Math Bank-4

1. If $\sin\theta + \cos\theta = m$ and $\sec\theta + \text{cosec}\,\theta = n$, then
(a) $2n = m(n^2 - 1)$ (b) $2m = n(m^2 - 1)$
(c) $2n = m(m^2 - 1)$ (d) none of these

2. If in a ΔABC, $\cos A = \dfrac{\sin B}{2\sin C}$, then it is
(a) an isosceles triangle
(b) an equilateral triangle
(c) a right angled triangle
(d) none of these

3. If $\cos 2B = \dfrac{\cos(A+C)}{\cos(A-C)}$, then $\tan A$, $\tan B$, $\tan C$ are in
(a) A.P. (b) G.P.
(c) H.P. (d) none of these

4. If $n = \dfrac{\pi}{4\alpha}$, then $\tan\alpha\cdot\tan 2\alpha\cdot\tan 3\alpha \ldots \tan(2n-1)\alpha$ is equal to
(a) 1 (b) – 1
(c) ∞ (d) none of these

5. If $\sin(\pi\cos\theta) = \cos(\pi\sin\theta)$, then the value of $\cos\left(\theta + \dfrac{\pi}{4}\right)$ is
(a) $\dfrac{2}{\sqrt{2}}$ (b) $\dfrac{1}{\sqrt{2}}$
(c) $-\dfrac{1}{2\sqrt{2}}$ (d) $\dfrac{1}{2\sqrt{2}}$

6. If $\cos\alpha + \cos\beta = 0 = \sin\alpha + \sin\beta$, then $\cos 2\alpha + \cos 2\beta$ =
(a) $-2\sin(\alpha+\beta)$ (b) $-2\cos(\alpha+\beta)$
(c) $2\sin(\alpha+\beta)$ (d) $2\cos(\alpha+\beta)$

7. $\cos\dfrac{\pi}{7}\cos\dfrac{2\pi}{7}\cos\dfrac{4\pi}{7} =$
(a) 0 (b) $\dfrac{1}{2}$
(c) $\dfrac{1}{4}$ (d) $-\dfrac{1}{8}$

8. The smallest positive angle which satisfies the equation $2\sin^2\theta + \sqrt{3}\cos\theta + 1 = 0$ is
(a) $\dfrac{5\pi}{6}$ (b) $\dfrac{2\pi}{3}$
(c) $\dfrac{\pi}{3}$ (d) $\dfrac{\pi}{6}$

9. Let α, β be any two positive values of x for which $2\cos x$, $|\cos x|$ and $1 - 3\cos^2 x$ are in G.P. The minimum value of $|\alpha - \beta|$ is
(a) $\pi/3$ (b) $\pi/4$
(b) $\pi/2$ (d) none of these

10. The general solution of $\sin^2\theta\sec\theta + \sqrt{3}\tan\theta = 0$ is
(a) $\theta = n\pi + (-1)^{n+1}\dfrac{\pi}{3}, \theta = n\pi, n \in Z$
(b) $\theta = n\pi, n \in Z$
(b) $\theta = n\pi + (-1)^{n+1}\dfrac{\pi}{3}, n \in Z$
(d) $\theta = \dfrac{n\pi}{2}, n \in Z$

11. The equation $a\sin x + \cos 2x = 2a - 7$ possesses a solution if
(a) $a > 6$ (b) $2 \le a \le 6$

12. $\text{cosec}^{-1}(\cos x)$ is real if
(a) $x \in [-1, 1]$
(b) $x \in$ R
(c) x is an odd multiple of $\dfrac{\pi}{2}$
(d) x is an integral multipe of π

13. α, β are γ are three angles given by
$\alpha = 2\tan^{-1}\left(\sqrt{2}-1\right)$, $\beta = 3\sin^{-1}\dfrac{1}{\sqrt{2}} + \sin^{-1}\left(-\dfrac{1}{2}\right)$
and $\gamma = \cos^{-1}\dfrac{1}{3}$. Then
(a) $\alpha > \beta$ (b) $\beta > \gamma > \alpha$
(c) $\alpha > \gamma$ (d) none of these

