



UNIFIED CYBER OLYMPIAD

CLASS - 10
Question Paper Code : 3P104

KEY

1. B	2. D	3. A	4. B	5. B	6. C	7. D	8. C	9. D	10. A
11. C	12. A	13. B	14. A	15. C	16. A	17. C	18. B	19. D	20. B
21. D	22. B	23. B	24. A	25. C	26. A	27. A	28. B	29. D	30. A
31. C	32. A	33. D	34. B	35. B	36. B	37. C	38. A	39. C	40. B
41. B	42. D	43. D	44. C	45. B	46. B	47. B	48. D	49. A	50. D

SOLUTIONS

MENTAL ABILITY

01. (B) Let $x = \sqrt{5 + \sqrt{5 + \sqrt{5 + \dots \infty}}}$

S.O.B.S.

$$x^2 = \left[\sqrt{5 + \sqrt{5 + \sqrt{5 + \dots \infty}} \right]^2$$

$$x^2 = 5 + \sqrt{5 + \sqrt{5 + \sqrt{5 + \dots \infty}}}$$

$$x^2 = 5 + x$$

$$x^2 - x - 5 = 0$$

$$a = 1, b = -1, c = -5$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-1) \pm \sqrt{(-1)^2 - 4 \times 1 \times -5}}{2 \times 1}$$

$$= \frac{1 \pm \sqrt{1+20}}{2}$$

$$= \frac{1 + \sqrt{21}}{2} \text{ (or) } \frac{1 - \sqrt{21}}{2}$$

$$\therefore x = \frac{\sqrt{21} + 1}{2}$$

[$\because \frac{-\sqrt{21} + 1}{2}$ is rejected because it is negative]

02. (D) Given 7.2, x , y , z , 12.4 are in AP

$$\therefore a_1 = a = 7.2, a_5 = 12.4$$

$$a_5 = a + 4d = 12.4$$

$$7.2 + 4d = 12.4$$

$$4d = 12.4 - 7.2$$

$$d = \frac{5.2}{4}$$

$$d = 1.3$$

$$x + y + z = a + d + a + 2d + a + 3d$$

$$= 3a + 6d$$

$$= 3(a + 2d)$$

$$= 3(7.2 + 2.6)$$

$$= 3(9.8)$$

$$(x + y + z) = 29.4$$

03. (A) Given $x - y = 0.9$ \longrightarrow ①

$$x + y = \frac{11}{2}$$

$$x + y = 5.5 \quad \longrightarrow \quad \text{②}$$

$$x + y = 5.5 \quad \longrightarrow \quad \text{②}$$

$$x - y = 0.9 \quad \longrightarrow \quad \text{①}$$

$$\frac{2x}{2} = 6.4$$

$$x = \frac{6.4}{2} = 3.2$$

$$3.2 + y = 5.5$$

$$y = 5.5 - 3.2$$

$$y = 2.3$$

$$3x - 5y = 3 \times 3.2 - 5 \times 2.3$$

$$= 9.6 - 11.5$$

$$= -1.9$$

04. (B) Given $(3^2)^x \times 3^y = 3^7$

$$3^{2x+y} = 3^7$$

$$2x + y = 7 \longrightarrow \text{①}$$

$$y = (7 - 2x)$$

$$\text{Given } 2^{3x+2y} = (2^2)^{xy}$$

$$3x + 2y = 2xy \longrightarrow \text{②}$$

$$3x + 2(7 - 2x) = 2x(7 - 2x)$$

$$3x + 14 - 4x = 14x - 4x^2$$

$$4x^2 - x - 14x + 14 = 0$$

$$4x^2 - 15x + 14 = 0$$

$$4x^2 - 8x - 7x + 14 = 0$$

$$4x(x - 2) - 7(x - 2) = 0$$

$$(x - 2)(4x - 7) = 0$$

$$x - 2 = 0 \text{ (or) } 4x - 7 = 0$$

$$x = 2 \text{ (or) } 4x = 7$$

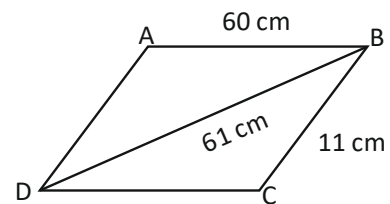
$$x = \frac{7}{4}$$

$$\text{If } x = 2 \text{ then } y = 7 - 2 \times 2$$

$$= 3$$

$$x + y = 2 + 3 = 5$$

05. (B)



