Math Bank - 5

1. The value of $\cos\frac{2\pi}{7}+\cos\frac{4\pi}{7}+\cos\frac{6\pi}{7}$ is

(a) 0 (b) 1

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

2. The value of

$\left(1+\cos\frac{\pi}{8}\right)\left(1+\cos\frac{3\pi}{8}\right)\left(1+\cos\frac{5\pi}{8}\right)\left(1+\cos\frac{7\pi}{8}\right)$ is

(a) $\frac{1}{4}$ (b) $\frac{1}{8}$

(c) $\frac{1}{16}$ (d) none of these

3. If $x + \frac{1}{x} = 2\cos\theta$ then $x^n + \frac{1}{x^n}$ is equal to

(a) $2\sin n\theta$ (b) $\cos n\theta$

(c) $\sin n\theta$ (d) $2\cos n\theta$, $n \in Z^+$

4. The ratio of the greatest value of $2 - \cos x + \sin^2 x$ to its least value is

(a) $\frac{1}{4}$ (b) $\frac{9}{4}$

(c) $\frac{13}{4}$ (d) none of these

5. The value of $\cos\frac{2\pi}{15}\cos\frac{4\pi}{15}\cos\frac{8\pi}{15}\cos\frac{14\pi}{15}$ is

(a) $\frac{1}{4}$ (b) $\frac{1}{8}$

(c) $\frac{1}{16}$ (d) none of these

6. If $\tan\theta = n\tan\phi$ $(n > 0)$, then

(a) $\tan^2(\theta - \phi) > \frac{(n-1)^2}{4n}$

(b) $\tan^2(\theta - \phi) \geq \frac{(n-1)^2}{4n}$

(c) $\tan^2(\theta - \phi) \leq \frac{(n-1)^2}{4n}$

(d) none of these

7. Let n be a fixed positive integer such that

$\sin\left(\frac{\pi}{2n}\right)+\cos\left(\frac{\pi}{2n}\right) = \frac{\sqrt{n}}{2}$, then

(a) $n = 4$ (b) $n = 5$

(c) $n = 6$ (d) none of these

8. If $4\cos^2\theta + \sqrt{3} = 2(\sqrt{3}+1)\cos\theta$, then $\theta =$

(a) $2n\pi \pm \frac{\pi}{3}$ (b) $2n\pi \pm \frac{\pi}{4}$

(c) $2n\pi \pm \frac{\pi}{6}$ (d) none of these

9. From the identity $\sin 3x = 3\sin x - 4\sin^3 x$, it follows that if x is real and $|x| < 1$, then

(a) $(3x - 4x^3) > 1$ (b) $(3x - 4x^3) \leq 1$

(c) $(3x - 4x^3) < 1$

(d) Nothing can be said about $3x - 4x^3$

10. The set of all x in the interval $[0, \pi]$ for which $2\sin^2 x - 3\sin x + 1 \geq 0$ is

(a) $\{\pi/2\}$ (b) ϕ

(c) $\{x : 0 \leq x \leq \pi/4\}$

(d) $\{x : 0 \leq x \leq \pi/6, \pi/2, 5\pi/6 \leq x \leq \pi\}$

11. One root of the equation $\cos - x + \frac{1}{2} = 0$ lies in the interval

(a) $\left[0, \frac{\pi}{2}\right]$ (b) $\left[-\frac{\pi}{2}, 0\right]$

(c) $\left[\frac{\pi}{2}, \pi\right]$ (d) $\left[\pi, \frac{3\pi}{2}\right]$

12. $2\left(\tan^{-1}1+\sin^{-1}\left(\frac{2}{\sqrt{5}}\right)+\tan^{-1}3\right)$ is equal to

(a) π (b) 4π

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

13. The value of

$\tan^{-1}\left(\frac{1}{2}(\tan 2A) + \tan^{-1}(\cot A) + \tan^{-1}(\cot^3 A)\right)$ is

(a) 0 if $\frac{\pi}{4} < A < \frac{\pi}{2}$ (b) p, if $0 < A < \frac{\pi}{4}$

(c) both (a) and (b) (d) none of these

14. If $2\tan^{-1}\left[\sqrt{\frac{a-b}{a+b}}\tan\left(\frac{\theta}{2}\right)\right] = \cos^{-1}\left[\frac{2a+3b}{3a+2b}\right]$, then $\cos\theta$ is equal to

