

1. If ${}^nC_8 = {}^nC_2$ then find nC_4 .

2. Prove that $\frac{\sin(x+y)}{\sin(x-y)} = \frac{\cot y + \cot x}{\cot y - \cot x}$

3. Find the general solution of the equation $\cot x = -\frac{1}{2}$

4. Insert 3 arithmetic means between 4 and 24.

5. Find the 4th term of expansion $\left(9x - \frac{1}{3x}\right)^6$, $x \neq 0$.

6. Find the equation of straight line cutting an intercept of 3 units on positive y-axis and making an angle of 30° with positive x-axis.

7. Prove that $\frac{\sin x + \sin 3x}{\cos x + \cos 3x} = \tan 2x$

8. Prove by the principle of mathematical induction: $\frac{1}{2 \times 5} + \frac{1}{5 \times 8} + \frac{1}{8 \times 11} + \dots + \frac{1}{(3n-1)(3n+2)} = \frac{n}{6n+4}$

9. Solve the inequality for real x: $\frac{1}{2}\left(\frac{3x}{5} + 4\right) \geq \frac{1}{3}(x - 6)$

10. Find the equation of the line passing through (3, 2) and parallel to the line $x - 2y = 3$

11. Find the equation of the circle with centre (2, 3) and radius 5:

12. If $y = \frac{\cos x}{1 + \sin x}$, then find $\frac{dy}{dx}$

13. If three coins are tossed once, find the probability of getting 2 tails.

14. Variance of 6 observations is 4. If each observation is multiplied by 3, find the new variance.

15. Find the middle term in the expansion of $\left(3 - \frac{x^3}{6}\right)^8$, Also find coefficient of x^9 .

16. Find the coordinates of foci, eccentricity latus rectum, lengths of transverse and conjugate axes of hyperbola

$$\frac{x^2}{16} - \frac{y^2}{9} = 1$$

17. Find the equation of the straight line through the intersection of lines $4x + 7y - 3 = 0$ and $2x - 3y + 1 = 0$ and parallel to x-axis.

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

19. Find the general solution of the equation $\cos 3x + \cos x - \cos 2x = 0$.

20. Find Mean and Standard Deviation of the following data:

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

21. Find the value of $\tan \frac{19\pi}{3}$.

22. If $x + iy = \frac{1+2i}{2+i}$ prove that $x^2 + y^2 = 1$

23. Which term of the G. P. $2, 2\sqrt{2}, 4, \dots$ is 128?

24. Find the angle between the lines $x - 2y + 5 = 0$ and $x + 3y - 5 = 0$.

25. If $y = \frac{\sin x}{1 + \cos x}$, then find $\frac{dy}{dx}$.

26. If $\frac{2x+3}{4x^2+5x+6}$, then find $\frac{dy}{dx}$.

27. Find Standard Deviation of the following

x	3	8	13	18	23	28
f	7	10	15	10	6	2

28. An entrance exam is based on two papers A and B. The probability of passing one paper A by a randomly selected student is 80% and passing paper B is 70%. The passing at least A or B is 95%. Find the probability that the student passes both the papers.

29. The sum of first three terms of a G. P. is $\frac{49}{15}$ and their product is 1, then find the common ratio and the terms of G.P.

30. If a, b, c, d are in G. P., then prove that $(a^n + b^n)$, $(b^n + c^n)$, $(c^n + d^n)$ are also in G. P.

31. Find the foot of the perpendicular from (1, 2) to the line $x - 3y + 4 = 0$

32. Find the equation of the ellipse whose vertices are $(0, \pm 13)$ and foci $(0, \pm 5)$.

33. Find sum of all natural numbers between 100 and 1000 and divisible by 5.

34. Find the angles between the lines $y - 3\sqrt{x} - 5 = 0$ and $\sqrt{3}y - x + 6 = 0$

35. Out of 500 car owners, 400 owned car A and 200 owned car B. How many car owners have both car A and B ?

36. Find the middle term in the expansion of $(2x^2 - \frac{1}{3})^6$.

37. The sum of a certain number of terms of A.P. 25, 22, 19, terms. is 116. Find the number of terms.

38. Find the eccentricity of the hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1$.

39. Find the angle between the lines $x - 2y + 2 = 0$ and $x + 3y + 4 = 0$

40. If $y = (7x + 6\tan x)x^5$ then find $\frac{dy}{dx}$

41. If coefficient of variation of two distributions are 30 and 50 and their standard deviations are 12 and 15 respectively. Find their arithmetic means.

42. A bag contains 2 white and 3 red balls. 2 balls are selected at random. Find the probability of getting 1 white and 1 red ball.

43. Prove that $\frac{\sin x - 2\sin 3x + \sin 5x}{\cos 5x - \cos x} = \tan x$

44. Prove by the principle of mathematical induction : $1 \times 2 + 2 \times 3 + 3 \times 4 + \dots + n(n+1) = \frac{n(n+1)(n+2)}{3}$

45. If sum of n terms of A.P. is $3n^2 + 5n$ and its mth term is 164. Find the value of m.

46. A point R on line PQ with x-coordinate 4 divides the line joining P (2, -3, 4) and Q(8, 0, 1). Find the coordinate of point R. Also find the ratio in which R divides PQ.

