

TRIGONOMETRIC EQUATION

LEVEL-I

1. If $\sin(\pi \cos \theta) = \cos(\pi \sin \theta)$, then $\sin 2\theta$ may take value
(A) $3/4$ (B) $-3/4$
(C) $1/4$ (D) None of these
2. General solution to the equation $\tan^2 \theta + \cos 2\theta - 1 = 0$ will be given by
(A) $\theta = n\pi$ (B) $\theta = 2n\pi + \pi/4$
(C) $\theta = n\pi + \pi/4$ (D) $\theta = 2n\pi - \pi/4$
3. If $\sin \alpha = p$ then the equation whose solution is $\tan \frac{\alpha}{2}$ is
(A) $px^2 + 2xp - 1 = 0$ (B) $px^2 + 2x - p = 0$
(C) $x^2 + 2x - p = 0$ (D) None of these
4. If $\tan(\cot x) = \cot(\tan x)$ then $\sin 2x$ is equal to
(A) $\frac{2}{(2n+1)\pi}$ (B) $\frac{4}{(2n+1)\pi}$
(C) $\frac{2}{n(n+1)\pi}$ (D) $\frac{4}{n(n+1)\pi}$
- *5. If $\sin^{-1}x + \tan^{-1}x = \frac{\pi}{2}$, then $2x^2 + 1 =$
(A) $\sqrt{5}$ (B) $\frac{\sqrt{5}-1}{2}$
(C) 2 (D) none of these
6. Solution set of the equation $\sin^2 x + \cos^2 3x = 1$ is given by
(A) $\left\{\frac{n\pi}{4}, n \in \mathbb{I}\right\}$ (B) $\left\{\frac{n\pi}{2}, n \in \mathbb{I}\right\}$
(C) $\{n\pi, n \in \mathbb{I}\}$ (D) none of these
- *7. The difference between the roots in the first quadrant ($0 \leq x \leq \pi/2$) of the equation $4 \cos x (2 - 3 \sin^2 x) + (\cos 2x + 1) = 0$ is
(A) $\pi/6$ (B) $\pi/4$
(C) $\pi/3$ (D) $\pi/2$
8. The value of $\tan\left(2 \tan^{-1}\left(\frac{1}{5}\right) - \frac{\pi}{4}\right)$ is equal to
(A) $\frac{7}{17}$ (B) $\pi - \frac{7}{17}$
(C) $-\frac{7}{17}$ (D) none of these

- *9. The set of values of a for which $x^2 - ax - \sin^{-1}(\sin 3) > 0$ for all $x \in \mathbb{R}$ is
 (A) \mathbb{R} (B) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$
 (C) \emptyset (D) none of these
10. If $\sin^{-1}(\sin x) = \pi - x$, then x belongs to
 (A) $(-\infty, \infty)$ (B) $[0, \pi]$
 (C) $\left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$ (D) $[\pi, 2\pi]$
- *11. If $\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = 3\pi$ then $x^2 + y^2 + z^2 - xy - yz - zx$ equals to
 (A) 0 (B) 1
 (C) 2 (D) 3
12. The number of real solutions of the equation $\tan^{-1} \sqrt{x(x+1)} + \sin^{-1} \sqrt{x^2 + x + 1} = \frac{\pi}{2}$ is
 (A) zero (B) one (C) two (D) infinite
- *13. If $x \geq 1$, then $2 \tan^{-1} x + \sin^{-1} \frac{2x}{1+x^2}$ is equal to
 (A) $4 \tan^{-1} x$ (B) π
 (C) 0 (D) None of these
14. If $\sin x + \sin y + \sin z = 3$, $x, y, z \in [0, 2\pi]$, then
 (A) $x^2 + y^2 + z^2 - xy - yz - zx = 0$ (B) $x^3 + y^3 + z^3 = \pi^3/3$
 (C) $x^3 + y^3 + z^3 = 0$ (D) $x + y + z = 0$
15. If $\cos \theta_1 + 2 \cos \theta_2 + 3 \cos \theta_3 = 6$ then $\tan \theta_1 + \tan \theta_2 + \tan \theta_3$ equals to
 (A) $1/2$ (B) 6
 (C) 0 (D) 3
- *16. The equation $e^{\sin x} + e^{-\sin x} = 2 \sin x$ will have
 (A) no solution (B) one solution
 (C) two solution (D) none of these
17. If $1 + \tan \theta = \sqrt{2}$ then $\cos \theta - \sin \theta$ equals to ($\theta \neq (2n+1)\pi/2$)
 (A) $2 \sin \theta$ (B) $\sqrt{2} \sin \theta$
 (C) $\sqrt{2} \cos \theta$ (D) $2 \cos \theta$
18. Value of $\cos(2 \cos^{-1}(4/5))$ equals to
 (A) $6/25$ (B) $7/25$
 (C) $4/25$ (D) $8/25$
19. If $4 \cos^{-1} x + \sin^{-1} x = \pi$ then x equals to
 (A) $1/2$ (B) $1/\sqrt{2}$
 (C) 1 (D) $\sqrt{3}/2$

