

Roll No.

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**JHARKHAND ACADEMIC COUNCIL**  
**RANCHI, JHARKHAND**  
**NATIONAL TALENT SEARCH EXAMINATION (PRELIMINARY), 2017-18**  
**CLASS X**  
**MENTAL ABILITY AND SCHOLASTIC APTITUDE TEST**

*Part I : Time 45 Minutes*

*Max. Marks : 50*

*Part II : Time 45 Minutes*

*Max. Marks : 50*

*Part III : Time 90 Minutes*

*Max. Marks : 100*

**INSTRUCTIONS TO CANDIDATES**

Read the following instructions carefully before you answer the questions. **Answers are to be given on a separate O.M.R. Answer-Sheet.**

1. Please write your Roll No. very carefully (only one digit in one block) as given on your admission card. Please see that no block is left unfilled and even zeros appearing in the Roll No. are correctly transferred to the appropriate blocks on the booklet and on the answer-sheet. For example, a student appearing from Ranchi and Roll Number 21188899999 will make entries in the boxes as under :

Roll No.	2	1	1	8	8	8	9	9	9	9	9
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For all subsequent purposes your Roll No. shall remain the same as given on the admission card.

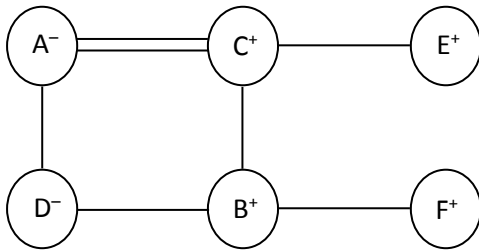
2. This test in three Parts. Part I consists of 50 questions, Part II consists of 50 questions and Part III consists of 100 questions.
  3. All questions in Part I, Part II, and Part III carry one mark each and are compulsory.
  4. Since all questions are compulsory, do not try to read through the whole question-paper before beginning to answer it.
  5. Begin with the first question and keep on trying one question after another till you finish both the parts.
  6. If you do not know the answer to any question, do not spend much time on it and pass on to the next one. Time permitting, you can come back to the questions which you have left in the first instances and try them again.
  7. Since the time allotted to the two parts of this question-paper is very limited, you should make the best use of it by not spending too much time on any question.
  8. A blank page has been provided for rough-work at the end of each subject.
  9. **Remember you have to mark your answers on a separate O.M.R. Answer-Sheet as per instructions given below :**
  10. The answer-sheet has three parts : Part I, Part II and Part III corresponding to Part I, Part II and Part III of the test. The answer-sheet comprises three printed columns, one for answering the Mental Ability Test questions, one for answering Language Test and the other for answering the Scholastic Aptitude Test questions. The answers to the Mental Ability Test questions, Language Test questions and Scholastic Aptitude Test questions are to be marked on the respective columns. Marks will not be awarded, if the answers are not entered in proper columns.
  11. Answer to each question is to be indicated by darkening the circle by blue or black ball pen only, the number of the correct alternative in the answer-sheet from amongst the ones given for the corresponding question in the test booklet.
  12. Now turn to the next page and start answering the questions.
- N.B.: Do not write anything except the Roll Number in the Booklet.***

# HINTS & SOLUTIONS

## Part I

### MENTAL ABILITY TEST

#### Question No. 1 to 6



1. Ans. (4) 4
2. Ans. (4) A
3. Ans. (3) Three
4. Ans. (4) Cannot be determined
5. Ans. (4) AD
6. Ans. (3) Uncle
7. Ans. (4) 27 triangles
8. Ans. (1)
9. Ans. (1) or (3)
10. Ans. (2)

$$7 \times 2 + 2 = 16$$

$$16 \times 2 + 2 = 34$$

$$34 \times 2 + 2 = 70$$

$$70 \times 2 + 2 = 142$$

$$142 \times 2 + 2 = 286$$

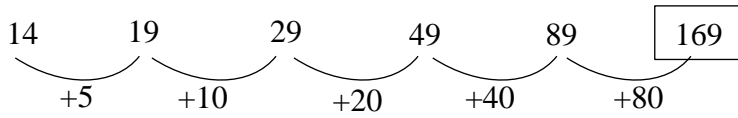
11. Ans. (1)

