ACE OF PACE OBJECTIVE SECTION
(SOLUTION)

1. **(A)**

$\frac{9}{40}=\frac{18}{x}$

$\Rightarrow x=80$

2. **(C)**

Clearly it can be seen that G is coded as 5, A as 2, T as 4 and E as 7. So the code for GATE is 5247. The correct choice is (C)

3. **(B)**

Clearly the correct sequence is

$2^3-1,\ 3^3-1,\ 4^3-1,\ 5^3-1,\ 6^3-1,\ 7^3-1,\ 8^3-1$

$\therefore$ 28 is wrong and should be replaced by 3^3-1 i.e. 26.

Hence the answer is (B)

4. **(C)**

The rule is $3\times5+4=19, 5\times7+6=41, 4\times6+5=29$

$\therefore$ the missing number is 41.

Hence, the answer is (C)

5. **(C)**

Using proper signs, we get

$36-12\div4+6\div2\times3$

$=36-3+3\times3$

$= 36-3+9$

$= 42$

So the answer is (C)

6. **(C)**

The logic is: –7, so the missing term is 37 – 7 i.e. 30.

7. **(C)**

Central number is the cube root of the sum of the four number outside the circle.

$\sqrt{3+2+1+2}=8^{1/3}=2$

8. **(C)**

Soham's son uncle means Soham's brother, so the old man's sons is Soham's brother, the old man is the father of Soham.

The answer is (C)

9. **(C)**

10. **(D)**

11. **(B)**

The given series consists of two series in alternate terms namely:

(i) 5, 20, 80, 320 and (ii) 7, 21, 63, 189

missing term belongs to series (i) which is $80\times4,320$

12. **(C)**

Slope of line ax + by + c = 0 is $m = {-a}/{b}$ and slope of line perpendicular to the line this is ${b}/{a}$

13. **(D)**

$$\frac{11+14+y+8+7}{5} = y$$

$40 + y = 5y$
$40 = 4y$
$y = 10$

14. **(C)**

$$\left(\sqrt{2}-1\right)+\left(\sqrt{3}-\sqrt{2}\right)+\left(\sqrt{4}-\sqrt{3}\right)+\left(\sqrt{5}-\sqrt{4}\right)+....+...+\left(\sqrt{15}-\sqrt{14}\right)+\left(\sqrt{16}-\sqrt{15}\right)$$

$$= \sqrt{16}-1 = 3$$

15. **(C)**

$x^2 + {1}/{x^2} = 34$ is $x^4 + {1}/{x^4} = 1154$

Then $\dfrac{x^4 + {1}/{x^4}}{x^2 + {1}/{x^2}} = \dfrac{1154}{34} = \dfrac{577}{17}$

16. **(B)**

$$y + {4}/{y} = \left(\sqrt{y}\right)^2 + \left({2}/{\sqrt{y}}\right)^2$$

$$\left[a^2 + b^2 = (a-b)^2 + 2ab\right]$$

$$= \left(\sqrt{y} - \frac{2}{\sqrt{y}}\right)^2 + 4 > 0 + 4$$

$$\because \left(\sqrt{y} - \frac{2}{\sqrt{y}}\right)^2 > 0 \,\forall\, y$$

Thus the value of the given expression is greater than 4

17. **(C)**

$4x^2 + y^2 + 9z^2 - 12x - 4y - 6z + 14 = 0$
$(2x)^2 - 2 \,.\, 2x.\, 3 + 9 + y^2 - 2.2y + 4 + (3z)^2 - 6z + 1 = 0$
$(2x-3)^2 + (y-2)^2 + (3z-1)^2 = 0$

