



## UNIFIED CYBER OLYMPIAD

**CLASS - 10**

**Question Paper Code : UC394**

### KEY

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

### SOLUTIONS

#### MENTAL ABILITY

01. (B) HCF = Product of common prime with least power  
 $= 2^2 \times 3 \times 5^2$   
 $= 300$

02. (D)  $\alpha + \beta + \gamma = \frac{-b}{a} = \frac{-(-5)}{3}$   
 $\alpha\beta + \beta\gamma + \gamma\alpha = \frac{c}{a} = \frac{-11}{3}$   
 $\alpha + \beta + \gamma = \frac{5}{3}$   
 squaring on both sides

$$(\alpha + \beta + \gamma)^2 = \left(\frac{5}{3}\right)^2$$

$$\alpha^2 + \beta^2 + \gamma^2 + 2(\alpha\beta + \beta\gamma + \gamma\alpha) = \frac{25}{9}$$

$$\alpha^2 + \beta^2 + \gamma^2 + 2\left(\frac{-11}{3}\right) = \frac{25}{9}$$

$$\alpha^2 + \beta^2 + \gamma^2 - \frac{22}{3} = \frac{25}{9}$$

$$\alpha^2 + \beta^2 + \gamma^2 = \frac{25}{9} + \frac{22}{3} = \frac{25+66}{9} = \frac{91}{9}$$

03. (A) Given  $(-3)$  is the zero of  $p(x) = 3x^3 + 16x^2 + 15x - 18$

$\therefore (x + 3)$  is a factor of  $p(x)$ .

$$\begin{array}{r}
 3x + 7x - 6 \\
 x + 3 \overline{) 3x^3 + 16x^2 + 15x - 18} \\
 \underline{3x^3 + 9x^2} \phantom{+ 15x - 18} \\
 (-) \phantom{3x^3 + } (-) \phantom{+ 15x - 18} \\
 \phantom{3x^3 + } 7x^2 + 15x - 18 \\
 \underline{7x^2 + 21x} \phantom{- 18} \\
 \phantom{3x^3 + } (-) \phantom{7x^2 + } (-) \phantom{- 18} \\
 \phantom{3x^3 + } \phantom{7x^2 + } -6x - 18 \\
 \underline{-6x - 18} \\
 \phantom{3x^3 + } \phantom{7x^2 + } \phantom{-6x - } (+) \phantom{- 18} (+) \phantom{- 18} \\
 \phantom{3x^3 + } \phantom{7x^2 + } \phantom{-6x - } 0
 \end{array}$$

$$\begin{aligned}
 \therefore 3x^2 + 7x - 6 &= 3x^2 + 9x - 2x - 6 \\
 &= 3x(x + 3) - 2(x + 3) \\
 &= (x + 3)(3x - 2)
 \end{aligned}$$

$\therefore (x + 3)$  and  $(3x - 2)$  are the factors of  $p(x)$

$$\begin{aligned}
 \therefore 3x - 2 &= 0 \quad \text{and} \quad x + 3 = 0 \\
 3x &= 2 \quad \quad \quad x = -3
 \end{aligned}$$

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

$\therefore \frac{2}{3}$  and  $-3$  are the other zeros

04. (D) Let the present ages of son and father be  $x$  &  $y$

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

$$y + 3 = 3x + 9$$

$$y - 3x = 9 - 3$$

$$y - 3x = 6 \quad \longrightarrow \textcircled{1}$$

$$\text{Given } (y - 6) = 6(x - 6)$$

$$y - 6 = 6x - 36$$

$$y - 6x = -36 + 6$$

$$y - 6x = -30 \quad \longrightarrow \textcircled{2}$$

$$y - 3x = 6$$

$$y - 3x = 6 \quad \longrightarrow \textcircled{1}$$

$$y - 6x = -30 \quad \longrightarrow \textcircled{2}$$

$$\begin{array}{r}
 (-) \quad (+) \quad \quad (+) \\
 \hline
 3x = 36
 \end{array}$$

$$x = 12$$

$$y = 3(12) = 6 \quad \longrightarrow \textcircled{1}$$

$$y = 6 + 36 = 42$$

$\therefore$  Sum of their present ages  
 $= x + y = 12 + 42 = 54$  years

05. (C) Given  $a = 1$ ,  $b = -6$  and  $c = 1$

$$\begin{aligned}
 x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\
 &= \frac{-(-6) \pm \sqrt{36 - 4 \times 1 \times 1}}{2(1)}
 \end{aligned}$$

$$= \frac{6 \pm \sqrt{32}}{2}$$

$$= \frac{6 \pm 4\sqrt{2}}{2}$$

$$= \frac{6}{2} \pm \frac{4\sqrt{2}}{2}$$

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

$$x = 3 + 2\sqrt{2} \quad \text{and} \quad x = 3 - 2\sqrt{2}$$

06. (B) Given  $a = 100$  m,  $b = 99$  m and  $c = 89$  m

$$\therefore s = \frac{a + b + c}{2} = \frac{(100 + 99 + 89) \text{ m}}{2} = \frac{288 \text{ m}}{2} = 144 \text{ m}$$

