Roll No.											

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**

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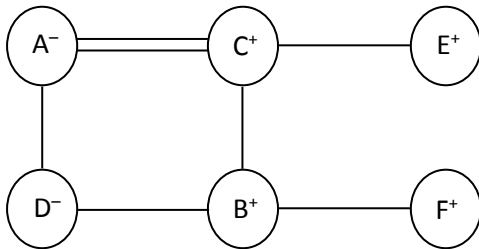
1. Ans. (4) 4
2. Ans. (4) A
3. Ans. (3) Three
4. Ans. (4) Cannot be determined
5. Ans. (4) AD
6. Ans. (3) Uncle
7. Ans. (4) 27 triangles
8. Ans. (1)
9. Ans. (1) or (3)
10. Ans. (2)

    $7 \times 2 + 2 = 16$

    $16 \times 2 + 2 = 34$

    $34 \times 2 + 2 = 70$
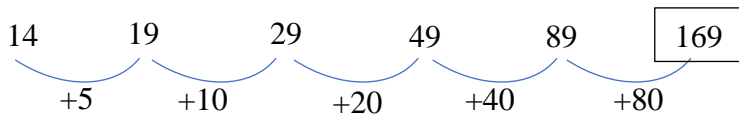
    $70 \times 2 + 2 = 142$

    $142 \times 2 + 2 = 286$

11. Ans. (1)

$$(11)^2 \quad (15)^2 \quad (19)^2 \quad (23)^2 = 529$$

$$\underset{4}{\underline{\quad\quad}} \quad \underset{4}{\underline{\quad\quad}} \quad \underset{4}{\underline{\quad\quad}}$$

12. Ans. (3)

$$18 \quad 24 \quad 21 \quad 27 \quad 24 \quad 30 \quad 27$$

$$+3 \qquad +3 \qquad +3$$

13. Ans. (4)

14 19 29 49 89 [169]
  +5 +10 +20 +40 +80

14. Ans. (1)
    Solution : m<u>p</u> pl/m ppl/mp <u>p</u> l/mpp <u>l</u>
15. Ans. (4)
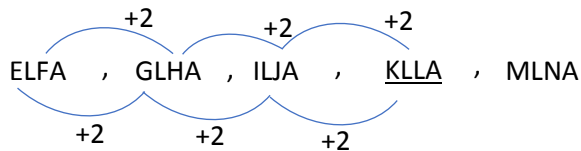   Solution : p<u>q</u> pq <u>r</u>/qrqr <u>p</u>/rprp q
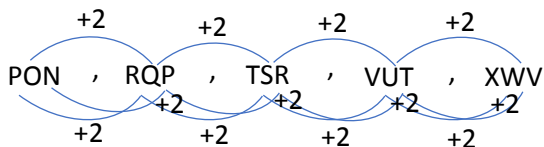16. Ans. (3) <u>q</u> psr/q <u>p</u> sr/qp <u>s</u> r/qps <u>r</u>
17. Ans. (1) KLM<u>N</u>/KL<u>M</u>N/K<u>L</u>MN/<u>K</u>LMN
18. Ans. (4) <u>Y</u>XX<u>Y</u>/Y<u>X</u>XY/YX<u>X</u>Y
19. Ans. (4)

        +2   +2   +2
ELFA , GLHA , ILJA , <u>KLLA</u> , MLNA
    +2   +2   +2

20. Ans. (3)

      +2   +2   +2   +2
PON , RQP , TSR , VUT , XWV
        +2   +2   +2   +2
    +2   +2   +2   +2

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

Now $7 \times 8 = 56$ $\& 7 \times 9 = 63$

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.

Then $x + y = 80$ _____(1)

$4x + 2y = 200 \Rightarrow 2x + y = 100$ _____(II)

Solving equation (1) & (II) we get

X = 20 and y = 60

29. Ans. (1)

Solution :

C→15 yrs

A→ 12 yrs

D→ 11 yrs

B→ 10 years

30. Ans.(2)

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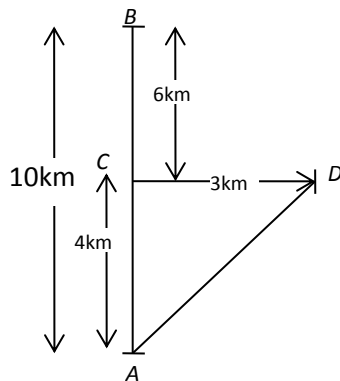
$$AD = \sqrt{4^2 + 3^2} = \sqrt{25} = 5 km\, North\, east$$