- *20. Number of solution to the equation $\sin^{-1}x - \cos^{-1}x = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$ is
 (A) one (B) two
 (C) four (D) none of these.
- *21. The solutions of the equation $(\cos^2x - 4\sin x + 6)(1 - \sin x) = \cos^2x$ are
 (A) $2n\pi, n \in \mathbb{I}$ (B) $(4n - 1)\pi/2, n \in \mathbb{I}$
 (C) $(4n + 1)\frac{\pi}{2}, n \in \mathbb{I}$ (D) None of these
22. If $\tan^2 \frac{x}{2} = \sec x - \cos x$, then
 (A) $x = 2n\pi, n \in \mathbb{I}$ (B) $x = (2n + 1)\pi, n \in \mathbb{I}$
 (C) $x = (2n + 1)\frac{\pi}{2}, n \in \mathbb{I}$ (D) None of these
23. The inequality $\log_2 x < \sin^{-1}(\sin 5)$ holds if
 (A) $x \in (0, 2^{5-2\pi})$ (B) $x \in (2^{5-2\pi}, \infty)$
 (C) $x \in (2^{2\pi-5}, \infty)$ (D) None of these
24. The value(s) of y for which the equation $4 \sin x + 3 \cos x = y^2 - 6y + 14$ has a real solution, is (are)
 (A) 3 (B) 5
 (C) -3 (D) None of these.
25. The most general values of x for which $\sin x + \cos x = \min\{y^2 - 10y + 26, y^2 - 6y + 12\}$, $\forall y \in \mathbb{R}$, are given by
 (A) $[2n\pi, (2n+1)\pi]$ (B) $[n\pi + (-1)^n \frac{\pi}{4} - \frac{\pi}{4}, (n+1)\pi]$
 (C) $[2n\pi, (4n+1)\frac{\pi}{2}]$ (D) None of these
26. If $\cos^{-1}x + \cos^{-1}y + \cos^{-1}z = 3\pi$, then $x^3 + y^3 + z^3$ is equal to
 (A) -3 (B) 3
 (C) 0 (D) None of these
- *27. The solution(s) x , of the equation $\sqrt{3} \cos x - \sin x = (\cos^{10}y + \sec^{10}y)$, is (are)
 (A) $\pi/6$ (B) $-\pi/6$
 (C) $-\pi/3$ (D) $\pi/3$
28. If $\cot x \cot y = k$ and $x + y = \pi/3$, then $\tan x, \tan y$ satisfy the equation
 (A) $kt^2 - \sqrt{3}(k-1)t + 1 = 0$ (B) $kt^2 + \sqrt{3}(k-1)t + 1 = 0$
 (C) $kt^2 - \sqrt{3}(k+1)t + 1 = 0$ (D) $kt^2 + \sqrt{3}(k+1)t + 1 = 0$

