Math Bank - 7

1. The value of $\sin\left[n\pi+(-1)^n\frac{\pi}{4}\right]$, $n \in I$ is

(a) 0 (b) $\frac{1}{\sqrt{2}}$

(c) $-\frac{1}{\sqrt{2}}$ (d) none of these

2. The value of $\cos^2\frac{\pi}{8}+\cos^2\frac{3\pi}{8}+\cos^2\frac{5\pi}{8}+\cos^2\frac{7\pi}{8}$ is

(a) 1 (b) 2

(c) – 1 (d) none of these

3. $\sin^6x+\cos^6x$ lies between

(a) $\frac{1}{4}$ and 1 (b) $\frac{1}{4}$ and 2

(c) 0 and 1 (d) none of these

4. If $x = y\cos\frac{2\pi}{3} = z\cos\frac{4\pi}{3}$, then $xy + yz + zx =$

(a) – 1 (b) 0

(c) 1 (d) 2

5. If $\cos 2\alpha = \frac{3\cos2\beta-1}{3-\cos2\beta}$, then $\frac{\tan\alpha}{\tan\beta} =$

(a) 1 (b) – 1

(c) $\sqrt{2}$ (d) $-\sqrt{2}$

6. If an angle θ be divided into two parts such that the tangent of one part is m times the tangent of the other, then their difference ϕ is given by

(a) $\cos\phi = \frac{m-1}{m+1}\cos\theta$

(b) $\sin\phi = \frac{m-1}{m+1}\sin\theta$

(c) $\sin\phi = \frac{m-1}{m+1}\cos\theta$

(d) $\cos\phi = \frac{m-1}{m+1}\sin\theta$

7. If $P_n = \cos^n\theta + \sin^n\theta$, then $P_n - P_{n-2} = k\,P_{n-4}$ where

(a) $k = 1$ (b) $k = -\sin^2\theta\cos^2\theta$

(c) $k = \sin^2\theta$ (d) $k = \cos^2\theta$.

8. If $\cot\theta - \tan\theta = \sec\theta$, then θ is equal to

(a) $2n\pi + \frac{3\pi}{2}$ (b) $n\pi + (-1)^n\frac{\pi}{6}$

(c) $n\pi + \frac{\pi}{2}$ (d) none of these

9. The general value of x satisfying the equation $\cot^2(x+y) + \tan^2(x+y) + y^2 + 2y - 1 = 0$ is

(a) $(2n+1)\frac{\pi}{4}+1, n\in Z$

(b) $\frac{n\pi}{4}+1, n\in Z$

(c) $n\pi \pm 1, n\in Z$ (d) none of these

10. The solution of $\tan^2 9x = \cos 2x - 1$ is

(a) $\frac{n\pi}{3}, n\in Z$ (b) $\frac{n\pi}{6}, n\in Z$

(b) $n\pi, n\in Z$ (d) none of these

11. If $r\sin\theta = 3$, $r = 4(1+\sin\theta)$, $0\le\theta\le2\pi$ then $\theta =$

(a) $\frac{\pi}{6},\frac{\pi}{3}$ (b) $\frac{\pi}{6},\frac{5\pi}{6}$

(c) $\frac{\pi}{3},\frac{\pi}{4}$ (d) $\frac{\pi}{2},\pi$

12. If we consider only the principal values of the inverse trigonometric functions, then the value of

$\tan\left(\cos^{-1}\frac{1}{\sqrt{2}} - \sin^{-1}\frac{4}{\sqrt{17}}\right)$ is :

(a) $\frac{\sqrt{29}}{3}$ (b) $\frac{29}{3}$

(c) $\frac{\sqrt{3}}{29}$ (d) none of these

13. The value of

$\cos^{-1}x + \cos^{-1}\left(\frac{x}{2}+\frac{\sqrt{3-3x^2}}{2}\right); \frac{1}{2}\le x\le 1$ is equal to