14. The value of $\cos(2\cos^{-1} 0.8)$ is
(a) 0.48 (b) 0.96
(c) 0.6 (d) 0.28

15. In a ΔABC, $2ac\sin\dfrac{1}{2}(A - B + C) =$
(a) $a^2 + b^2 - c^2$ (b) $c^2 + a^2 - b^2$
(c) $b^2 - c^2 - a^2$ (d) $c^2 - a^2 - b^2$

16. In any ΔABC, $\dfrac{2abc}{a+b+c}\cos\dfrac{A}{2}\cos\dfrac{B}{2}\cos\dfrac{C}{2} =$
(a) Δ (b) 2Δ
(c) 3Δ (d) none of these

17. Let the angles A, B, C of ΔABC be in A.P. and let $b : c = \sqrt{3} : \sqrt{2}$. Then angle A is
(a) 75º (b) 45º
(c) 60º (d) none of these

18. If the angles A and B of a ΔABC satisfy the equation $\sin A + \sin B = \sqrt{3}(\cos B - \cos A)$, then they differ by

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

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

19. A man of height 6 ft. observes the top of a tower and the foot of the tower at angles of 45º and 30º of elevation and depression respectively. The height of the tower is

(a) $(1+\sqrt{3})$m (b) $3(1+\sqrt{3})$m

(c) $6(1+\sqrt{3})$m (d) none of these

20. Two vertical poles 20 m and 80 m high stand apart on a horizontal plane. The height of the point of intersection of the lines joining the top of each pole to the foot of the other is

(a) 15 m (b) 16 m

(c) 18 m (d) 50 m

21. A vertical tree stands at a point A on a bank of canal. The angle of elevation of its top from a point B on the other bank at the canal and directly opposite to A is 60º. The angle of elevation of the top from another point C is 30º. If A, B and C are on the same horizontal plane, $\angle ABC = 120º$ and BC = 20 m, the height of the tree is

(a) $\frac{5}{4}(\sqrt{3}+3\sqrt{11})$ (b) $\frac{5}{4}(\sqrt{3}-3\sqrt{11})$

(c) $\frac{5}{4}(1+\sqrt{33})$ (d) $\frac{5}{4}(1-\sqrt{33})$

22. The angle of elevation of a stationary cloud from a point 2500 m above a lake is 15º and the angle of depression of its reflection in the lake is 45º. The height of cloud above the lake level is

(a) $2500\sqrt{3}$ *metres* (b) 2500 *metres*

(c) $500\sqrt{3}$ *metres* (d) none of these

23. If α, β, γ are the real roots of the equation $x^3 - 3px^2 + 3qx - 1 = 0$, then the centroid of the triangle having vertices $\left(\alpha, \frac{1}{\alpha}\right)$, $\left(\beta, \frac{1}{\beta}\right)$ and $\left(\gamma, \frac{1}{\gamma}\right)$ are

(a) (p, q) (b) $(p, -q)$

(c) $(-p, q)$ (d) $(-p, -q)$

24. A rectangle has two opposite vertices at the points (1, 2) and (5, 5). If the other vertices lie on the line $x = 3$, then the coordinates of the other vertices are

(a) (3, – 1), (3, – 6) (b) (3, 1), (3, 5)

(c) (3, 2), (3, 6) (d) (3, 1), (3, 6)

25. Without changing the direction of coordinates axes, origin is transferred to (α, β) so that the linear terms in the equation $x^2 + y^2 + 2x - 4y + 6 = 0$ are eliminated. The point (α, β) is

(a) (– 1, 2) (b) (1, – 2)

(c) (1, 2) (d) (– 1, – 2)

26. A square is constructed on the portion of the line $x + y = 5$ which is intercepted between the axes, on the side of the line away from origin. The equations to the diagonals of the square are

(a) $x = 5, y = -5$ (b) $x = 5, y = 5$

(c) $x = -5, y = 5$ (d) $x - y = 5, x - y = -5$

27. The centroid of the triangle formed by the pair of lines $2x^2 - 27y^2 - 3xy + 4x - 3y + 2 = 0$ and the line $4x - 3y - 26 = 0$ is

(a) (3, – 2) (b) (4, 2)

