ZIEL CLASSES

FEBRUARY 2023

Std: X **MATHEMATICS** **Marks:80**

Time: 2 ½ hr

Answers to this paper must be written on the paper provided separately.
You will not be allowed to write during the first 15 minutes.
This time is to be spent in reading the question paper.
The time given at the head of the paper is the time allotted for writing the answers.

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*Attempt **all** the questions from **Section A** and **any four** questions from **Section B***

All essential working should be clearly shown whenever needed on the same sheet. The omission of the essential working will result in the loss of marks.

Do the rough working at the bottom of the paper.
The intended marks for questions or parts of questions are given in the brackets [ ].
*This paper comprises **10** printed pages.*

Section - A (40 marks)

(*Attempt **all** the questions from this Section)*

Question 1

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

(i) If the discriminant of quadratic equation $ax^2 + bx + c = 0$ is equal to zero, then two equal roots are:

(a) $\frac{-b}{2a}$

(b) $\frac{b}{2a}$

(c) $\frac{b}{a}$

(d) $\frac{-a}{2b}$

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(ii) A shopkeeper buys goods worth ₹1000 and sells at a profit of 10%. If rate of GST is 5%, then the bill amount is :

(a) ₹1050
(b) ₹1155
(c) ₹1080
(d) ₹1000

(iii) The solution set representing the following number line, is:

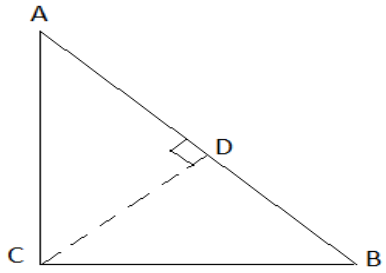
(a) {x: x ∈ R, -3 < x < 3}
(b) {x: x ∈ R, -3 < x ≥ 3}
(c) {x: x ∈ Z, -3 < x < 3}
(d) {x: x ∈ Z, -3 ≤ x < 3}

(iv) Manisha opens a Recurring Deposit Account with the Bank of Assam and deposits ₹ 600 per month for 20 months. Calculate the interest accrued, if the bank pays interest at the rate of 10% per annum.

(a) ₹1050
(b) ₹1000
(c) ₹1200
(d) ₹1500

(v) In the given figure, we have ∠ACB = 90°, CD ⊥ AB, then ΔACB~ΔADC by:

(a) SSS similarity rule
(b) SAS similarity rule
(c) AA similarity rule
(d) None of these



(vi) The curved surface area of a cylinder of height 14 cm is 88 sq. cm. The diameter of the cylinder is:

(a) 0.5 cm
(b) 1.0 cm
(c) 1.5 cm
(d) 2.0 cm

(vii) If $g(x) = x + 1$ is a factor of $h(x) = 5x^3 + px^2 - 8x - 12$, then the value of p is:

(a) -8
(b) 5
(c) 9
(d) 12

(viii) If the nth term of an A.P. is $7 - 4n$, then find its 6^{th} term is:

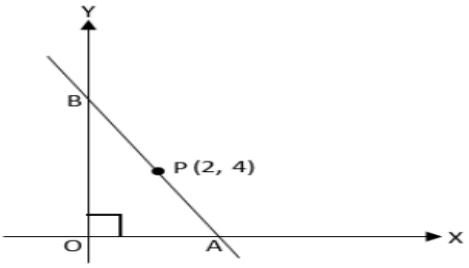
(a) 17
(b) – 17
(c) 18
(d) – 18

(ix) Drawing of an ogive table is useful in determining the:

(a) mode
(b) mean
(c) median
(d) all the three above

(x) In the given figure, P (2,4) is the mid point of the line segment AB. The coordinates of A and B are :

(a) A (8, 0), B(0, 4)
(b) A(0 ,4), B(8, 0)
(c) A(4, 0), B(0, 8)
(d) A(0, 8), B(4, 0)



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(xi) Two matrices A and B are multiplied to get AB if:

(a) Both have same order
(b) Both are rectangular
(c) Number of columns in matrix A is equal to the number of rows in matrix B
(d) Number of rows in matrix B is equal to the number of columns in matrix A

(xii) The point (5, -6) on reflection in a line is mapped to (-5, -6). Name the mirror line and write its equation.