$$\begin{array}{cccc} (11)^2 & (15)^2 & (19)^2 & (23)^2=529 \\ \underbrace{\quad\quad\quad} & \underbrace{\quad\quad\quad} & \underbrace{\quad\quad\quad} & \\ 4 & 4 & 4 & \end{array}$$

12. Ans. (3)

$$\begin{array}{ccccccc} 18 & 24 & 21 & 27 & 24 & 30 & 27 \\ \underbrace{\quad\quad\quad} & \underbrace{\quad\quad\quad} & \underbrace{\quad\quad\quad} & & & & \\ +3 & +3 & +3 & & & & \end{array}$$

13. Ans. (4)



14. Ans. (1)

Solution : mp pl/m ppl/mp p l/mpp l

15. Ans. (4)

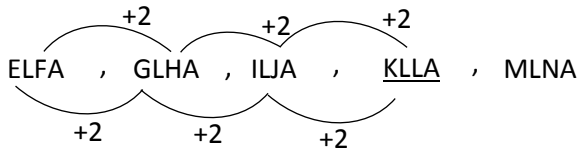
Solution : pq pq r/qrqr p/rprp q

16. Ans. (3) q psr/q p sr/qp s r/qps r

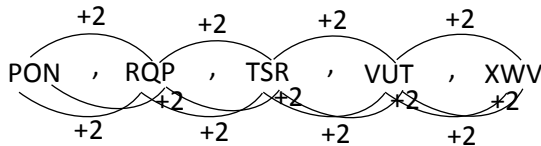
17. Ans. (1) KLMN/KLMN/KLMN/KLMN

18. Ans. (4) YXXY/YXXY/YXXY

19. Ans. (4)



20. Ans. (3)



**Question No. 21 to 25**

A	Horticulturist	(Tea) to coffee
B	Industrialist	(Coffee) to tea
C	Physicist	(Tea) to coffee
D	Journalist	(Coffee) to tea
E	Advocate	(Tea) to coffee

21. Ans. (1)

22. Ans. (3)

23. Ans. (4)

24. Ans. (4)

25. Ans. (4)

26. Ans. (4)

Solution :  $A + E + D + B + C = 180$

$$x + (x - 8) + (x - 3) + (2x - 11) + (118 - 2x) = 180$$

$$3x = 84$$

$$x = 28$$

$$E = x - 8 = 28 - 8 = 20$$

27. Ans.(2)

Solution : LCM of 6,5,7,10 and 12 is 420 so, that bells will toll together after every 420 seconds ie. 7 minutes

$$\text{Now } 7 \times 8 = 56 \text{ \& } 7 \times 9 = 63$$

So, in 1 hour( 60 min) the bells will toll together 8 times, excluding the one at start

28. Ans. (4)

Solution : Let  $x$  and  $y$  be the number of deer and peacocks in the zoo.

$$\text{Then } x + y = 80 \text{ ( I )}$$

$$4x + 2y = 200 \Rightarrow 2x + y = 100 \text{ ( II )}$$

Solving equation (1) & (II) we get

$$X = 20 \text{ and } y = 60$$

29. Ans. (1)

Solution :