Area of the field

$$\begin{aligned}
 &= \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{144 \times 44 \times 45 \times 55} \text{ m}^2 \\
 &= \sqrt{12 \times 12 \times 11 \times 4 \times 9 \times 5 \times 5 \times 11} \text{ m}^2 \\
 &= 12 \times 11 \times 2 \times 3 \times 5 \text{ m}^2 \\
 &= 3960 \text{ m}^2
 \end{aligned}$$

07. (A) Given in an AP  $a_5 + a_{25} = 215$

$$\Rightarrow a + 4d + a + 24d = 215$$

$$\Rightarrow 2a + 28d = 215$$

$$\begin{aligned}
 a_9 + a_{21} &= a + 8d + a + 20d \\
 &= 2a + 28d
 \end{aligned}$$

$$= 215$$

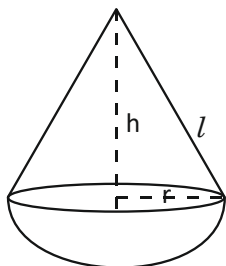
$$[\because 2a + 28d = 215]$$

08. (A) Let the radius of each of the cone and the hemisphere be  $r$ . Let the height of the cone be  $h$  and its slant height be  $l$ .

Then, curved surface area of the hemisphere

= curved surface area of the cone

$$\Rightarrow 2\pi r^2 = \pi r l \Rightarrow 2\pi r^2 = \pi r \sqrt{r^2 + h^2}$$



$$\Rightarrow 2r = \sqrt{r^2 + h^2}$$

[squaring both sides]

$$4r^2 = r^2 + h^2$$

$$\Rightarrow 3r^2 = h^2 \Rightarrow \frac{r^2}{h^2} = \frac{1}{3} \Rightarrow \frac{r}{h} = \sqrt{\frac{1}{3}} = \frac{1}{\sqrt{3}}$$

Hence, the required ratio is  $1 : \sqrt{3}$

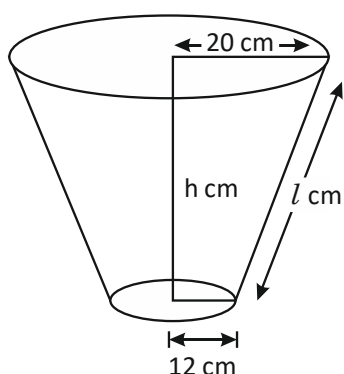
09. (D) Here,  $R = 20$  cm,  $r = 12$  cm

and volume =  $12308.8$  cm<sup>3</sup>

Let the height of the bucket be  $h$  cm

Volume of the bucket

= volume of frustum of the cone.



$$\therefore \frac{1}{3} \pi h (R^2 + r^2 + Rr) = 12308.8$$

$$\Rightarrow \frac{1}{3} \times 3.14 \times h [(20)^2 + (12)^2 + 20 \times 12] = 12308.8$$

$$\Rightarrow 784h = \frac{12308.8 \times 3}{3.14}$$

$$\Rightarrow h = \left( \frac{12308.8 \times 3}{3.14 \times 784} \right) = 15$$

Slant height of the bucket

$$l = \sqrt{h^2 + (R - r)^2} \text{ units}$$

$$= \sqrt{(15)^2 + (20 - 12)^2} \text{ cm} = \sqrt{(15)^2 + 8^2} \text{ cm}$$

$$= \sqrt{225 + 64} \text{ cm} = \sqrt{289} \text{ cm} = 17 \text{ cm}$$

Area of the metal sheet used

= (curved surface area) + (area of the bottom)

$$= [\pi l (R + r) + \pi r^2]$$

$$= [3.14 \times 17 \times (20 + 12) + 3.14 \times 12 \times 12] \text{ cm}^2$$

$$= [3.14 \times (17 \times 32) + 3.14 \times 144] \text{ cm}^2$$

$$= [3.14 \times (544 + 144)] \text{ cm}^2$$

$$= (3.14 \times 688) \text{ cm}^2 = 2160.32 \text{ cm}^2$$

10. (C) Total number of marbles =  $3 + 2 + 4 = 9$

Number of non-white marbles =  $3 + 4 = 7$

$$\therefore P(\text{getting a non-white marble}) = \frac{7}{9}$$

11. (B) Number of all possible outcomes = 52

Number of black kings = 2

$$\therefore P(\text{getting a black king}) = \frac{2}{52} = \frac{1}{26}$$

12. (B) Let  $a$  be the first term and  $d$  be the common difference of the given AP.