(c) (4, 0) (d) none of these

28. The three lines whose combined equation is $(3x^2 + 2xy - 3y^2)(x - y + 2) = 0$ form a triangle which is

(a) equilateral (b) right angled

(c) obtuse angled (d) none of these

29. If the angle between the two lines represented by $2x^2 + 5xy + 3y^2 + 6x + 7y + 4 = 0$ is $\tan^{-1} m$, then m =

(a) $\frac{1}{5}$ (b) 1

(c) $\frac{7}{5}$ (d) 7

30. The length of intercept made by the line $lx + my + n = 0$ between the pair of lines $ax^2 + 2hxy + by^2 = 0$ is

(a) $\frac{n^2(l^2+m^2)\sqrt{h^2-ab}}{am^2-2hlm+bl^2}$

(b) $\frac{n\sqrt{(l^2+m^2)(h^2-ab)}}{2(am^2-2hlm+bl^2)}$

(c) $\frac{2n\sqrt{(h^2-ab)(l^2+m^2)}}{am^2-2hlm+bl^2}$

(d) none of these

31. The equation of a circle passing through the origin and making intercepts 4, 5 on the coordinate axes is

(a) $x^2 + y^2 - 4x + 5y = 0$

(b) $x^2 + y^2 - 4x - 5y = 0$

(c) $x^2 + y^2 + 4x + 5y = 0$

(d) none of these

32. The abscissae of two points A and B are the roots of the equation $x^2 + 2ax - b^2 = 0$ and their ordinates are the roots of the equation $x^2 + 2px - q^2 = 0$. The equation of the circle with AB as diameter is

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

33. The equation of the circle which touches both the axes and the straight line $4x + 3y = 6$ in the first quadrant and lies below it is
(a) $4x^2 + 4y^2 - 4x - 4y + 1 = 0$
(b) $x^2 + y^2 - 6x - 6y + 9 = 0$
(c) $x^2 + y^2 - 6x - y + 9 = 0$
(d) $4(x^2 + y^2 - x - 6y) + 1 = 0$

34. The number of common tangents to the circles
$x^2 + y^2 - 6x - 2y + 9 = 0$ and
$x^2 + y^2 - 14x - 8y + 61 = 0$ is
(a) 2 (b) 3
(c) 1 (d) 4

35. If QQ' is a double ordinate of a parabola $y^2 = 9x$, then the locus of its point of trisection is
(a) $y^2 = x$ (b) $y^2 = 3x$
(c) $y^2 = 6x$ (d) none of these

36. The curve described parametrically by
$x = t^2 + t + 1$, $y = t^2 - t + 1$ represents
(a) a pair of straight lines
(b) an ellipse
(c) a parabola
(d) a hyperbola

37. The portion of a tangent to a parabola $y^2 = 4ax$ cut off between the directrix and the curve subtends an angle θ at the focus, where $\theta =$
(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{3}$
(c) $\frac{\pi}{2}$ (d) none of these

38. If $y + 3 = m_1(x + 2)$ and $y + 3 = m_2(x + 2)$ are two tangents to the parabola $y^2 = 8x$, then
(a) $m_1 + m_2 = 0$ (b) $m_1 m_2 = -1$
(c) $m_1 m_2 = 1$ (d) none of these

39. The domain of the function

$$f(x) = \sin^{-1}\left\{\log_2\left(\frac{1}{2}x^2\right)\right\} \text{ is}$$

(a) $[-2, -1) \cup [1, 2]$ (b) $(-2, -1] \cup [1, 2]$
(c) $[-2, -1] \cup [1, 2]$ (d) $(-2, -1) \cup (1, 2)$

40. The domain of the function

$$f(x) = \cos\left[\log\left(\frac{\sqrt{16 - x^2}}{3 - x}\right)\right] \text{ is}$$

(a) $(-4, 4)$ (b) $(-4, 3)$
(c) $(-\infty, -4) \cup (3, \infty)$ (d) none of these

41. The domain of the function $f(x) = \sqrt{1 - \sqrt{1 - \sqrt{1 - x^2}}}$ is
(a) $(-\infty, 1)$ (b) $(-1, \infty)$
(c) $[0, 1]$ (d) $[-1, 1]$