(a) $\frac{1}{2}$ (b) $\frac{1}{3}$

(c) $\frac{2}{3}$ (d) $\frac{2a}{3b}$

15. If $\sin\left(\sin^{-1}\frac{1}{5}+\cos^{-1}x\right) = 1$ then x is equal to

(a) 1 (b) 0

(c) $\frac{4}{5}$ (d) $\frac{1}{5}$

16. If the lengths of the sides of a triangle are 3, 4 and 5 units then R is

(a) 3.5 (b) 3.0

(c) 2.0 (d) 2.5

17. In any ΔABC, $rr_1 + r_2 r_3 =$

(a) ab (b) ac

(c) bc (d) none of these

18. If in a triangle ABC, $\tan\frac{A}{2}$, $\tan\frac{B}{2}$, $\tan\frac{C}{2}$ are in H.P., then the sides a, b, c are in

(a) A.P. (b) G.P.

(c) H.P. (d) None of these

19. The value $\frac{1}{r_1^2}+\frac{1}{r_2^2}+\frac{1}{r_3^2}+\frac{1}{r^2}$ is equal to

(a) 0 (b) $\frac{a^2+b^2+c^2}{\Delta^2}$

(c) $\frac{\Delta^2}{a^2+b^2+c^2}$ (d) $\frac{a^2+b^2+c^2}{\Delta}$

20. If upper part of a tree broken over by the wind makes an angle of 30º with the ground, and the distance from the root to the point where the top of the tree touches the ground is 10m, the height of the tree is

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

(c) $15\sqrt{3}$m (d) none of these

21. A ballon is observed simultaneously from three points A, B and C on a straight road directly under it. The angular elevation at B is twice and at C is thrice that of A. If the distance between A and B is 200 metres and the distance between B and C is 100 metres, then the height of balloon between B and C is 100 meters, then the height of balloon is given by

(a) 50 metres (b) $50\sqrt{3}$ metres

(c) $50\sqrt{2}$ metres (d) none of these

22. A tower stands at the top of a hill whose height is 3 times the height of the tower. The tower is found to sutend at a point 3 km away on the horizontal through the foot of the hill, an angle θ where $\tan\theta = \frac{1}{9}$. The height of the tower is

(a) 12 (b) 3

(c) $\frac{9 \pm \sqrt{33}}{8}$ (d) none of these

23. A person is standing on a tower of height $15(\sqrt{3}+1)\,m$ and observing a car coming towards the tower. He observed that angle of depression changes from 30º to 45º in 3 *sec*. What is the speed of the car

(a) 36 *km*/*hr* (b) 72 *km*/*hr*

(c) 18 *km*/*hr* (d) 30 *km*/*hr*

24. If a triangle has its orthocentre at (1, 1) and circumcentre at $\left(\frac{3}{2}, \frac{3}{4}\right)$, then the coordinates of the centroid of the triangle are

(a) $\left(\frac{4}{3}, -\frac{5}{6}\right)$ (b) $\left(\frac{4}{3}, \frac{5}{6}\right)$

(c) $\left(-\frac{4}{3}, \frac{5}{6}\right)$ (d) $\left(-\frac{4}{3}, -\frac{5}{6}\right)$

25. A line joining two points A (2, 0) and B (3, 1) is rotated about A in anticlockwise direction through an angle 15º. If B goes to C in the new position, then the coordinates of C are

(a) $\left(2, \sqrt{\frac{3}{2}}\right)$ (b) $\left(2, -\sqrt{\frac{3}{2}}\right)$

(c) $\left(2+\frac{1}{\sqrt{2}}, \sqrt{\frac{3}{2}}\right)$ (d) none of these

26. P (3, 1), Q (6, 5) and R (x, y) are three points such that the angle RPQ is a right angle and the area of $\Delta RPQ = 7$, then the number of such points R is

(a) 0 (b) 1

(c) 2 (d) 4

27. If a, b, c are in H.P. then the straight line $\frac{x}{a}+\frac{y}{b}+\frac{1}{c} = 0$ always passes through a fixed point, that point is

