

O. P. JINDAL SCHOOL, SAVITRI NAGAR**Annual Examination - (2024 – 2025) , SET 2B****Class: XI****MM: 80****Subject: Mathematics****Time: 3 Hrs.***(Fifteen Minutes Extra will be given for reading the Question Paper.)***General Instructions:**

- i. This question paper has 5 sections A-E.
- ii. Section A has 20 MCQs carrying 1 mark each.
- iii. Section B has 5 questions carrying 2 mark each.
- iv. Section C has 6 questions carrying 3 mark each.
- v. Section D has 4 questions carrying 5 mark each.
- vi. Section E has 3 case based integrated units of assessment (04 marks each) with 4 sub- parts of 1 mark each.
- vii. All the questions are compulsory. However an internal choice in 2 Qs of 5 marks, 3 Qs of 3 marks, 2 Qs of 2 marks has been provided.
- viii. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

SECTION A

1. How many 3 digits number are there with no digit repeated?
a) 648 b) 720 c) 729 d) none of these
2. The coefficient of x^8y^{10} in the expansion of $(x + y)^{18}$ is
a) ${}^{18}C_8$ b) ${}^{18}P_{10}$ c) 2^{18} d) ${}^{10}C_8$
3. How many different teams of 7 players can be chosen out of 10 players ?
a) 6720 b) 70 c) 120 d) none of these
4. The slope of the line parallel to the line joining the points A(-5, -1) and B(3, 3) is
a) $\frac{1}{3}$ b) 2 c) $\frac{1}{2}$ d) $-\frac{1}{2}$
5. The n^{th} term of the $12, 4, \frac{4}{3}, \frac{4}{9}, \dots$ is
a) $\frac{4}{3^{n-1}}$ b) $\frac{4}{3^{n-2}}$ c) $\frac{4}{3^{n-3}}$ d) none of these
6. If $A = \{1, 2, 3\}$, $B = \{3, 4\}$, $C = \{4, 5, 6\}$, then $(A \times B) \cap (B \times C)$ is equal to
a) $\{(1, 4)\}$ b) $\{(3, 4)\}$ c) $\{(1, 4), (3, 4)\}$ d) None of these
7. A wheel makes 180 revolutions in 1 minute. How many radians does it turn in 1 second?
a) $(3\pi)^\circ$ b) $(4\pi)^\circ$ c) $(6\pi)^\circ$ d) $(12\pi)^\circ$
8. If $n(A) = 24$ and $n(B) = 18$ and $n(A \cup B) = 36$ then $n(A \cap B)$ is
a) 12 b) 18 c) 6 d) 4
9. If $-3x + 17 < -13$, then
a) $x \in (10, \infty)$ b) $x \in [10, \infty)$ c) $x \in (-\infty, 10]$ d) $x \in [-10, 10]$

10. If $z = (2 + \sqrt{-5})$ then $|z| = ?$

- a) 9 b) 7 c) 3 d) none of these

11. In which octant does the point $(-2, 3, -5)$ lie?

- a) 2nd b) 5th c) 6th d) 8th

12. The probability of getting a total of 10 in a single throw of two dice is

- a) $\frac{1}{9}$ b) $\frac{1}{12}$ c) $\frac{1}{6}$ d) $\frac{5}{36}$

13. $\lim_{x \rightarrow 0} \frac{e^{3x} - 1}{x} = ?$

- a) 3 b) 1 c) $\frac{1}{3}$ d) 0

14. If $P(A) = 0.3$, $P(B) = 0.45$ and $P(A \cap B) = 0.15$, then $P(A' \cap B') =$

- a) 0.4 b) 0.75 c) 0.6 d) 0.45

15. The vertices of a hyperbola are $(\pm 2, 0)$ and its foci are $(\pm 3, 0)$. The equation of the hyperbola is

- a) $\frac{x^2}{2} - \frac{y^2}{3} = 1$ b) $\frac{x^2}{3} - \frac{y^2}{4} = 1$ c) $\frac{x^2}{4} - \frac{y^2}{5} = 1$ d) $\frac{x^2}{4} - \frac{y^2}{9} = 1$

16. The equation of line passing through the point $(3, -4)$ and parallel to the x – axis is

- a) $x - 4 = 0$ b) $x + 4 = 0$ c) $y - 4 = 0$ d) $y + 4 = 0$

17. Marks obtained in mathematics by 7 students are as follows, 32, 35, 43, 49, 55, 68, 75. The mean deviation from their median is:

- a) 11.57 b) 12.57 c) 13.57 d) 14.57

18. If $y = 2\sin^2 x$, then $\frac{dy}{dx}$ is:

- a) $2\sin 2x$ b) $-\cos 2x$ c) $4\sin x$ d) $\sin 2x$

DIRECTIONS: In the question number 19 and 20, a statement of **Assertion(A)** is followed by a statement of **Reason(R)**. Choose the correct option

- (A) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)
(B) Both assertion(A) and reason(R) are true and reason(R) is not the correct explanation of assertion(A)
(C) Assertion(A) is true but reason(R) is false
(D) Assertion(A) is false but reason(R) is true.

19. **Assertion(A):** The distance between the foci of the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$ is 6 units.

Reason(R): For the ellipse in the form $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, length of latus rectum is $\frac{2b^2}{a}$.

20. **Assertion(A):** Any point lies on yz-plane must be in the form $(0, y_1, z_1)$.

