

1. The 6th term of an AP of n terms whose sum is $n^2 - 2n$ is
 (A) 9 (B) 10 (C) 12 (D) 18
2. If $y = 1 + x + x^2 + \dots$ to ∞ , with $|x| < 1$, then x is
 (A) $\frac{y}{y-1}$ (B) $\frac{y}{1-y}$ (C) $\frac{y-1}{y}$ (D) $\frac{1-y}{y}$
3. Which of the following statement is not TRUE
 (A) $2 \geq 3$ or 3 is not a positive integer
 (B) $2 < 3$ or 3 is a positive integer
 (C) $2 \geq 3$ or 3 is a positive integer
 (D) $2 < 3$ or 3 is not a positive integer
4. The contrapositive of the implication "If it is snowing, then I get wet" is
 (A) If it is not snowing, then I do not get wet.
 (B) If I do not get wet, then it is not snowing.
 (C) If it is snowing, then I do not get wet.
 (D) If it is not snowing, then I get wet.
5. Number of subset of $\{a, b, c, d\}$ having two elements is
 (A) 4 (B) 3 (C) 6 (D) 15
6. The relation R defined on the set $X = \{4, 5, 6\}$ by $R = \{(4, 5)\}$ is
 (A) reflexive (B) symmetric (C) identity (D) transitive
7. If $A = \emptyset$ (empty set). Number of elements present in power set of A is
 (A) 0 (B) 1 (C) 2 (D) none of these
8. The domain of the function $f(x) = \frac{x^2+2x+1}{x^2-x-6}$ is
 (A) $\mathbb{R}$ (B) $\mathbb{R} \setminus \{3\}$ (C) $\mathbb{R} \setminus \{-2, 3\}$ (D) none of these
9. The value of π is
 (A) $\frac{22}{7}$ (B) 3.14 (C) 3.142 (D) none of these
10. If $z = 2 - \sqrt{3}i$, then value of $z\bar{z}$ is
 (A) 8 (B) 7 (C) $2 + \sqrt{3}i$ (D) none of these
11. The n th roots of unity are in
 (A) AP (B) GP (C) HP (D) none of these

12. The number of different 5 letter words, with or without meaning, which can be formed out of the letters of the word "APPLE", where repetition of the letters is not allowed is
 (A) 60 (B) 30 (C) 120 (D) none of these
13. The number of ways the 3 girls and 2 boys can be seated in a row so that no two boys are together is
 (A) 36 (B) 9 (C) 6 (D) 72
14. The term independent of x in $\left(\frac{x}{3} - \frac{2}{x^2}\right)^{10}$ is
 (A) 6 (B) 4 (C) 3 (D) none of these
15. In the expansion of $(1 + x)^n$, the sum of coefficients of odd powers of x is
 (A) $2^n + 1$ (B) $2^n - 1$ (C) 2^n (D) 2^{n-1}
16. If the equations $ax^2 + bx + c = 0$ and $bx^2 + cx + a = 0$ have a common root with $a \neq b \neq c$, then
 (A) $a + b + c = 0$ (B) $a + b + c = 1$ (C) $a + b + c = -1$ (D) none of these
17. The number of solution of the equation $\cos(e^x) = 4^x + 4^{-x}$ is
 (A) 1 (B) 2 (C) 0 (D) infinite
18. If α is the AM of the roots of the equation $x^2 - 2ax + b = 0$ and β is the GM of the roots of the equation $x^2 - 2bx + a^2 = 0$, then
 (A) $\alpha > \beta$ (B) $\alpha = \beta$ (C) $\alpha < \beta$ (D) none of these
19. The vector $\vec{b} \times (\vec{a} \times \vec{b})$ is
 (A) perpendicular to $\vec{b}$ (B) perpendicular to $\vec{a}$
 (C) perpendicular to both $\vec{a}$ and $\vec{b}$ (D) null vector
20. The area of the parallelogram whose adjacent sides are given by vectors $\vec{a} = \hat{i} - \hat{j} + 3\hat{k}$ and $\vec{b} = 2\hat{i} - 7\hat{j} + \hat{k}$ is
 (A) $10\sqrt{2}$ (B) $5\sqrt{2}$ (C) $15\sqrt{2}$ (D) none of these
21. The decimal equivalent of 110110 is
 (A) 54 (B) 52 (C) 56 (D) 58
22. If $a = 3\sqrt{3}$, $b = 9$ and $C = 90^\circ$ in a ΔABC , then $\angle A$ is
 (A) $\frac{\pi}{4}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{2}$ (D) $\frac{\pi}{6}$

