
TEST PAPER 3

Total Questions: 75

Time allotted 90 minutes

1. If $\operatorname{cosec}\theta = x + \frac{1}{4x}$ then the value of $\operatorname{cosec}\theta + \cot\theta$ is
(a) $2x$ (b) $-2x$
(c) $1/2x$ (d) $-1/2x$
2. If $\sin(A+B+C) = 1$, $\tan(A-B) = \frac{1}{\sqrt{3}}$ and $\sec(A+C) = 2$, then
(a) $A = 90^\circ, B = 60^\circ, C = 30^\circ$
(b) $A = 120^\circ, B = 60^\circ, C = 0^\circ$
(c) $A = 60^\circ, B = 30^\circ, C = 0^\circ$
(d) None of these
3. The value of $2\cos\frac{\pi}{13}\cos\frac{9\pi}{13} + \cos\frac{3\pi}{13} + \cos\frac{5\pi}{13}$ is
(a) 1 (b) 0
(c) -1 (d) None of these
4. The solution of the equation $\cos^2\theta + \sin\theta + 1 = 0$, lies in the interval.
(a) $\left(\frac{-\pi}{4}, \frac{\pi}{4}\right)$ (b) $\left(\frac{\pi}{4}, \frac{3\pi}{4}\right)$
(c) $\left(\frac{3\pi}{4}, \frac{5\pi}{4}\right)$ (d) $\left(\frac{5\pi}{4}, \frac{7\pi}{4}\right)$
5. Solution of the equation $4\cos 2\theta = \cot^2\theta - \tan^2\theta$ is
(a) $\theta = n\pi \pm \frac{\pi}{2}$ (b) $\theta = n\pi \pm \frac{\pi}{3}$
(c) $\theta = n\pi \pm \frac{\pi}{4}$ (d) None of these
6. The value of $\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{3}$ is
(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{6}$
(c) $\frac{\pi}{3}$ (d) 0
7. $\sin^{-1}(\cos(\sin^{-1}x) + \cos^{-1}(\sin(\cos^{-1}x)))$ is equal to
(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$
(c) $\frac{3\pi}{4}$ (d) 0
8. If $(\sin^{-1}x)^2 + (\cos^{-1}x)^2 = \frac{5\pi^2}{8}$, then x is equal to

17. 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
18. The equation of that diameter of the circle $x^2 + y^2 - 6x + 2y - 8 = 0$, which passes through the origin, is
- (a) $x - 3y = 0$ (b) $x + 3y = 0$
(c) $3x - y = 0$ (d) None of these
19. If the line $2x - y + k = 0$ is a diameter of the circle $x^2 + y^2 + 6x - 6y + 5 = 0$ then k is equal to
- (a) 12 (b) 9
(c) 6 (d) 3
20. The locus of a point whose sum of the distances from the origin and the line $x = 2$ is 4 units is
- (a) $y^2 = -12(x - 3)$ (b) $y^2 = 12(x - 3)$
(c) $x^2 = 12(y - 3)$ (d) $x^2 = -12(y - 3)$
21. In an ellipse the distance between its foci is 6 and length of its minor axis is 8. Then its eccentricity is
- (a) $\frac{3}{5}$ (b) $\frac{1}{\sqrt{5}2}$
(c) $\frac{1}{2}$ (d) $\frac{4}{5}$
22. The eccentricity of the hyperbola $\frac{\sqrt{1999}}{3}(x^2 - y^2) = 1$ is
- (a) $\sqrt{2}$ (b) 2
(c) $2\sqrt{2}$ (d) $\sqrt{3}$
23. Equation of the tangent to the hyperbola $2x^2 - 3y^2 = 6$ which is parallel to the line $y = 3x + 4$ is
- (a) $y = 3x + 5$
(b) $y = 3x - 5$
(c) $y = 3x + 5$ and $y = 3x - 5$
(d) None of these
24. The mirror image of the directrix of the parabola $y^2 = 4(x + 1)$ in the line mirror $x + 2y = 3$ is
- (a) $x = -2$ (b) $4y - 3x = 16$
(c) $3x - 4y + 16 = 0$ (d) None of these
25. If the distance of a point on the ellipse $\frac{x^2}{6} + \frac{y^2}{2} = 1$ from the centre is 2, then the eccentric angle is
- (a) $\frac{\pi}{3}$ (b) $\frac{\pi}{4}$
(c) $\frac{\pi}{6}$ (d) $\frac{\pi}{2}$
26. The domain of the function $f(x) = \sqrt{x-1} + \sqrt{5-x}$ is

