ICSE Class 12 Mathematics 2026 Question Paper

Time Allowed :3 Hours	**Maximum Marks :**80	**Total questions :**22

General Instructions

Read the following instructions very carefully and strictly follow them:

1. *Answers to this Paper must be written on the paper provided separately.*
2. *You will not be allowed to write during the first 15 minutes.*
3. *This time is to be spent in reading the question paper.*
4. ***The time given at the head of this Paper is the time allowed for writing the answers.***
5. *Attempt all questions from **Section A** and any four questions from **Section B**.*
6. *The intended marks for questions or parts of questions are given in brackets[ ].*

1(i). If A and B are square matrices of order 3, A is non-singular matrix and AB = O, then the matrix B is:

(A) unit matrix

(B) Scalar matrix

(C) non-singular matrix

(D) null matrix

1(ii). If m and n are respectively the order and degree of the differential equation $\frac{d}{dx}\left(\frac{dy}{dx}\right)^3 = 0$ then the value of $(m-n)$ is:

(A) 0

(B) 1

(C) 2

(D) 3

1(iii). The derivative of $xy = c^2$ with respect to x is:

(A) $\frac{dy}{dx} = \frac{2c-y}{x}$

(B) $\frac{dy}{dx} = \frac{c^2}{x^2}$

(C) $\frac{dy}{dx} = \frac{-y}{x}$

(D) $\frac{dy}{dx} = \frac{y}{x}$

1(iv). Consider $\Delta = \begin{vmatrix} 2a & 2b & 2c \\ 2e & f & g \\ 2i & j & k \end{vmatrix}$. Assertion: The value of $\Delta = 4 \times \begin{vmatrix} a & b & c \\ e & f & g \\ i & j & k \end{vmatrix}$. Reason: If all elements of one row or one column of a determinant are multiplied by a scalar, k then the value of the determinant is multiplied by k. Which of the following is correct?

(A) Both Assertion and Reason are true, and Reason is the correct explanation for Assertion.

(B) Both Assertion and Reason are true, but Reason is not the correct explanation for Assertion.

(C) Assertion is true and Reason is false.

(D) Assertion is false and Reason is true.

1(v). Five numbers x_1, x_2, x_3, x_4, x_5 are randomly selected from the numbers 1, 2, 3, . . . , 18 and are arranged in the increasing order such that $x_1 < x_2 < x_3 < x_4 < x_5$. What is the probability that $x_2 = 7$ and $x_4 = 11$?

(A) $\frac{26}{51}$

(B) $\frac{3}{104}$

(C) $\frac{1}{68}$

(D) $\frac{1}{34}$

1(vi). If $A = \begin{pmatrix} a & 0 & 0 \\ 0 & a & 0 \\ 0 & 0 & a \end{pmatrix}$, then A^n equals to:

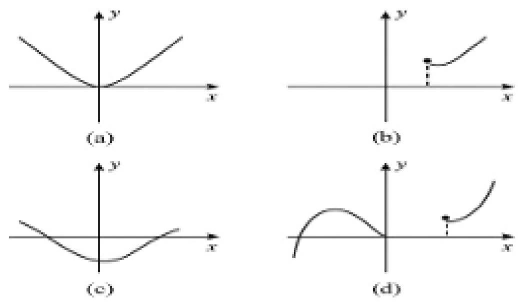
(A) $\begin{pmatrix} a^n & 0 & 0 \\ 0 & a^n & 0 \\ 0 & 0 & a^n \end{pmatrix}$

(B) $\begin{pmatrix} a & 0 & 0 \\ 0 & a^n & 0 \\ 0 & 0 & a \end{pmatrix}$

(C) $\begin{pmatrix} a^n & 0 & 0 \\ 0 & a & 0 \\ 0 & 0 & a^n \end{pmatrix}$

(D) $\begin{pmatrix} na & 0 & 0 \\ 0 & na & 0 \\ 0 & 0 & a^n \end{pmatrix}$

1(vii). Observe the following graphs (a), (b), (c), and (d), each representing different types of functions.