29. If $\left(\cos^2 x + \frac{1}{\cos^2 x}\right)(1 + \tan^2 2y)(3 + \sin 3z) = 4$, then
 (A) x may be a multiple of π (B) x can not be an even multiple of π
 (C) z can be a multiple of π (D) y can be a multiple of $\pi/2$.
30. $\tan\theta + \tan 2\theta + \tan\theta \tan 2\theta = 1$. Then θ is equal to
 (A) $\pi/12$ (B) $5\pi/12$
 (C) $-3\pi/12$ (D) $-7\pi/12$
31. If $-1 < x < 0$ then $\tan^{-1}x$ equals
 (A) $\pi - \cos^{-1}\left(\sqrt{1-x^2}\right)$ (B) $\sin^{-1}\left(\frac{x}{\sqrt{1+x^2}}\right)$
 (C) $-\cot^{-1}\left(\frac{\sqrt{1-x^2}}{x}\right)$ (D) $\operatorname{cosec}^{-1}x$
32. The set of all x in $(-\pi, \pi)$ satisfying $|4\sin x - 1| < \sqrt{5}$ is given by
 (A) $\left(-\frac{\pi}{10}, \frac{3\pi}{10}\right)$ (B) $\left(\frac{\pi}{10}, \frac{3\pi}{10}\right)$ (C) $\left(\frac{\pi}{10}, -\frac{3\pi}{10}\right)$ (D) none of these.
33. The number of roots of the equation $x + 2\tan x = \pi/2$ in the interval $[0, 2\pi]$ is
 (A) 1 (B) 2 (C) 3 (D) infinite
34. The general solution of the equation $\sin x + \cos x = 1$, for $n = 0, \pm 1, \pm 2, \dots$ is
 (A) $x = 2n\pi$ (B) $x = 2n\pi + \frac{1}{2}\pi$
 (C) $x = n\pi + (-1)^n \frac{\pi}{4} - \frac{\pi}{4}$ (D) none of these
35. The solution set of $(2\cos x - 1)(3 + 2\cos x) = 0$ in the interval $0 \leq x \leq 2\pi$ is
 (A) $\left\{\frac{\pi}{3}\right\}$ (B) $\left\{\frac{\pi}{3}, \frac{5\pi}{3}\right\}$
 (C) $\left\{\frac{\pi}{3}, \frac{5\pi}{3}, \cos^{-1}(-3/2)\right\}$ (D) none of these.
36. The number of solutions of the equation $\tan x + \sec x = 2\cos x$ lying in the interval $[0, 2\pi]$ is
 (A) 0 (B) 1
 (C) 2 (D) 3
37. The general solution of the equation $\tan^2\theta + 2\sqrt{3}\tan\theta = 1$ is given by

$$(A) \theta = \frac{\pi}{2}$$

$$(B) \theta = \left(n + \frac{1}{2}\right)\pi$$

$$(C) \theta = (6n+1)\frac{\pi}{12}$$

$$(D) \frac{n\pi}{12}$$

38. The general solution of $\sin x - 3\sin 2x + \sin 3x = \cos x - 3\cos 2x + \cos 3x$ is

$$(A) n\pi + \frac{\pi}{8}$$

$$(B) \frac{n\pi}{2} + \frac{\pi}{8}$$

$$(C) (-1)^n \frac{n\pi}{2} + \frac{\pi}{8}$$

$$(D) 2n\pi + \cos^{-1}(3/2)$$

*39. The value of $\tan[\cos^{-1} 4/5 + \tan^{-1} 2/3]$ or $\tan [\sin^{-1}(3/5) + \cot^{-1} 3/2]$ is

$$(A) 6/17$$

$$(B) 7/16$$

$$(C) 17/6$$

$$(D) \text{ none of these.}$$

40. The principal value of $\sin^{-1}(\sin \frac{2\pi}{3})$ is

$$(A) -2\pi/3$$

$$(B) 2\pi/3$$

$$(C) 4\pi/3$$

$$(D) \text{ None of these}$$

*41. If $1 + |\sin x| + \sin^2 x + |\sin^3 x| + \dots \infty = 4 + 2\sqrt{3}$, then

$$(A) x = \frac{\pi}{6}$$

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

$$(C) x = \frac{2\pi}{3}$$

$$(D) x = \frac{5\pi}{6}$$

42. The number of ordered pair (x, y) , where x and y satisfy $x + y = 2\pi/3$ and $\cos x + \cos y = 3/2$ is

$$(A) 0$$

$$(B) 1$$

$$(C) 2$$

$$(D) \text{ infinity}$$

43. The number of solutions of $\cos^2 \theta + \sin \theta + 1 = 0$, is $(\theta \in [0, 2\pi])$

$$(A) 0$$

$$(B) 1$$

$$(C) 2$$

$$(D) \text{ infinity}$$

44. If $\sin^{-1} x > \cos^{-1} x$, then

$$(A) x \in \left(-1, -\frac{1}{\sqrt{2}}\right)$$

$$(B) x \in \left(0, \frac{1}{\sqrt{2}}\right)$$

$$(C) x \in \left(\frac{1}{\sqrt{2}}, 1\right)$$

$$(D) x \in \left(-\frac{1}{\sqrt{2}}, 0\right)$$

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

$$(A) [0, \pi/6]$$

$$(B) [0, \pi/3]$$

$$(C) [2\pi/3, \pi]$$

$$(D) [0, \pi/6] \cup \{\pi/2\} \cup [5\pi/6, \pi]$$

*46. If the expression $\frac{\sin(x/2) + \cos(x/2) + i \tan x}{1 + 2i \sin(x/2)}$ is real If x belong to the set