Given ABCD is a parallelogram

$$\therefore AD = BC = 11 \text{ cm}$$

In $\triangle ABD$, $a = 60 \text{ cm}$, $b = 11 \text{ cm}$

$c = 61 \text{ cm}$

$$s = \frac{a + b + c}{2} = \frac{(60 + 11 + 61) \text{ cm}}{2}$$

$$s = 66 \text{ cm}$$

$$\text{Area of } \triangle ABD = \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{66(66 - 60)(66 - 11)(66 - 61)}$$

$$= \sqrt{66 \times 6 \times 55 \times 5}$$

$$= \sqrt{11 \times 6 \times 6 \times 11 \times 5 \times 5}$$

$$= 11 \times 6 \times 5 \text{ cm}^2$$

$$= 330 \text{ cm}^2$$

$$\left. \begin{array}{l} \text{Area of the} \\ \text{parallelogram} \\ \text{ABCD} \end{array} \right\} = 2 \times \text{area of } \triangle ABD$$

$$= 2 \times 330 \text{ cm}^2$$

$$= 660 \text{ cm}^2$$

06. (C) Given $p(x) = (2x^3 - ax^2 - 8x + 20)$ is divided by $(x - 2)$ then the remainder is $p(2)$

$$\therefore p(2) = 2 \times 2^3 - a \times 2^2 - 8(2) + 20 =$$

$$\cancel{16} - 4a - \cancel{16} + 20$$

$$p(2) = 20 - 4a$$

If $g(x) = (x^3 - 3x^2 - ax + 14)$ is divided by $(x - 2)$ then the remainder is $g(2)$

$$\therefore g(2) = 2^3 - 3(2)^2 - 2a + 14 = 8 - 12 - 2a + 14 = 10 - 2a$$

$$\text{Given } f(2) = g(2)$$

$$20 - 4a = 10 - 2a$$

$$-4a + 2a = 10 - 20$$

$$-2a = -10$$

$$a = \frac{\cancel{-10}}{\cancel{-2}} = 5$$

07. (D) Given

$$\alpha + \beta + \beta + \gamma + \gamma + \alpha = -1 + 1 + 8$$

$$2\alpha + 2\beta + 2\gamma = 8$$

$$2(\alpha + \beta + \gamma) = 8$$

$$\alpha + \beta + \gamma = \frac{8}{2} = 4$$

$$\alpha + \beta + \gamma = 4 \longrightarrow \textcircled{1}$$

$$(\alpha + \beta + \gamma) - (\beta + \gamma) = 4 - 1$$

$$\alpha + \cancel{\beta} + \cancel{\gamma} - \cancel{\beta} - \cancel{\gamma} = 3$$

$$\alpha = 3$$

$$3 + \beta = -1$$

$$\beta = -1 - 3 = -4$$

$$-4 + \gamma = 1$$

$$\gamma = 1 + 4$$

$$\gamma = 5$$

$$\alpha + \beta + \gamma = \frac{4}{1} = \frac{-b}{a} \Rightarrow a = 1 \text{ \& } b = -4$$

$$\alpha\beta + \beta\gamma + \gamma\alpha = -12 + (-20) + 15 =$$

$$\frac{-17}{1} = \frac{c}{a}$$

$$\therefore c = -17$$

$$\alpha\beta\gamma = (3)(-4)(5) = \frac{-60}{1} = \frac{-d}{a}$$

$$d = 60$$

$$\therefore \left. \begin{array}{l} \text{Required cubic} \\ \text{polynomial} \end{array} \right\} = ax^3 + bx^2 + cx + d$$