Statement 1: A function which is continuous at a point may not be differentiable at that point.

Statement 2: Graph (c) is an example of a function that is continuous but not differentiable at the origin.

Which of the following is correct?

(A) Statement 1 is true and Statement 2 is false.

(B) Statement 2 is true and Statement 1 is false.

(C) Both the statements are true.

(D) Both the statements are false.

1(viii). If $f(x) = kx^2 + 7x - 4$ and $f'(5) = 97$ then what is the value of k?

(A) -4

(B) 0

(C) 4

(D) 9

1(ix). Statement 1: If a relation R on a set A satisfies $R = R^{-1}$, then R is symmetric.

Statement 2: For a relation R to be symmetric, it is necessary that $R = R^{-1}$.

Which one of the following is correct?

(A) Statement 1 is true and Statement 2 is false.

(B) Statement 2 is true and Statement 1 is false.

(C) Both the statements are true.

(D) Both the statements are false.

1(x). Assertion: The equality $\tan(\cot^{-1} x) = \cot(\tan^{-1} x)$, is true for all $x \in \mathbb{R}$.

Reason: The identity $\tan^{-1} x + \cot^{-1} x = \frac{\pi}{2}$, is true for all $x \in \mathbb{R}$.

Which of the following is correct?

(A) Both Assertion and Reason are true and Reason is the correct explanation for Assertion.

(B) Both Assertion and Reason are true but Reason is not the correct explanation for Assertion.

(C) Assertion is true and Reason is false.

(D) Assertion is false and Reason is true.

1(xi). Given two events A and B such that $P(\frac{A}{B}) = 0.25$ and $P(A \cap B) = 0.12$. The value $P(A' \cap B)$ is:

(A) 0.36

(B) 0.48

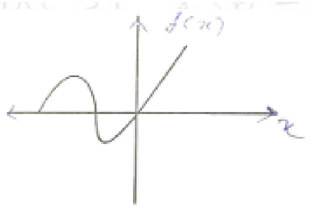
(C) 0.88

(D) 0.036

1(xii). The value of the determinant of a matrix A of order 3 is 3. If C is the matrix of cofactors of the matrix A, then what is the value of determinant of C^2?

1(xiii). If a relation R on the set $\{a, b, c\}$ defined by R = {(b, b)}, then classify the relation.

1(xiv).



The given function $f : \mathbb{R} \to \mathbb{R}$ is many to one function. Give reason.

1(xv). There are three machines and 2 of them are faulty. They are tested one by one in a random order till both the faulty machines are identified. What is the probability that only two tests are needed to identify the faulty machines?

2(i). If $x = e^{\frac{x}{y}}$, then prove that $\frac{dy}{dx} = \frac{x-y}{x \log x}$

2(ii). Find the values of 'a' for which the function $f(x) = b - ax + \sin x$ is increasing on $\mathbb{R}$.

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3. Find the point on the curve $y = (x-2)^2$ at which the tangent is parallel to the chord joining the end points $(2, 0)$ and $(4, 4)$.

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4. Show that the general solution of the differential equation: $\frac{dy}{dx} = y \cot 2x$ is
$\log y = \frac{1}{2} \log|\sin 2x| + C$

5(i). If $\int x^5 \cos(x^6) dx = k \sin(x^6) + C$, find the value of 'k'.