23. $\sin \left[\tan^{-1} \left(\frac{1-x^2}{2x} \right) + \cos^{-1} \left(\frac{1-x^2}{1+x^2} \right) \right]$ is equal to

- (A) 0 (B) 1 (C) $\frac{1}{\sqrt{2}}$ (D) $\sqrt{2}$

24. If $\sin 5x + \sin 3x + \sin x = 0$, then the value of x other than zero between $0 \leq x \leq \frac{\pi}{2}$ is

- (A) $\frac{\pi}{6}$ (B) $\frac{\pi}{12}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{9}$

25. Range of $\cot x$ is

- (A) $(1, \infty)$ (B) $[-1, 1]$ (C) $(-\infty, -1)$ (D) $\mathbb{R}$

26. If A is any non-singular square matrix of order 3, then $A(adj A)$ is equal to

- (A) I (B) $\det A \cdot I$ (C) $\det A^3 I$ (D) none of these

27. The system of linear equations :

$$x + y + z = 0, 2x + 2y + 2z = 0, 3x + 3y + 3z = 0 \text{ has}$$

- (A) No solution (B) A unique solutions
(C) An infinitely many solutions (D) None of these

28. The cofactor of '0' in the determinant $\begin{vmatrix} 1 & -3 & 4 \\ 0 & 2 & 5 \\ -2 & 6 & 3 \end{vmatrix}$ is

- (A) 33 (B) 24 (C) -33 (D) -24

29. The value of determinant $\begin{vmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 5 & 7 & 8 \end{vmatrix}$ is

- (A) 1 (B) 32 (C) -32 (D) 0

30. If the mean deviation is 16, then the value of standard deviation is

- (A) 15 (B) 18 (C) 20 (D) none of these

31. The mean of the sum of first n natural number is

- (A) $\frac{n-1}{2}$ (B) $\frac{n+1}{2}$ (C) $\frac{n}{2}$ (D) none of these

32. Two identical dice are rolled. The probability that the same number will appear on each of them is

- (A) $\frac{1}{6}$ (B) $\frac{1}{18}$ (C) $\frac{1}{36}$ (D) None of these

33. A determinant is chosen at random from the set of all determinants of order 2 with elements 0 or 1 only. The probability that the values of the determinant is chosen is positive is

- (A) $\frac{5}{16}$ (B) $\frac{7}{16}$ (C) $\frac{1}{4}$ (D) $\frac{3}{16}$

34. Equation of a straight line making equal intercepts on the axes and passing through the point (1,2) is

(A) $4x - y - 2 = 0$

(B) $2x + y - 4 = 0$

(C) $x + y - 3 = 0$

(D) $x + 2y - 5 = 0$

35. If the equation $4x^2 - 8xy + \lambda y^2 = 0$ represents two perpendicular lines, then the value of λ is

(A) 4

(B) -4

(C) 3

(D) -3

36. The equation of the circle which touches the line $5x + 12y = 1$ and which has its centre at (3,4) is

(A) $(x - 3)^2 + (y - 4)^2 = \left(\frac{62}{11}\right)^2$

(B) $(x - 3)^2 + (y - 4)^2 = \left(\frac{62}{17}\right)^2$

(C) $(x - 3)^2 + (y - 4)^2 = \left(\frac{62}{13}\right)^2$

(D) none of these

37. The equation of the normal to the parabola $y^2 = 4x$ which is parallel to the line $y - 2x + 6 = 0$ is

(A) $2x - y - 12 = 0$

(B) $2x + y - 12 = 0$

(C) $x + 2y - 12 = 0$

(D) $x - 2y + 12 = 0$

38. The equation of the ellipse whose foci are $(\pm 2, 0)$ and eccentricity $\frac{1}{2}$ is

(A) $\frac{x^2}{12} + \frac{y^2}{16} = 1$

(B) $\frac{x^2}{16} + \frac{y^2}{12} = 1$

(C) $\frac{x^2}{16} + \frac{y^2}{8} = 1$

(D) None of these

39. The equation of the diameter which is conjugate to $y = 3x$ with respect to the hyperbola $\frac{x^2}{4} - \frac{y^2}{9} = 1$ is

(A) $y = \frac{3}{4}x$

(B) $y = -\frac{3}{4}x$

(C) $y = \frac{4}{3}x$

(D) $y = -\frac{4}{3}x$

40. The direction cosines of any normal to the xy - plane are

(A) 1,0,0

(B) 0,1,0

(C) 1,1,1

(D) 0,0,1

41. The lines $\frac{x-2}{1} = \frac{y-3}{1} = \frac{z-4}{-k}$ and $\frac{x-1}{k} = \frac{y-4}{2} = \frac{z-5}{1}$ are coplanar if