C  $\rightarrow$  15 yrs

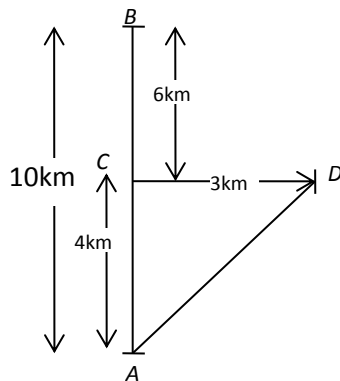
A  $\rightarrow$  12 yrs

D  $\rightarrow$  11 yrs

B  $\rightarrow$  10 years

30. Ans.(2)

Solution :



$$AD = \sqrt{4^2 + 3^2} = \sqrt{25} = 5 \text{ km North east}$$

31. Ans. (3)

Solution : A,E

32. Ans. (1)

Solution : B

33. Ans. (4)

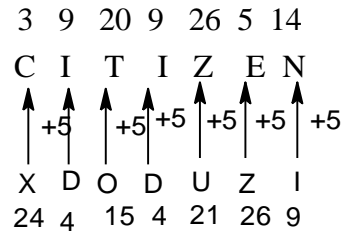
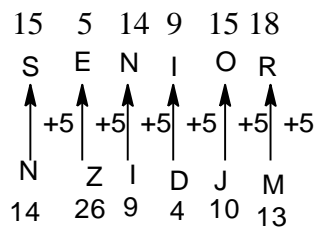
Solution : L,H

34. Ans. (2)

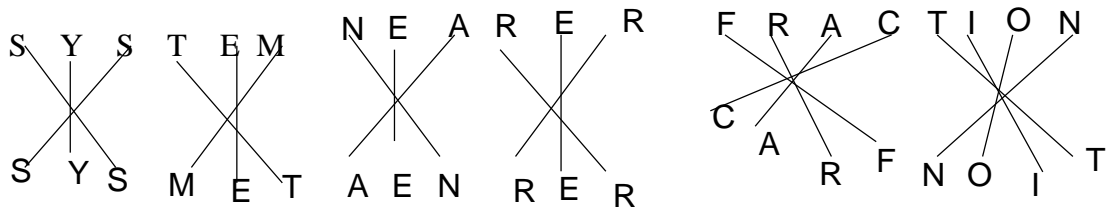
Solution : F

35. Ans. (1) or (2)  
 Solution : F & C

36. Ans. (3)  
 Solution :



37. Ans. (1)  
 Solution :



38. Ans. (2)  
 Solution : here R = 18 , E = 5 and D = 4

In this code  
 R = 18 + 2 = 20  
 E = 5 + 2 = 7  
 D = 4 + 2 = 6

( 2 is added to each code generate a new code. Such as A will be 3(1+2 & Z will be 28)

RED = D(6) E (7) R (20) = 6720 (order of alphabets and their code is reversed)  
 similarly, GREEN = NEERG = (14+2) (5+2) (5+2) (18+2) (7+2) = 1677209

39. Ans. (4)  
 Solution : Martyrdom

40. Ans. (4)

41. Ans. (2)

Two

42. Ans. (4)

Solution : Mandate (The words in each pain are synonyms).

43. Ans. (3)

Solution : Narrow

44. Ans. (2)

Solution :

$$\underbrace{63 : 80}_{+17} :: \underbrace{120 : 137}_{+17}$$

45. Ans. (3)

Solution :  $5 : 5^3 - 1 = 124$   
 $7 : 7^3 - 1 = 343 - 1 = 342$

46. Ans. (2)

TEK CAR  
 RACKET  
 Reverse

TCE JBO  
 Reverse  
 order  
 OBJECT

47. Ans. (3)

Solution :

B D F H  
 |+8 |+8 |+8 |+8  
 J L N P

R T V X  
 |+8 |+8 |+8 |+8  
 Z B D F

48. Ans. (4)

Solution :

$\frac{11}{\frac{K}{T} \begin{matrix} \nearrow 20 \\ \searrow 11 \end{matrix}}$ 
 $∴$ 
 $\frac{7}{\frac{G}{L} \begin{matrix} \nearrow 12 \\ \searrow 7 \end{matrix}}$   
 20 12