(A) $\{n\pi : n \in \mathbb{I}\}$

(B) $\{2n\pi : n \in \mathbb{I}\}$

(C) $\{n\pi + \pi/4 : n \in \mathbb{I}\}$

(D) $\{2n\pi + \pi/4 : n \in \mathbb{I}\}$

47. $\sin x, \sin 2x, \sin 3x$ are in A.P. if (for $n \in \mathbb{I}$)

(A) $x = \frac{n\pi}{2}$

(B) $x = n\pi$

(C) $x = 2n\pi$

(D) $x = \frac{n\pi}{3}$

*48. $\sin x \cos x \cos 2x = k$ has a solution, if k belong to the interval

(A) $[0, 1]$

(B) $[-1, 0]$

(C) $[-\pi/2, \pi/2]$

(D) $[-1/4, 1/4]$

LEVEL-II

1. The values of x in $[0, 2\pi]$ which satisfy the equation $2^{1+|\sin x|+|\sin 2x|+|\sin 3x|+\dots} = 2$ are
 (A) 0 (B) π
 (C) 2π (D) $3\pi/2$
2. The values of θ in the interval $(-\pi/2, \pi/2)$ satisfying the equation $(\sqrt{3})^{\sec^2 \theta} = \tan^4 \theta + 2$ is
 (A) $\pi/4$ (B) $-\pi/4$
 (C) π (D) none of these
- *3. $\tan^{-1}\left(\frac{\sin 1 - 1}{\cos 1}\right)$ equals
 (A) 0 (B) $1 - \frac{\pi}{2}$
 (C) $\frac{\pi}{2} - 1$ (D) $\frac{1}{2} - \frac{\pi}{4}$
- *4. The value of x that satisfies the equation $\tan^2 x = \tan^{-1}(\tan 3)$ is
 (A) $\pi/3$ (B) $-\pi/3$
 (C) $\sqrt{\tan^{-1} 3}$ (D) none of these
5. If $\sin^{-1} x + \sin^{-1} y = \frac{2\pi}{3}$, $\cos^{-1} x - \cos^{-1} y = \frac{\pi}{3}$, then the number of ordered pairs (x, y) is
 (A) 0 (B) 1
 (C) 2 (D) none of these
6. The number of real solutions of $\cos^{-1} x + \cos^{-1} 2x = -\pi$ is
 (A) 0 (B) 1
 (C) 2 (D) infinitely many
7. $\sin x + \cos x = y^2 - y + a$ has no value of x for any y if 'a' belongs to
 (A) $(0, \sqrt{3})$ (B) $(-\sqrt{3}, 0)$
 (C) $(-\infty, -\sqrt{3})$ (D) $(\sqrt{3}, \infty)$
8. The values of k , for which the system of equations $\cos x \cos 2y = (k^2 - 4)^2 + 1$ and $\sin x \sin 2y = k + 2$ holds, is (are) given by
 (A) $k = \pm 2$ (B) $k = -2$
 (C) $k = 2$ (D) none of these
9. The value of $\tan[\sin^{-1}(\cos(\sin^{-1} x))]\tan[\cos^{-1}(\sin(\cos^{-1} x))]$, $(x \in (0, 1))$ is equal to
 (A) 0 (B) 1
 (C) -1 (D) none of these.