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$

(c) $\frac{\pi}{3}$ (d) 0

14. Two angles of a triangle are $\cot^{-1}2$ and $\cot^{-1}3$. Then, the third angle is

(a) $\frac{\pi}{4}$ (b) $\frac{3\pi}{4}$

(c) $\frac{\pi}{6}$ (d) $\frac{\pi}{3}$

15. $\sum_{r=1}^{\infty}\cot^{-1}\left(r^2+\frac{3}{4}\right)$ *equals*

(a) $\frac{\pi}{2}$ (b) $\cot^{-1}2$

(c) $\frac{\pi}{6}$ (d) $\tan^{-1}2$

16. In a ΔABC, $a = 13$ cm, $b = 12$ cm and $c = 5$ cm. The distance of A from BC is

(a) $\frac{144}{13}$ (b) $\frac{65}{12}$

(c) $\frac{60}{13}$ (d) $\frac{25}{13}$

17. In any ΔABC, $4R \sin \frac{A}{2} \sin \frac{B}{2} \sin \frac{C}{2} =$

(a) $2r$ (b) r

(c) $3r$ (d) none of these

18. If $c^2 = a^2 + b^2$, then $4s(s-a)(s-b)(s-c) =$

(a) a^2b^2 (b) c^2a^2

(c) b^2c^2 (d) s^4

19. If in a ΔABC

$$\frac{2\cos A}{a} + \frac{\cos B}{b} + \frac{2\cos C}{c} = \frac{a}{bc} + \frac{b}{ca}$$

the value of $\angle A$ is

(a) 45° (b) 60°

(c) 30° (d) 90°

20. A person, standing on the bank of a river observes that the angle subtended by a tree on the opposite bank is 60°, when he retreats 40m from the bank, he finds the angle to be 30°. The height of the tree and the breadth of the river are

(a) $10\sqrt{3}$m, 10 m (b) $20\sqrt{3}$m, 10m

(c) $20\sqrt{3}$m, 20 m (d) none of these

21. A ballon is comiong down at the rate 4m/minute and at any point on the ground the angle of elevation is 45° and after 10 minute the angle of elevation is 30°, then the height of the ballon from the observer is

(a) $20\sqrt{3}$ m (b) $20(3+\sqrt{3})$ m

(c) $10(3+\sqrt{3})$ m (d) $10\sqrt{3}$ m

22. A flag-post 20*m* high standing on the top of a house subtends an angle whose tangent is $\frac{1}{6}$ at a distance 70 *m* from the foot of the house. The height of the house is

(a) 30 *m* (b) 60 *m*

(c) 50 *m* (d) none of these

23. The shadow of a pole of height $(1+\sqrt{3})$ metres standing on the ground is found to be 2 metres longer when the elevation is 30° than when the elevation was α. Then $\alpha =$

(a) 75° (b) 60°

(c) 45° (d) 30°

24. The coordiantes of the orthocentre of the triangle, formed by lines $xy = 0$ and $x + y = 1$, are

(a) (0, 0) (b) (2, – 1)

(c) (– 2, 1) (d) none of these

25. Through the point $P(\alpha, \beta)$, where $\alpha\beta > 0$ the straight line $\frac{x}{a} + \frac{y}{b} = 1$ is drawn so as to form with coordinate axes a triangle of area S. If $ab > 0$, then the least value of S is

(a) $\alpha\beta$ (b) $2\alpha\beta$

(c) $4\alpha\beta$ (d) none of these

26. The point $(2t^2 + 2t + 4, t^2 + t + 1)$ lies on the line $x + 2y = 1$ for

(a) all real values of t (b) some real values of t

(c) $t = \frac{-4 \pm \sqrt{7}}{8}$ (d) none of these

27. The area of the region enclosed by $4|x| + 5|y| \le 20$ is

(a) 10 (b) 20

(c) 40 (d) none of these

28. The circumcentre of the triangle formed by the lines $xy + 2x + 2y + 4 = 0$ and $x + y + 2 = 0$ is

(a) (0, 0) (b) (– 2, – 2)

(c) (– 1, – 1) (d) (– 1, – 2)

29. Equations of the bisectors of the angles between the lines through the origin, the sum and product of whose slopes are respectively the arithmetic and the goemetric means of 9 and 16 is

(a) $24x^2 - 25xy + 2y^2 = 0$

(b) $25x^2 + 44xy - 25y^2 = 0$

(c) $11x^2 - 25xy - 11y^2 = 0$

(d) none of these

30. The distance between the two lines represented by the equation $9x^2 - 24xy + 16y^2 - 12x + 16y - 12 = 0$ is

(a) $\frac{8}{5}$ (b) $\frac{6}{5}$

(c) $\frac{11}{5}$ (d) none of these

31. If one of the lines of $my^2 + (1 - m^2)xy - mx^2 = 0$ is a bisector of the angle between the lines $xy = 0$ then m is