$x = {3}/{2}$, $\quad y = 2$, $\quad z = {1}/{3}$

$$4x + y + 3z = 4\left(\frac{3}{2}\right) + 2 + 1 = 6 + 2 + 1 = 9$$

18. **(B)**

$\Delta ABC \sim \Delta BDC$

$$\frac{AC}{BC} = \frac{BC}{DC}$$

$\Rightarrow BC^2 = 16\times 4$

$BC = 8$

$AB = \sqrt{16^2 - 8^2}$

$AB = 8\sqrt{3}$

19. **(B)**

$\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=\frac{10}{3}$

$\Rightarrow \frac{a+b+c}{a}+\frac{a+b+c}{b}+\frac{a+b+c}{c}=10$

$\Rightarrow \frac{b+c}{a}+\frac{a+c}{b}+\frac{a+b}{c}=7$

20. **(B)**

$\angle OAB = \angle OBA = \frac{50^0}{2} = 25^0$

$\therefore \angle OBC = 180^0 - 110^0 - 25^0 = 45^0$

Now $\angle ABC + \angle ADC = 180^0$

$\therefore \angle ADC = 180^0 - 70^0 = 110^0$

21. **(D)**

$\left[\frac{x^{a(a-b-a-b)}}{x^{b(b-a-b-a)}}\right]^{a+b} = \left(\frac{x^{-2ab}}{x^{-2ab}}\right)^{a+b} = 1$

22. **(C)**

$x - 1/x = 3 \Rightarrow x^2 + 1/x^2 - 2 = 9$

$x^2 + 1/x^2 = 11 \Rightarrow x^4 + 1/x^4 + 2 = 121$

$x^4 + 1/x^4 = 119$

23. **(D)**

Area of circle = πr^2

$(A_1) = \frac{22}{7}\times\frac{25\times 25}{4}$

$= 491\ cm^2$ (Approx.)

The area of ΔABC is

$A_2 = \frac{1}{2}\times AC\times BC = 1/2\times 24\times 7 = 84 cm^2$

Thus, the area of the shaded region is $A_1 - A_2 = 407\, cm^2$

24. **(C)**

$\frac{(1+\cos\theta)(1-\cos\theta)}{(1+\sin\theta)(1-\sin\theta)} = \frac{1-\cos^2\theta}{1-\sin^2\theta} = \frac{\sin^2\theta}{\cos^2\theta}$

$$= \frac{1}{\cot^2\theta} = \frac{1}{7^2/8^2} = \frac{8^2}{7^2} = \frac{64}{49}$$

25. **(A)**

$a^3 = 729$

$a = 9$

length of diagonal = $a\sqrt{3}$

$= 9\sqrt{3}$

26. **(A)**

$$x^2 + y^2 + z^2 - xy - yz - zx = \frac{1}{2}\left[(x-y)^2 + (y-z)^2 + (z-x)^2\right] > 0$$

27. **(C)**

$(6+2)\times 2+1=17$

$(1+4)\times 2+1=11$

$(3+7)\times 2+1=21$

28. **(B)**

$\sec\theta - \tan\theta = 4$

$\sec\theta + \tan\theta = \frac{1}{4}$

$\Rightarrow 2\sec\theta = 4 + \frac{1}{4}$

$\Rightarrow \sec\theta = \frac{17}{8}$

$\Rightarrow \cos\theta = \frac{8}{17}$

29. **(C)**

$3x + 4y = 12$

$\frac{\lambda x}{3} + 4y = 10$

For no solution

$\therefore \lambda/3 = 3 \qquad \Rightarrow \lambda = 9$

30. **(A)**

$3^1+1, 3^2-1, 3^3+1, 3^4-1, 3^5+1, 3^6-1$

$\therefore 3^6 - 1 = 728$

31. **(D)**

$15 + 37 - 1 = 51$

32. **(B)**

$S = \{HH, HT, TH, TT\}$

n(S) = 4

E = event of getting at the most one head

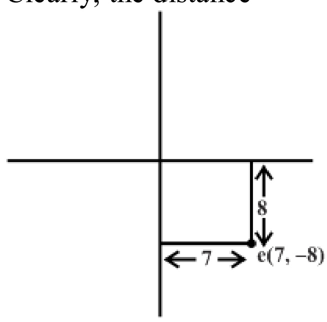
$= \{TT, HT, TH\}$

n(E) = 3

$\therefore P(E) = \frac{n(E)}{n(S)} = 3/4$

33. **(B)**

Clearly, the distance



34. **(B)**

f(–1) = 10

$\Rightarrow 3(-1)^2 + a(-1) + 9 = 10$

$\Rightarrow \quad a = 2$

$\therefore f(x) = 3x^2 + 2x + 9$

$\Rightarrow f(1) = 3(1)^2 + 2(1) + 9 = 14$

35. **(B)**

$n(s) = 6 \times 6 = 36$

$n(E) = 15$

$\Rightarrow P(E) = \frac{15}{36} = \frac{5}{12}$

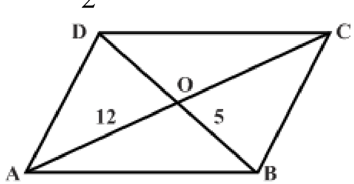
36. **(C)**

37. **(C)**

Clearly the difference between the two consecutive term is 21. So, the next term is 112 + 21 i.e. 133.