47. Differentiate $\frac{4x+5\sin x}{x+7\cos x}$ w.r.t.x

48. Prove that $(\cos x - \cos y)^2 + (\sin x - \sin y)^2 = 4\sin^2\left(\frac{x-y}{2}\right)$

49. Find the general solution and principal solution of the equation $\sec^2 2x = 1 - \tan 2x$.

50. Evaluate $(\sqrt{3} + \sqrt{2})^4 + (\sqrt{3} - \sqrt{2})^4$

51. If the ratio of 5th term from the beginning and 5th term from end in the expansion of $\left(2^{\frac{1}{4}} + \frac{1}{3^{\frac{1}{4}}}\right)^n$ is $\sqrt{6}:1$ Find the value of n

52. Find the coordinates of foci, vertices, eccentricity and length of latus rectum of the ellipse $\frac{x^2}{25} + \frac{y^2}{4} = 1$

53. Find mean and standard deviation of the following frequency distribution :

Class-interval	70-75	75-80	80-85	85-90	90-95	95-100	100-105	
Frequency	3	4	7	6	5	3	2	

Objective Questions

54. If set A = {2, 6, 10, 14} and B = {3, 6, 11, 14} then A - B :

55. if $\cos x = \frac{3}{5}$ and x is in 4th quadrant, then tan x is equal to

56. The modulus and argument of $-\sqrt{3} + i$ is:

57. ${}_{14}C = {}_6^n C$ then value of n is

58. If sum of first n terms of an A. P. is $3n^2 + 2n$, then the common difference is :

59. if $\frac{3}{5}, x, \frac{1}{15}$ are in G.P. then value of x is

60. The slope of the line joining (4, 5) and (-2, 3) is:

61. $\lim_{x \rightarrow 0} \frac{\tan 3x}{\tan 2x} = ?$

62. Find the derivative of $5 \tan x - 6 \cos x + 7$ with respect to x.

63. Mean Deviation of 7, 8, 3, 11, 9, 12, 16 from median is :

64. The domain and range of $|x-3|$ are respectively:

65. $\lim_{x \rightarrow 2} \frac{x^5 - 32}{x^3 - 8}$

66. Differentiate $(x^2+2)^3$ with respect to x.

67. The coordinates of the focus of the parabola $x^2 = -9y$ is:

68. A = {x: x is a prime number}, Set A is..... set. (Finite, Null, Infinite)

69. A = {a, e, i, o, u}. Number of subsets of set A is..... (5, 20, 32, 120)

70. If A = {a, b, c}, B = {a, b, c, d, e}, then $A \cap B =$.(A, B, neither A nor B)

71. In a school there are 20 teachers who teach Mathematics or Physics. Of these 12 teach Maths and 4 teach Maths and Physics. The number of teacher who teach Physics are.....

72. Let A = {0, 1, 2, 3, 4, 5, 6, 7}. A relation R is defined from A to A where $R = \{(x, y) : y = x + 5, x, y \in A\}$. Then the relation R has the range.....

73. If $\tan x = \frac{3}{4}$ then the value of $\cos 2x$ is :

74. The value of $\cos 75^\circ$ is

75. If $4x + i(3x - y) = 3 - 6i$ then the value of x and y are, respectively.

76. If $3(2x) \geq 2(1-x)$, then the value of x lies in the interval:
77. The value of x for which $\frac{1}{6!} + \frac{1}{7!} = \frac{x}{8!}$
78. If n th term of a G.P. is $3(2)^{n-1}$, then its common ratio is.....
79. The geometric mean between $\frac{1}{9}$ and 729 is.....
80. Find the modulus of complex number $(2 + 3i)^2$
81. If ${}^nC_5 = {}^nC_7$ then the value of n is
82. Three arithmetic means between 5 and 25 are..... ,, respectively.
83. If multiplicative inverse of $3 - 4i$ is $x + iy$, then the values of x and y
84. If a straight line passes through the points (1, 2) and (3, 5) then its slope is:
85. The coordinates of the focus of the parabola $x^2 = -8y$ is:
86. Find the coordinates of the centre of the circle $x^2 + y^2 - 8x + 12y - 12 = 0$.
87. The length of major axis of the ellipse $4x^2 + y^2 = 400$ is
88. The equation of line passing through (2, 3) and making an angle 45° with positive x -axis is :
89. The line $4x + 3y = 12$ meets x -axis at the point
90. The length of perpendicular from (1, 1) to the line $5x + 12y + 9 = 0$ is.....
91. Find the eccentricity of the ellipse $9x^2 + y^2 = 225$.
92. $\lim_{x \rightarrow 0} \frac{\tan x}{x}$ where x is radians.
93. $\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - 1}{x}$ is.....
94. Find derivative of $x^5(3-6x^9)$ w.r.t. x
95. The derivative of $3 \cot x + 5 \operatorname{cosec} x$ w. r. t. x is:
96. The mean deviation of 9, 5, 3, 12, 10, 18, 4, 7, 19 about Median is.
97. If A and B are two events such that $P(A) = \frac{1}{2}$, $P(B) = \frac{7}{10}$ and $P(A \cap B) = \frac{3}{5}$, then find $P(A \cup B)$
98. If $\frac{2}{11}$ is the probability of an event then the probability of the event "not A " is :
99. If $G = \{7, 8\}$ and $H = \{5, 4, 2\}$, then number of subsets of $G \times H$ is :
100. The conjugate of $\frac{1}{3+4i}$ is
101. The sum of first 5 terms of geometric series $1 + \frac{2}{3} + \frac{4}{9} + \dots$
102. The equation of the line passing through (0, 2) and making an angle 60° with x -axis is :
103. The distance of the point $(-1, 1)$ from the line $12x - 5y = 9$ is :
104. If a coin is tossed thrice, then the probability of getting 1 Head and 2 tails is :
105. Find the equation of the line perpendicular to the line $x - 7y + 5 = 0$ and passing through (3, 0).