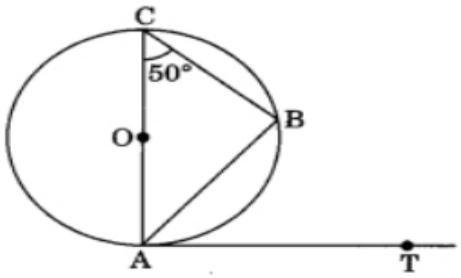
(a) X- axis, y = 0
(b) Y - axis, x = 0
(c) X- axis, x = 0
(d) Y - axis, y = 0

(xiii) The probability of not winning a game is 0.35. What is the probability of winning?

(a) 0.15
(b) 0.25
(c) 0.65
(d) 1.50

(xiv) In the figure given, if AB is a chord of the circle and AC is its diameter such that ∠ACB = 50°. If AT is the tangent to the circle at the point A, then ∠CAB is equal to :

(a) 65°
(b) 50°
(c) 40°
(d) 60°



(xv) If x, 9, 5 and 3 are in proportion, then x equals to:

(a) 15
(b) 45
(c) 27
(d) 18

Question 2

(i) Using the properties of proportion, find the value of x in the expression: (4)

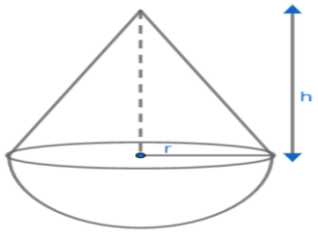
$$\frac{\sqrt{a+x}+\sqrt{a-x}}{\sqrt{a+x}-\sqrt{a-x}} = 5$$

(ii) Find the equation of the line perpendicular to the line joining the points A(2, 4) and B(6, 8) and passing through the point (5,7). (4)

(iii) The given figure represents a hemisphere surmounted by a conical block of wood. The diameter of their base is 12 cm each and the slant height of the cone is 10 cm. Calculate : (4)

(a) the perpendicular height of the cone,

(b) the volume of the solid (Take π = 3.14)



Question 3

(i) Ritwik deposits ₹1600 per month for 18 months in a recurring deposit account. If he gets ₹31080 at the time of maturity. Find: (4)

(a) The total interest earned by Ritwik
(b) The rate of interest per annum

(ii) Prove that: $\frac{cos^2 A}{\cos A - \sin A} + \frac{\sin A}{1 - \cot A} = \sin A + \cos A$. (4)

(iii) Use graph paper for this question. The point R (6, 3) was reflected in the origin to get the image R′. (5)

(a) Write down the coordinates of R′.

(b) If M is the foot of the perpendicular from R to the line y = 0, find the coordinates of M.

(c) If N is the foot of the perpendicular from R′ to the line y = 0, find the coordinates of N.

(d) Name the figure RMR′N.

Section - B (40 marks)

(Attempt **any four** questions from this Section)

Question 4

(i) If $A = \begin{bmatrix} 3 & 2 \\ x & y \end{bmatrix}$ and $A^2 = I$, where I is the identity matrix. (3)

Find the value of x and y.

(ii) Solve the inequation and represent the solution set on the number line: (3)

$2y - 3 \leq y + 1 \leq 4y + 7, x \in Z$

(iii) By using step-deviation method, compute the arithmetic mean for the following data: (4)

Marks obtained	No. of workers
0 – 10	14
10 – 20	22
20 – 30	37
30 – 40	58
40 – 50	67
50 – 60	75

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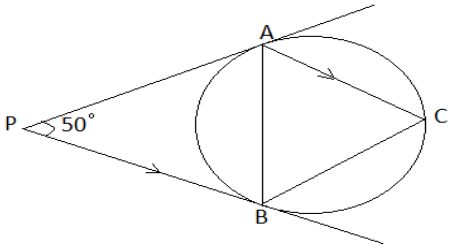
Question 5

(i) Without solving the following quadratic equation, find the value of 'p' if the roots of the equation $px^2 – (2p – 2)x + p = 0$ has real and equal roots. (3)

(ii) In an intra-state transaction the marked price of an article is ₹6000. A wholeseller sells it to a dealer at 20% discount. The dealer further sells the article to a customer at a discount of 10% on the marked price. If the rate of GST at each stage is 18%, find the amount of tax(under GST) paid by the dealer to the government. (3)

