

O.P. JINDAL SCHOOL, PATRATU

Model Question Paper 2024-25

Class: XI
Sub. : Mathematics

M.M: 80
Duration:180Min

General Instructions-

- All questions are compulsory.
- This question paper contains- five sections A, B, C, D and E.
- Section-A has 20 questions of 1 mark each.
- Section -B has 05 questions of 2 marks each.
- Section-C has 06 questions of 3 marks each.
- Section-D has 03 case-study based questions of 4 marks each.
- Section -E has 04 questions of 5 marks each.

SECTION-A

1. If $f(x) = \frac{9}{5}x + 32$, the value of $f(-10)$ is
(a) 15 (b) 14
(c) -15 (d) -14
2. Let two finite sets have m and n elements. The number of subsets of the first set is 112 more than that of second set. The values of m and n are respectively:
(a) 4, 7 (b) 7, 4
(c) 4, 4 (d) 7, 7
3. The value of $i + i^{10} + i^{20} + i^{30}$ is:
(a) 1 (b) $-i$
(c) 0 (d) $i - 1$
4. If a single letter is selected at random from the word 'PROBABILITY', then the probability that it is a vowel is
(a) $\frac{1}{3}$ (b) $\frac{4}{11}$
(c) $\frac{2}{11}$ (d) $\frac{3}{11}$
5. If $f(x) = 1 + x + \frac{x^2}{2} + \dots + \frac{x^{100}}{100}$, then $f'(1)$ is equal to
(a) $\frac{1}{100}$ (b) 100
(c) 0 (d) Does not exist
6. The point $(-2, -3, -4)$ lies in the
(a) First octant (b) Second octant
(c) Eighth octant (d) seventh octant

7. In the expansion of $\left(x - \frac{1}{3x^2}\right)^9$, the term independent of x is
- (a) T_3 (b) T_4
(c) T_5 (d) None of these
8. Let $S = \{x|x \text{ is a positive multiple of } 3 \text{ less than } 100\}$
 $P = \{x|x \text{ is a prime number less than } 20\}$. Then $n(S) + n(P)$ is:
- (a) 34 (b) 41
(c) 33 (d) 30
9. Everybody in a room shakes hands with everybody else. If the total number of handshakes is 66, then the total number of persons in the room is
- (a) 11 (b) 13
(c) 12 (d) 14
10. A line passes through $(2, 2)$ and is perpendicular to the line $3x + y = 3$. Its y -intercept is
- (a) $\frac{1}{3}$ (b) $\frac{2}{3}$
(c) 1 (d) $\frac{4}{3}$
11. The coefficient of x^4 in $\left(\frac{x}{2} - \frac{3}{x^2}\right)^{10}$ is
- (a) $\frac{405}{256}$ (b) $\frac{504}{259}$
(c) $\frac{450}{263}$ (d) None of these
12. The number of ways in which we can choose a committee from four men and six women, so that the committee includes at least two men and exactly twice as many women as men is
- (a) 94 (b) 126
(c) 128 (d) 130
13. If $y = \sqrt{x} + \frac{1}{\sqrt{x}}$, then $\frac{dy}{dx}$ at $x = 1$ is equal to
- (a) 1 (b) $\frac{1}{2}$
(c) $\frac{1}{\sqrt{2}}$ (d) 0
14. The argument of $\frac{1-i}{1+i}$ is
- (a) $-\frac{\pi}{2}$ (b) $\frac{\pi}{2}$
(c) $\frac{3\pi}{2}$ (d) $\frac{5\pi}{2}$

15. If the distance between the points $(a, 0, 1)$ and $(0, 1, 2)$ is $\sqrt{27}$, then the value of a is
 (a) 5 (b) ± 5
 (c) -5 (d) None of these
16. In a non-leap year, the probability of having 53 Tuesday or 53 Wednesday is
 (a) $\frac{1}{7}$ (b) $\frac{2}{7}$
 (c) $\frac{3}{7}$ (d) None of these
17. The mean deviation of the data 3, 10, 10, 4, 7, 10, 5 from the mean is
 (a) 2 (b) 2.57
 (c) 3 (d) 3.75
18. $\lim_{x \rightarrow \frac{\pi}{4}} \frac{\sec^2 x - 2}{\tan x - 1}$ is
 (a) 3 (b) 1
 (c) 0 (d) 2

ASSERTION-REASON BASED QUESTIONS

In the following questions 19 and 20, a statement of assertion(A) is followed by a statement of Reason(R). Choose the correct answer out of the following choices.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
 (b) Both (A) and (R) are true and (R) is not the correct explanation of (A).
 (c) (A) is true but (R) is false.
 (d) (A) is false but (R) is true.

19. **Assertion(A):** Number of relations from the set $A = \{1, 3\}$ to the set $B = \{-1, 0, 1\}$ is 32.

Reason(R): Number of relations from a set A to another set B is $2^{n(A \times B)}$.

20. **Assertion(A):** For a complex number z , $|z - 1| = |z + 1|$, then $\text{Re}(z) = 0$.

Reason(R): Modulus of $a + ib$ is $\sqrt{a^2 + b^2}$, and two complex numbers are equal if and only if their real and imaginary parts are equal.