42. The domain of the function

$$f(x) = \underbrace{\log_2 \log_2 \log_2 \ldots \log_2 x}_{n \text{ times}} \text{ is}$$

(a) $(2^{n-1}, \infty)$ (b) $[2^n, \infty)$
(c) $(2^{n-2}, \infty)$ (d) none of these

43. $\lim_{x \to 0} \frac{e^x + e^{-x} + 2\cos x - 4}{x^4}$ is equal to
(a) 0 (b) 1
(c) $\frac{1}{6}$ (d) $-\frac{1}{6}$

44. Let $f(x)$ be a twice differentiable function and $f''(0) = 5$, then $\lim_{x \to 0} \frac{3f(x) - 4f(3x) + f(9x)}{x^2}$ is equal to
(a) 30 (b) 120
(c) 40 (d) none of these

45. If α and β be the roots of $ax^2 + bx + c = 0$, then

$$\lim_{x \to \alpha} (1 + ax^2 + bx + c)^{1/(x - \alpha)} \text{ is}$$

(a) $\log |a(\alpha - \beta)|$ (b) $e^{a(\alpha - \beta)}$
(c) $e^{a(\beta - \alpha)}$ (d) none of these

46. $\lim_{n \to \infty}\left(\tan\theta + \frac{1}{2}\tan\frac{\theta}{2} + \frac{1}{2^2}\tan\frac{\theta}{2^2} + \ldots + \frac{1}{2^n}\tan\frac{\theta}{2^n}\right) =$
(a) $\frac{1}{\theta}$ (b) $\frac{1}{\theta} - 2\cot\theta$
(c) $2\cot 2\theta$ (d) none of these

47. Let $f(x) = \begin{cases} \frac{\sqrt{1 + px} - \sqrt{1 - px}}{x}, & -1 \le x < 0 \\ \frac{2x + 1}{x - 2}, & 0 \le x \le 1 \end{cases}$. If $f(x)$ is continuous in the interval $[-1, 1]$, then p equals
(a) $\frac{1}{2}$ (b) $-\frac{1}{2}$
(c) -1 (d) 1

48. If $f(x) = |x - 2|$ and $g(x) = f[f(x)]$, then $g'(x)$ for $x > 20$ is
(a) 1 (b) 2
(c) -1 (d) none of these

49. If $f(x) = \sqrt{1 - \sqrt{1 - x^2}}$, then at $x = 0$,
(a) $f(x)$ is differentiable as well as continuous
(b) $f(x)$ is differentiable but not continuous

(c) $f(x)$ is continuous but not differentiable
(d) $f(x)$ is neither continuous not differentiable

50. The set of points of discontinuity of the function

$$f(x) = \frac{|\sin x|}{\sin x} \text{ is}$$

(a) $\{0\}$ (b) $\{n\pi : n \in I\}$
(c) ϕ (d) none of these

51. If $y = (1 + x^{1/4})(1 + x^{1/2})(1 - x^{1/4})$, then $\frac{dy}{dx} =$
(a) 1 (b) – 1
(c) x (d) $\sqrt{x}$

52. If $y = x^{(x)^x}$, $\frac{dy}{dx} =$
(a) $x^{(x)^x}$ $(\log x + 1)$
(b) $x^{x^x + x}\left[\log(x)(1 + \log x) + \frac{1}{x}\right]$
(c) $x^{(x)^x} \log x(1 + \log x)$
(d) none of these

53. If $y = \cos^{-1}\sqrt{\frac{\sqrt{1+x^2}+1}{2\sqrt{1+x^2}}}$, then $\frac{dy}{dx} =$
(a) $\frac{1}{1+x^2}$ (b) $\frac{-1}{2(1+x^2)}$
(c) $\frac{1}{2(1+x^2)}$ (d) none of these

54. If $\sqrt{1-x^6} + \sqrt{1-y^6} = a^3(x^3 - y^3)$, then $\frac{dy}{dx}$ is equal to
(a) $\frac{x^2}{y^2}\sqrt{\frac{1-y^6}{1-x^6}}$ (b) $\frac{y^2}{x^2}\sqrt{\frac{1-y^6}{1-x^6}}$
(c) $\frac{x^2}{y^2}\sqrt{\frac{1-x^6}{1-y^6}}$ (d) none of these