31. Ans. (3)

Solution : A,E

32. Ans. (1)

Solution : B

33. Ans. (4)

Solution : L,H

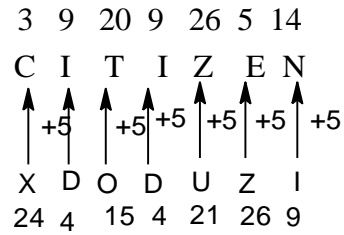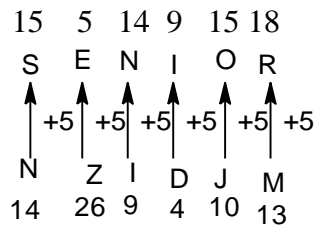34. Ans. (2)
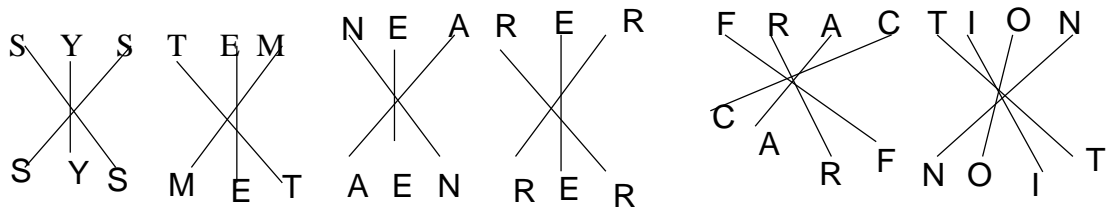
Solution : F
35. Ans. (1) or (2)
    Solution : F & C
36. Ans. (3)
    Solution :

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 :

    63 : 80   : :   120 : 137
       + 17   + 17

45. Ans. (3)
    Solution : $5 : 5^3 - 1 = 124$
               $7 : 7^3 - 1 = 343 - 1 = 342$
46. Ans. (2)

TEK   CAR
⟩Reverse
←
R A C K E T

TCE   JBO
Reverse ⟩
← order
O B J E C T

47. Ans. (3)
   Solution :
   B   D   F   H   R   T   V   X
   |+8 |+8 |+8 |+8 |+8 |+8 |+8 |+8
   J   L   N   P   Z   B   D   F

48. Ans. (4)
   Solution :

   11   7
   $\frac{K}{T}$ ⤬ $\frac{20}{11}$: : $\frac{G}{L}$ ⤬ $\frac{12}{7}$
   20   12

49. Ans. (3)
   Solution : $8 \times 4 - 2 + 4 \div 2$

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

50. Ans. (2)
   Solution : $14 \times 10 + 42 \div 2 - 8$

   $\qquad\qquad 21$
   $140 + \cancel{42} \times \dfrac{1}{\cancel{2}} - 8$
   $140 + 21 - 8 = 153$

Part III

SCHOLASTIC APTITUDE TEST

PHYSICS

1. Ans.(3)
   Solution : prefix for 10^{-18} is atto

2. Ans. (4)
   Solution : $V_d = \dfrac{i}{Ane}$, n varies with conductor
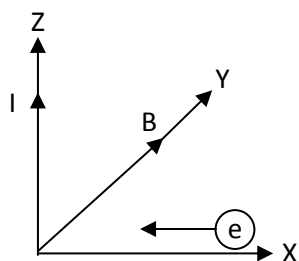
3. Ans. (3)
   Solution : In series, $R_1 = r_1 + r_2$

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

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

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 $(w) = \dfrac{\mu_v - \mu_r}{\mu_y - 1}$

   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)

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

11. Ans. (3)

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

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

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

12. Ans. (3)

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

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

14. Hints & Solution:(3) $Pb(NO_3)_2 + 2HCl \longrightarrow PbCl_2 + 2HNO_3$

    (White ppt)

15. Hints & Solution:(3)

    $C-C-C=C$ $C-C=C-C$ $C=C-C$

                   (cis & trans)   C

16. Hints & Solution:(3)

    sp^3 sp^3

    $C-----C$

    $\rightarrow 1.54$ Å

17. Hints & Solution:(4) Ammoniacal CuCl

18. Hints & Solution:(2) $Pr\,opionic \xrightarrow{\;LiAlH_4\;} 1-propanol$

    Strong reducing agent

19. Hints & Solution:(3)

    $$\underset{\text{2° Alcohol}}{C-\overset{\overset{\displaystyle OH}{|}}{C}-C} \xrightarrow{\text{oxidate}} C-\overset{\overset{\displaystyle O}{||}}{C}-C$$

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

    $$\underset{R}{\overset{R}{\diagdown}} \ddot{O} \diagup \longrightarrow \text{Lewis Base}$$

21. Hints & Solution:(4) $NaNO_2 + H_2SO_4 \rightarrow NaHSO_4 + HNO_2$ (will not envolve CO_2 or SO_2)

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)

    $$\underset{HO^-}{\overset{\displaystyle HNO_3}{\diagup}} \underset{NO_2^+}{\overset{\displaystyle H_2SO_4}{\diagdown}} \longrightarrow \text{nitratior}$$

    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

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

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

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

Irrational no.

