkeeper draws one pen at random and gives it to her. What is the probability that [2]

i) she will buy it?

ii) she will not buy it?

SECTION - C

■ **Answer any 6 (Six) of the following as asked out of 9 (Nine) with calculation: (Questions : 38 to 46)**

(Each correct answer carries 3 marks.) [18]

38) Find the zeros of the polynomial $x^2 - 5$ and verify the relationship between the zeros and the coefficients. [3]

39) If the zeros of polynomial are $2+\sqrt{3}$ and $2-\sqrt{3}$ then find the polynomial. [3]

40) The sum of the 4th and 8th terms of an AP is 24 and the sum of the 6th and 10th terms is 44. Find the first 3 terms of the AP. [3]

41) Students of a school were determined to reduce air pollution. A tree plantation program was arranged for it by the school. It was decided that the number of trees, that each section of each class will plant, will be the same as the class in which they are studying e.g. a section of class I will plant 1 tree, a section of class II will plant 2 trees and so on till class XII. There are three sections of each class. How many trees will be planted by the students? [3]

42) If A and B are (–2, –2) and (2, – 4) respectively, find the coordinates of P such that $AP = \frac{3}{7}AB$ and P lies on the line segment AB. [3]

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

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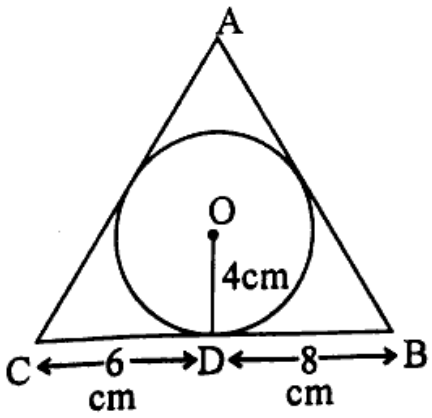
43) Answer the following questions : [3]

i) Define tangent of a circle.

ii) Two circles touch each other externally at one point. How many common tangents can be drawn to them?

iii) How many tangents can a circle have?

44) A triangle ABC is drawn to circumscribe a circle of radius 4 cm such that the segments BD and DC into which BC is divided by the point of contact D are of lengths 8 cm and 6 cm respectively (see fig.). Find the sides AB and AC. [3]



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44) Answer the following questions : **[3]**

i) Define secant of a circle.

ii) $\odot(P, r_1)$ and $\odot(Q, r_2)$ touch each other externally at one point. Find the length of PQ.

iii) A circle can have _____ parallel tangents at the most.

45) A chord of a circle having length 10 cm subtends a right angle at the centre. Find the area of the corresponding: **[3]**

i) Minor segment

ii) Major sector

(Use $\pi = 3.14$)

46) Two dice, one blue and one gray, are thrown at the same time. Find the following probabilities. **[3]**

i) Sum of the digits on dice is 13.

ii) Same digit on both dice.

iii) Product of digits on dice is even.

SECTION - D

■ **Answer any 5 (Five) of the following questions out of 8 (Eight): (Questions : 47 to 54) (Each question carries 4 marks.)** **[20]**

47) Nihan hires a taxi to visit his uncle's house. The taxi charges in a city consist of a fixed charge together with the charge for the distance covered. His uncle's house is 10 km from his house and for that he pays ₹105. From there he goes to his grandfather's house. His grandfather's house is 15 km from his uncle's house. He pays ₹155 for this travel. What are the fixed charges and the charge per km? Nihan returns to his house from his grandfather's house. His house is 25 km from grandfather's house. How much taxi fare will he pay? **[4]**

48) The sum of a two-digit number and the number obtained by reversing the digits is 66. If the digits of the number differ by 2, find the number. How many such numbers are there? [4]

49) State and prove Thales theorem. [4]

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49) Answer the following questions: [4]

i) State the fundamental theorem of proportionality.

ii) State SAS condition for similarity of triangles.

iii) Define similarity of triangles.

iv) Give 2 examples of figure that are not similar.

50) Anil's height is 90 cm. He is walking away from the base of a lamp - post at a speed of 1.2 m/s. If the lamp is 3.6 m above the ground, find the length of his shadow after 4 seconds. [4]

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50) Answer the following questions: [4]

i) Give 2 examples of similar figures.

ii) State AAA condition for similarity of triangles.

iii) If a line divides any two sides of a triangle in the same ratio then what is the relation between the line and third side?

iv) State SSS condition for similarity of triangles.

51) A straight highway leads to the foot of a tower. Rudra, who is standing at the top of the tower observes a car at an angle of depression of 30°, which is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depression of the car is found to be 60°. Find the time taken by the car to reach the foot of the tower from this point. [4]

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51) Answer the following questions: **[4]**

i) Define the angle of elevation.

ii) Define the line of sight.

iii) A person is standing at the centre of line joining 2 buildings A and B. He observes the top of both buildings. The angles of elevation are 30° and 60° for A and B respectively. Which building is taller?

iv) On observing from top of a tower, the angle of depression of a car moving towards the tower is decreasing. Is this statement True or False?

52) A vessel is in the form of an inverted cone. Its height is 8 cm and the radius of its top, which is open, is 5 cm. It is filled with water up to the brim. Two friends Yash and Akash are playing with lead shots near it. Yash drops lead shots, each of which is a sphere of radius 0.5 cm into the vessel, one-fourth of the water flows out. Find the number of lead shots dropped in the vessel. **[4]**

53) A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively, and the slant height of the top is 2.8 m, find the area of the canvas used for making the tent. Also, find the cost of the canvas of the tent at the rate of ₹500 per m^2. (Note that the base of the tent will not be covered with canvas.) **[4]**

54) The mode of frequency distribution given below is 34.5 and number of observations is 165. Find the missing frequencies a and b. **[4]**

Class	5-14	14-23	23-32	32-41	41-50	50-59
Frequency	5	11	a	53	b	26