49. Ans. (3)

Solution :  $8 \times 4 - 2 + 4 \div 2$

$$32 - 2 + 4 \times \frac{1}{2} = 32 - 2 + 2 = 32$$

50. Ans. (2)

Solution :  $14 \times 10 + 42 \div 2 - 8$

21

$$140 + 42 \times \frac{1}{2} - 8$$

$$140 + 21 - 8 = 153$$

**Part III**  
**SCHOLASTIC APTITUDE TEST**

**PHYSICS**

1. Ans.(3)

Solution : prefix for  $10^{-18}$  is atto

2. Ans. (4)

Solution :  $V_d = \frac{i}{Ane}$ ,  $n$  varies with conductor

3. Ans. (3)

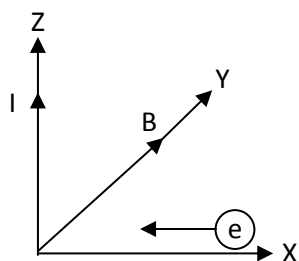
Solution : In series,  $R_1 = r_1 + r_2$

In parallel,  $R_2 = \frac{r_1 + r_2}{r_1 r_2}$

$$\frac{R_1}{R_2} = \frac{(r_1 + r_2)^2}{r_1 r_2}$$

4. Ans. (3)

Solution :  $F_m = eVB$  acts in upward direction



5. Ans. (1)

Solution : Electromagnets are made of soft iron

6. Ans. (4)

Solution : X-rays beam is chargeless

7. Ans. (4)

Solution : Dispersive power  $(w) = \frac{\mu_v - \mu_r}{\mu_y - 1}$

So it is not defined for a particular colour.

8. Ans. (1)

For mirror

$f = -15$  cm, concave mirror

For lens

$f = -15$  cm, concave lens.

So, both focal length is negative .

9. Ans. (3)

Solution : Ciliary muscles change the focal length of eye lens by changing its thickness.

10. Ans. (4)

$$\text{Solution : } P = \frac{V_S^2}{R_{bulb}} = \frac{V_S^2}{\left(\frac{V_{Bulb}^2}{P_{Bulb}}\right)} = \left(\frac{V_S}{V_{Bulb}}\right)^2 P_{bulb} = \left(\frac{110}{220}\right)^2 \times 100 = 25W$$

11. Ans. (3)

$$\text{Solution : } \frac{1}{v} + \frac{1}{u} = \frac{1}{f}$$

$$\Rightarrow \frac{1}{-80} - \frac{1}{\infty} = \frac{1}{f}$$

$$\therefore f = -\frac{1}{0.8}(D) = -1.25D$$

12. Ans. (3)

$$\text{Solution : } R = \frac{u^2 \sin 2\theta}{g}$$

R is maximum when  $\sin 2\theta = 1$

$$2\theta = 90^\circ$$

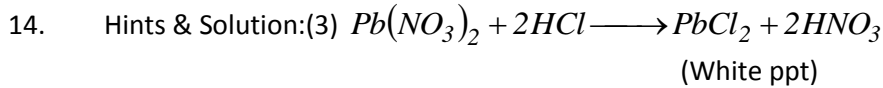
$$\theta = 45^\circ$$

13. Ans. (1)

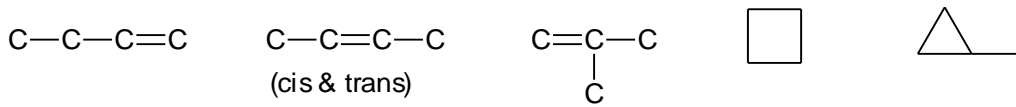
Solution : Parsec is unit for distance



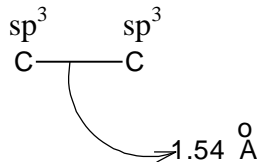
## CHEMISTRY



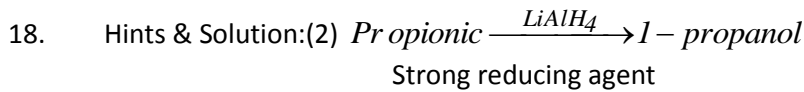
15. Hints & Solution:(3)