$$\text{Then, } \frac{T_{11}}{T_{18}} = \frac{2}{3} \Rightarrow \frac{a + (11 - 1)d}{a + (18 - 1)d} = \frac{2}{3}$$

$$\Rightarrow \frac{a + 10d}{a + 17d} = \frac{2}{3} \Rightarrow 3a + 30d = 2a + 34d$$

$$\Rightarrow a = 4d$$

Ratio of sum of first 5 terms to sum of first 21 terms

$$= \frac{S_5}{S_{21}} = \frac{\frac{5}{2} [2a + (5 - 1)d]}{\frac{21}{2} [2a + (21 - 1)d]} = \frac{5(2a + 4d)}{21(2a + 20d)}$$

$$= \frac{10(a + 2d)}{42(a + 10d)} = \frac{10(4d + 2d)}{42(4d + 10d)}$$

$$= \frac{60d}{588d} = \frac{60}{588} = \frac{5}{49} = 5:49$$

13. (D) Given  $a = 29$  cm

$$\text{Area of an equilateral triangle} = \frac{\sqrt{3}}{4} \text{ cm}^2$$

$$= \frac{\sqrt{3}}{4} \times 20^{10} \times 20^{10} \text{ cm}^2$$

$$= 100\sqrt{3} \text{ cm}^2$$

$$= 100 \times 1.732$$

$$= 173.2 \text{ cm}^2$$

14. (B)  $\left( \frac{2\sqrt{45} + 3\sqrt{20}}{2\sqrt{10}} \right) = \frac{2\sqrt{3 \times 3 \times 5} + 3\sqrt{2 \times 2 \times 5}}{2\sqrt{10}}$

$$= \frac{2 \times 3\sqrt{5} + 3 \times 2\sqrt{5}}{2\sqrt{10}}$$

$$= \frac{12\sqrt{5}}{2\sqrt{10}}$$

$$= \frac{\sqrt{2} \times \sqrt{2} \times \sqrt{3} \times \sqrt{3} \times \sqrt{5}}{\sqrt{2} \times \sqrt{5}}$$

$$= 3\sqrt{2} \text{ which is an irrational number.}$$

15. (A) Given  $2^{x+1} = (22)^{y-2}$

$$2^{x+1} = 2^{y-4}$$

$$\therefore x + 1 = 2y - 4$$

$$x - 2y = -4 - 1$$

$$x - 2y = -5 \quad \rightarrow \textcircled{1}$$

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

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

$$x + 2 = 3x - 3y$$

$$x - 3x + 3y = -2$$

$$-2x + 3y = -2 \quad \rightarrow \textcircled{2}$$

$$\begin{aligned} \text{Eq. } \textcircled{1} \times \textcircled{2} \Rightarrow & \begin{array}{r} 2x - 4y = -10 \\ 2x - 3y = -2 \\ \hline -y = -12 \\ y = 12 \end{array} \end{aligned}$$

$$x - 2(12) = -5 \quad \rightarrow \textcircled{1}$$

$$x = -5 + 24$$

$$x = 19$$

$$x - y = 19 - 12$$

$$= 7$$

### REASONING

16. (D) Rohan first turns  $90^\circ$  to his right, so he's now facing East.

A  $180^\circ$  turn to his left from East brings him to West.

Finally, turning  $45^\circ$  to his left from West brings him to South-West.

17. (B)

2	$\xrightarrow{+5}$	7	$\xrightarrow{+7}$	14	$\xrightarrow{+9}$	23	$\xrightarrow{+11}$	34	$\xrightarrow{+13}$	47
Z	$\xrightarrow{-1}$	Y	$\xrightarrow{-1}$	X	$\xrightarrow{-1}$	W	$\xrightarrow{-1}$	V	$\xrightarrow{-1}$	U
5	$\xrightarrow{+2}$	7	$\xrightarrow{+2}$	9	$\xrightarrow{+2}$	11	$\xrightarrow{+2}$	13	$\xrightarrow{+2}$	15

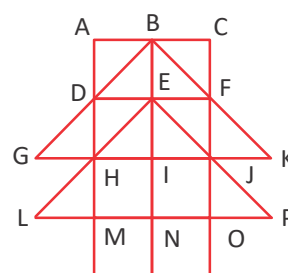
18. (D) Alphabets in reverse order

Z	Y	X	W	V	U	T	S	R	Q	P	O	N
1	2	3	4	5	6	7	8	9	10	11	12	13
M	L	K	J	I	H	G	F	E	D	C	B	A
14	15	16	17	18	19	20	21	22	23	24	25	26
				11	15	26	13	22				
				↓	↓	↓	↓	↓				
				P	L	A	N	E				
				15	11	22	26	13				
				↓	↓	↓	↓	↓				

19. (B)  $L_{MN} O$

20. (D)  $3 \times 5 + 1 = 16, 16 \times 5 + 1$   
 $= 81 \times 5 + 1 = 406 \times 5 + 1 = 2031$

21. (D) The given figure can be labelled as



The number of triangles:

ADI, IDJ, IBC, IJC, DJE, JEK, JKF, JCF,

DEP, CQF, EMR, FGS → 12

IDC, JEF, IPQ, JRS → 4

IKP, IKQ, JLR, JLS → 4

Hence, there are 20 triangles.