(a) (– 1, – 2) (b) (– 1, 2)

(c) (1, – 2) (d) $\left(1, -\frac{1}{2}\right)$

28. The figure formed by the lines $x^2 + 4xy + y^2 = 0$ and $x - y = 4$, is

(a) A right angled triangle

(b) An isosceles triangle

(c) An equilateral triangle

(d) none of these

29. The value of λ for which the equation $12x^2 - 10xy + 2y^2 + 11x - 5y + \lambda = 0$ represents two straight lines is

(a) 1 (b) 2

(c) – 1 (d) – 2

30. The pair of lines which join the origin to the points of intersection of the line $y = mx + c$ with the curve $x^2 + y^2 = a^2$ are at right angles, if

(a) $c^2 = a^2(1 + m^2)$ (b) $2c^2 = a^2(1 + m^2)$

(c) $2c^2 = a^2(1 - m^2)$ (d) none of these

31. If the equation $2x^2 - 2hxy + 2y^2 = 0$ represents two congruent lines through origin, then h =

(a) ± 2 (b) ± 3
(c) ± 6 (d) ± 4

32. The sides of a square are $x = 2$, $x = 3$, $y = 1$ and $y = 2$. The equation of the circle drawn on the diagonals of the square as its diameter, is

(a) $x^2 + y^2 - 5x - 3y + 8 = 0$
(b) $x^2 + y^2 + 5x - 3y + 8 = 0$
(c) $x^2 + y^2 + 5x + 3y - 8 = 0$
(d) none of these

33. The circles $x^2 + y^2 - 10x + 16 = 0$ and $x^2 + y^2 = r^2$ intersect each other in two distinct points if

(a) $r < 2$ (b) $r > 8$
(c) $2 < r < 8$ (d) $2 \le r \le 8$

34. The two circles $x^2 + y^2 - 2x - 4y = 0$ and $x^2 + y^2 - 8y - 4 = 0$

(a) touch externally (b) touch internally
(c) intersect (d) do not touch

35. The number of points on the circle $x^2 + y^2 - 4x - 10y + 13 = 0$ which are at a distance 1 from the point $(-3, 2)$ is

(a) 1 (b) 2
(c) 3 (d) none of these

36. The equation of the normal to the parabola $y^2 = 4x$ which is parallel to the line $y - 2x + 5 = 0$ is

(a) $2x + y - 12 = 0$ (b) $2x - y - 12 = 0$
(c) $x + 2y - 12 = 0$ (d) none of these

37. If the tangent to the parabola $y^2 = 4ax$ meets the axis in T and tangent at the vertex A in Y and the rectangle TAYG is completed, then the locus of G is

(a) $y^2 + 2ax = 0$ (b) $y^2 + ax = 0$
(c) $x^2 + ay = 0$ (d) none of these

38. If the parabola $x^2 = ay$ makes an intercept of length $\sqrt{40}$ on the line $y - 2x = 1$, then a is equal to

(a) 1 (b) -2
(c) -1 (d) 2

39. If PSQ is the focal chord of the parabola $y^2 = 8x$ such that $SP = 6$, then the length SQ is

(a) 6 (b) 4
(c) 3 (d) none of these

40. The domain of the function

$$f(x) = {}^{24-x}C_{3x-1} + {}^{40-6x}C_{8x-10} \text{ is,}$$

(a) $\{2, 3\}$ (b) $\{1, 2, 3\}$
(c) $\{1, 2, 3, 4\}$ (d) none of these

41. The domain of the function

$$f(x) = \cos^{-1}\left(\frac{2-|x|}{4}\right) + [\log(3-x)]^{-1} \text{ is}$$

(a) $[-6, 3)\backslash\{2\}$ (b) $[-6, 2) \cup (2, 3]$
(c) $[-6, 3]$ (d) $[-6, 3)$

42. The domain of the function $f(x) = \dfrac{1}{\sqrt{|\sin x| + \sin x}}$ is

(a) $(-2n\pi, 2n\pi)$
(b) $(2n\pi, (2n+1)\pi)$
(c) $\left((4n-1)\frac{\pi}{2}, (4n+1)\frac{\pi}{2}\right)$
(d) none of these