$$= (x^3 - 4x^2 - 17x + 60)$$

08. (C) $\sqrt{6}x^2 + x - \sqrt{6} = 0$

$$\sqrt{6}x^2 + 3x - 2x - \sqrt{6} = 0$$

$$\sqrt{3}x(\sqrt{2}x + \sqrt{3}) - \sqrt{2}(\sqrt{2}x + \sqrt{3}) = 0$$

$$(\sqrt{2}x + \sqrt{3})(\sqrt{3}x - \sqrt{2}) = 0$$

$$\sqrt{2}x + \sqrt{3} = 0 \text{ (OR)}$$

$$\sqrt{2}x = -\sqrt{3}$$

$$\sqrt{3}x - \sqrt{2} = 0$$

$$x = \frac{-\sqrt{3}}{\sqrt{2}} = -\frac{\sqrt{3}}{2}$$

$$\sqrt{3}x = \sqrt{2}$$

$$x = \sqrt{\frac{2}{3}}$$

09. (D) Total out comes = $6 \times 6 = 36 = n(S)$

Product less than 18 numbers (1,1) (1,2) (1,3) (1,4) (1,5) (1,6) (2,1) (2,2) (2,3) (2,4) (2,5) (2,6) (3,1) (3,2) (3,3) (3,4) (3,5) (4,1) (4,2) (4,3) (4,4) (5,1) (5,2) (5,3) (6,1) (6,2)

$$\therefore \text{No. of favourable out comes} = 26 = n(E)$$

Required Probability

$$= \frac{n(E)}{n(S)} = \frac{\cancel{26}^{13}}{\cancel{36}^{18}} = \frac{13}{18}$$

10. (A) Volume of hollow sphere = $\frac{4}{3}\pi(R^3 - r^3)$

$$= \frac{4}{3}\pi(4^3 - 2^3)\text{cm}^3$$

$$= \frac{4}{3}\pi(64 - 8)\text{cm}^3$$

$$= \frac{4}{3}\pi \times 56 \text{ cm}^3$$

Let the height of the cone be 'h' cm.

\therefore Volume of cone

$$= \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi \times 4 \times 4 \times h \text{ cm}^3$$

Given sphere melt and made a cone

∴ Cone volume = Sphere volume

$$\frac{1}{3}\pi \times 16 h \text{ cm}^3 = \frac{4}{3}\pi \times 56 \text{ cm}^3$$

$$\therefore h = \frac{4}{3}\pi \times 56 \times \frac{1}{\pi} \times \frac{1}{16} \text{ cm}$$

$$= 14 \text{ cm}$$

11. (C) $(2x^2 - 3x)^2 - 14(2x^2 - 3x) + 45 = (2x^2 - 3x)^2 - 9(2x^2 - 3x) - 5(2x^2 - 3x) + 45$

$$= (2x^2 - 3x)(2x^2 - 3x - 9) - 5(2x^2 - 3x - 9)$$

$$= (2x^2 - 3x - 9)(2x^2 - 3x - 5)$$

$$= (2x^2 - 6x + 3x - 9)(2x^2 - 5x + 2x - 5)$$

$$= [2x(x - 3) + 3(x - 3)][x(2x - 5) + 1(2x - 5)]$$

$$= (x - 3)(2x + 3)(2x - 5)(x + 1)$$

12. (A) Let a be the first term and d be the common difference of the given AP. Then,

$$T_4 + T_8 = 24 \Rightarrow (a + 3d) + (a + 7d) = 24$$

$$\Rightarrow 2a + 10d = 24$$

$$\Rightarrow a + 5d = 12 \quad \dots\dots (i)$$

and $T_6 + T_{10} = 44 \Rightarrow (a + 5d) + (a + 9d) = 44$

$$\Rightarrow 2a + 14d = 44$$

$$\Rightarrow a + 7d = 22 \quad \dots\dots (ii)$$

On solving (i) and (ii), we get $a = -13$ and $d = 5$

∴ Required sum = $S_3 = \frac{3}{2}[2(-13) + 2(5)]$

$$= \frac{3}{2} \times 2\{-13 + 5\}$$

$$= 3 \times -8$$

$$= -24$$

13. (B) Let the present ages of B and A be x years and y years respectively. Then, B's age 5 years ago = $(x - 5)$ years and A's age 5 years ago = $(y - 5)$ years.