(a) 1 (b) 2

(c) $-\frac{1}{2}$ (d) $\frac{1}{2}$

32. A circle of radius 2 lies in the first quadrant and touches both the axes of coordinates. The equation of the circle with centre at (6, 5) and touching the above circle externally is

(a) $x^2 + y^2 + 12x - 10y + 52 = 0$

(b) $x^2 + y^2 - 12x + 10y + 52 = 0$

(c) $x^2 + y^2 - 12x - 10y + 52 = 0$

(d) none of these

33. Two rods of lengths a and b slide along the axes which are rectangular is such a manner that their ends are concyclic. The locus of the centre of the circle passing through these points is

(a) $4(x^2 + y^2) = a^2 + b^2$ (b) $x^2 - y^2 = a^2 - b^2$

(c) $4(x^2 - y^2) = a^2 - b^2$ (d) $x^2 + y^2 = a^2 + b^2$

34. If the coordinates of two consecutive vertices of a regular hexagon which lies completely above the x-axis, are (–2, 0) and (2, 0), then the equation of the circle, circumscribing the hexagon, is

(a) $x^2 + y^2 - 4\sqrt{3}y - 4 = 0$

(b) $x^2 + y^2 + 4\sqrt{3}y - 4 = 0$

(c) $x^2 + y^2 - 4\sqrt{3}x - 4 = 0$

(d) $x^2 + y^2 + 4\sqrt{3}x - 4 = 0$

35. If the line $(y - 2) = m(x + 1)$ intersects the circle $x^2 + y^2 + 2x - 4y - 3 = 0$ at two real distinct points, then the number of possible values of m is

(a) 2 (b) 1

(c) any real value of m (d) none of these

36. The length of the side of an equilateral triangle, inscribed in the parabola $y^2 = 8x$ so that one angular point is at the vertex, is

(a) $16\sqrt{3}$ (b) $8\sqrt{3}$

(c) $4\sqrt{3}$ (d) none of these

37. If (4, 0) is the vertex and y-axis, the directrix of a parabola, then its focus is

(a) (8, 0) (b) (4, 0)

(c) (0, 8) (d) (0, 4)

38. The length of the latus rectum of the parabola $25[(x - 2)^2 + (y - 4)^2] = (4x - 3y + 12)^2$ is

(a) $\frac{16}{5}$ (b) $\frac{8}{5}$

(c) $\frac{12}{5}$ (d) none of these

39. The parametric representation $(3 + t^2, 3t - 2)$ represents a parabola with

(a) focus at (– 3, – 2) (b) vertex at (3, – 2)

(b) directrix $x = -5$ (d) all of these

40. The domain of the function

$$f(x) = \frac{1}{\sqrt{x^{12} - x^9 + x^4 - x + 1}} \text{ is}$$

(a) $(-\infty, -1)$ (b) $(1, \infty)$

(c) $(-1, 1)$ (d) $(-\infty, \infty)$

41. The domain of the function $f(x) = \log_2 \log_3 \log_4 x$ is

(a) $[4, \infty)$ (b) $(4, \infty)$

(c) $(-\infty, 4)$ (d) none of these

42. The domain of the function

$f(x) = \log_{10}[1 - \log_{10}(x^2 - 5x + 16)]$ is

(a) (2, 3) (b) [2, 3]

(c) (2, 3] (d) [2, 3)

43. The domain of the function $f(x) = \dfrac{1}{\sqrt{[x]^2 - [x] - 6}}$ is

(a) $(-\infty, -2) \cup [4, \infty)$ (b) $(-\infty, -2] \cup [4, \infty)$

(c) $(-\infty, -2) \cup (4, \infty)$ (d) none of these

44. If $\lim\limits_{x \to 0} \dfrac{729^x - 243^x - 81^x + 9^x + 3^x - 1}{x^3} = k(\log 3)^3$, then k =

(a) 4 (b) 5

(c) 6 (d) none of these

45. If $f(9) = 9$ and $f'(9) = 1$, then $\lim\limits_{x \to 9} \dfrac{3 - \sqrt{f(x)}}{3 - \sqrt{x}}$ is equal to

(a) 0 (b) 1

(c) – 1 (d) none of these

46. $\lim\limits_{x \to 1} \dfrac{\sqrt[3]{x^2} - 2\sqrt[3]{x} + 1}{(x-1)^2}$ is equal to