43. The domain of the function

$$f(x) = \log_3\left[-\log_{1/2}\left(1 + \frac{1}{x^{1/5}}\right) - 1\right] \text{ is}$$

(a) $(-\infty, 1)$ (b) $(0, 1)$
(c) $(1, \infty)$ (d) none of these

44. If $f(2) = 2$ and $f'(2) = 1$ then $\lim\limits_{x \to 2} \dfrac{2x^2 - 4f(x)}{x-2}$ is equal to

(a) 4 (b) -4
(c) 2 (d) -2

45. $\lim\limits_{n \to \infty}\left(\cos\frac{x}{2}\cos\frac{x}{4}\cos\frac{x}{8}\ldots\cos\frac{x}{2^n}\right) =$

(a) $\dfrac{x}{\sin x}$ (b) $\dfrac{\sin x}{x}$
(c) 0 (d) none of these

46. $\lim\limits_{n \to \infty}\prod_{4=3}^{n}\left(\frac{r^3-1}{r^3+1}\right)$

(a) $\dfrac{1}{3}$ (b) $\dfrac{6}{7}$
(c) $-\dfrac{2}{3}$ (d) none of these

47. $\lim\limits_{x \to a}\left(\dfrac{\sin x}{\sin a}\right)^{\frac{1}{x-a}}$, $a \ne n\pi$, n is an integer, equals

(a) $e^{\cot a}$ (b) $e^{\tan a}$
(c) $e^{\sin a}$ (d) $e^{\cos a}$

48. If $f(x) = \begin{cases} \dfrac{[x]-1}{x-1}, & x \ne 1 \\ 0, & x = 1 \end{cases}$, then $f(x)$ is

(a) continuous as well as differentiable at $x = 1$
(b) differentiable but not continuous at $x = 1$
(c) continuous but not differentiable at $x = 1$
(d) neither continuous nor differentiable at $x = 1$

49. Let $f(x) = \begin{cases} \dfrac{x^4 - 5x^2 + 4}{|(x-1)(x-2)|}, & x \neq 1, 2 \\ 6 & , x = 1 \\ 12 & , x = 2 \end{cases}$. Then $f(x)$ is continuous on the set

(a) $R\backslash\{2\}$ (b) $R\backslash\{1, 2\}$

(c) R (d) $R\backslash\{1\}$

50. The function $f(x) = (1 + x)^{\cot x}$ is not defined at $x = 0$. The value of $f(0)$ so that $f(x)$ becomes continuous at $x = 0$, is

(a) 1 (b) 0

(c) e (d) none of these

51. Let $f(x) = [2x^3 - 5]$, where [ ] denotes the greatest integer function. Then the number of points in (1, 2), where the function is discontinuous is

(a) 0 (b) 13

(c) 15 (d) 11

52. If $y = (\sin^{-1}x)^2$, then $(1 - x^2)\dfrac{d^2y}{dx^2}$ is equal to

(a) $x\dfrac{dy}{dx} + 2$ (b) $x\dfrac{dy}{dx} - 2$

(c) $-x\dfrac{dy}{dx} + 2$ (d) none of these

53. If $f(x) = \log\left(\dfrac{m(x)}{n(x)}\right)$, $m(1) = n(1) = 1$ and $m'(1) = n'(1) = 2$, then $f'(1)$ is equal to

(a) 0 (b) 1

(c) -1 (d) none of these

54. The differential coefficient of $\tan^{-1}\dfrac{2x\sqrt{1-x^2}}{1-2x^2}$ w.r.t. $\sec^{-1}\dfrac{1}{2x^2-1}$ at $x = \dfrac{1}{2}$ is equal to

(a) $\dfrac{1}{2}$ (b) $-\dfrac{1}{2}$

(c) -1 (d) none of these

55. If $x^2 + y^2 = 1$, then

(a) $yy'' - 2(y')^2 + 1 = 0$ (b) $yy'' + (y')^2 + 1 = 0$

(c) $yy'' + (y')^2 - 1 = 0$ (d) $yy'' + 2(y')^2 + 1 = 0$

56. If the normal at the point "t_1" on the curve $xy = c^2$ meets the curve again at "t_2", then

(a) $t_1^3 t_2 = 1$ (b) $t_1^3 t_2 = -1$

(c) $t_1 t_2^3 = -1$ (d) $t_1 t_2^3 = 1$.

