

LR DAV APTITUDE TEST (2023)

Roll No.

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Set



Time : 3 Hours

Guidelines to the Candidates:

1. This Booklet contains printed 14 pages and 2 blank pages for rough work. Any defect found should be brought to the notice of the invigilator immediately.
2. Fill in the particulars in the OMR Sheet given to you separately as per the directions given therein.
3. This test is of three hours' duration.
4. There are four choices in every question as (a), (b), (c) and (d). Only one is correct. Each question carries 4 marks.
5. (i) The test consists of 100 multiple choice questions comprising Mathematics (40), General Science (40) and mental ability (20) carrying maximum of 400 marks.
(ii) -1 will be awarded for each wrong answer/multiple answer.
(iii) No mark will be awarded for any overwriting/scratching answer.
6. Each candidate must show his/her Admit Card to the invigilator whenever required.
7. No candidate shall leave his/her seat during examination.
8. Do not tear or remove any page of the Booklet.
9. For rough work the blank page at the end of the question booklet may be used. No calculator is allowed.
10. After finishing the test, the booklet with the OMR sheet is to be handed over to the invigilator before leaving the room.

MATHEMATICS

1. If one root of $(k-1)x^2+kx+1$ is -3 , then value of k is
(a) $\frac{4}{3}$ (b) $\frac{-4}{3}$ (c) $\frac{2}{3}$ (d) $\frac{-2}{3}$
2. The area of a triangle formed by the lines $x=3$, $y=4$ and $x=y$ is
(a) $\frac{1}{2}$ sq. unit (b) 1 sq. unit (c) 2 sq. units (d) none of these
3. If the equation $(a^2 + b^2)x^2 - 2(ac + bd)x + c^2 + d^2 = 0$ has equal roots, then
(a) $ab=cd$ (b) $ad=bc$ (c) $ad=\sqrt{bc}$ (d) $ab=\sqrt{cd}$
4. If sum of the roots of the equation $x^2 - (k + 6)x + 2(2k - 1) = 0$ is equal to half of their product, then $k=$
(a) 6 (b) 7 (c) 1 (d) 5
5. If sum of n terms of an A.P. is $3n^2 + 5n$, then which of its term is 164?
(a) 26^{th} (b) 27^{th} (c) 28^{th} (d) none of these
6. If three points $(0,0)$, $(3, \sqrt{3})$ and $(3,p)$ form an equilateral triangle, then $p=$
(a) 2 (b) -4 (c) -3 (d) none of these
7. If $P(2,4)$, $Q(0,3)$, $R(3,6)$ and $S(5,y)$ are vertices of a parallelogram PQRS, then value of y is
(a) 7 (b) 5 (c) -7 (d) -8
8. In $\triangle ABC$, $XY \parallel BC$, cuts AB at X and AC at Y . If BY bisects $\angle XYC$, then
(a) $BC=CY$ (b) $BC=BY$ (c) $BC \neq CY$ (d) $BC \neq BY$
9. If $\cos \theta = \frac{2}{3}$, then $2\sec^2 \theta + 2\tan^2 \theta - 7 =$
(a) 1 (b) 0 (c) 3 (d) 4
10. $9\sec^2 A - 9\tan^2 A =$
(a) 1 (b) 8 (c) 9 (d) 0
11. If perimeter of a semi-circular protractor is 108cm, then its diameter is
(a) 36 cm (b) 24cm (c) 42cm (d) 48cm
12. The area of incircle of an equilateral triangle of side 42cm is
(a) $22\sqrt{3}cm^2$ (b) $213 cm^2$ (c) $924 cm^2$ (d) $462 cm^2$
13. If perimeter of a circle is equal to that of a square, then ratio of their areas is
(a) 22:7 (b) 14:11 (c) 7:22 (d) 11:14
14. Volumes of two spheres are in the ratio 64:27. The ratio of their surface areas is
(a) 1:2 (b) 2:3 (c) 9:16 (d) 16:9