∴ $(y - 5) = 3(x - 5)$

$$3x - y = 10 \quad \dots\dots (i)$$

B's age 10 years hence = $(x + 10)$ years.
A's age 10 years hence = $(y + 10)$ years.

∴ $(y + 10) = 2(x + 10)$

$$2x - y = -10 \quad \dots\dots (ii)$$

On subtracting (ii) from (i), we get $x = 20$

Putting $x = 20$ in (i) we get

$$(3 \times 20) - y = 10 \Rightarrow y = 60 - 10 = 50$$

∴ $x = 20$ and $y = 50$

Hence, B's present age = 20 years and A's present age = 50 years

14. (A) Let the radius of the sphere be r and the edge of the cube be a . Then,

Surface area of the sphere = surface area of the cube $\Rightarrow 4\pi r^2 = 6a^2 \Rightarrow a^2 = \frac{2}{3}\pi r^2$

$$\Rightarrow a = r\sqrt{\frac{2\pi}{3}}$$

∴ required ratio = volume of sphere : volume of cube

$$= \frac{4}{3}\pi r^3 : a^3 = \frac{4}{3}\pi r^3 : \frac{2}{3}\pi r^3 \cdot \sqrt{\frac{2\pi}{3}}$$

$$= 2 : \sqrt{\frac{2\pi}{3}} = \sqrt{2} : \sqrt{\frac{\pi}{3}} = \sqrt{6} : \sqrt{\pi}$$

15. (C) $a = 1, b = -8, c = -1$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{(-8) \pm \sqrt{(-8)^2 - 4 \times 1 \times -1}}{2 \times 1}$$

$$= \frac{8 \pm \sqrt{64 + 4}}{2}$$

$$= \frac{8 \pm \sqrt{68}}{2}$$

$$= \frac{8 \pm \sqrt{2 \times 2 \times 17}}{2}$$

$$= \frac{8 \pm 2\sqrt{17}}{2}$$

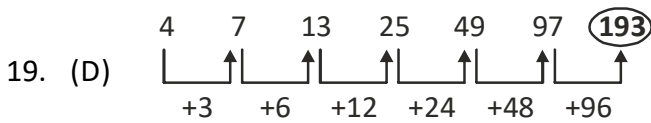
$$= \cancel{2}(4 \pm \sqrt{17})$$

REASONING



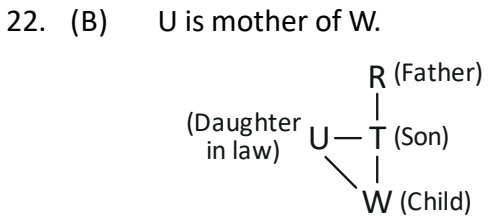
17. (C) First letter represent colour
i.e., black circle = M, white circle = N
Second letter represent number of circles
Two circles = A, three circles = B

18. (B) Yesterday Today Tommorrow
March April May

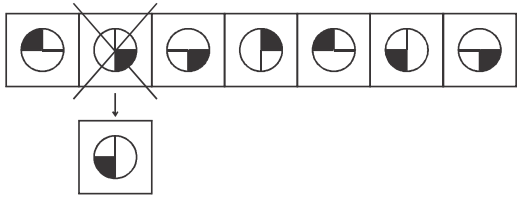


20. (B)
1. Facing north, turning 90 degrees to the right means facing east.
2. From facing east, turning 180 degrees to the left (or right) changes the direction to west.
So, he is facing West.