57. The minimum value of $\log_a x + \log_x a$, $0 < x < a$, is

(a) 1 (b) 2

(c) -2 (d) none of these

58. The function $f(x) = \dfrac{\ln(\pi + x)}{\ln(e + x)}$ is

(a) increasing on $(0, \infty)$

(b) decreasing on $(0, \infty)$

(c) increasing on $(0, \pi/e)$, decreasing on $(\pi/e, \infty)$

(d) decreasing on $(0, \pi/e)$, increasing on $(\pi/e, \infty)$

59. For the curve $x = t^2 - 1$, $y = t^2 - t$, the tangent is parallel to x-axis where

(a) $t = \dfrac{1}{\sqrt{3}}$ (b) $t = -\dfrac{1}{\sqrt{3}}$

(c) $t = 0$ (d) $t = \dfrac{1}{2}$

60. $\displaystyle\int \frac{\cot x}{\sqrt{\sin x}}\,dx$ is equal to

(a) $2\sqrt{\sin x} + C$ (b) $\dfrac{1}{2\sqrt{\sin x}} + C$

(c) $\dfrac{-2}{\sqrt{\sin x}} + C$ (d) $\dfrac{2}{\sqrt{\sin x}} + C$

61. $\displaystyle\int \sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}}\,dx$ is equal to

(a) $2\sqrt{1-x} + \cos^{-1}\sqrt{x} + \sqrt{x - x^2} + C$

(b) $2\sqrt{1-x} - \cos^{-1}\sqrt{x} + \sqrt{x - x^2} + C$

(c) $-2\sqrt{1-x} + \cos^{-1}\sqrt{x} + \sqrt{x - x^2} + C$

(d) none of these

62. If $\displaystyle\int \frac{\sqrt{\cot x}}{\sin x \cos x}\,dx = P\sqrt{\cot x} + Q$, then P equals

(a) 1 (b) 2

(c) –1 (d) –2

63. $\displaystyle\int \frac{d^2}{dx^2}(\tan^{-1}x)\,dx$ is equal to

(a) $\dfrac{1}{1+x^2} + C$ (b) $\tan^{-1}x + C$

(c) $x\tan^{-1}x - \dfrac{1}{2}\log(1 + x^2) + C$

(d) none of these

64. $\displaystyle\int_0^{\pi/2} (\tan x + \cot x)\,dx$ is equal to

(a) $\dfrac{\pi}{2}\log 2$ (b) $-\dfrac{\pi}{2}\log 2$

(c) $\pi \log 2$ (d) none of these

65. The value of the integral $\displaystyle\int_0^{\pi} \frac{x^2 \sin x}{(2x - \pi)(1 + \cos^2 x)}\,dx$ is

(a) $\frac{\pi^2}{4}$ (b) $\frac{\pi^2}{2}$

(c) $\frac{\pi^2}{6}$ (d) none of these

66. $\int_0^{1.5} [x^2]\, dx$, where [.] denotes the greatest in integer function, is equal to

(a) $\sqrt{2} - 2$ (b) $2 - \sqrt{2}$

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

67. $\int_0^{\pi} |\sin x + \cos x|\, dx$ is equal to

(a) $\sqrt{2}$ (b) $2\sqrt{2}$

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

68. The general solution of the differential equation $\frac{dy}{dx} = y \tan x - y^2 \sec x$ is

(a) $\tan x = (c + \sec x)\, y$ (b) $\sec y = (c + \tan y)\, x$

(c) $\sec x = (c + \tan x)\, y$ (d) none of these

69. Solution of the equation $x\, dy = \left(y + x \frac{f(y/x)}{f'(y/x)} \right) dx$ is

(a) $f\left(\frac{x}{y}\right) = cy$ (b) $f\left(\frac{y}{x}\right) = cx$

(c) $f\left(\frac{y}{x}\right) = cxy$ (d) none of these

70. The degree of the differential equation

$$\left(\frac{d^4y}{dx^4}\right)^{3/5} - 5\frac{d^3y}{dx^3} + 6\frac{d^2y}{dx^2} - 8\frac{dy}{dx} + 5 = 0 \text{ is}$$