- (a) $f(x)$ is continuous for $x = n^{1/3}$, where $n \in \mathbb{I}$
 (b) $f\left(\frac{3}{2}\right) = 1$
 (c) $f'(x) = 0$ for $-1 < x < 1$
 (d) None of these
35. If $f(x) = |\cos x|$, then $f^{-1}\left(\frac{3\pi}{4}\right)$ is equal to
 (a) $-\frac{1}{\sqrt{2}}$ (b) $\frac{1}{\sqrt{2}}$
 (c) 1 (d) None of these
36. If $y = \sin x$, then $\frac{d^2}{dy^2}(\cos^7 x)$ is equal to
 (a) $35 \cos^3 x - 42 \cos^5 x$ (b) $35 \cos^3 x + 42 \cos^5 x$
 (c) $42 \cos^3 x - 35 \cos^5 x$ (d) None of these
37. If $f(x) = |x - 3|$ and $\phi(x) = (f \circ f)(x)$, then for $x > 10$, $\phi'(x)$ is equal to
 (a) 1 (b) 0
 (c) -1 (d) None of these
38. The equation of the normal to the curve $y = e^{-2|x|}$ at the point where the curve cuts the line $x = \frac{1}{2}$ is
 (a) $2e(ex + 2y) = e^2 - 4$
 (b) $2e(ex - 2y) = e^2 - 4$
 (c) $2e(ex - 2x) = e^2 - 4$
 (d) None of these
39. The maximum value of $\frac{\log x}{x}$ is
 (a) $\frac{2}{e}$ (b) $\frac{1}{e}$
 (c) 1 (d) $d = e$
40. If $y = f(x)$ be the equation of an ellipse to which the line $y = 2x + 3$ is a tangent at the point where $x = 2$, then
 (a) $f'(2) = 2$ (b) $f(2) = 2f'(2)$
 (c) $f(2) + f'(2) + f''(2) = 2$
 (d) None of these
41. The value of $\int \frac{(x - x^3)^{1/3}}{x^4} dx$ is