(A) $k = 0$ or -1

(B) $k = 1$ or -1

(C) $k = 3$ or -3

(D) $k = 0$ or -3

42. The perpendicular distance of the point (3,4,5) from the y - axis, is

(A) $\sqrt{34}$

(B) $\sqrt{41}$

(C) 4

(D) 5

43. The radius of the sphere $x^2 + y^2 + z^2 - 6x + 8y - 10z + 1 = 0$ is

(A) 5

(B) 2

(C) 7

(D) 15

44. The solution of the given differential equation $\frac{dy}{dx} = ye^x$ with $y(0) = e$ is

(A) $y = e^x$ (B) $y = e^{-x}$ (C) $\ln y = e^x$

(D) None of these

45. The solution of $(x + 2y^3)dy = y dx$ is

(A) $x + y^3 = cy$ (B) $x = y^3 + cy$ (C) $y^2 - x = cy$

(D) None of these

46. The second order differential equation is

(A) $y'^2 + x = y^2$ (B) $y'y'' + y = \sin x$ (C) $y''' + y'' + y = \cos x$ (D) $y' = y$

47. The slope of the tangent to the curve $y = \frac{1}{4}x^3 - 4x$ at $x = 4$ is

(A) 16

(B) 64

(C) 32

(D) 8

48. If $\omega = f(y - z, z - x, x - y)$ then $\frac{\partial \omega}{\partial x} + \frac{\partial \omega}{\partial y} + \frac{\partial \omega}{\partial z}$ is

(A) 0

(B) 3

(C) -3

(D) None of these

49. $D^{(16)}\cos(x + 5)$ is equal to

(A) $5^{16}\cos(x + 5)$ (B) $5^{16}\sin(x + 5)$ (C) $\sin(x + 5)$ (D) $\cos(x + 5)$

50. $\lim_{x \rightarrow 0} \frac{\tan 3x}{\tan 4x}$ is equal to

(A) 0

(B) $\frac{3}{4}$ (C) $\frac{4}{3}$

(D) 1

51. The graph of the function $y = \ln x$ lies in

(A) 1st and 2nd quadrant(B) 2nd and 3rd quadrant(C) 3rd and 4th quadrant(D) 1st and 4th quadrant

52. The function $f(x) = \begin{cases} x \sin \frac{1}{x} & , x \neq 0 \\ 0 & , x = 0 \end{cases}$ is

(A) differentiable at $x = 0$ (B) continuous at $x = 0$ (C) $f'(x)$ is continuous at $x = 0$

(D) none of these

53. If $y = \cot^{-1} \left[\tan \left(\frac{\pi}{2} - x \right) \right]$ then $\frac{dy}{dx}$ is

(A) x (B) $\frac{1}{1+x^2}$

(C) 1

(D) $-\frac{1}{1+x^2}$

54. If $x = p$ is a local maximum point of the function $f(x) = x^5 - 5x^4 + 5x^3 - 10$, then p is

(A) 1

(B) -1

(C) 3

(D) -3

55. $\frac{d}{dx}(\sin x^\circ)$ is

(A) $\cos x^\circ$ (B) $\frac{\pi}{180} \sin x^\circ$ (C) $\frac{\pi}{180} \cos x^\circ$ (D) $\sin x^\circ$

56. The area bounded by the curve $y = x^2$ and the line $y = x$ is

(A) $\frac{1}{3}$ (B) $\frac{1}{6}$ (C) 1 (D) $\frac{1}{2}$

57. $\int_{-1}^1 |x| dx$ is equal to

(A) 1 (B) 2 (C) 4 (D) $\frac{1}{2}$

58. $\int \frac{\cos \sqrt{x}}{\sqrt{x}} dx$ is equal to

(A) $2 \cos \sqrt{x} + C$ (B) $\frac{1}{2} \cos \sqrt{x} + C$ (C) $\sin \sqrt{x} + C$ (D) $2 \sin \sqrt{x} + C$

59. $\int e^x \cos x dx$ is equal to

(A) $\frac{1}{2} e^x (\cos x - \sin x) + C$ (B) $\frac{1}{2} e^x (\cos x + \sin x) + C$
 (C) $\frac{1}{2} e^x (\sin x - \cos x) + C$ (D) none of these

60. $\int_0^{\frac{\pi}{2}} \left(\sin^2 \frac{x}{4} - \cos^2 \frac{x}{4} \right) dx$ is

(A) 0 (B) 1 (C) -1 (D) -2