(a) $\frac{1}{9}$ (b) $\frac{1}{6}$

(c) $\frac{1}{3}$ (d) none of these

47. $\lim\limits_{n \to \infty} \dfrac{\{x\} + \{2x\} + \{3x\} + \ldots + \{nx\}}{n^2}$, where $\{x\} = x - [x]$ denotes the fractional part of x, is

(a) 1 (b) 0

(c) $\frac{1}{2}$ (d) none of these

48. The value of b for which the function

$$f(x) = \begin{cases} 5x - 4 \text{ if } 0 < x \le 1 \\ 4x^2 + 3bx \text{ if } 1 < x < 2 \end{cases}$$ is continuous at every points of its domain, is

(a) $\frac{13}{3}$ (b) 1

(c) 0 (d) – 1

49. Let $f(x) = \begin{cases} 1, x \le -1 \\ |x|, -1 < x < 1 \\ 0, x \ge 1 \end{cases}$, then

(a) f is continuous at $x = -1$

(b) f is differentiable at $x = -1$

(c) f is continuous everywhere

(d) f is differentiable for all x.

50. The value of $f(0)$ so that the function

$$f(x) = \frac{(256-8x)^{1/4}-4}{16-4(64+3x)^{1/3}} \quad (x \neq 0)$$

may be continuous every where is given by

(a) – 1/8 (b) 1/8

(c) 1/64 (d) none of these

51. The function $f(x)$ is defined by

$$f(x) = \begin{cases} \log_{(4x-3)}(x^2-2x+5), & x \in \left(\frac{3}{4}, 1\right) \cup (1, \infty) \\ 4, & x = 1 \end{cases}$$

(a) is continuous at $x = 1$

(b) is discontinuous at $x = 1$ since $f(1^-)$ does not exist though $f(1^+)$ eixts

(c) is discontinuous at $x = 1$ since $f(1^+)$ does not exist though $f(1^-)$ exists

(d) is discontinuous at $x = 1$ since neither $f(1^+)$ nor $f(1^-)$ exists

52. Differential coefficient of $\log_{10} x$ with respect to $\log_x 10$ is

(a) $-\frac{(\log 10)^2}{(\log x)^2}$ (b) $\frac{(\log_x 10)^2}{(\log 10)^2}$

(c) $\frac{(\log_{10} x)^2}{(\log 10)^2}$ (d) $-\frac{(\log x)^2}{(\log 10)^2}$

53. If $y = f(x^3)$, $z = g(x^5)$, $f'(x) = \tan x$ and $g'(x) = \sec x$, then the value of $\frac{dy}{dz}$ is

(a) $\frac{3}{5x^2} \cdot \frac{\tan x^3}{\sec x^5}$ (b) $\frac{5x^2}{3} \cdot \frac{\sec x^5}{\tan x^3}$

(c) $\frac{3x^2}{5} \cdot \frac{\tan x^3}{\sec x^5}$ (d) none of these

54. If $y = x^{(\log x)^{\log\log x}}$, then $\frac{dy}{dx}$ is equal to

(a) $\frac{y \log y}{x \log x}$ (2 log log x + 1)

(b) $\frac{x \log x}{y \log y}$ (2 log log x + 1)

(c) $\frac{2y \log y}{x \log x}$ (log log x + 1)

(d) none of these

55. If $y = [(\tan x)^{\tan x}]^{\tan x}$, then $\frac{dy}{dx}$ at $x = \frac{\pi}{4}$ is equal to

(a) 1 (b) 2

(c) 0 (d) none of these

56. The curves $x^3 - 3xy^2 = a$ and $3x^2y - y^3 = b$, where a and b are constants, cut each other

(a) at an angle $\frac{\pi}{3}$ (b) at an angle $\frac{\pi}{4}$

(c) orthogonally (d) none of these

57. If $y = a \log_e x + bx^2 + x$ has its extreme values (i.e. maximum or minimum value) at $x = 1$ and $x = 2$, then the values of a and b are

(a) $a = -\frac{1}{6}$, $b = \frac{4}{3}$ (b) $a = -\frac{4}{3}$, $b = \frac{1}{6}$

(c) $a = \frac{4}{3}$, $b = -\frac{1}{6}$ (d) none of these

58. The range of values of x for which the function $f(x) = \frac{x}{\log x}$, $x > 0$ and $x \neq 1$, may be decreasing, is

(a) $(0, e)$ (b) (e, ∞)