15. The probability of throwing a number greater than 2 with a fair dice is
 (a) $\frac{3}{5}$ (b) $\frac{2}{5}$ (c) $\frac{2}{3}$ (d) $\frac{1}{3}$
16. What is the probability that a leap year has 52 Mondays?
 (a) $\frac{5}{7}$ (b) $\frac{6}{7}$ (c) $\frac{2}{7}$ (d) $\frac{4}{7}$
17. If $\sin\theta + \cos\theta = \sqrt{2}$, then $\tan\theta + \cot\theta =$
 (a) 1 (b) -1 (c) -2 (d) 2
18. The point on X-axis which is equidistant from the points (-1,0) and (5,0) is
 (a) (0,2) (b) (2,0) (c) (3,0) (d) (0,3)
19. The area of a triangle formed by the line $\frac{x}{a} + \frac{y}{b} = 1$ with the coordinate axes is
 (a) ab (b) 2ab (c) $\frac{1}{2}ab$ (d) $\frac{1}{4}ab$
20. If two tangents are inclined at an angle of 60° are drawn to a circle of radius 3cm, then length of each tangent is
 (a) $\frac{3\sqrt{3}}{2}$ cm (b) 6cm (c) 3cm (d) $\sqrt{3}$
21. The mean of n observations is \bar{x} . If the first observation is increased by 1, second by 2, the third by 3, and so on, then the new mean is
 (a) $\bar{x} + (2n+1)$ (b) $\bar{x} + \frac{n+1}{2}$ (c) $\bar{x} + (n+1)$ (d) $\bar{x} - \frac{n+1}{2}$
22. The sum of n terms of two AP's are in the ratio $5n+9:9n+6$. Then, the ratio of their 18th term is
 (a) $\frac{179}{321}$ (b) $\frac{178}{321}$ (c) $\frac{175}{321}$ (d) $\frac{176}{321}$
23. If two tangents inclined at an angle of 60° , are drawn to a circle of radius 3cm, then length of each tangent is equal to
 (a) $\frac{3\sqrt{3}}{2}$ cm (b) 6cm (c) 3cm (d) $3\sqrt{3}$ c
24. The perpendicular bisector of the line segment joining the points A (1,5) and B (4,6) cuts the y-axis at
 (a) (0,13) (b) (0, -13) (c) (0,12) (d) (13,0)
25. If the three sides of a triangle are a, $\sqrt{3}a$ and $\sqrt{2}a$, then the measure of the angle opposite to the longest side is
 (a) 45° (b) 30° (c) 60° (d) 90°
26. The value of θ for $\cos^4\theta - \sin^4\theta = \frac{1}{2}$ ($0 < \theta < 90^\circ$) is
 (a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{6}$

27. The shadow of a tower standing on a level ground is x meters long when the sun's altitude is 30° , while it is y metres long when the sun's altitude is 60° . If the height of the tower is $45\frac{\sqrt{3}}{2}$ m, then the value of $x - y$ is

- (a) 45m (b) $45\sqrt{3}$ m (c) $\frac{45}{\sqrt{3}}$ m (d) $45\frac{\sqrt{3}}{2}$ m

28. The ratio in which the line segment joining the points A(-12,2) and B(8,3) is divided by the y-axis is

- (a) 2:1 (b) 1:4 (c) 1:3 (d) 3:2

29. The pair of linear equations $7x - 3y = 4$ and $3x + \frac{k}{7}y = 4$ is consistent only when

- (a) $K = 9$ (b) $k = -9$ (c) $k \neq -9$ (d) $k \neq 7$.

30. If α, β be the zeros of the quadratic polynomial $5x + 2x^2 + 1$, then value of $\alpha + \beta + \alpha\beta$ is

- (a) -2 (b) -1 (c) 1 (d) none of these

DIRECTIONS:

In the question number 31 to 35, a statement of **assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct option

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)
 (b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)
 (c) Assertion (A) is true but reason (R) is false.
 (d) Assertion (A) is false but reason (R) is true.

31. **Assertion (A)** : Common difference of the AP having sum of n terms as $an^2 + bn$ is $2a$.

Reason (R) : If sum of n terms of an AP is denoted by S_n , then its n th term is $S_n - S_{n-1}$.

32. **Assertion (A)** : $\sqrt{2} + \sqrt{3}$ is an irrational number.

Reason (R) : Sum of two irrational numbers is irrational.

33. **Assertion (A)** : A die is thrown once. Then the probability of getting a number greater than 6 is 1.

Reason (R) : Probability of an impossible event = 0.