Reason(R): Distance of any point $P(x_1, y_1, z_1)$ from origin is $\sqrt{x_1^2 + y_1^2 + z_1^2}$.

SECTION B

- 21.** Find the real values of x and y for which $(x - iy)(3 + 5i)$ is the conjugate of $(-6 - 24i)$.
- 22.** Given that P(3, 2, -4), Q(5, 4, -6) and R(9, 8, -10) are collinear. Find the ratio in which Q divides PR.
- 23.** If A and B are two sets such that $n(A) = 24$, $n(B) = 22$ and $n(A \cap B) = 8$, find ;
a) $n(A \cup B)$ b) $n(A - B)$
- 24.** A wheel makes 240 revolutions in one minute . Through how many radians does it turn in one second?

OR

Find the value of $\sin 135^\circ \operatorname{cosec} 225^\circ \tan 150^\circ \cot 315^\circ$.

- 25.** Find the foci of the hyperbola $9x^2 - 16y^2 = 144$.

OR

Find the equation of the circle coordinate of ends of whose diameter is $(3, -4)$ and $(-5, 2)$.

SECTION C

26. Evaluate: $x \xrightarrow{Lim} 0 \left(\frac{x^4 - 81}{2x^2 - 5x - 3} \right)$.

27. Find the sum to n terms of the sequence 5, 55, 555, 5555, . . .
28. Prove that $9^{n+1} - 8n - 9$ is divisible by 64 wherever n is a positive integer.
29. Prove that $\sin x + \sin 3x + \sin 5x + \sin 7x = 4 \sin 4x \cos 2x \cos x$.

OR

Prove that $(\sin 3x + \sin x) \sin x + (\cos 3x - \cos x) \cos x = 0$.

- 30.** Find the equation of line perpendicular to the line $x - 2y + 5 = 0$ and passing through the point $(0, 3)$.

OR

If A(1, 4), B(2, -3) and C(-1, -2) are the vertices of a $\triangle ABC$, find the equation of the median through A.

31. If the origin is the centroid of the triangle PQR with vertices P(2a, 2, 6), Q(-4, -3b, 10) and R(8, 14, 2c), then find the value of a, b, c .

SECTION D

- 32.** Find deviation about the median for the following data:

Classes	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
Frequencies	6	7	15	16	4	2

OR

Find the mean and variance fo the following frequency distribution.

Classes	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequencies	5	8	15	16	6

33. Find the coordinate of the foot of the perpendicular from the point (2, 3) on the line $y = 3x + 4$.
34. An arc is in the form of a semi ellipse. It is 8 m wide and 2 m high at the centre. Find the height of the arch at a point 1.5 m from one end.

OR

Find the equation of circle passing through the points (2, 3) and (-1, 1) and whose centre is on the line $x - 3y = 11$.

35. Find the derivative of $\cos\left(x - \frac{\pi}{8}\right)$ from first principle.

SECTION E

36. The sum of some terms of a GP is 315 whose first term is 5 and common ratio is 2.

- (i) Find the number of term of GP .
 (ii) Find the last term of given GP.
 (iii) Find the sum of n terms of the GP

1
1
2

OR

Find the difference of 3rd and 5th term of GP.

37. A box contains 10 red marbles, 20 blue marbles and 30 green marbles. 5 marbles are drawn from the box. What is the probability that

- (i) all will be blue?
 (ii) all are not red?
 (iii) at least one will be green?

1
1
2

OR

marbles are either red or green?

38. 4 cards are selected from a pack of 52 cards. In how many of these

- (i) four cards are of the same suit ?
 (ii) are face cards?

1
2

OR

two are red and two are black cards

- (iii) cards are of same colour?

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CLASS –XI (MATHEMATICS)

Sl. no.	CHAPTER NO. AND NAME	MCQ (1 M)	VSA (2 M)	SA (3 M)	LA (5 M)	Case based Questions (4 M)	Total
1.	1. Sets	1(1)	2(1)	-	-	-	3(2)
2.	2. Relations and Functions	1(1)	-	-	-	-	1(1)
3.	3. Trigonometric Functions	1(1)	2(1)	3(1)	-	-	6(3)
4.	4. Complex Number and Quadratic Equations	1(1)	2(1)	-	-	-	3(2)
5.	5. Linear Inequalities	1(1)	-	-	-	-	1(1)
6.	6. Permutations and Combinations	2(2)	-	-	-	4(1)	6(3)
7.	7. Binomial Theorem	1(1)	-	3(1)	-	-	4(2)
8.	8. Sequence and series	1(1)	-	3(1)	-	4(1)	8(3)
9.	9. Straight Lines	2(2)	-	3(1)	5(1)		10(4)
10.	10. Conic section	2(2)	2(1)	-	5(1)	-	9(4)
11.	11. Introduction to Three Dimensional Geometry	2(2)	2(1)	3(1)	-	-	7(4)
12.	12. Limits and Derivatives	2(2)	-	3(1)	5(1)	-	10(4)
13.	13. Statistics	1(1)	-	-	5(1)	-	6(2)
14.	14. Probability	2(2)	-	-	-	4(1)	6(3)
	Total	20(20)	10(5)	18(6)	20(4)	12(3)	80(38)

Abbreviations: VSA- Very Short Answer(2mark) , MCQ: Multiple choice question(1 mark) SA: Short Answer(3 marks) LA: Long answer(5 marks) .

NOTE:- Question number 17 – 18 have 5 MCQ each out of which students need to attempt any 4.