(a) $\frac{1}{8} \left(x - \frac{1}{x^2} \right)^{\frac{4}{3}} + 1 + c$

(b) $\frac{3}{8} \left(\frac{1}{x^2} - 1 \right) + c$

(c) $-\frac{3}{8} \left(\frac{1}{x^2} - 1 \right)^{\frac{4}{3}} + c$

(d) None of these

42. The value of $\int \frac{\sqrt{1-x}}{x} dx$ is

(a) $2\sqrt{1+x} + \ln \left| \frac{\sqrt{1+x}-1}{\sqrt{1+x}+1} \right| + c$

(b) $\ln \left(\frac{\sqrt{1+x}-1}{\sqrt{1+x}+1} \right) + c$

(c) $2\sqrt{1+x} + c$

(d) $\frac{\sqrt{1+x}-1}{\sqrt{1+x}+1} + c$

43. The antiderivative of the function $(3x+4)|\sin x|$, where $0 < x < \pi$, is given by

(a) $3 \sin x - (3x+4) \cos x$

(b) $3 \sin x + (3x+4) \cos x$

(c) $-3 \sin x + (3x+4) \cos x$

(d) None of these

44. $\int_0^{\pi} x \sin^6 x \cos^4 x dx$ is equal to

(a) $\frac{3\pi^2}{512}$

(b) $\frac{3\pi^2}{256}$

(c) $\frac{3\pi^2}{1024}$

(d) None of these

45. The value of α which satisfies $\int_0^{\alpha} \cos x dx = \cos 2\alpha$, $\alpha \in [0, 2\pi]$ is

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

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

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

(d) None of these

46. $\int_0^1 \frac{dx}{[ax + (1-x)b]^2}$ is equal to
 (a) ab (b) a/b
 (c) b/a (d) $1/ab$
47. The degree of the differential equation of which $y^2 = 4a(x + a)$ is a solution, is
 (a) 1 (b) 2
 (c) 3 (d) None of these
48. Integrating Factor of differential equation $\cos x \cdot \frac{dy}{dx} + y \sin x = 1$ is
 (a) $\sin x$ (b) $\sec x$
 (c) $\tan x$ (d) $\cos x$
49. The solution of the differential equation $2x \frac{dy}{dx} - y = 3$ represents
 (a) circles (b) straight lines
 (c) ellipse (d) parabola
50. If $\frac{(a+ib)^2}{a-ib} - \frac{(a-ib)^2}{a+ib} = x + iy$, then x
 (a) $\frac{-2b^3}{(a^2 + b^2)^2}$ (b) $\frac{6a^2b}{(a^2 + b^2)^2}$
 (c) 0 (d) None of these
51. If set $A = \{5, 15, 20, 30\}$ and $B = \{3, 5, 15, 18, 20\}$ then $A \cup B$ is
 (a) $\{3, 5, 15, 18, 20, 30\}$
 (b) $\{3, 18, 30\}$
 (c) $\{2, 5, 15, 18, 20\}$
 (d) $\{5, 15, 20\}$
52. In a group of people 65% speak German and 45 speak French. If 5% of the people speak neither French nor German, then the percentage of people who can speak both German and French is
 (a) 5% (b) 10%
 (c) 15% (d) 20%
53. Convert 103 of base to a number of base 3 is
 (a) 12011 (b) 10211
 (c) 10221 (d) 10031
54. If $(2311)_4 - (1111)_2 = (x)_5$, then x
 (a) 1131 (b) 1130
 (c) 1129 (d) None of these
55. Given $A = \{1, 2, 3\}$, $B = \{3, 4\}$, $C = \{4, 5, 6\}$, then $(A \times B) \cap (B \times C)$ is
 (a) A null set of ordered pairs
 (b) $\{(4, 3)\}$
 (c) $\{(3, 4)\}$
 (d) $\{(4, 3), (3, 4)\}$

56. Value of $(x+1+i)(x+1-i)(x-1+i)(x-1-i)$ is
 (a) $x^4 + 4$ (b) $x^3 + 3$
 (c) $x^2 + 2$ (d) None of these
57. The multiplicative inverse of the complex number $z = 3 - 2i$ is
 (a) $\frac{3}{12} - \frac{2}{13}i$ (b) $\frac{3}{13} + \frac{2}{13}i$
 (c) $-\frac{3}{13} + \frac{2}{13}i$ (d) $-\frac{3}{13} - \frac{2}{13}i$
58. If $(x+iy)(2-3i) = 4+i$, find $(x+y) \div (y-x)$
 (a) $\frac{14}{9}$ (b) $\frac{13}{9}$
 (c) $\frac{-13}{9}$ (d) None of these
59. The conjugate of $\frac{(2+3i)^2}{2-i}$ is
 (a) $\frac{22}{5} - \frac{9i}{5}$ (b) $\frac{22}{5} - \frac{9i}{5}$
 (c) $-\frac{22}{5} - \frac{9i}{5}$ (d) $\frac{22}{5} + \frac{9i}{5}$
60. If ω is the cube root of unity then $(1 + \omega - \omega^2)^7$ equals
 (a) 128ω (b) -128ω
 (c) $128 \omega^2$ (d) $-128 \omega^2$
61. The smallest positive integer for which $(1+i)^{2n} = (1-i)^{2n}$ is
 (a) 4 (b) 8
 (c) 2 (d) 12
62. If $\alpha + \beta = 3, \alpha^3 + \beta^3 = 7$, then α and β are the roots of
 (a) $3x^3 + 9x + 7 = 0$ (b) $9x^2 - 27x + 20 = 0$
 (c) $2x^2 - 6x + 15 = 0$ (d) None of these
63. If one root of the equation $ix^2 - 2(i+1)x + (2-i) = 0$ is $2-i$, then $\sqrt{\frac{P}{q}} + \sqrt{\frac{q}{P}}$ the other root is:
 (a) $-i$ (b) $2+i$
 (c) i (d) $2-i$
64. If the ratio of the roots of the equation $lx^2 + nx + n = 0$ be $P : q$, then is equal to:
 (a) 0 (b) $\sqrt{\frac{n}{l}}$
 (c) $-\sqrt{\frac{n}{l}}$ (d) $-\sqrt{\frac{l}{n}}$