5(ii). Evaluate: $\int_0^5 \frac{\sqrt{x}}{\sqrt{5-x}+\sqrt{x}}dx$

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6. A music streaming app uses the function: $f(x) = \tan^{-1}\left(\frac{x}{10}\right)$ **to assign a mood score based on the number of hours a user listens to music per week. Let the listening times of two users, User A and User B, be 6 and 8 respectively. Compute the combined mood score of user A and user B, that is,** $f(6) + f(8)$**.**

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7. Solve: $\sin^{-1}(x) + \sin^{-1}(1-x) = \cos^{-1} x$**.**

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8. If $y = (A + Bx)e^{-2x}$**, prove that:** $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 4y = 0$

9(i). Solve the following differential equation: $x\frac{dy}{dx} = y - x\tan\left(\frac{y}{x}\right)$

9(ii). Solve the following differential equation: $(1 + x^2)\frac{dy}{dx} + 2xy = 4x^2$

10(i)(a). Three friends go to a restaurant to have pizza. They decide who will pay for the pizza by tossing a coin. It is decided that each one of them will toss a coin and if one person gets a different result (heads or tails) than the other two, that person would pay. If all three get the same result (all heads or all tails), they will toss again until they get a different result. What is the probability that all three friends will get the same result (all heads or all tails) in one round of tossing?

10(i)(b). What is the probability that they will get a different result in one round of tossing?

10(i)(c). What is the probability that they will need exactly four rounds of tossing to determine who would pay?

10(ii)(a). A school offers students the choice of three modes for attending classes:
Mode A: Offline (in-person) - 40% of students
Mode B: Online (live virtual classes) - 35% of students
Mode C: Recorded lectures - 25% of students
After a feedback survey: 20% of students from Mode A, 30% from Mode B, and 50% from Mode C rated the class as "Excellent". Represent the data in terms of probability. Define the events clearly.

10(ii)(b). Using Bayes' Theorem, find the probability that the student attended the Recorded lectures (Mode C), given that they rated the class as "Excellent".

10(ii)(c). Interpret your result. Which mode has the highest likelihood of being chosen if a student says "Excellent"?

11(i). To raise money for an orphanage, students of three schools A, B and C organised an exhibition in their residential colony, where they sold paper bags, scrap books and pastel sheets made by using recycled paper. Student of school A sold 30 paper bags, 20 scrap books and 10 pastel sheets and raised 410. Student of school B sold 20 paper bags, 10 scrap books and 20 pastel sheets and raised 290. Student of school C sold 20 paper bags, 20 scrap books and 20 pastel sheets and raised 440.
Translate the problem into a system of equations.

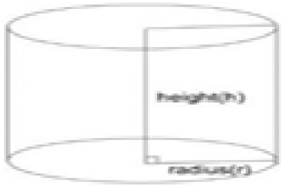
11(ii). Solve the system of equations by using matrix method.

11(iii). Hence, find the cost of one paper bag, one scrap book and one pastel sheet.

12(i). Evaluate: $\int \frac{x^2+x+1}{(x+2)(x^2+1)}dx$

12(ii). Evaluate: $\int_{\pi/4}^{3\pi/4} \frac{x}{1+\sin x} dx$

13(i)(a).



A person has manufactured a water tank in the shape of a closed right circular cylinder. The volume of the cylinder is $\frac{539}{2}$ **cubic units. If the height and radius of the cylinder be h and r.**

Express h in terms of radius r and given volume.

13(i)(b). Let the total surface area of the closed cylinder tank be S, express S in term of radius r.

13(i)(c). If the total surface area of the tank is minimum, then prove that radius $r = \frac{7}{2}$ **units.**

13(i)(d). Find the height of the tank.

13(ii)(a).

A Dolphin jumps and taken a path given by the equation $h(t) = \frac{1}{2}(-7t^2 + 3t + 2)$**,** $(t \geq 0)$**,** $h(t)$ **is the height of the Dolphin at any point of time.**

Is the function differentiable for $t \geq 0$? Justify.

13(ii)(b). Find the instantaneous rate of change of height at $t = \frac{1}{14}$.

13(ii)(c). $h(t)$ is increasing in $(-\infty, \frac{3}{14})$. Is this true or false? Justify.

13(ii)(d). Find the time at which the Dolphin will attains the maximum height. Also find the maximum height.

14(i). In a school, three subject teachers English, Math, and Science sometimes give surprise tests on the same day. Based on past records:

- **The English teacher gives a test 90% of the time**
- **The Math teacher gives a test 80% of the time**
- **The Science teacher gives a test 70% of the time**

Let X be the number of surprise tests a student gets on a given day. So, $X \in \{0, 1, 2, 3\}$. Find the probability for each possible number of surprise tests.