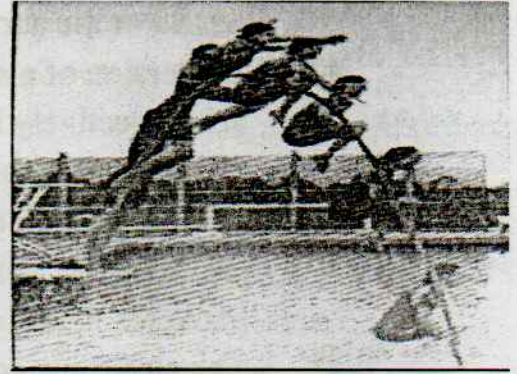
34. **Assertion (A)** : A parallelogram circumscribing a circle is a rhombus.

Reason (R) : If two tangents are drawn to a circle from an external point, then they subtend equal angles at the centre.

35. **Assertion (A) :** If the median and mode of a distribution are 21.2 and 21.4 respectively, then its mean is 21.1.
Reason (R) : Mean, median and mode are related by the relation $\text{mode} = 2\text{median} - 3 \text{ mean}$.

CASE BASED QUESTION

The Figure given alongside shows the path of a diver, when she takes a jump from the diving board. Clearly it is a parabola.



Annie was standing on a diving board, 48 feet above the water level. She took a dive into the pool. Her height (in feet) above the water level at anytime 't' in seconds is given by the polynomial $h(t)$ such that

$$h(t) = -16t^2 + 8t + k.$$

36. What is the value of k ?
(a) 0 (b) - 48 (c) 48 (d) $48/-16$
37. At what time will she touch the water in the pool?
(a) 30 seconds (b) 2 seconds (c) 1.5 seconds (d) 0.5 seconds
38. Rita's height (in feet) above the water level is given by another polynomial $P(t)$ with zeroes -1 and 2. Then $p(t)$ is given by -
(a) $t^2 + t - 2$
(b) $t^2 + 2t - 1$
(c) $24t^2 - 24t + 48$
(d) $-24t^2 + 24t + 48$
39. A polynomial $q(t)$ with sum of zeroes as 1 and the product as -6 is modelling Anu's height in feet above the water at any time t (in seconds). Then $q(t)$ is given by
(a) $t^2 + t + 6$
(b) $t^2 + t - 6$
(c) $-8t^2 + 8t + 48$
(d) $8t^2 - 8t + 48$
40. The zeroes of the polynomial $r(t) = -12t^2 + (k-3)t + 48$ are negative of each other. Then k is
(a) 3 (b) 0 (c) -1.5 (d) -3

GENERAL SCIENCE

41. Which one will help to accelerate the process of evaporation of a liquid kept in an open china dish?
- (a) Keeping the dish in open
 - (b) Blowing air into the liquid
 - (c) Keeping the dish under a running fan
 - (d) All of the above
42. Dispersion of a solid in a liquid, a liquid in a gas and a liquid in a liquid are respectively known as:
- (a) Aerosol, emulsion, sol
 - (b) Sol, aerosol, emulsion
 - (c) Emulsion, sol, aerosol
 - (d) Aerosol, sol, emulsion
43. The electronic configuration of Cl^- is:
- (a) 2, 8, 7
 - (b) 2, 8, 8
 - (c) 2, 8, 6
 - (d) 2, 8, 8, 1
44. Which of the following has the highest no. of atoms?
- (a) 100 g of Na
 - (b) 100 g of Al
 - (c) 100 g of C
 - (d) 100 g of O
45. Select the one that when used would be considered as best condition for liquification of a gas.
- (a) Increase the temperature
 - (b) Decrease the pressure
 - (c) Increase the pressure and decrease the temperature
 - (d) Decrease the pressure and increase the temperature.
46. Identify the reducing agent in the following reactions:
- $$\text{Pb}_3\text{O}_4 + 8\text{HCl} \rightarrow 3\text{PbCl}_2 + \text{Cl}_2 + 4\text{H}_2\text{O}$$
- (a) Pb_3O_4
 - (b) HCl
 - (c) PbCl_2
 - (d) Cl_2