38. **(B)**

$120 = \frac{1}{2} \times 10 \times 2^{nd}$.diagonal



$\therefore$ 2^{nd}. Diagonal = 24 *cm*

$\therefore$ Side of rhombus $= \sqrt{12^2 + 5^2} = 13\,cm$

39. **(D)**

$$V = \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi \times 6^2 \times 12 = 144\pi$$

40. **(B)**

Clearly

(7k + 1) – (3k + 4) = (12k – 5) – (7k + 1)

$\Rightarrow$ k = 3

41. **(C)**

42. **(B)**

43. **(D)**

44. **(A)**

We know that in a simultaneous throw of two dice, $n(S) = 6 \times 6 = 36$

Let E = event of getting a total of $7 = \{(1,6),(2,5),(3,4),(4,3),(5,2),(6,1)\}$

$$\therefore P(E) = \frac{n(E)}{n(S)} = \frac{6}{36} = \frac{1}{6}$$

45. **(B)**

Here, n(S) = 52

There are 13 cards of diamond (including one king) and there are 3 more kings.

Let E = event of getting a diamond or a king.

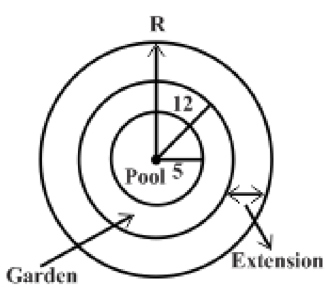
Then, n(E) = (13 + 3) = 16

$$\therefore P(E) = \frac{n(E)}{n(S)} = \frac{16}{52} = \frac{4}{13}$$

46. **(A)**

Area of the pool = 25π

Area of extension = $\pi R^2 - 12^2\pi$



$\therefore 25\pi = \pi R^2 - 144\pi$

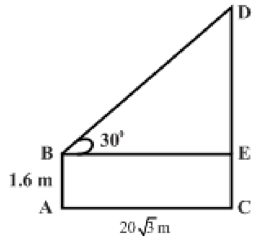
$\Rightarrow$ R = 13

$\therefore$ r = R – 12 = 13 – 12 = 1 m

47. **(A)**

Let AB be the observer and CD be the tower.

Draw $BE \perp CD$



Then, $CE = AB = 1.6\,m, BE = AC = 20\sqrt{3}\,m$

$\frac{DE}{BE} = \tan 30^0 = \frac{1}{\sqrt{3}}$

$\Rightarrow DE = \frac{20\sqrt{3}}{\sqrt{3}} m = 20m$

$\therefore CD = CE + DE = (1.6 + 20)m = 21.6\,m$

48. **(A)**

For $0 < \theta < \pi/4; \cos\theta > \sin\theta$

$\therefore \cos 10^0 > \sin 10^0 \Rightarrow \cos 10^0 - \sin 10^0$ is positive

49. **(B)**

Since α and β are the roots of $ax^2 + bx + c = 0$

$\therefore a\alpha^2 + b\alpha + c = 0$ i.e. $\alpha(a\alpha + \beta) + c = 0$

$\therefore a\alpha + b = -\frac{c}{\alpha}$. Similarly $a\beta + b = -\frac{c}{\beta}$

$\therefore \frac{1}{a\alpha + b} + \frac{1}{a\beta + b} = -\frac{\alpha}{c} - \frac{\beta}{c} = -\frac{1}{c}(\alpha + \beta) = \frac{b}{ac}$

50. **(C)**

Let $a = (x - y); b = (y - z)$ and $c = (z - x)$

$G.E = \frac{a^3 + b^3 + c^3}{abc} = \frac{3abc}{abc} = 3$