(iii) PA and PB are two tangents of a circle. AC is parallel to PB. Find the angles of ΔABC. (4)



Question 6

(i) If a, b and c are in continued proportion, prove that (3)

$$\frac{1}{a^3} + \frac{1}{b^3} + \frac{1}{c^3} = \frac{a}{b^2c^2} + \frac{b}{c^2a^2} + \frac{c}{a^2b^2}$$

(ii) The daily profits in rupees of 100 shops in a departmental store are distributed as follows: (3)

Profit per shop (in ₹)	0-100	100-200	200-300	300-400	400-500	500-600
No. of Shops	12	18	27	20	17	6

Draw a histogram of the data given above on the graph paper and estimate the mode.

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(iii) If $2x^3 + ax^2 + bx - 6$ has a factor $(2x + 1)$ and leaves the remainder 12 when divided by $(x + 2)$. Calculate the values of a and b. (4)

Question 7

(i) Find the sum of n terms of the A.P. 8, 5, 2, -1,… to 11 terms. (3)

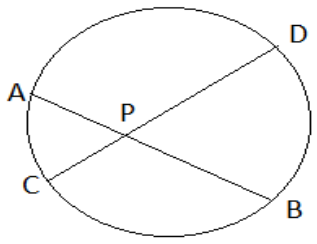
(ii) P(-4, 6), Q(-1, 6) and R(-1, 2) are the vertices of a triangle. (3)
(a) Find the coordinates of the centroid G of the triangle.
(b) Find the equation of the line through G passing through P.

(iii) Construct a circle of radius 3.5 cm with centre O. Construct 2 tangents PT and PR from a point P outside the circle such that ∠TOR = 120°. (4)

Question 8

(i) A hollow copper pipe of inner diameter 14 cm and outer diameter 16 cm is melted into another solid cylinder is of same height as that of pipe. Find the diameter of the solid cylinder. (3)

(ii) In the given figure, AB and CD are two chords of a circle intersecting each other at a point P, such that AP = CP. Prove that AB = CD. (3)



(iii) A man standing on a window of the first floor of a building observes that the angle of depression of a dustbin which is 10m from the foot of the building is 45°. He climbs to the window of the second floor, directly above the first floor and observes the angle of depression of the dustbin to be 60°. Calculate the difference in height between the first floor and the second floor. (4)

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Question 9

(i) Car A travels x km for every litre of petrol, while car B travels (x + 5) km for every litre of petrol. (4)

(a) Write down the number of litres of petrol, use by car A and car B in covering a distance of 200km.

(b) If car A uses 2 litres of petrol more than car B in covering the 200km, write down an equation in x and solve it to determine the number of litres of petrol used by car B for the journey.

(ii) Use graph paper for this question. (6)

Marks obtained by 200 students in an examination are given below:

Marks	No. of Students
0 – 10	5
10 – 20	11
20 – 30	10
30 – 40	20
40 – 50	28
50 – 60	37
60 – 70	40
70 – 80	29
80 – 90	14
90 - 100	6

Draw an ogive for the given distribution taking 2 cm = 10 marks on one axis and 2 cm = 20 students on the other axis. Determine:

(a) The median marks

(b) The number of students who failed if the minimum marks required is 40.

(c) If scoring 85 and above is grade one, find the number of students who secured grade one in the examination.

Question 10

(i) Prove that: $\frac{cotA + tanB}{cotB + tanA}$ = cot A tan B (3)

(ii) Two dice are thrown at the same time. Find the probablity that the sum of two numbers appearing on the dice. (3)

(a) 10

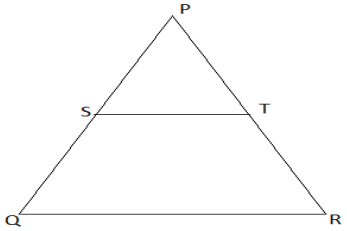
(b) Atleast 12

(iii) In the adjoining figure; QR || ST and S divides PQ in the ratio 1 : 2. Find: (4)

(a) $\frac{PT}{TR}$

(b) $\frac{PT}{PR}$

(c) ST if QR = 4.5 cm



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