47. Which of the following salts does not contain any water of crystallisation?
- (a) Blue vitriol
 - (b) Washing soda
 - (c) Baking soda
 - (d) Gypsum
48. While cooking, if the bottom of the vessel is getting blackened on the outside, it means that:
- (a) The food is not cooked completely
 - (b) The fuel is not burning completely
 - (c) The fuel is wet
 - (d) The fuel is burning completely.
49. Identify the functional group in the following compound: $\text{Br-CH}_2\text{-CH}_2\text{-CHO}$
- (a) Aldehyde
 - (b) Alcohol
 - (c) Bromine
 - (d) Both bromine and aldehyde.
50. Identify the wrong sequence of the elements in a group:
- (a) Ca, Sr, Ba
 - (b) Cu, Au, Ag
 - (c) N, P, As
 - (d) Cl, Br, I
51. When a zinc strip is dipped in the blue solution of copper sulphate for some time, the colour of the solution changes to:
- (a) Pink
 - (b) Green
 - (c) Colourless
 - (d) Remains blue
52. While preparing CO_2 in the laboratory, on which of the following substances HCl is poured?
- (a) Pieces of zinc
 - (b) Pieces of marble
 - (c) Crystals of copper sulphate
 - (d) Ammonium chloride

53. Crypts of Lieberkühn are present in
- (a) pancreas and secrete pancreatic juice
 - (b) stomach and secrete dilute HCl
 - (c) small intestine and secrete digestive enzymes
 - (d) stomach and secrete trypsin
54. Which one of the following pairs matches a hormone with a disease resulting from its deficiency?
- (a) Relaxin- gigantism
 - (b) Prolactin- cretinism
 - (c) Parathyroid hormone- tetany
 - (d) Insulin-diabetes insipidus
55. Prokaryotic genome consists of
- (a) DNA with histones
 - (b) DNA without histones
 - (c) DNA or histones
 - (d) Histones only
56. The major component of the cell wall in bacterial prokaryotes is a polymer named
- (a) Cellulose
 - (b) Chitin
 - (c) Xylan
 - (d) Peptidoglycan
57. Afferent nerve fibre carries impulses from
- (a) Effector to central nervous system
 - (b) Receptors to central nervous system
 - (c) central nervous system to muscles
 - (d) central nervous system to receptors
58. Lining of intestine in man is
- (a) Ciliated
 - (b) Keratinized
 - (c) Brush bordered
 - (d) Nonkeratinized
59. Pectin of cell wall is
- (a) excretory product
 - (b) waste product
 - (c) secretory product
 - (d) all of these

60. A phylum that includes exclusively marine animals is
- Porifera
 - Coelenterata
 - Protozoa
 - Echinodermata
61. A Mendelian experiment consisted of breeding tall pea plants bearing violet flowers with short pea plants bearing white flowers. The progeny of all bore violet flowers but almost half of them were short. This suggests that the genetic make-up of the tall parent can be depicted as
- TTVV
 - TTvv
 - TtVV
 - TtVv
62. Which of the following option shows the transport of oxygen to the cell correctly?
- Lungs- pulmonary vein – right atrium – right ventricle – aorta – body cells
 - Lungs- pulmonary vein – left atrium – left ventricle – aorta – body cells
 - Lungs- pulmonary artery– left atrium – left ventricle – vena cava – body cells
 - Lungs- pulmonary artery– right atrium – right ventricle – vena cava – body cells
63. A body of mass m is moving in a circle of radius r with a constant speed v . The force on the body is $\frac{mv^2}{r}$ and is directed towards the centre. What is the work done by this force in moving the body over half the circumference of the circle
- $\frac{mv^2}{\pi r^2}$
 - Zero
 - $\frac{mv^2}{r^2}$
 - $\frac{\pi r^2}{mv^2}$
64. If the unit of force and length each be increased by four times, then the unit of energy is increased by
- 16 times
 - 8 times
 - 2 times
 - 4 times
65. A man pushes a wall and fails to displace it. He does
- Negative work
 - Positive but not maximum work

- (c) No work at all
- (d) Maximum work

66. The same retarding force is applied to stop a train. The train stops after 80 m. If the speed is doubled, then the distance will be