14(ii). Use the probabilities to build a distribution table.

14(iii). Calculate the average number of surprise tests per day.

14(iv). Based on your calculations, decide: Should the teachers coordinate better? Or is the current plan acceptable?

15(i). Consider the following statements and choose the correct option:

Statement 1: If $\vec{a}$ and $\vec{b}$ represents two adjacent sides of a parallelogram then the diagonals are represented by $\vec{a} + \vec{b}$ and $\vec{a} - \vec{b}$.

Statement 2: If $\vec{a}$ and $\vec{b}$ represents two diagonals of a parallelogram then the adjacent sides are represented by $2(\vec{a} + \vec{b})$ and $2(\vec{a} - \vec{b})$.

Which of the following is correct?

(A) Statement 1 is true and Statement 2 is false.

(B) Statement 2 is true and Statement 1 is false.

(C) Both the statements are true.

(D) Both the statements are false.

15(ii). A plane passes through three points A, B and C with position vectors $\hat{i} + \hat{j} + \hat{k}$, $\hat{j} + \hat{k}$ and $\hat{k} + \hat{i}$ respectively. The equation of the line passing through the point P with position vector $\hat{i} + 2\hat{j} + 2\hat{k}$ and normal to the plane is:

(A) $\vec{r} = (\hat{i} + 2\hat{j} + 2\hat{k}) + \lambda(\hat{i} + \hat{j} + \hat{k}), \lambda \in \mathbb{R}$

(B) $\vec{r} = (\hat{i} + \hat{j} + \hat{k}) + \lambda(\hat{i} + 2\hat{j} + 2\hat{k}), \lambda \in \mathbb{R}$

(C) $\vec{r} \cdot (\hat{i} - \hat{j} - \hat{k}) = \hat{i} + 2\hat{j} + 2\hat{k}$

(D) $x - 1 = y = z$

15(iii). If the direction cosines of a line are $\langle \frac{1}{c}, \frac{1}{c}, \frac{1}{c} \rangle$, then:

(A) $c > 0$

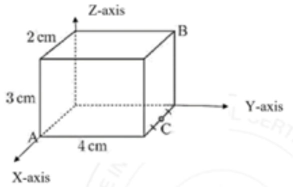
(B) $0 < c < 1$

(C) $c = \pm\sqrt{3}$

(D) $c > 2$

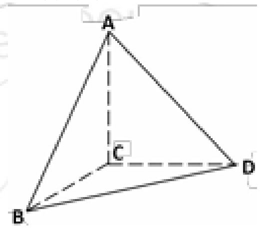
15(iv). If $\vec{a}$ and $\vec{b}$ are unit vectors enclosing an angle θ and $|\vec{a} + \vec{b}| < 1$, then find the values between which θ lies.

15(v).



Shown below is a cuboid with dimensions 4 cm along X-axis, 3 cm along Y-axis and 2 cm along Z-axis. Find $\vec{BA} \cdot \vec{BC}$.

16(i)(a).

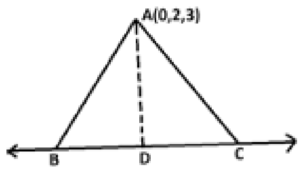


A building is to be constructed in the form of a triangular pyramid ABCD as shown in the figure. Let the angular points be $A(0,1,2), B(3,0,1), C(4,3,6)$ and $D(2,3,2)$ and let G be the point of intersection of the medians of $\triangle BCD$. What will be the length of vector $\vec{AG}$?

16(i)(b). Find the area of $\triangle ABC$.

16(ii). What are the values of x for which the angle between the vectors $2x^2\hat{i} + 3x\hat{j} + \hat{k}$ and $\hat{i} - 2\hat{j} + x^2\hat{k}$ is obtuse?