55. The equation of the tangent to the curve $y = \sqrt{9 - 2x^2}$ at the point where the ordinate and the abscissa are equal, is
(a) $2x + y - 3\sqrt{3} = 0$ (b) $2x + y + 3\sqrt{3} = 0$
(c) $2x - y - 3\sqrt{3} = 0$ (d) none of these

56. If $f(x) = a - (x - 3)^{89}$, then greatest value of $f(x)$ is
(a) 3 (b) a
(c) no maximum value (d) none of these

57. $f(x) = x^3 + ax^2 + bx + 5\sin^2 x$ is an increasing function in the set of real numbers if a and b satisfy the condition
(a) $a^2 - 3b - 15 > 0$ (b) $a^2 - 3b + 15 > 0$
(c) $a^2 - 3b + 15 < 0$ (d) $a > 0$ $b > 0$

58. The equation of the normal to the curve $y = 1 - 2^{x/2}$ at the point of intersection with the y-axis is
(a) $2y - x \log 2 = 0$ (b) $2y + x = 0$
(c) $2y + x \log 2 = 0$ (d) none of these

59. $\int \frac{\log(x+1) - \log x}{x(x+1)} dx$ is equal to
(a) $-\frac{1}{2}\left[\log\left(\frac{x+1}{x}\right)\right]^2 + C$
(b) $C - [\{\log(x + 1)\}^2 - (\log x)^2]$
(c) $-\log\left[\log\left(\frac{x+1}{x}\right)\right] + C$
(d) $-\log\left(\frac{x+1}{x}\right) + C$

60. $\int \sqrt{\frac{e^x - 1}{e^x + 1}}\, dx$ is equal to
(a) $\log\left(e^x + \sqrt{e^{2x} - 1}\right) - \sec^{-1}(e^x) + C$
(b) $\log\left(e^x + \sqrt{e^{2x} - 1}\right) + \sec^{-1}(e^x) + C$
(c) $\log\left(e^x - \sqrt{e^{2x} - 1}\right) - \sec^{-1}(e^x) + C$
(d) none of these

61. Let $f(x) = \int \frac{dx}{(1+x^2)^{3/2}}$ and $f(0) = 0$, then $f(1) =$
(a) $\frac{-1}{\sqrt{2}}$ (b) $\frac{1}{\sqrt{2}}$
(c) $\sqrt{2}$ (d) none of these

62. $\int \sin x\, d(\cos x)$ is equal to
(a) $\frac{\sin 2x}{2} - x + C$ (b) $\frac{1}{2}\left(\frac{\sin 2x}{2} - x\right) + C$
(c) $\frac{1}{2}\left(\frac{\sin 2x}{2} + x\right) + C$ (d) none of these

63. The value of the integer $\int_0^{\pi} e^{\cos^2 x} \cdot \cos^3(2n + 1)x\, dx$, n integer, is
(a) 0 (b) π
(c) 2π (d) none of these

64. If $\int_{-1}^{-4} f(x)\, dx = 4$ and $\int_{2}^{-4}(3 - f(x))\, dx = 7$, then the value of $\int_{-2}^{1} f(-x)\, dx$ is
(a) 30 (b) 29