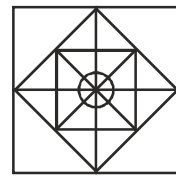
21. (D) First Number = $(25 \times 2) + 1 = 51$
Second Number = $(30 - 25)^2 = 25$
Third Number = $(30 \times 2) + 1 = 61$



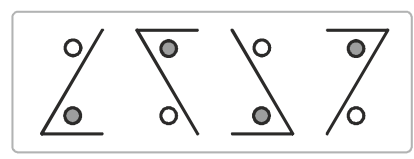
23. (B) A is opposite to C.
24. (A) After each successive step the shaded part is shifted by 90° in anti-clock wise direction. Hence, option (A) does not fit into the given series.



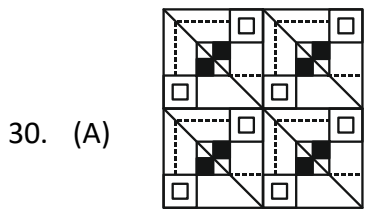
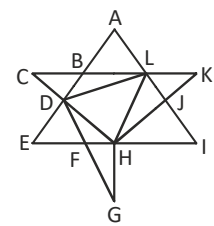
25. (C) The answer is SIT, because the complete word is DEPOSITED and the missing 3 letter word is SIT.
Now the sentence is
"Ram went to the bank and DEPOSITED his wages".



27. (A) Except in option (A) sum of the digits in others is 27.



29. (D) There are 17 triangles in the given figure.
ALB, LKJ, BCD, DEF, FGH, DFH, JHI, LHJ, LOH, ADL, AEI, CKH, LKH, LBD, LDC, DGH, LCH



COMPUTERS

31. (C) Telnet typically uses port 23 for communication. When connecting to a remote computer via Telnet, the connection is established over port 23 by default.
32. (A) `<link rel="stylesheet" href="style.css" />`
33. (D) To remove the redundant "Grade" field from the student database, the appropriate action is to use the ALTER TABLE statement to delete the field. This ensures that the field is removed from the table structure without affecting other fields or data.
34. (B) On mobile devices like smartphones and tablets, the operating system is responsible for managing apps and system resources, controlling hardware components, providing a user interface, and facilitating communication between the user and the device.
35. (B) LinkedIn is a professional networking platform that can be used to find people on the internet. Users can create profiles that include information about their employment history, education, skills, and professional interests, making it a valuable resource for finding and connecting with individuals in a professional context.
36. (B) Python is a high-level, versatile programming language known for its readability and simplicity. It supports multiple paradigms, including procedural, object-oriented, and functional programming.
37. (C) Blockchain technology is a recent development in information security in e-commerce. It offers decentralized and secure transaction processing, ensuring transparency, integrity, and immutability of data, which are crucial for secure e-commerce transactions.
38. (A) To establish a wired connection between devices.
39. (C) The kernel is responsible for managing system resources and handling critical system functions, including system crashes and recoveries. It ensures the stability and reliability of the operating system by managing processes, memory, and hardware interactions.
40. (B) `<ALT>` attribute is used to display alternate text when graphics feature is turned off or when image is downloading.
41. (B) Object Name. Property = New value is the code in Visual Basic to set properties of objects at run time.
42. (D) The program uses `cout` to output a string ("My age is "), the value of the variable `age` (16), and another string (" years."). This results in the output "My age is 16 years."
43. (D) The modern binary number system, the basis for binary code was invented by Gottfried Leibniz.
44. (C) "P@ssw0rd!"
A strong password typically includes a combination of uppercase letters, lowercase letters, numbers, and special characters, making it difficult to guess or crack through brute-force attacks.
45. (B) Spell check is a common feature in word processing software that helps users identify and correct spelling errors in their documents. Options A, B, and C are features typically associated with spreadsheet software (pivot tables), automation tools (macros), and presentation software (slide transitions), respectively, rather than word processing.

ENGLISH

46. (B)
47. (B)
48. (D)
49. (A)
50. (D)