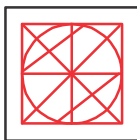
22. (A) Only option(A) cannot be made by the given net.
23. (D) The first, second, third, fourth and fifth letter in the word are respectively one, two, three, four and five steps ahead of the corresponding letter of the code.
24. (D) Rotate  $90^\circ$  anticlock wise starting with right border.
25. (D) Moving b from tribal leaves us with trial and adding it to robed makes robbed.
26. (C) There are two small circles and one large circle. Intersection of two small circles should be dark and one portion should be shaded and other should be white.
27. (C) All others are solid whereas chlorine is gas.



28. (D) -----



29. (C)  $Q \bullet R$  means Q is daughter of R and  $R \Delta P$  means R is the sister of P. Hence, P is the maternal uncle of Q.
30. (B) The actual embedded image of real image is



## COMPUTERS

31. (C) The first firm to mass-market a microcomputer as a personal computer was Radio Shaks. A small firm named MITS made the first personal computer, the Altair (now Apple Inc.), Apple II, the Tandy Radio Shack TRS-80, and the Commodore Business Machines Personal Electronic Transactor (PET).
32. (B) If want to select in continuous slide use Shift + Click each slide.
33. (D)  $5 + 4 + 4 + 6 = 19$  sec.
34. (A) Option A - '###, ##, ##, ##0.0' : This pattern correctly places commas for numbers in the ten millions (crores) and above. It will format the number as 4,54,53,453.0.
- Option B - '###, ###, ##0.0' : This pattern is the usual one for Western numbering, and it will format the number as 45,453,453.0.
- Option C - '#####0.0' : This does not incorporate any commas and will display the number 45453453.0.
- Option D - '##, ##, ##, ###.#' : This pattern is incorrect because it will add unnecessary comma for smaller numbers and might not display the number 45453453 correctly as 4,54,53,453.0.
35. (D)
- ```
int i = 1 ;
while (i < 6) {
    cout << i << "\n" ;
    i++ ;
}
```
36. (B) The parental company of Facebook is Meta.
- Note: Meta is the parental company of Facebook, Instagram, WhatsApp. Alphabet is the parent company of Google. Odeo is the parental company of Twitter.
37. (D) The correct HTML statement to display H<sub>2</sub>O in a paragraph is:
- <p>H<sub>2</sub>O</p>

38. (D) An email account includes a storage area, often called Mailbox
39. (D) In MS Access, when you're working with text and memo fields, you can use input masks to define how data should be entered into the database. Here's a breakdown of the given options:
- Option - A @: Represents a character that's required to be entered. It allows spaces.
- Option - B <: Converts all characters that follow to lowercase.
- Option - C &: Represents a character that's required to be entered. It does not allow spaces.
40. (A) The <a> tag is used to create hyperlinks in HTML. It stands for "anchor" and is commonly used with the href attribute to link to another webpage or resource.
41. (C) Crowdsourcing can be used to improve handwriting recognition. For example, an app might ask users to provide samples of their handwriting. With enough data from diverse handwriting styles, the app can train a more robust machine learning model to recognize handwritten text. This crowd-based approach can make handwriting recognition software more accurate by exposing it to a broader range of variations in handwriting.
- Direct Benefit Transfer In this context, transfer can be defined as the payment that the government makes directly to the beneficiary without receiving any returns. Some of the examples of transfers are scholarships and subsidies.

Iris recognition is an automated method of biometric identification, taking unique patterns within a ring-shaped region surrounding the pupil of each eye

Natural Language Processing (NLP) is a subfield of artificial intelligence (AI).

42. (A) IDE stands for Integrated Developer Environment, which is a software application that provides tools and features for software development, including code editing, debugging, and project management.
43. (C) The user form is saved with the file extension ".frm".
44. (A) Arrays in C++ are declared with the data type, followed by the array name and its size inside square brackets.
45. (A) = SUM(C11 – D11)

### **ENGLISH**

46. (B) Synonym of Cowardice is fear.
47. (B) He has no money now as he has given up all his wealth.
48. (D) So, the complete sentence would be: "Dhruv's father was a colonel in the army."
49. (A) The idiom "Hit the nail on the head" means to describe exactly what is causing a situation or problem. Among the options given, the one that correctly replaces this idiom is: said the right thing
50. (A) The correct spelling is "dimension".

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**THE END**

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