(a) 2 (b) 3

(c) 4 (d) 5

71. The differential equation that represents all parabolas each of which has a latus rectum $4a$ and whose axes are parallel to x-axis, is

(a) $a\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^3 = 0$

(b) $2a\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^3 = 0$

(c) $2a\frac{d^2y}{dx^2} - \left(\frac{dy}{dx}\right)^3 = 0$ (d) none of these

72. The complex number $z = x + iy$ which satisfy the equation $\left|\frac{z-5i}{z+5i}\right| = 1$ lie on

(a) the x-axis (b) the line $y = 5$

(c) a circle through the origin

(d) none of these

73. The value of $\left(\frac{1+i}{\sqrt{2}}\right)^8 + \left(\frac{1-i}{\sqrt{2}}\right)^8$ is equal to

(a) 4 (b) 6

(c) 8 (d) 2

74. If 1, ω, ω^2 are the three cube roots of unity, then $(1 - \omega + \omega^2)(1 - \omega^2 + \omega^4)(1 - \omega^4 + \omega^8)$ ... to $2n$ factors =

(a) 2^n (b) 2^{2n}

(c) 2^{4n} (d) none of these

75. The complex number z satisfying the equations $|z - i| = |z + 1| = 1$ is

(a) 0 (b) $1 + i$

(c) $-1 + i$ (d) $1 - i$

76. In the series 3, 7, 11, 15, ... and 2, 5, 8, ... each continued to 100 terms, the number of terms that are identical is

(a) 21 (b) 27

(c) 25 (d) none of these

77. The sum of positive terms of the series

$10 + 9\frac{4}{7} + 9\frac{1}{7} + \ldots$ is

(a) $\frac{352}{7}$ (b) $\frac{437}{7}$

(c) $\frac{852}{7}$ (d) none of these

78. If S_1 is the sum of an arithmetic series of 'n' odd number of terms and S_2, the sum of the terms of the series in odd places, then $\frac{S_1}{S_2}$ =

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

(c) $\frac{n+1}{2n}$ (d) $\frac{n+1}{n}$

79. The sum of n terms of m A.P.s are $S_1, S_2, S_3, \ldots, S_m$. If the first term and common difference are 1, 2, 3, ..., m respectively, then $S_1 + S_2 + S_3 + \ldots + S_m$ =

(a) $\frac{1}{4}mn(m+1)(n+1)$

(b) $\frac{1}{2}mn(m+1)(n+1)$

(c) $mn(m+1)(n+1)$

(d) none of these

80. If $a(b - c)x^2 + b(c - a)x + c(a - b) = 0$ has equal roots, then a, b, c are in

(a) A.P. (b) G.P.

(c) H.P. (d) none of these

81. The equation

$\sqrt{x + 3 - 4\sqrt{x-1}} + \sqrt{x + 8 - 6\sqrt{x-1}} = 1$ has

(a) no solution (b) one solution

(c) two solutions (d) more than two solutions

82. If the sum of the roots of the equation $ax^2 + bx + c = 0$ is equal to the sum of the reciprocals of their squares, then bc^2, ca^2 and ab^2 are in

(a) A.P. (b) G.P.

(c) H.P. (d) none of these

83. In copying a quadratic equation of the form $x^2 + px + q = 0$, a student wrote the coefficient of x incorrectly and the roots were found to be 3 and 10; another student wrote the same equation but he wrote the constant term incorrectly and thus he found the roots to be 4 and 7. The roots of the correct equation are

(a) 5, 6 (b) 4, 6
(c) 4, 5 (d) none of these

84. The number of positive terms in the sequence

$$x_n = \frac{195}{4\,{}^nP_n} - \frac{{}^{n+3}P_3}{{}^{n+1}P_{n+1}},\ n \in N \text{ is}$$

(a) 2 (b) 3
(c) 4 (d) none of these

85. The number of ways in which the letters of the word "STRANGE" can be arranged so that the vowels may appear in the odd places, is