(c) 28 (d) none of these

65. $\int_0^2 x^3\sqrt{2x-x^2}\,dx$ is equal to

(a) $\frac{7\pi}{2}$ (b) $\frac{7\pi}{4}$

(c) $\frac{7\pi}{8}$ (d) $\frac{7\pi}{16}$

66. $\int_0^{2\pi}\sqrt{\frac{1-\cos 2x}{2}}\,dx$ is equal to

(a) 2 (b) – 2

(c) 4 (d) – 4

67. The differential equation of family of parabolas with foci at the origin and axis along the x-axis is

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

(b) $x\left(\frac{dy}{dx}\right)^2+2y\frac{dy}{dx}-y=0$

(c) $y\left(\frac{dy}{dx}\right)^2+2x\frac{dy}{dx}+y=0$

(d) none of these

68. Solution of the equation $xdx+ydy+\frac{xdy-ydx}{x^2+y^2}=0$ is

(a) $y=x\tan\left(\frac{c+x^2+y^2}{2}\right)$

(b) $x=y\tan\left(\frac{c+x^2+y^2}{2}\right)$

(c) $y=x\tan\left(\frac{c-x^2-y^2}{2}\right)$

(d) none of these

69. A solution of the differential equation

$$\left(\frac{dy}{dx}\right)^2-x\frac{dy}{dx}+y=0 \text{ is}$$

(a) $y=2$ (b) $y=2x$

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

70. The order of the differential equation whose general solution is given by $y=(c_1+c_2)\cos(x+c_3)-c_4e^{x+c_5}$ where c_1, c_2, c_3, c_4, c_5 are arbitrary constants, is

(a) 5 (b) 4

(c) 3 (d) 2

71. The smallest integer n for which $\left(\frac{1+i}{1-i}\right)^n=1$, is

(a) 2 (b) 4

(c) 8 (d) 12

72. The locus represented by $|z-1|=|z+i|$ is

(a) a circle of radius 1

(b) an ellipse with foci at 1 and $-i$

(c) a line through the origin

(d) a circle on the join of 1 and $-i$ as diameter

73. The value of $\sum_{k=1}^{10}\left(\sin\frac{2\pi k}{11}-i\cos\frac{2\pi k}{11}\right)$ is

(a) 1 (b) – 1

(c) i (d) $-i$

74. The common roots of the equations $z^3+2z^2+2z+1=0$ and $z^{1985}+z^{100}+1=0$ are

(a) $-1, \omega$ (b) $-1, \omega^2$

(c) ω, ω^2 (d) none of these

75. The smallest integer n for which $\left(\frac{1+i}{1-i}\right)^n=1$, is

(a) 2 (b) 4

(c) 8 (d) 12

76. The locus represented by $|z-1|=|z+i|$ is

(a) a circle of radius 1

(b) an ellipse with foci at 1 and $-i$

(c) a line through the origin

(d) a circle on the join of 1 and $-i$ as diameter

77. The number of odd numbers between 60 and 360 is

(a) 148 (b) 150

(c) 153 (d) none of these

78. The sum to n terms of the sequence $\log a, \log ar, \log ar^2, \ldots$ is

(a) $\frac{n}{2}\log a^2r^{n-1}$ (b) $n\log a^2r^{n-1}$

(c) $\frac{3n}{2}\log a^2r^{n-1}$ (d) none of these

79. If the first, second and last terms of an A.P. are a, b and $2a$ respectively, then its sum is

(a) $\frac{ab}{2(b-a)}$ (b) $\frac{ab}{b-a}$

(c) $\frac{3ab}{2(b-a)}$ (d) none of these

80. Between two numbers whose sum is $2\frac{1}{6}$, an even number of arithmetic means are inserted. If the sum of these means exceeds their number by unity, then the number of means are

(a) 12 (b) 10

(c) 8 (d) none of these

81. The set of values of p for which the roots of the equation $3x^2+2x+p(p-1)=0$ are of opposite sign is

(a) $(-\infty, 0)$ (b) $(0, 1)$

(c) $(1, \infty)$ (d) $(0, \infty)$

82. If the ratio of the roots of $lx^2+nx+n=0$ is $p:q$, then

(a) $\sqrt{\frac{q}{p}}+\sqrt{\frac{p}{q}}+\sqrt{\frac{l}{n}}=0$

(b) $\sqrt{\frac{p}{q}}+\sqrt{\frac{q}{p}}+\sqrt{\frac{n}{l}}=0$

(c) $\sqrt{\frac{q}{p}}+\sqrt{\frac{p}{q}}+\sqrt{\frac{l}{n}}=1$

(d) $\sqrt{\frac{p}{q}}+\sqrt{\frac{q}{p}}+\sqrt{\frac{n}{l}}=1$

83. The equation $125^x + 45^x = 2.27^x$ has
(a) no solution (b) one solution
(c) two solutions (d) more than two solutions

