CBSE POINT, BALASORE

CLASSROOM EXAMINATION (2025-26)

SUBJECT-MATHEMATICS

TIME: 3 HR **CLASS-XI** **FM-60**

General Instructions:

- *There are **32** questions. All questions are compulsory.*
- *This question paper has four sections: Section **A**, Section **B**, Section **C**, Section **D**.*
- ***Section A** consists of **14** multiple-choice questions carrying **1** marks each.*
- ***Section B** consists of **10** very short answer questions carrying **2** marks each.*
- ***Section C** consists of **2** case-based questions carrying **4** marks each.*
- ***Section D** consists of **6** short answer questions carrying **3** marks each.*

Section – A [1 × 14]

1. The inclination of the lines $x - y + 3 = 0$ with the positive direction of x-axis is

(a) 45° (b) 135° (c) −45° (d) −135°

2. The two lines $ax + by = c$ and $a'x + b'y = c'$ are perpendicular if

(a) $aa' + bb' = 0$ (b) $ab' = ba'$

(c) $ab + a'b' = 0$ (d) $ab' + ba' = 0$

3. If the lines $2y = x + 3$ and $y = 3x + 1$ are equally inclined to the line $y = mx + 4$ then the value of m is

(a) $\frac{1+5\sqrt{2}}{7}$ (b) $\frac{5\sqrt{2}-1}{7}$ (c) $\frac{1-4\sqrt{2}}{7}$ (d) None of these

4. The distance between the lines $5x + 3y - 7 = 0$ and $15x + 9y + 14 = 0$ is

(a) $\frac{35}{\sqrt{34}}$ (b) $\frac{1}{3\sqrt{34}}$ (c) $\frac{35}{3\sqrt{34}}$ (d) $\frac{35}{2\sqrt{34}}$

5. If $y = \log_a x$ then $\frac{dy}{dx}$ at $x = e$, equals

(a) $\frac{1}{e \log_e a}$ (b) $\frac{\log_e a}{e}$ (c) $e \log_e a$ (d) None of these

6. If $y = \frac{x}{x+5}$, then $\frac{dx}{dy}$ equals

(a) $\frac{5}{(1-y)^2}$ (b) $\frac{5}{(1+y)^2}$ (c) $\frac{1}{(1+y)^2}$ (d) None of these

7. If $y = \sqrt{\sin x + y}$, then $\frac{dy}{dx}$ equals

(a) $\frac{\cos x}{2y-1}$ (b) $\frac{\cos x}{1-2y}$ (c) $\frac{\sin x}{1-2y}$ (d) $\frac{\sin x}{2y-1}$

8. Let $x_1, x_2, x_3, \ldots, x_n$ be the n observations. Let $w_i = lx_i + k$ for $i = 1, 2, \ldots, n$ where l and k are constant. If the mean of x_i's is 48 and standard deviation is 12, the mean of w_i's is 55 and standard deviation of w_i's is 15, then the values of l and k are

(a) $l = 1.25, k = -5$ (b) $l = -1.25, k = 5$

(c) $l = 2.5, k = -5$ (d) $l = 2.5, k = 5$

9. The variance of first 20 natural numbers is

(a) $\frac{133}{4}$ (b) $\frac{379}{12}$ (c) $\frac{133}{2}$ (d) $\frac{399}{4}$

10. Variance of the data given below is

Size of items	3.5	4.5	5.5	6.5	7.5	8.5	9.5
Frequency	3	7	22	60	85	32	8

(a) 1.29 (b) 2.19 (c) 1.32 (d) None of these

In the following questions consist of two statements – Assertion(A) and Reason(R). Answer the questions selecting the appropriate option given below:
(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.

11. Assertion**(A):** If the mean of 100 observations is 48, then the sum of their deviations from 48 is zero.
Reason**(R):** The algebraic sum of the deviations about mean is zero.

12. Assertion**(A):** The variance of first n natural numbers is $\frac{n^2-1}{6}$.
Reason**(R):** The sum of first n odd natural numbers is n^2 and the sum of squares of first n odd natural numbers is $\frac{n}{3}(4n^2-1)$.

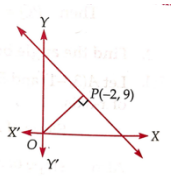
13. Assertion**(A):** Probability of getting a head of an unbiased coin is $\frac{1}{2}$.
Reason**(R):** In a simultaneous toss of two coins, the probability of getting 'no tails' is $\frac{1}{4}$.