43. Ans. (2)

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

$2k-1 = 3k-3$

K=2

44. Ans. (2)

Solution : $\dfrac{\alpha_1}{\beta_1} = \dfrac{\alpha_2}{\beta_2}$

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

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

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

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

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

45. Ans. (1)

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

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

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

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

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

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

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

46. Ans. (1)

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

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

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

47. Ans. (2)

Soution : $tan\,30^o = \dfrac{200\sqrt{3}}{x}$

$x = 600$

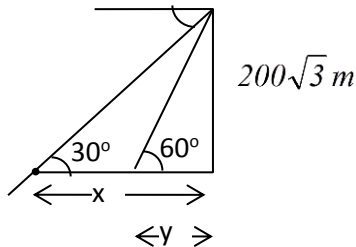$tan\,60^o = \dfrac{200\sqrt{3}}{y}$

y = 200

xy = 400 m

$\dfrac{4ab}{1200} \times \dfrac{18}{6}$

=12

$200\sqrt{3}\,m$

30°   60°

x

y

48. Ans. (2)

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

49. Ans. (1)

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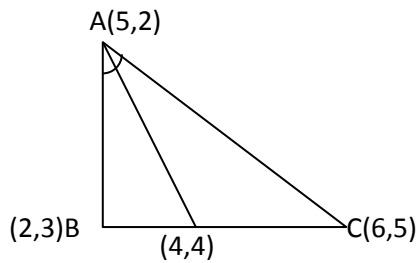
Solution : $AB = \sqrt{9+1}$ $AC = \sqrt{1+9} = \sqrt{10}$

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

$y-2 = -2x+10$

$2x+y = 12$

A(5,2)

(2,3)B ⌐ ∖C(6,5)
(4,4)

51. Ans. (4)

Solution : $\lambda^2 + 9 = 25$
$\lambda = 24$
$(x-4)^2 + y^2 = 25$
$x^2 + y^2 + 8x - 9 = 0$

52. Ans. (2)

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

$x_1 + x_2 + ---- x_7 = 70$
$x_1 + x_2 + x_5 + x_4 = 32$
$x_4 + x_5 + x_6 + x_7 = 64$
$(x_1 + ---- x_7) + x_9 = 96$
$x_4 = 96 - 70 = 26$

53. Ans. (4)

Solution : $(\dfrac{100\pi}{4} - \dfrac{25\pi}{4})$

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

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

58.275

54. Ans. (4)

Solution : $2\pi r^2 + \pi r \ell$

$2\pi \times (3.5)^2 + \pi \times 3.5 \sqrt{144(3.5)^2}$
$\sqrt{144 + 12.25}$
$\sqrt{156.25}$
$2\pi(3.5)^2 + \lambda 3.5 \times 12.5$
$\pi(3.5)(7 + 12.5)$
$19.5 \times 3.5 \times \dfrac{22}{7}$
19.5×11
214.5

55. Ans. (1)

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

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

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

56. Ans. (4)

Solution : $2\pi rh + \pi r \wp$

$\pi(105 \times 3 + 52.5 \times 53)$

=9735

57. Ans. (2)

Solution : $\angle PBO = \angle OPB = 30$

$\angle POT = 30 + 30 = 60$

$\angle OPT = 90$

$\angle PTA = 108^o - (90 + 60) = 30$

58. Ans. (3)

Solution : $PR = 4$

$OR = 3$

$OP^2 + PT^2 = OT^2$

$25 + PT^2 = (3 + RT)^2$

$25 + PT^2 = 9 + RT^2 + 6RT \;----(1)$

$PR^2 + RT^2 = PT^2$

$16 + RT^2 = PT^2$

Putting (II) in (1)

$25 + 16 + RT^2 = 9 + RT^2 + 6RT$

$41 - 9 = 6RT$

$32 = 6RT$

$RT = \dfrac{16}{3}$

Putting the value of RT is (2)

$16 + \dfrac{256}{9} = PT^2$

$= \dfrac{144 + 256}{9} = PT^2$

$PT^2 = \dfrac{400}{9} \Rightarrow PT = \dfrac{20}{3}$

59. Ans. (2)

Solution : r=1

OP= 2

$let\ OA = 1, OP2, AP = \sqrt{3}$

$tan\ AOP = \dfrac{AP}{OA} = \dfrac{\sqrt{3}}{1}$

$\angle AOP = 60^o$

From, ΔAOB

$\angle AOB = 120^o$

$In \Delta AOX$

$sin\,60^o = \dfrac{AX}{1}$

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

$in \Delta APB$

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)