10. The value of $\tan^{-1}\left(\frac{1}{2}\tan 2A\right) + \tan^{-1}(\cot A) + \tan^{-1}(\cot^3 A)$, for $0 < A < \pi/4$, is
 (A) $\tan^{-1} 2$ (B) $\tan^{-1}(\cot A)$
 (C) $4 \tan^{-1}(1)$ (D) $2 \tan^{-1}(2)$
- *11. The value of a for which the equation $4\operatorname{cosec}^2(\pi(a+x)) + a^2 - 4a = 0$ has a real solution, is
 (A) $a = 1$ (B) $a = 2$
 (C) $a = 10$ (D) None of these
- *12. $\cos\left(\frac{\pi}{4} + \frac{1}{2}\cos^{-1}\frac{a}{b}\right) + \cos\left(\frac{\pi}{4} - \frac{1}{2}\cos^{-1}\frac{a}{b}\right)$ is equal to
 (A) $\pm\sqrt{\frac{a+b}{b}}$ (B) $\sqrt{\frac{b}{a+b}}$
 (C) $\sqrt{\frac{a+b}{b}}$ (D) None of these
13. If $2 \sin^{-1}x = \cos^{-1}(1 - 2x^2)$, then
 (A) $-1 \leq x \leq 1$ (B) $-1 \leq x \leq 0$
 (C) $x = 1/\sqrt{2}$ (D) $0 \leq x \leq 1$
14. If $\sqrt{1 - \sin A} = \sin \frac{A}{2} - \cos \frac{A}{2}$, then $\frac{A}{2} - \frac{\pi}{4}$ could lie in quadrant
 (A) first (B) second
 (C) third (D) fourth
15. General solution to the equation $\tan^2\theta + \cos 2\theta - 1 = 0$ will be given by
 (A) $\theta = n\pi$ (B) $\theta = 2n\pi + \pi/4$
 (C) $\theta = n\pi + \pi/4$ (D) $\theta = 2n\pi - \pi/4$
16. If $\sin x + \cos x = \sqrt{y + \frac{1}{y}}$, $x \in [0, \pi]$, then
 (A) $x = \pi/4$ (B) $y = 0$ (C) $y = 1$ (D) $x = 3\pi/4$
17. The minimum value of $2^{\sin x} + 2^{\cos x}$ is
 (A) 1 (B) $2 - \frac{1}{\sqrt{2}}$ (C) $2^{-1/\sqrt{2}}$ (D) $2^{1-\frac{1}{\sqrt{2}}}$
- *18. The number of solutions of the equation $\tan^{-1}\frac{1}{2x+1} + \tan^{-1}\frac{1}{4x+1} = \tan^{-1}\frac{2}{x^2}$ is
 (A) 1 (B) 2
 (C) 3 (D) 4

*19. The value of $\tan^{-1}\left(\frac{a_1x-y}{a_1y+x}\right) + \tan^{-1}\frac{a_2-a_1}{1+a_1a_2} + \tan^{-1}\frac{a_3-a_2}{1+a_2a_3} + \dots + \tan^{-1}\frac{a_n-a_{n-1}}{1+a_na_{n-1}} + \tan^{-1}\frac{1}{a_n}$ is