(a) 1440 (b) 1470
(c) 1370 (d) none of these

86. The number of ways in which 7 people can be arranged at a round table so that 2 particular persons may be together, is

(a) 132 (b) 148
(c) 240 (d) none of these

87. The number of ways in which a committee of 3 ladies and 4 gentlemen can be appointed from a meeting consisting of 8 ladies and 7 gentlemen, if Mrs X refuses to serve in a committee if Mr. Y is a member is

(a) 1960 (b) 1540
(c) 3240 (d) none of these

88. The 7th term in $\left(\frac{1}{y} + y^2\right)^{10}$, when expanded in descending power of y, is

(a) $\frac{210}{y^2}$ (b) $\frac{y^2}{210}$
(c) $210y^2$ (d) none of these

89. The coefficient of x^{30} in the expansion of $(1 + 3x + 3x^2 + x^3)^{15}$ is

(a) ${}^{45}C_{15}$ (b) ${}^{45}C_{25}$
(c) ${}^{45}C_{30}$ (d) ${}^{15}C_{11}$

90. The coefficient of x^5 in the expansion of $(1 + x^2)^5 (1 + x)^4$ is

(a) 40 (b) 50
(c) –50 (d) 60

91. In the expansion of $(x + a)^n$ if the sum of odd terms be P and the sum of even terms be Q, then $4PQ =$

(a) $(x + a)^n - (x - a)^n$ (b) $(x + a)^n + (x - a)^n$
(c) $(x + a)^{2n} - (x - a)^{2n}$ (d) none of these

92. The sum of the series $\frac{2}{1!} + \frac{4}{3!} + \frac{6}{5!} + \ldots\infty$ is

(a) e (b) $2e$
(c) $3e$ (d) $4e$

93. The sum of the series $1 + \frac{1}{2!} + \frac{1\cdot 3}{4!} + \frac{1\cdot 3\cdot 5}{6!} + \ldots$ is

(a) $\sqrt{e}$ (b) $e^{3/2}$
(c) $e^{-1/2}$ (d) e

94. The value of $(1+3)\log_e 3 + \frac{(1+3^2)}{2!}(\log_e 3)^2 + \frac{(1+3^3)}{3!}(\log_e 3)^3 + \ldots\infty$ is

(a) 18 (b) 28
(c) 36 (d) none of these

95. The value of $(x+y)(x-y) + \frac{1}{2!}(x+y)(x-y)(x^2+y^2) + \frac{1}{3!}(x+y)(x-y)(x^4+y^4+x^2y^2) + \ldots\infty$ is

(a) $e^{x^2} + e^{y^2}$ (b) $e^{x^2 - y^2}$
(c) $e^{x^2} - e^{y^2}$ (d) none of these

96. If $X = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$, the value of X^n is

(a) $\begin{bmatrix} 3n & -4n \\ n & -n \end{bmatrix}$ (b) $\begin{bmatrix} 2+n & 5-n \\ n & -n \end{bmatrix}$
(c) $\begin{bmatrix} 3^n & (-4)^n \\ 1^n & (-1)^n \end{bmatrix}$ (d) none of these

97. If A is 3×4 matrix and B is a matrix such that $A'B$ and BA' are both defined. Then B is of the type

(a) 3×4 (b) 3×3
(c) 4×4 (d) 4×3

98. If B is a non-singular matrix and A is a square matrix, then $\det(B^{-1}AB)$ is equal to

(a) $\det(A^{-1})$ (b) $\det(B^{-1})$
(c) $\det(A)$ (d) $\det(B)$

99. If A and B are two matrices such that $A + B$ and AB are both defined, then:

(a) A and B are two matrices not necessarily of same order
(b) A and B are square matrices of same order.
(c) number of columns of A = number of rows of B
(d) none of the above.

100. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & -2 & 4 \end{bmatrix}$, $I = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

$$A^{-1} = \frac{1}{6}\left[A^2 + CA + dI\right]$$

where $c, d \in R$, the pair of values (c, d) are

(a) (6, 11) (b) (6, –11)
(c) (– 6, 11) (d) (– 6, –11)

Answer keys

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