(c) $(0, e)\backslash\{1\}$ (d) none of these

59. A point on the curve $\frac{x^2}{4} + \frac{y^2}{16} = 1$ where the tangent is equally inclined to the axes is

(a) $\left(\frac{2}{\sqrt{5}}, \frac{-8}{\sqrt{5}}\right)$ (b) $\left(\frac{2}{\sqrt{5}}, \frac{8}{\sqrt{5}}\right)$

(c) $\left(\frac{-2}{\sqrt{5}}, \frac{8}{\sqrt{5}}\right)$ (d) all of the above

60. $\int \frac{e^x(1+\sin x)}{(1+\cos x)} dx$ is equal to

(a) $e^x \cot x$ (b) $\sin(\log x)$

(c) $e^x \tan \frac{x}{2}$ (d) $\log \tan x$

61. $\int 7^{7^{7^x}} . 7^{7^x} \cdot 7^x \, dx$ is equal to

(a) $\frac{7^{7^{7^x}}}{(\log 7)^3} + C$ (b) $\frac{7^{7^{7^x}}}{(\log 7)^2} + C$

(c) $7^{7^{7^x}} \cdot (\log 7)^3 + C$ (d) none of these

62. $\int \frac{\sqrt{1-\sin x}}{1+\cos x} \cdot e^{-x/2} \, dx$ is equal to

(a) $\sec \frac{x}{2} \cdot e^{-x/2} + C$ (b) $-\sec \frac{x}{2} \cdot e^{-x/2} + C$

(c) $\tan \frac{x}{2} \cdot e^{-x/2} + C$ (d) none of these

63. If $\int f(x) \, dx = g(x) + C$, then $\int f(ax+b) \, dx$ is equal to

(a) $g(ax + b) + C$ (b) $ag(ax + b) + C$

(c) $\frac{1}{a}[g(ax + b) + C]$ (d) none of these

64. $\int_0^a \frac{dx}{a+\sqrt{a^2-x^2}}$ is equal to

(a) $\frac{\pi}{2}+1$ (b) $\frac{\pi}{2}-1$

(c) $1-\frac{\pi}{2}$ (d) none of these

65. The value of the integral $\int_0^{\pi} \frac{\sin 2kx}{\sin x}\, dx$, where $k \in I$, is

(a) $\frac{\pi}{2}$ (b) π

(c) 0 (d) none of these

66. $\int_{-1}^{1} [x]\, dx$, where [.] denotes the greatest integer function, is equal to

(a) 0 (b) 1

(c) – 1 (d) none of these

67. $\int_{-2}^{2} [x^2]\, dx$ is equal to

(a) $10-2\sqrt{3}-2\sqrt{2}$ (b) $10+2\sqrt{3}-2\sqrt{2}$

(c) $10-2\sqrt{3}+2\sqrt{2}$ (d) none of these

68. The degree of differential equation

$$x = 1+\left(\frac{dy}{dx}\right)+\frac{1}{2!}\left(\frac{dy}{dx}\right)^2+\frac{1}{3!}\left(\frac{dy}{dx}\right)^3+\ldots\ldots\ldots\ldots \text{ is}$$

(a) three (b) one

(c) not defined (d) none of these

69. The solution of the equation

$$y \sin x \frac{dy}{dx} = \cos x\left(\sin x - \frac{y^2}{2}\right),$$

given $y = 1$ when $x = \frac{\pi}{2}$ is

(a) $y^2 = \sin x$ (b) $y^2 = 2 \sin x$

(c) $x^2 = \sin y$ (d) $x^2 = 2 \sin y$

70. The order of the differential equation whose general solution is given by

$y = c_1 \cos (2x + c_2) - (c_3 + c_4)\, a^{x+c_5} + c_6 \sin (x - c_7)$ is

(a) 3 (b) 4

(c) 5 (d) 2

71. The inequality $|z-4| < |z-2|$ represents the region given by

(a) Re $(z) > 0$ (b) Re $(z) < 0$

(c) Re $(z) > 3$ (d) none of these

72. The centre of a regular polygon of n sides is located at the point $z = 0$, and one of its vertex z_1 is known. If z_2 be the vertex adjacent to z_1, then z_2 is equal to