(A) 0

(B) 1

(C) $\tan^{-1}\frac{x}{y}$

(D) $\tan^{-1}\frac{y}{x}$

*20. If $\sin x + \cos x = 1 + \sin x \cos x$, then

(A) $\sin\left(x + \frac{\pi}{4}\right) = \frac{1}{\sqrt{2}}$

(B) $\sin\left(x - \frac{\pi}{4}\right) = \frac{1}{\sqrt{2}}$

(C) $\cos\left(x + \frac{\pi}{4}\right) = \frac{1}{\sqrt{2}}$

(D) $\cos\left(x - \frac{\pi}{4}\right) = \frac{1}{\sqrt{2}}$

21. If $\alpha \leq \tan^{-1}x + \cot^{-1}x + \sin^{-1}x \leq \beta \quad \forall x \in (0, 1]$ then

(A) $\alpha = 0, \beta = \pi/2$

(B) $\alpha = 0, \beta = \pi$

(C) $\alpha = \pi/2, \beta = \pi$

(D) $\alpha = \pi/2, \beta = \pi$

LEVEL-III

1. If all the solutions 'x' of $a^{\cos x} + a^{-\cos x} = 6$ ($a > 1$) are real, then set of values of a is
 (A) $[3+2\sqrt{2}, \infty)$ (B) (6, 12)
 (C) $(1, 3+2\sqrt{2})$ (D) none of these.
2. The value of $\sin^{-1} \left\{ \cot \left(\sin^{-1} \sqrt{\frac{2-\sqrt{3}}{4}} + \cos^{-1} \frac{\sqrt{12}}{4} + \sec^{-1} \sqrt{2} \right) \right\}$ is
 (A) 0 (B) $\pi/4$
 (C) $\pi/6$ (D) $\pi/2$
3. The number of integral values of p for which the equation $\cos(p \sin x) = \sin(p \cos x)$ has a solution in $[0, 2\pi]$ is
 (A) 1 (B) 2
 (C) 3 (D) none of these
4. If $(\tan^{-1}x)^2 + (\cot^{-1}x)^2 = \frac{5\pi^2}{8}$, then x equals to
 (A) -1 (B) 1
 (C) 0 (D) none of these
- *5. The number of points inside or on the circle $x^2 + y^2 = 4$ satisfying $\tan^4 x + \cot^4 x + 1 = 3\sin^2 y$ is
 (A) one (B) two
 (C) four (D) infinite
- *6. If $\cos \left[\pi \left\{ \sin \left(x + \frac{\pi}{6} \right) + \cos \left(x - \frac{\pi}{3} \right) \right\} \right] = 0$, then x is
 (A) $n\pi + \pi/4, n \in \mathbb{I}$. (B) $n\pi - \pi/2, n \in \mathbb{I}$.
 (C) $n\pi - \pi/4, n \in \mathbb{I}$. (D) none of these
7. Indicate the relation which is true
 (A) $\tan |\tan^{-1} x| = |x|$ (B) $\cot |\cot^{-1} x| = x$ (C) $\tan^{-1} |\tan x| = |x|$
 (D) $\sin |\sin^{-1} x| = |x|$
8. The values of x between 0 and 2π which satisfy the equation $\sin x \sqrt{8\cos^2 x} = 1$ are in A.P. with common difference
 (A) $\pi/4$ (B) $\pi/8$ (C) $3\pi/8$ (D) $5\pi/8$
9. In a triangle ABC, the angle B is greater than angle A. If the values of angles A and B satisfy the equation $3\sin x - 4\sin^3 x - k = 0, 0 < k < 1$, then the value of C is
 (A) $\frac{\pi}{3}$ (B) $\frac{\pi}{2}$
 (C) $\frac{2\pi}{3}$ (D) $\frac{5\pi}{6}$

10. If $A = 2 \tan^{-1}(2\sqrt{2} - 1)$ and $B = 3 \sin^{-1}(1/3) + \sin^{-1}(3/5)$, then
 (A) $A = B$ (B) $A < B$
 (C) $A > B$ (D) none of these
- *11. The equation $(\cos p - 1)x^2 + (\cos p)x + \sin p = 0$, where x is a variable, has real roots. Then the interval of p may be
 (A) $(0, 2\pi)$ (B) $(-\pi, 0)$
 (C) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ (D) $(0, \pi)$

ANSWERS

LEVEL -I

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|-----|------|-----|------------|-----|------|-----|---|
| 1. | A | 2. | A,C | 3. | D | 4. | B |
| 5. | A | 6. | A | 7. | A | 8. | C |
| 9. | C | 10. | C | 11. | A | 12. | C |
| 13. | B | 14. | A | 15. | C | 16. | A |
| 17. | | 18. | B | 19. | D | 20. | A |
| 21. | C | | | 22. | A | | |
| 23. | A | 24. | A | | | | |
| 25. | D | 26. | A | | | | |
| 27. | B | 28. | A | | | | |
| 29. | A,D | 30. | A, B, C, D | 31. | B | 32. | A |
| 33. | C | 34. | C | 35. | B | 36. | C |
| 37. | C | 38. | | 39. | C | 40. | D |
| 41. | B, C | 42. | A | 43. | B | 44. | C |
| 45. | D | 46. | B,C | 47. | A, C | 48. | D |

LEVEL -II

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|-----|---------|-----|------|-----|---|-----|------|
| 1. | A, B, C | 2. | A, B | 3. | D | 4. | D |
| 5. | B | 6. | A | 7. | D | 8. | B |
| 9. | B | 10. | C | 11. | C | 12. | C |
| 13. | D | 14. | A,B | 15. | | 16. | A, C |
| 17. | D | 18. | B | 19. | C | 20. | A, D |
| 21. | | | | | | | |

LEVEL -III

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|----|---|-----|---|-----|---------|----|---|
| 1. | A | 2. | A | 3. | D | 4. | A |
| 5. | C | 6. | | 7. | A, B, D | 8. | A |
| 9. | C | 10. | C | 11. | D | | |