



Roll No:

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Total printed pages : 02
Total printed questions : 26

GENERAL INSTRUCTIONS:

1. Attempt all the questions.
2. Section - A consists of 6 questions of 1 mark each.
3. Section - B consists of 13 questions of 4 marks each.
4. Section - C consists of 7 questions of 6 marks each.

SECTION – A (1 x 6 = 6 marks)

1. Name the octant in which point (2,-3,-4) lies.
2. Let $n(A) = 2$ and $n(B) = 3$. Write the number of subsets that $A \times B$ will have.
3. The foot of perpendicular from origin to a line meets it at point (2, 3). Find the equation of line.
4. In triangle ABC, if $a=3$, $b=5$ and $c=7$, find the value of $\cos C$.
5. If $y = \sin^3 \sqrt{x}$, then find $\frac{dy}{dx}$.
6. If E and F are events such that $P(E \cup F) = 0.88$, $P(F) = 0.69$, $P(E \cap F) = 0.35$. Then find $P(E)$.

SECTION – A (4 x 13 = 52 marks)

7. Find domain and range of, $f(x) = \sqrt{x^2 - 25}$.
8. Let $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{2, 4, 6, 8\}$, $B = \{2, 3, 5, 7\}$. Verify that
i) $(A \cup B)' = A' \cap B'$ ii) $(A \cap B)' = A' \cup B'$
9. Using binomial theorem, prove that $6^n - 5n$ always leaves remainder 1 when divided by 25.
10. If the lines $y=3x+1$ and $2y=x+3$ are equally inclined to the line $y = mx + 4$, find the value of m.
11. Find the equation of ellipse whose major axis is x axis and passes through the points (4, 3) and (6,2).
12. Find focus, vertex, axis, equation of directrix, length of latus rectum, equation of latus rectum, eccentricity and equation of tangent at vertex of the parabola:
 $x^2 = -9y$.
13. Find the equation of the set of points P, the sum of whose distance from $A(4, 0, 0)$ and $B(-4, 0, 0)$ is equal to 10.
14. Two students Anil and Ashima appeared in an examination. The probability that Anil will qualify the exam is 0.05 and that Ashima will qualify the exam is 0.10. The probability that both will qualify the exam is 0.02. Find the probability that
 - a) Both Anil and Ashima will not qualify the exam.
 - b) At least one of them will qualify the exam.
 - c) Only one of them will qualify the exam.

15. Find the probability that when a hand of 7 cards is drawn from a well shuffled deck of 52 cards, it contains
- i) all kings ii) 3 kings iii) at least 3 kings.
16. If, $y = \sqrt{\frac{x}{a}} + \sqrt{\frac{a}{x}}$, show that $2xy \frac{dy}{dx} = \frac{x}{a} - \frac{a}{x}$.
17. Evaluate : $\lim_{x \rightarrow 0} \frac{\sec 4x - \sec 2x}{\sec 3x - \sec x}$.
18. For any triangle ABC, prove that: $\frac{b^2 - c^2}{a^2} \sin 2A + \frac{c^2 - a^2}{b^2} \sin 2B + \frac{a^2 - b^2}{c^2} \sin 2C = 0$.
19. Differentiate: $\frac{\sin x - x \cos x}{x \sin x + \cos x}$, with respect to x.

SECTION – C (6 x 7 = 42 marks)

20. In a survey of 25 students, it was found that 15 had taken mathematics, 12 had taken physics and 11 had taken chemistry, 9 had taken mathematics and physics, 5 had taken mathematics and chemistry, 4 had taken physics and chemistry and 3 had taken all three subjects. Find the number of students that had:
- i) Only chemistry ii) physics and chemistry but not mathematics
iii) only one subject.
21. Using first principle, find the derivative of $x \cos x$.
22. Prove that the product of the lengths of the perpendiculars drawn from points $(\sqrt{a^2 - b^2}, 0)$ and $(-\sqrt{a^2 - b^2}, 0)$ to the line $\frac{x}{a} \cos \theta + \frac{y}{b} \sin \theta = 1$ is b^2 .
23. Find n, If the ratio of the fifth term from the beginning to the fifth term from the end in the expansion of $\left(\sqrt[4]{3} + \frac{1}{\sqrt[4]{3}}\right)^n$ is $\sqrt{6} : 1$.
24. Solve the following system of linear inequalities graphically:
 $x + 2y \leq 1$, $x + y \geq 1$, $x - y \leq 0$, $x \geq 0$, $y \geq 0$.
25. Show that the points (5, 5) (6, 4), (-2, 4) and (7, 1) are concyclic.
26. Find the mean, variance and standard deviation for the following frequency distribution:

Classes	0 - 30	30 - 60	60 - 90	90 - 120	120 - 150	150 - 180	180 - 210
Frequencies	2	3	5	10	3	5	2