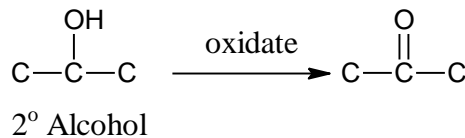
16. Hints & Solution:(3)



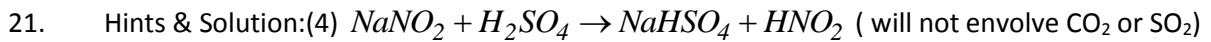
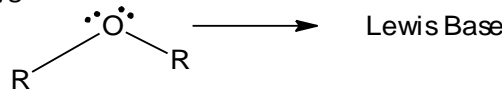
17. Hints & Solution:(4) Ammoniacal CuCl



19. Hints & Solution:(3)



20. Hints & Solution:(2) Oxygen do not have d-orbitals



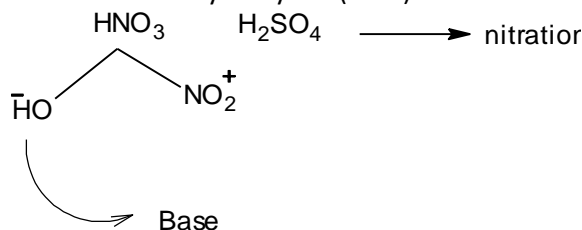
22. Hints & Solution:(2) conceptual

23. Hints & Solution:(1) conceptual

24. Hints & Solution:(4) Helium nuclei scattered.

25. Hints & Solution:(2) Zone of complete combustion

26. Hints & Solution:(1) nitric acid liberate hydroxyl ion(base)



## BIOLOGY

27. Ans. (4)

28. Ans. (2)

29. Ans. (2)

30. Ans. (3)

31. Ans. (2)

32. Ans. (2)

33. Ans. (2)

34. Ans. (2)

35. Ans. (4)

36. Ans. (2)

37. Ans. (3)

38. Ans. (3)

39. Ans. (4)

40. Ans. (3)

## MATHEMATICS

41. Ans. (2)

Solution :  $n=9q+7$

$$3n-1=3(9q+7)-1$$

$$= 27q+20$$

42. Ans. (4)

Solution :  $3a = 3$

$$a=1$$

$$(1-d)(1+d)+(1-d)(1)+(1+d)1=1$$

$$\Rightarrow 1-d^2+1-d+1+d=1 \quad 2=d^2 \Rightarrow d=\sqrt{2}$$

$$a+d=\sqrt{2}+1$$

Irrational no.

43. Ans. (2)

$$\text{Solution : } \frac{2k-1}{3} = \frac{k-1}{1} = \frac{2k+1}{1}$$

$$2k-1=3k-3$$

$$k=2$$

44. Ans. (2)

$$\text{Solution : } \frac{\alpha_1}{\beta_1} = \frac{\alpha_2}{\beta_2}$$

$$\frac{\alpha_1}{\beta_2} = \frac{\beta_1}{\beta_2} = \frac{\alpha_1 + \beta_1}{\beta_2 + \beta_2} = \frac{\sqrt{\alpha_1 \beta_1}}{\sqrt{\beta_2 \beta_2}}$$

$$\frac{+b/a}{+a/b} = \frac{\sqrt{c/a}}{\sqrt{r/p}}$$

$$\frac{b^2/a^2}{a^2/p^2} = \frac{c/a}{r/p}$$

$$\frac{pb^2}{aq^2} = \frac{c}{r}$$

$$\frac{b^2}{q^2} = \frac{4ac}{4p^2} = \frac{D_1}{D_2}$$

45. Ans. (1)

Solution :  $p+q=\pi/2$

$$p/2+a/2=\pi/4$$

$$\tan(p/2+a/2)=1$$

$$\frac{\tan p/2 + \tan q/2}{1 - \tan p/2 \tan q/2} = 1$$

$$\frac{-b/a}{1-c/a} = 1$$

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

$$a-c=b \quad [a+b=c]$$

46. Ans. (1)

$$\text{Solution : } \frac{s_n}{s_n} = \frac{3n-13}{sn+21} = \frac{n/2[2A+(n-1)D]}{n/2[2a+(n-1)d]}$$