14. Assertion**(A):** The Sample space S for two children are selected from a group of 2 boys and 3 girls is $S = \{B_1B_2, B_1G_1, B_1G_2, B_1G_3, B_2G_1, B_2G_2, B_2G_3, G_1G_2, G_1G_3, G_2G_3\}$.
Reason**(R):** The set of all possible outcomes of a random experiments is called the sample space associated with it.

Section – B [2 × 10]

15. Draw a quadrilateral in the Caretsian plane, whose vertices are $(-4, 5), (0, 7), (-5, 5)$ and $(-4, -2)$. Also find its area.

16. The perpendicular from the origin to a line meets it at the point $(-2, 9)$, find the equation of the line.



17. By using the concept of equation of a line, prove that the three points $(3, 0), (-2, -2)$ and $(8, 2)$ are collinear.

18. Find equation of the line through the point $(0, 2)$ making an angle $\frac{2\pi}{3}$ with the positive x-axis. Also, find the equation of line parallel to it and crossing the y-axis at a distance of 2 units below the origin.

19. Find the derivative of $x^n + ax^{n-1} + a^2x^{n-2} + \cdots + a^{n-1}x + a^n$ for some fixed real number a.

20. Prove that the derivative of $\cos x$ with respect to x is $-\sin x$ *i.e.*, $\frac{d}{dx}(\cos x) = -\sin x$.

21. Find k so that $\lim_{x \to -1} f(x)$ may exist where

$$f(x) = \begin{cases} x^3 - 3x + 7, & x \leq -1 \\ 3x + k \quad , & x > -1 \end{cases}.$$

22. Find the mean deviation about the median for the data.

13, 17, 16, 14, 11, 13, 10, 16, 11, 18, 12, 17

23. The mean and variance of eight observations are 9 and 9.25 respectively. If six of the observations are 6, 7, 10, 12, 12, 13, find the remaining two observations.

24. The probability that a student will pass the final examination in both English and Hindi is 0.5 and the probability of passing neither is 0.1. If the probability of passing the English examination is 0.75. What is the probability of passing the Hindi examination?

Section – C [4 × 2]

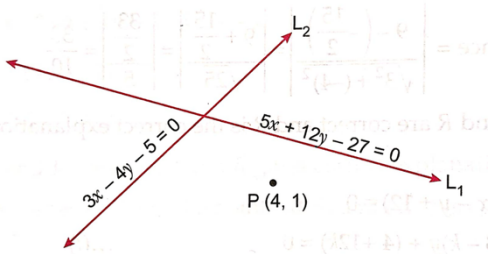
25. ***Read the following passage and answer the following questions.***

For a sightseeing trip, a group of tourists selects a country randomly from Argentina, China, Nepal, Angola, Russia and Algeria.

(i) What is the number of total possible outcomes?
(ii) What is the probability that the name of selected country will begins with N?
(iii) What is the probability that the name of selected country begins with letter A?
(iv) If $P(A) = \frac{1}{2}, P(B) = \frac{7}{10}, P(A \cup B) = 1$, then find $P(A \cap B)$.

26. ***Read the following passage and answer the following questions.***

In a colony there are two roads crossing each other. There is a shop nearby the one road. A student Ramesh of the colony represents the roads by the straight lines and shop as a point P shown below.



(i) What is the point of intersection of lines L_1 and L_2?
(ii) What is the distance of the point P from the line L_1?
(iii) Write the slope-intercept form of the line $3x - 4y - 5 = 0$?
(iv) What is the coordinates of the point where the line $5x + 12y - 27 = 0$ cuts the x-axis?

Section – D [3 × 6]

27. Find perpendicular distance from the origin to the line joining the points $(\cos\theta, \sin\theta)$ and $(\cos\phi, \sin\phi)$.

28. If $f(x) = \begin{cases} mx^2 + n, & x < 0 \\ nx + m, & 0 \le x \le 1 \\ nx^3 + m, & x > 1 \end{cases}$ for what integers m and n does both $\lim_{x\to 0} f(x)$ and $\lim_{x\to 0} f(x)$ exist?

29. Evaluate: $\lim_{x\to 0} \frac{\tan x + 4\tan 2x - 3\tan 3x}{x^2 \tan x}$

30. Find $\frac{dy}{dx}$ when $y = \frac{x^2 \sin x}{1-x}$.

31. The mean and standard deviation of a group of 100 observations were found to be 20 and 3 respectively. Later on it was found that three observations were incorrect, which were recorded as 21, 21 and 18. Find the mean and standard deviation if the incorrect observations are omitted.

32. Calculate the mean and standard deviation for the following data:

Wages upto (*in* ₹)	15	30	45	60	75	90	105	120
No. of workers	12	30	65	107	157	202	222	230