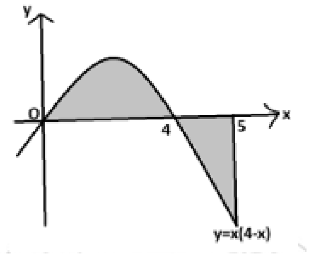
17(i).



Given, $A(0,2,3)$, B and C lie on the line $\frac{x+3}{5} = \frac{y-1}{2} = \frac{z+4}{3}$ and $BC = 5$ units. Find the area of $\triangle ABC$.

17(ii). Find the equation of the plane containing the line $\frac{x}{-2} = \frac{y-1}{3} = \frac{1-z}{1}$ and the point $(-1,0,2)$.

18.



Find the area bounded by the curve $y = x(4 - x)$ and the x-axis from $x = 0$ to $x = 5$ as shown in the figure.

19(i). Which condition is true if Average Cost (AC) is constant at all levels of output?

(A) MC $>$ AC

(B) MC = AC

(C) MC $<$ AC

(D) MC = $\frac{1}{2}$ AC

19(ii). Which of the following statement(s) is/are correct with respect to regression coefficients?

Statement 1: It measures the degree of linear relationship between two variables.

Statement 2: It gives the value by which one variable changes for a unit change in the other variable.

Which of the following is correct?

(A) Statement 1 is true and Statement 2 is false.

(B) Statement 2 is true and Statement 1 is false.

(C) Both the statements are true.

(D) Both the statements are false.

19(iii). Mean of $x = 53$, mean of $y = 28$, regression co-efficient y on $x = -1.2$, regression co-efficient x on $y = -0.3$. Find coefficient of correlation (r).

19(iv). The total revenue received from the sale of x unit of a product is given by $R(x) = 3x^2 + 36x + 5$. Find the marginal revenue when $x = 5$.

19(v). A manufacturing company finds that the daily cost of producing x item of product is given by $C(x) = 210x + 7000$. Find the minimum number that must be produced and sold daily for break even, if each item is sold for 280.

20(i).

A real estate company is going to build a new residential complex. The land they have purchased can hold at the most 500 apartments. Also, if they make x apartments, then the monthly maintenance cost for the whole complex would be as follows:
Fixed cost = 4000
Variable cost = $(14x - 0.04x^2)$
How many apartments should the complex have in order to minimize the maintenance costs?

20(ii). The demand function of a monopoly is given by $x = 100 - 4p$. Find the quantity at which the Marginal Revenue will be zero.

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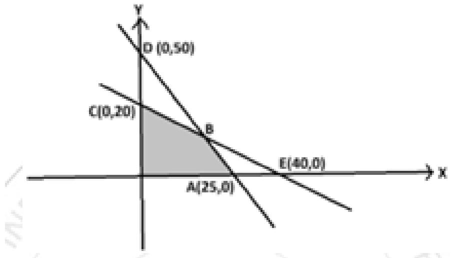
21. A survey of 50 families to study the relationships between expenditure on accommodation in (x) and expenditure on food and entertainment (y) gave the following results:
$\sum x = 8500$**,** $\sum y = 9600$**,** $\sigma_x = 60, \sigma_y = 20, r = 0.6$**.**
Estimate the expenditure on food and entertainment when expenditure on accommodation is 200.

22(i)(a). A linear programming problem is given by $Z = px + qy$ where $p, q > 0$ subject to the constraints: $x + y \leq 60, 5x + y \leq 100, x \geq 0$ and $y \geq 0$.
Solve graphically to find the corner points of the feasible region.

22(i)(b). If $Z = px + qy$ is maximum at (0,60) and (10, 50), find the relation of p and q. Also mention the number of optimal solution(s) in this case.

22(ii)(a).



Based on the given graph of the feasible region, answer the following: Write the constraints for the L.P.P.

22(ii)(b). Find the co-ordinates of the point B.

22(ii)(c). Find the maximum value of the objective function $Z = x + y$.