SECTION-B

21. If $U = \{1, 2, 3, \dots, 10\}$, $A = \{1, 2, 3, 5\}$, $B = \{2, 4, 6, 8\}$, then find $(A - B)'$.
22. Find the least positive value of n , if $\left(\frac{1+i}{1-i}\right)^n = 1$.

23. If $A = \{a, b, c, d\}$ and the number of relations from A to B is 256, find $n\{P(B)\}$.

OR

If $P = \{1, -1\}$, then form the set $P \times P \times P$.

24. Between 1 and 31 are inserted m arithmetic means so that the ratio of the 7th and $(m - 1)^{th}$ means is 5:9. Find the value of m .

25. Evaluate: $\lim_{x \rightarrow \frac{\pi}{2}} \frac{\tan 2x}{x - \frac{\pi}{2}}$

OR

Evaluate: $\lim_{x \rightarrow 0} \frac{\sqrt{1+2x} - \sqrt{1-2x}}{x}$

SECTION-C

26. In how many ways 7 positive and 5 negative signs can be arranged in a row so that no two negative signs occur together?

OR

How many words, with or without meaning, can be formed using all the letters of the word EDUCATION using

- (i) All the letters at a time
- (ii) All the letters so that the vowels and consonants occur together.

27. Find the domain and range of the function $f(x) = \sqrt{9 - x^2}$.

28. The sum of n terms of two arithmetic progression are in the ratio $5n + 4 : 9n + 6$. Find the ratio of their 18th terms.

OR

Find the sum upto n terms of the following series: $5 + 55 + 555 + \dots$

29. (i) Find the derivative of $\frac{x^5 - \cos x}{\sin x}$ with respect to x .

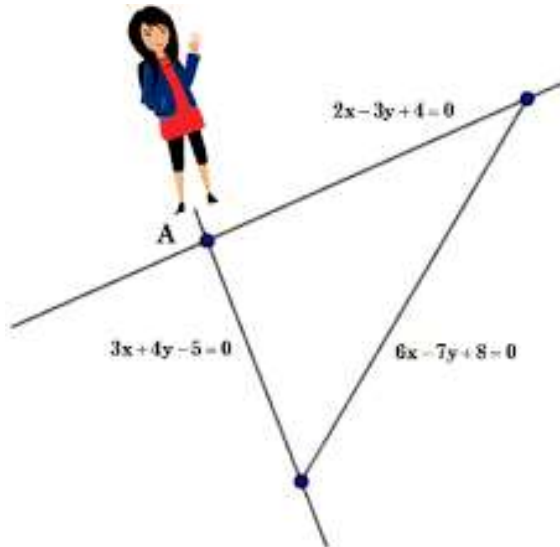
(ii) Find the derivative of $\sin^n x$ with respect to x .

30. The second, third and fourth terms in the binomial expansion $(x + a)^n$ are 240, 720 and 1080 respectively. Find x , a and n .

31. Prove that: $\frac{\tan 5x + \tan 3x}{\tan 5x - \tan 3x} = 4 \cos 2x \cos 4x$.

SECTION-D

32. Rajshri is standing at the junction (point A) of two straight paths represented by the equations $2x - 3y + 4 = 0$ and $3x + 4y - 5 = 0$.



Based on the given information, answer the following questions:

- (i) Find the slope of the line $2x - 3y + 4 = 0$.
 - (ii) Find the coordinates of point A.
 - (iii) Find the equation of the line along which she walks to reach the line $6x - 7y + 8 = 0$ in least time.
33. In a survey of 50 persons of an apartment, it was found that 15 persons read Magazine A, 16 persons read Magazine B, 16 persons read Magazine C, 8 read both A and B, 10 read both B and C, 7 read both C and A, 5 read all the three Magazines.

Based on this data answer the following questions:

- (i) How many persons read only Magazine A?
- (ii) How many persons read only Magazine A and B but not C?
- (iii) How many persons read at least one of the Magazine A, B and C?
- (iv) How many persons read none of the Magazine?

34. Two candidates Anil and Ashima appeared in a written test for a job position in a company. The probability that Anil will qualify the test is 0.05 and that Ashima will qualify the test is 0.10. The probability that both will qualify the test is 0.02.



Based on the given information, answer the following questions:

- (i) Find the probability that both Anil and Ashima will not qualify the test.
(ii) Find the probability that only one of them will qualify the test.

SECTION-E

35. Solve the system of following inequalities graphically:

$$x + 2y \leq 8, 2x + y \geq 2, x - y \leq 1, x \geq 0, y \geq 0$$

36. Find the mean, variance and standard deviation for the following distribution:

Classes	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	3	7	12	15	8	3	2

37. Find the equation of the circle concentric with the circle $x^2 + y^2 - 8x + 6y - 5 = 0$ and passing through the point $(-2, -7)$.

OR

Find the coordinates of the foci, the vertices, length of major axis, minor axis, the eccentricity and length of latus rectum of the ellipse $36x^2 + 4y^2 = 144$.

38. Prove that: $\cos^2 x + \cos^2 \left(x + \frac{\pi}{3}\right) + \cos^2 \left(x - \frac{\pi}{3}\right) = \frac{3}{2}$.