(a) $z_1\left(\cos\frac{2\pi}{n} \pm t\sin\frac{2\pi}{n}\right)$

(b) $z_1\left(\cos\frac{\pi}{n} \pm t\sin\frac{\pi}{n}\right)$

(c) $z_1\left(\cos\frac{\pi}{2n} \pm t\sin\frac{\pi}{2n}\right)$

(d) none of these

73. If $\sqrt[3]{a-ib} = x - iy$, then $\sqrt[3]{a+ib} =$

(a) $x + iy$ (b) $x - iy$

(c) $y + ix$ (d) $y - ix$

74. The inequality $|z-4| < |z-2|$ represents the region given by

(a) Re $(z) > 0$ (b) Re $(z) < 0$

(c) Re $(z) > 3$ (d) none of these

75. The centre of a regular polygon of n sides is located at the point $z = 0$, and one of its vertex z_1 is known. If z_2 be the vertex adjacent to z_1, then z_2 is equal to

(a) $z_1\left(\cos\frac{2\pi}{n} \pm t\sin\frac{2\pi}{n}\right)$

(b) $z_1\left(\cos\frac{\pi}{n} \pm t\sin\frac{\pi}{n}\right)$

(c) $z_1\left(\cos\frac{\pi}{2n} \pm t\sin\frac{\pi}{2n}\right)$

(d) none of these

76. If $\sqrt[3]{a-ib} = x - iy$, then $\sqrt[3]{a+ib} =$

(a) $x + iy$ (b) $x - iy$

(c) $y + ix$ (d) $y - ix$

77. The solution of the equation $|z| - z = 1 + 2i$ is

(a) $\frac{3}{2} - 2i$ (b) $\frac{3}{2} + 2i$

(c) $2 - \frac{3}{2}i$ (d) none of these

78. The number of numbers lying between 100 and 500 that are divisible by 7 but not by 21 is

(a) 57 (b) 19

(c) 38 (d) none of these

79. Let S_n denotes the sum of n terms of an A.P. whose first term is a. If the common difference $d = S_n - k\, S_{n-1} + S_{n-2}$ then $k =$

(a) 1 (b) 2

(c) 3 (d) none of these

80. If $5^{1+x} + 5^{1-x}$, $\frac{a}{2}$ and $25^x + 25^{-x}$ are three consecutive terms of an A.P., then the values of a are given by

(a) $a \geq 12$ (b) $a > 12$

(c) $a < 12$ (d) $a \leq 12$

81. If a, b, c are in A.P. and p is the A.M. between a and b and q is the A.M. between b and c, then

(a) a is the A.M. between p and q
(b) b is the A.M. between p and q
(c) c is the A.M. between p and q
(d) none of these

82. If the roots of the equation
$(a^2 + b^2)\,x^2 + 2\,(bc + ad)\,x + (c^2 + d^2) = 0$ are real, then a^2, bd, c^2 are in
(a) A.P. (b) G.P.
(c) H.P. (d) none of these

83. If α, β are irrational roots of $ax^2 + bx + c = 0$ ($a, b, c \in$ Q), then
(a) $\alpha = \beta$
(b) $\alpha\beta = 1$
(c) α and β are conjugate roots
(d) $\alpha^2 + \beta^2 = 1$

84. The value of p for which the quadratic equation
$x^2 - px + p + 3 = 0$ has reciprocal roots is
(a) 1 (b) – 1
(c) 2 (d) – 2

85. The roots of the equation $2^{x+2} \cdot 3^{\frac{3x}{x-1}} = 9$ are given by
(a) $\log_2\left(\frac{2}{3}\right), -2$ (b) 3, – 3
(c) $-2, 1 - \frac{\log 3}{\log 2}$ (d) $1 - \log_2 3, 2$

86. ${}^{15}C_8 + {}^{15}C_9 - {}^{15}C_6 - {}^{15}C_7 =$
(a) 8 (b) 0
(c) 6 (d) none of these

87. There are 4 candidates for the post of a lecturer in Mathematics and one is to be selected by votes of 5 men. The number of ways in which the votes can be given is
(a) 1048 (b) 1024
(c) 1072 (d) none of these

88. The number of ways in which a committee of 5 can be chosen from 10 candidates so as to exclude the youngest if it includes the oldest, is
(a) 196 (b) 178
(c) 202 (d) none of these

89. There are 10 lamps in a hall. Each one of them can be switched on independently. The number of ways in which the hall can be illuminated is
(a) 10^2 (b) 18
(c) 2^{10} (d) 1023

