Mathematics CBSE XII

Mock Paper 1 (2026)

Time Allowed: 3 hours **Maximum Marks: 80**

General Instructions:

1. This Question paper contains 38 questions. All questions are compulsory.
2. This Question paper is divided into five Sections - A, B, C, D and E.
3. In Section A, Questions no. 1 to 18 are multiple choice questions (MCQs) and Questions no. 19 and 20 are Assertion-Reason based questions of 1 mark each.
4. In Section B, Questions no. 21 to 25 are Very Short Answer (VSA)-type questions, carrying 2 marks each.
5. In Section C, Questions no. 26 to 31 are Short Answer (SA)-type questions, carrying 3 marks each.
6. In Section D, Questions no. 32 to 35 are Long Answer (LA)-type questions, carrying 5 marks each.
7. In Section E, Questions no. 36 to 38 are Case study-based questions, carrying 4 marks each.
8. There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 3 questions in Section C, 2 questions in Section D and one subpart each in 2 questions of Section E.
9. Use of calculators is not allowed.

Section A

1. The number of all possible matrices of order 3×3 with each entry 0 or 1 is **[1]**

   a) 18 b) 27

   c) 512 d) 81

2. For non-singular square matrices A and B of the same order, we have adj (AB) = ? **[1]**

   a) (adj B) (adj A) b) |AB|

   c) (adj B).|A| d) (adj A).|B|

3. If $\Delta = \begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix}$, then the cofactor A_{21} is **[1]**

   a) hc - fg b) -(hc + fg)

   c) fg - hc d) fg + hc

4. Which of the following statements is true for the function f(x) = $\begin{cases} x^2+3, & x \neq 0 \\ 1, & x = 0 \end{cases}$? **[1]**

   a) f(x) is continuous and differentiable $\forall x \in \mathbb{R}$ b) f(x) is continuous and differentiable $\forall x \in \mathbb{R}$ - {0}

   c) f(x) is discontinuous at infinitely many d) f(x) is continuous $\forall x \in \mathbb{R}$

points

5. The angle between the lines $\frac{x}{2}=\frac{y}{2}=\frac{z}{1}$ and $\frac{x-5}{4}=\frac{y-2}{1}=\frac{z-3}{8}$ is **[1]**

a) $\cos^{-1}\left(\frac{3}{4}\right)$ b) $\cos^{-1}\left(\frac{2}{3}\right)$

c) $\frac{\pi}{3}$ d) $\cos^{-1}\left(\frac{5}{6}\right)$

6. The order and degree (if defined) of the differential equation, $\left(\frac{d^2y}{dx^2}\right)^2+\left(\frac{dy}{dx}\right)^3 = x\sin\left(\frac{dy}{dx}\right)$ respectively are: **[1]**

a) 2, degree not defined b) 2, 2

c) 2, 3 d) 1, 3

7. Maximize Z = 50x + 60y , subject to constraints $x + 2y \le 50$, $x + y \ge 30$, $x, y \ge 0$. **[1]**

a) 2500 b) 1600

c) 1547 d) 1525

8. The 2 vectors $\hat{j}+\hat{k}$ and $3\hat{i}-\hat{j}+4\hat{k}$ represents the two sides AB and AC, respectively of a $\triangle$ABC. The length of the median through A is **[1]**

a) $\frac{\sqrt{48}}{2}$ b) $\frac{\sqrt{34}}{2}$

c) $\sqrt{18}$ d) $\sqrt{22}$

9. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \cos x dx = ?$ **[1]**

a) 2 b) -1

c) 1 d) 0

10. If A and B are matrices of same order, then (AB′ – BA′) is a **[1]**

a) skew-symmetric matrix b) unit matrix

c) symmetric matrix d) null matrix

11. The linear programming problem minimize Z = 3x + 2y subject to constraints $x + y \geq 8$, $3x + 5y \leq 15$, $x \geq 0$ and $y \geq 0$, has **[1]**

a) one solution b) infinitely many solutions

c) no feasible solution d) two solutions

12. If $\vec{a}=(2\hat{i}+4\hat{j}-\hat{k})$ and $\vec{b}=(3\hat{i}-2\hat{j}+\lambda\hat{k})$ be such that $\vec{a}\perp\vec{b}$ then $\lambda=?$ **[1]**

a) 3 b) -3

c) -2 d) 2

13. If $A=\begin{bmatrix}1 & k & 3\\ 3 & k & -2\\ 2 & 3 & -4\end{bmatrix}$ is singular then k =? **[1]**

a) $\frac{16}{3}$ b) $\frac{33}{2}$

c) $\frac{34}{5}$ d) $\frac{33}{4}$

14. If $\mathrm{P}(\mathrm{A}\mid\mathrm{B})=\mathrm{P}\left(\mathrm{A}'\mid\mathrm{B}\right)$, then which of the following statements is true? **[1]**

a) P(A) = 2 P(B) b) $P(A\cap B)=2P(B)$

c) $P(A \cap B) = \frac{1}{2}P(B)$ d) $\mathrm{P(A)} = \mathrm{P}\left(\mathrm{A}'\right)$