84. If $\sin\theta$ and $\cos\theta$ are the roots of the equation $ax^2 + bx + c = 0$, then
(a) $(a-c)^2 = b^2 - c^2$ (b) $(a-c)^2 = b^2 + c^2$
(c) $(a+c)^2 = b^2 - c^2$ (d) $(a+c)^2 = b^2 + c^2$

85. ${}^{47}C_4 + \sum_{j=1}^{5} {}^{52-j}C_3 =$
(a) ${}^{52}C_4$ (b) ${}^{51}C_4$
(c) ${}^{52}C_3$ (d) none of these

86. A man has got seven friends. The number of ways in which he can invite one or more of his friends to dinner, is
(a) 116 (b) 128
(c) 127 (d) none of these

87. If there are 12 persons in a party, and if each of them shakes hands with each other, then number of handshakes happen in the party is
(a) 66 (b) 48
(c) 72 (d) none of these

88. In an examination there are three multiple choice questions and each question has 4 choices. Number of ways in which a student can fail to get all answers correct is
(a) 11 (b) 12
(c) 27 (d) 63

89. The 8th term of $\left(3x+\frac{2}{3x^2}\right)^{12}$, when expanded in ascending power of x, is
(a) $\frac{228096}{x^3}$ (b) $\frac{228096}{x^9}$
(c) $\frac{328179}{x^9}$ (d) none of these

90. The greatest term (numerically) in the expansion of $(3-5x)^{11}$ when $x = \frac{1}{5}$ is
(a) 55×3^9 (b) 46×3^9
(c) 55×3^6 (d) none of these

91. The value of x in the expression $(x + x^{\log_{10} x})^5$, if the third term in the expansion is 10,00,000, is
(a) 10^{-1} (b) 10^1
(c) $10^{-5/2}$ (d) $10^{5/2}$

92. If 7^{103} is divided by 25, then the remainder is
(a) 20 (b) 16
(c) 18 (d) 15

93. The coefficient of x^n in the expansion of $\frac{a-bx}{e^x}$ is
(a) $\frac{(-1)^n}{n!}(a-bn)$ (b) $\frac{(-1)^n}{n!}(a+bn)$
(c) $\frac{(-1)^n}{n!}(b+an)$ (d) none of these

94. $\sum_{n=1}^{\infty}\frac{C(n,0)+C(n,1)+\ldots+C(n,n)}{P(n,n)}$ is equal to
(a) e^2 (b) e^2+1
(c) e^2-1 (d) none of these

95. $\frac{2}{3!}+\frac{4}{5!}+\frac{6}{7!}+\ldots$ will be equal to
(a) $2e^{-2}$ (b) e^{-2}
(c) e^{-1} (d) $2e^{-1}$

96. The sum of these series $\sum_{n=0}^{\infty}\frac{n^2-n+1}{n!}$ is
(a) $2e$ (b) $\frac{3}{2}e$
(c) e (d) $3e$

97. If $AB = A$ and $BA = B$, then B^2 is equal to
(a) B (b) A
(c) 1 (d) 0

98. Let A be an invertible matrix, which of the following is not true ?
(a) $(A')^{-1} = (A^{-1})'$ (b) $A^{-1} = |A|^{-1}$
(c) $(A^2)^{-1} = (A^{-1})^2$ (d) none of these

99. The matrix $A = \begin{pmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{pmatrix}$ is
(a) Nilpotent (b) Idempotent
(c) Orthogonal (d) Involutary
(d) x is an integral multipe of π

100. If $P = \begin{bmatrix} \frac{\sqrt{3}}{2} & \frac{1}{2} \\ \frac{-1}{2} & \frac{\sqrt{3}}{2} \end{bmatrix}$, $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ and $Q = PAP^T$, then $P(Q^{2005})P^T$ is equal to
(a) $\begin{bmatrix} 1 & 2005 \\ 0 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} \sqrt{3}/2 & 2005 \\ 1 & 0 \end{bmatrix}$
(c) $\begin{bmatrix} 1 & 2005 \\ \sqrt{3}/2 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & \sqrt{3}/2 \\ 0 & 2005 \end{bmatrix}$

Answer Keys

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