$$\frac{3n-13}{5n+21} = \frac{\left[A + \frac{(n-1)}{2}D\right]}{\left[a + \frac{(n-1)}{2}d\right]}$$

$$\text{On putting } n = 47 \text{ we get } \frac{A+23D}{a+23d} = \frac{3 \times 47 - 13}{5 \times 47 + 21} = \frac{1}{2}$$

47. Ans. (2)

$$\text{Solution : } \tan 30^\circ = \frac{200\sqrt{3}}{x}$$

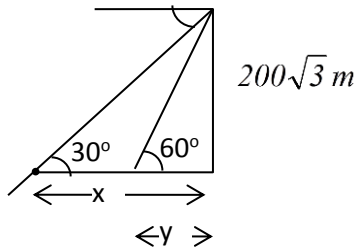
$$x = 600$$

$$\tan 60^\circ = \frac{200\sqrt{3}}{y}$$

$$y = 200$$

$$xy = 400 \text{ m}$$

$$\frac{4ab}{1200} \times \frac{18}{6} = 12$$



48. Ans. (2)

$$\text{Solution : } \frac{2 \sin x \cos y}{2 \cos x \sin y} = \frac{a}{b}$$

49. Ans. (1)

$$\text{Solution : } 9 \longrightarrow (6,3), (5,4), (3,6), (4,5)$$

$$10 \longrightarrow (6,4), (5,5), (4,6)$$

$$11 \longrightarrow (5,6), (6,5)$$

$$12 \longrightarrow (6,6)$$

$$10/36 = 5/18$$

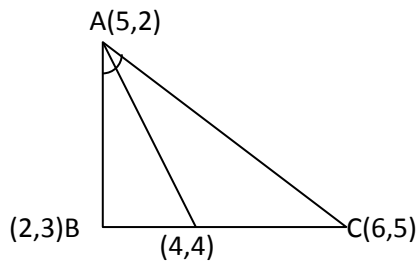
50. Ans. (3)

$$\text{Solution : } AB = \sqrt{9+1} \quad AC = \sqrt{1+9} = \sqrt{10}$$

$$AC : (4-2) = \frac{-2}{1}(x-5)$$

$$y-2 = -2x+10$$

$$2x+y=12$$



51. Ans. (4)

$$\text{Solution : } \lambda^2 + 9 = 25$$

$$\lambda = 24$$

$$(x-4)^2 + y^2 = 25$$

$$x^2 + y^2 + 8x - 9 = 0$$

52. Ans. (2)

$$\text{Solution : } \vec{x} = 10 = \frac{x_1 + x_2 + x_3}{7}$$

$$x_1 + x_2 + \dots + x_7 = 70$$

$$x_1 + x_2 + x_5 + x_4 = 32$$

$$x_4 + x_5 + x_6 + x_7 = 64$$

$$(x_1 + \dots + x_7) + x_9 = 96$$

$$x_4 = 96 - 70 = 26$$

53. Ans. (4)

$$\text{Solution : } \left( \frac{100\pi}{4} - \frac{25\pi}{4} \right)$$

$$\frac{1}{4} \times 75\pi$$

$$\frac{75}{4} \times 3.14$$

$$58.275$$

54. Ans. (4)

$$\text{Solution : } 2\pi r^2 + \pi r \ell$$

$$2\pi \times (3.5)^2 + \pi \times 3.5 \sqrt{144(3.5)^2}$$

$$\sqrt{144 + 12.25}$$

$$\sqrt{156.25}$$

$$2\pi(3.5)^2 + \lambda 3.5 \times 12.5$$

$$\pi(3.5)(7 + 12.5)$$

$$19.5 \times 3.5 \times \frac{22}{7}$$

$$19.5 \times 11$$

$$214.5$$

55. Ans. (1)

$$\text{Solution : } \frac{4}{3} \times (4^3 - 2^3) = \frac{1}{3} \pi (4)^2 \pi h$$

$$\frac{64 - 8}{4} = h$$

$$\frac{56}{4} = h = 14$$

56. Ans. (4)

$$\begin{aligned} \text{Solution : } & 2\pi r h + \pi r^2 \theta \\ & \pi(105 \times 3 + 52.5 \times 53) \\ & = 9735 \end{aligned}$$