15. A homogeneous equation of the form $\frac{dy}{dx} = h\left(\frac{x}{y}\right)$ can be solved by making the substitution **[1]**

a) $y = \nu x$ b) $\nu = yx$

c) $x = \nu$ d) $x = \nu y$

16. If $|\overrightarrow{\mathrm{a}}| = 3$, $|\overrightarrow{\mathrm{b}}| = 4$ and $|\vec{a} \times \vec{b}| = 6$, then the value of $\vec{a} \cdot \vec{b}$ is **[1]**

a) $6\sqrt{3}$ b) $3\sqrt{3}$

c) 6 d) 12

17. If $\sqrt{x} + \sqrt{y} = \sqrt{a}$ then $\frac{dy}{dx} = ?$ **[1]**

a) $\frac{-\sqrt{x}}{\sqrt{y}}$ b) $\frac{1}{2}\frac{-\sqrt{y}}{\sqrt{x}}$

c) $\frac{1}{2}\frac{\sqrt{y}}{\sqrt{x}}$ d) $\frac{-\sqrt{y}}{\sqrt{x}}$

18. The direction ratios of two lines are a, b, c and (b - c), (c - a), (a - b) respectively. The angle between these lines is **[1]**

a) $\frac{\pi}{3}$ b) $\frac{\pi}{4}$

c) $\frac{3\pi}{4}$ d) $\frac{\pi}{2}$

19. **Assertion (A):** f(x) = tan x - x always increases. **[1]**

Reason (R): Any function y = f(x) is increasing if $\frac{dy}{dx} > 0$.

a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false. d) A is false but R is true.

20. **Assertion (A):** The Relation R given by R = {(1, 3), (4, 2), (2, 4), (2, 3), (3, 1) on set A = {1, 2, 3, 2} is symmetric. **[1]**

Reason (R): For symmetric Relation $R = R^{-1}$

a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false. d) A is false but R is true.

Section B

21. Find the value of $\sin\left[2\cot^{-1}\left(\frac{-5}{12}\right)\right]$ **[2]**

OR

Find the principal value of $\cos^{-1}\left(\frac{1}{2}\right)$.

22. Find the maximum and minimum values of $f(x) = \left(\sin x + \frac{1}{2}\cos x\right)$ in $0 \leq x \leq \frac{\pi}{2}$ **[2]**

23. Find the intervals of function $f(x) = 6 + 12x + 3x^2 - 2x^3$ is **[2]**

a. increasing

b. decreasing.

OR

If $y = 7x - x^3$ and x increases at the rate of 4 units per second, how fast is the slope of the curve changing when x = 2?

24. Evaluate: $\int_0^a \frac{x^4}{\sqrt{a^2-x^2}}dx$ **[2]**

25. Find the local maxima and local minima, of function. Find also the local maximum and the local minimum value, as the case may be: $f(x) = (x - 1)(x + 2)^2$ **[2]**

Section C

26. $\int \frac{x^2(x^4+4)}{x^2+4} dx$ **[3]**

27. A bag contains 7 red, 5 white and 8 black balls. If four balls are drawn one by one with replacement, what is the probability that all are white? **[3]**

28. Find $\int \frac{\cos\theta}{(4+\sin^2\theta)(5-4\cos^2\theta)} d\theta.$ **[3]**

OR

Evaluate: $\int_0^{\pi/6} \left(2+3x^2\right)\cos 3x dx$

29. Solve the differential equation: $(y^2 - 2xy)\,dx = (x^2 - 2xy)\,dy$ **[3]**

OR

Solve the initial value problem: $xe^{y/x} - y\sin\left(\frac{y}{x}\right) + x\frac{dy}{dx}\sin\left(\frac{y}{x}\right) = 0$, $y(1) = 0$

30. Solve the Linear Programming Problem graphically: **[3]**

Maximize Z = 50x + 30y Subject to

$2x + y \leq 18$

$3x + 2y \leq 34$

$x, y \geq 0$

OR

Solve the following LPP graphically:

Minimize Z = 3x + 5y

Subject to

$-2x + y \leq 4$

$x + y \geq 3$

$x - 2y \leq 2$

$x, y \geq 0$

31. If $x = a\left(\cos t + \log\tan\frac{t}{2}\right)$, $y = a\sin t$, then evaluate $\frac{d^2y}{dx^2}$ at $t = \frac{\pi}{3}$. **[3]**

Section D

32. Find the area of the region enclosed by the parabola $y^2 = x$ and the line $x + y = 2$. **[5]**

33. Show that the relation R in the set A = {1, 2, 3, 4, 5} given by R = {(a, b) : |a - b| is even}, is an equivalence relation. Show that all the elements of {1, 3, 5} are related to each other and all the elements of {2, 4} are related to each other. But no element of {1, 3, 5} is related to any element of {2, 4}. **[5]**

OR

Let A = R – {3} and B = R – {1}. Consider the function f: A ⇒B defined by $f(x) = \left(\frac{x-2}{x-3}\right)$. Is f one-one and onto? Justify your answer.

34. Given $A = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}, B = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$, find BA and use this to solve the system of equations $y + 2z = 7$, $x - y = 3$, $2x + 3y + 4z = 17$. **[5]**

35. Find the shortest distance $\vec{r} = \left(\hat{i} + 2\hat{j} + 3\hat{k}\right) + \lambda\left(\hat{i} - 3\hat{j} + 2\hat{k}\right)$ and $\vec{r} = \left(4\hat{i} + 5\hat{j} + 6\hat{k}\right) + \mu\left(2\hat{i} + 3\hat{j} + \hat{k}\right)$. **[5]**

OR

Find the image of the point with position vector $3\hat{i}+\hat{j}+2\hat{k}$ in the plan $\vec{r}\cdot(2\hat{i}-\hat{j}+\hat{k})=4$ Also, find the position vectors of the foot of the perpendicular and the equation of the perpendicular line through $3\hat{i}+\hat{j}+2\hat{k}$.

Section E

36. **Read the following text carefully and answer the questions that follow:** **[4]**

There are two antiaircraft guns, named as A and B. The probabilities that the shell fired from them hits an airplane are 0.3 and 0.2 respectively. Both of them fired one shell at an airplane at the same time.

i. What is the probability that the shell fired from exactly one of them hit the plane? (1)

ii. If it is known that the shell fired from exactly one of them hit the plane, then what is the probability that it was fired from B? (1)

iii. What is the probability that the shell was fired from A? (2)

OR

How many hypotheses are possible before the trial, with the guns operating independently? Write the conditions of these hypotheses. (2)

37. **Read the following text carefully and answer the questions that follow:** **[4]**

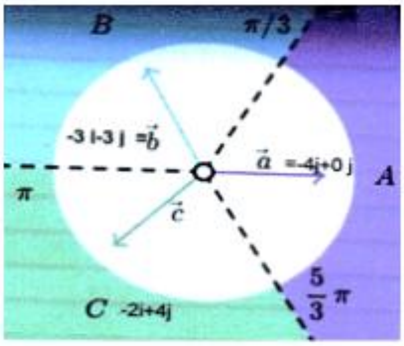
Three friends Ganesh, Dinesh and Ramesh went for playing a Tug of war game. Team A, B, and C belong to Ganesh, Dinesh and Ramesh respectively.

Teams A, B, C have attached a rope to a metal ring and is trying to pull the ring into their own area (team areas shown below).

Team A pulls with $F_1 = 4\hat{i} + 0\hat{j}$ KN

Team B $\rightarrow F_2 = -2\hat{i} + 4\hat{j}$ KN

Team C $\rightarrow F_3 = -3\hat{i} - 3\hat{j}$ KN



i. Which team will win the game? (1)

ii. What is the magnitude of the teams combine Force? (1)

iii. What is the magnitude of the force of Team B? (2)

OR

How many KN Force is applied by Team A? (2)

38. **Read the following text carefully and answer the questions that follow:** **[4]**

In order to set up a rain water harvesting system, a tank to collect rain water is to be dug. The tank should have a square base and a capacity of 250 m^3. The cost of land is ₹ 5,000 per square metre and cost of digging increases with depth and for the whole tank, it is ₹ 40,000 h^2, where h is the depth of the tank in metres. x is the side of the square base of the tank in metres.

ELEMENTS OF A TYPICAL RAIN WATER HARVESTING SYSTEM

i. Find the total cost C of digging the tank in terms of x. (1)

ii. Find $\frac{dC}{dx}$. (1)

iii. Find the value of x for which cost C is minimum. (2)

OR

Check whether the cost function C(x) expressed in terms of x is increasing or not, where $x > 0$. (2)