90. If A is the sum of the odd terms and B the sum of even terms in the expansion of $(x + a)^n$, then $A^2 - B^2 =$
(a) $(x^2 + a^2)^n$ (b) $(x^2 - a^2)^n$
(c) $2\,(x^2 - a^2)^n$ (d) none of these

91. The coefficient of x^{53} in the expansion

$$\sum_{m=0}^{100} {}^{100}C_m\,(x-3)^{100-m} \cdot 2^m \text{ is}$$

(a) ${}^{100}C_{47}$ (b) ${}^{100}C_{53}$
(c) $-{}^{100}C_{53}$ (d) $-{}^{100}C_{100}$

92. The coefficient of x^n in the expansion of $(1 + x)^{2n}$ and the coefficient of x^n in the expansion of $(1 + x)^{2n-1}$ are in the ratio
(a) 4 : 1 (b) 3 : 1
(c) 2 : 1 (d) 1 : 1

93. The sum of rational terms in the expansion of $(\sqrt{2} + 3^{1/15})^{10}$ is
(a) 31 (b) 41
(c) 51 (d) none of these

94. The coefficient of x^n in the series

$$\frac{1+x}{1!} + \frac{(1+x)^2}{2!} + \frac{(1+x)^3}{3!} + \ldots \text{ is}$$

(a) $\frac{2e}{n!}$ (b) $\frac{4e}{n!}$
(c) $\frac{e}{n!}$ (d) none of these

95. The sum of the series

$$\frac{1}{1\cdot2} + \frac{1\cdot3}{1\cdot2\cdot3\cdot4} + \frac{1\cdot3\cdot5}{1\cdot2\cdot3\cdot4\cdot5\cdot6} + \ldots \text{is}$$

(a) $\sqrt{e}$ (b) $\sqrt{e} - 1$
(c) $\sqrt{e} - 2$ (d) none of these

96. The sum of the series $1 + \frac{3}{2!} + \frac{7}{3!} + \frac{15}{4!} + \ldots \infty$ is
(a) $e\,(e + 1)$ (b) $e\,(1 - e)$
(c) $e\,(e - 1)$ (d) $3e$

97. $\frac{2}{1!} + \frac{4}{3!} + \frac{6}{5!} + \ldots \infty$ is equal to
(a) $e + 1$ (b) $e - 1$
(c) e^{-1} (d) e

98. If $A = \begin{bmatrix} 1 & 2 & -1 \\ -1 & 1 & 2 \\ 2 & -1 & 1 \end{bmatrix}$, then det. (adj (adj A)) is
(a) $(14)^4$ (b) $(14)^3$
(c) $(14)^2$ (d) $(14)^1$

99. If A is symmetric as well as skew symmetric matrix, then A is
(a) diagonal (b) null
(c) triangular (d) none of these

100. If A is a singular matrix, then adj A is
(a) non-singular (b) singular
(c) symmetric (d) not defined

Answer Keys

1. (b)	2. (b)	3. (a)	4. (b)	5. (c, d)	6. (b)
7. (b)	8. (b)	9. (a)	10. (c)	11. (c)	12. (c)
13. (c)	14. (a, d)	15. (a)	16. (b)	17. (a)	18. (c)
19. (a)	20. (a)	21. (c)	22. (c)	23. (c)	24. (a)
25. (b)	26. (d)	27. (c)	28. (a)	29. (a)	30. (c)
31. (a)	32. (c)	33. (c)	34. (a)	35. (c)	36. (a)
37. (a)	38. (b)	39. (b)	40. (d)	41. (b)	42. (a)
43. (a)	44. (c)	45. (b)	46. (a)	47. (b)	48. (a)
49. (a)	50. (d)	51. (b)	52. (b)	53. (b)	54. (a)
55. (c)	56. (b)	57. (a)	58. (c)	59. (a)	60. (a, c)
61. (b)	62. (a)	63. (b)	64. (b)	65. (c)	66. (c)
67. (a)	68. (b)	69. (a)	70. (c)	71. (b)	72. (c)
73. (a)	74. (a)	75. (a)	76. (c)	77. (b)	78. (a)
79. (b)	80. (b)	81. (c)	82. (d)	83. (c)	84. (b)
85. (b)	86. (a)	87. (d)	88. (b)	89. (c)	90. (c)
91. (b)	92. (c)	93. (b)	94. (c)	95. (d)	96. (a)
97. (b)	98. (b)	99. (d)	100. (c)		