57. Ans. (2)

$$\begin{aligned} \text{Solution : } & \angle PBO = \angle OPB = 30 \\ & \angle POT = 30 + 30 = 60 \\ & \angle OPT = 90 \\ & \angle PTA = 108^\circ - (90 + 60) = 30 \end{aligned}$$

58. Ans. (3)

$$\begin{aligned} \text{Solution : } & PR = 4 \\ & OR = 3 \\ & OP^2 + PT^2 = OT^2 \\ & 25 + PT^2 = (3 + RT)^2 \\ & 25 + PT^2 = 9 + RT^2 + 6RT \text{ -----(1)} \\ & PR^2 + RT^2 = PT^2 \\ & 16 + RT^2 = PT^2 \\ & \text{Putting (II) in (1)} \\ & 25 + 16 + RT^2 = 9 + RT^2 + 6RT \\ & 41 - 9 = 6RT \\ & 32 = 6RT \\ & RT = \frac{16}{3} \\ & \text{Putting the value of RT in (2)} \\ & 16 + \frac{256}{9} = PT^2 \\ & = \frac{144 + 256}{9} = PT^2 \\ & PT^2 = \frac{400}{9} \Rightarrow PT = \frac{20}{3} \end{aligned}$$

59. Ans. (2)

$$\begin{aligned} \text{Solution : } & r=1 \\ & OP=2 \\ & \text{let } OA=1, OP=2, AP=\sqrt{3} \\ & \tan AOP = \frac{AP}{OA} = \frac{\sqrt{3}}{1} \end{aligned}$$

$$\angle AOP = 60^\circ$$

From,  $\triangle AOB$

$$\angle AOB = 120^\circ$$

In  $\triangle AOX$

$$\sin 60^\circ = \frac{AX}{1}$$

$$\frac{\sqrt{3}}{2} = Ax \Rightarrow AB = \sqrt{3}$$

in  $\triangle APB$

$$AP = \sqrt{3}$$

$$BP = \sqrt{3}$$

$$AB = \sqrt{3}$$

Equilateral triangle

60. Ans. (3)

### HISTORY

- 61. Ans. (3)
- 62. Ans. (1)
- 63. Ans. (3)
- 64. Ans. (3)
- 65. Ans. (2)
- 66. Ans. (4)
- 67. Ans. (1)
- 68. Ans. (3)
- 69. Ans. (3)
- 70. Ans. (2)
- 71. Ans. (3)
- 72. Ans. (1)
- 73. Ans. (3)
- 74. Ans. (1)
- 75. Ans. (2)

### GEOGRAPHY

- 76. Ans. (2)
- 77. Ans. (2)
- 78. Ans. (3)
- 79. Ans. (1)
- 80. Ans. (3)
- 81. Ans. (1)
- 82. Ans. (4)
- 83. Ans. (1)
- 84. Ans. (4)
- 85. Ans. (3)
- 86. Ans. (4)
- 87. Ans. (4)
- 88. Ans. (1)
- 89. Ans. (1)
- 90. Ans. (1)

### CIVICS

- 91. Ans. (4)
- 92. Ans. (2)
- 93. Ans. (2)
- 94. Ans. (1)
- 95. Ans. (4)
- 96. Ans. (4)
- 97. Ans. (2)
- 98. Ans. (3)
- 99. Ans. (2)
- 100. Ans. (1)