65. The value of m for which the equation $x^3 - mx^2 + 3x - 2 = 0$ has two roots equal in magnitude but opposite in sign is
- (a) $\frac{1}{2}$ (b) $\frac{2}{3}$
(c) $\frac{3}{4}$ (d) $\frac{4}{5}$
66. T_n of an A.P. is $5 - 6n$. The value of S_n of the same A.P. is:
- (a) $(2n - 3n^2)$ (b) $(3n - 2n^2)$
(c) $(2n + 3n^2)$ (d) None of these
67. If in an A.P. the sum of 10 items, is 11 and the sum to 11 terms is 19 then the sum of 30 terms is:
- (a) -20 (b) 20
(c) 30 (d) -30
68. If 9th terms of an A.P. is zero, and 29th term is n times, the 19th term, then value of n is:
- (a) 2 (b) 3
(c) 4 (d) 5
69. An A.P. consists of 60 items. If the first and the last term be 7 and 125 respectively its 32nd term is:
- (a) 64 (b) 65
(c) 66 (d) 69
70. Let S_n = denote the sum of first n terms of an A.P.. If $S_{2n} = 3S_n$ then the ratio S_{3n} / S_n is equal to
- (a) 4 (b) 6
(c) 8 (d) 10
71. The sum of the first four terms of an A.P. is 56. The sum of the last four terms is 112. If its first term is 11, the number of terms is:
- (a) 10 (b) 11
(c) 12 (d) None of these
72. The sum of 20 arithmetic means between 7 and 43 is:
- (a) 360 (b) 400
(c) 500 (d) 440
73. Number of different signals can be given using any number of flags from 5 flags of different colour is?
- (a) 325 (b) 240
(c) 120 (d) None of these
74. In how many ways a committee of 5 members can be selected from 6 men and 5 women, consisting of 3 men and 2 women?
- (a) 320 (b) 200
(c) 450 (d) None of these
75. If $nC_{12} = nC_8$, then n has the value
- (a) 20 (b) 12
(c) 6 (d) 30

ANSWER KEYS

1.	(a)	16.	(c)	31.	(b)	46.	(d)	61.	(c)
2.	(c)	17.	(a)	32.	(b)	47.	(b)	62.	(b)
3.	(b)	18.	(b)	33.	(b)	48.	(b)	63.	(a)
4.	(d)	19.	(b)	34.	(a)	49.	(d)	64.	(c)
5.	(c)	20.	(a)	35.	(b)	50.	(c)	65.	(b)
6.	(a)	21.	(a)	36.	(a)	51.	(a)	66.	(a)
7.	(b)	22.	(a)	37.	(a)	52.	(c)	67.	(d)
8.	(c)	23.	(c)	38.	(b)	53.	(b)	68.	(a)
9.	(a)	24.	(b)	39.	(b)	54.	(a)	69.	(d)
10.	(c)	25.	(b)	40.	(a)	55.	(c)	70.	(b)
11.	(c)	26.	(d)	41.	(c)	56.	(a)	71.	(b)
12.	(a)	27.	(c)	42.	(a)	57.	(b)	72.	(c)
13.	(a)	28.	(b)	43.	(a)	58.	(a)	73.	(a)
14.	(a)	29.	(a)	44.	(a)	59.	(c)	74.	(b)
15.	(a)	30.	(b)	45.	(a)	60.	(d)	75.	(a)