- (a) The same
- (b) Doubled
- (c) Halved
- (d) Four times

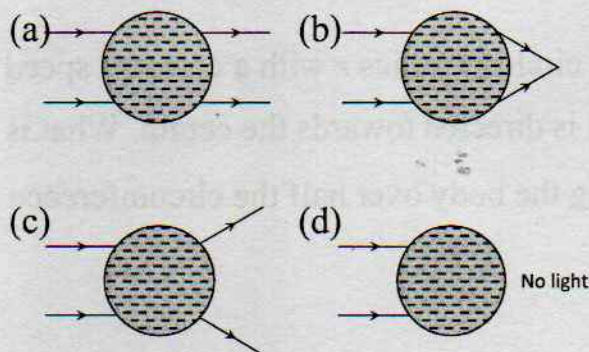
67. Two identical solid copper spheres of radius R placed in contact with each other. The gravitational attraction between them is proportional to

- (a) R^2
- (b) R^{-2}
- (c) R^4
- (d) R^{-4}

68. If the earth rotates faster than its present speed, the weight of an object will

- (a) Increase at the equator but remain unchanged at the poles
- (b) Decrease at the equator but remain unchanged at the poles
- (c) Remain unchanged at the equator but decrease at the poles
- (d) Remain unchanged at the equator but increase at the poles

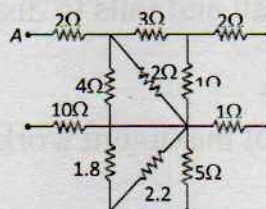
69. A water drop in air refracts the light ray as



70. A thin rod of 5 cm length is kept along the axis of a concave mirror of 10 cm focal length such that its image is real and magnified and one end touches the rod. Its magnification will be

- (a) 1
- (b) 2
- (c) 3
- (d) 4

71. What is the equivalent resistance between the points A and B of the network



- (a) $\frac{57}{7}\Omega$

(b) 8Ω

(c) 6Ω

(d) $\frac{57}{5} \Omega$

DIRECTIONS:

In the question number 72 to 76, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct option

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)

(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

72. **Assertion(A)** : Stimulus is interpreted by the brain and not by the sense organs.

Reason(R) : Sense organs act as transducers, transforming the stimulus energy into impulse energy.

73. **Assertion(A)**: Electronegativity of Fluorine is greater than that of oxygen.

Reason(R): The electronegativity of the elements increases along a period since metallic character increases.

74. **Assertion (A)** : A person working on a horizontal road with a load on his head does no work

Reason (R) : No work is said to be done, if directions of force and displacement of load are perpendicular to each other.

75. **Assertion (A)**:The work done during a round trip is always zero.

Reason (R):No force is required to move a body in its round trip.

76. **Assertion (A)**: Critical angle of light passing from glass to air is minimum for violet colour.

Reason (R) :The wavelength of blue light is greater than the light of other colours.

CASE BASED QUESTION

Human digestive system consists of main organs buccal cavity, oesophagus, stomach, small intestine and large intestine leading into rectum and anus. Salivary glands, liver, pancreas act as accessory organs. Various others glands like crypts of Lieberkühn, Bruner's glands also play an important role. Enzymes secreted from various glands helps in the

process of digestion. Intestinal juice contains enterokinase also called as activator enzyme.

77. In which of the following, proteins are absent?
- (a) pancreatic juice
 - (b) saliva
 - (c) bile
 - (d) intestinal juice
78. During prolonged fasting the sequence of organic compounds used by body is
- (a) carbohydrates, fats, proteins
 - (b) fats, carbohydrates, proteins
 - (c) carbohydrates, proteins, lipids
 - (d) protein, lipids, carbohydrates
79. Brunner's glands are found in
- (a) stomach
 - (b) ileum
 - (c) colon
 - (d) duodenum
80. Pepsin acts in
- (a) basic medium
 - (b) acidic medium
 - (c) neutral medium
 - (d) all types of media

Mental Ability

81. Kamal remembers that her brother Dinu's birthday falls after 20th May but before 28th May, while Garima remembers that Dinu's birthday falls before 22nd May but after 12th MAY on what date Dinu's birthday falls?
- a) 22nd May b) 21ST May c) Can't be determine d) None of these
82. What is the missing number in the given series?
- 50, 30, 40, 75, 170, ?
- a) 360 b) 450 c) 320 d) 295
83. In a certain code language "ACTIVATE" is coded as "BCUIWAUE". How is "CATALYST" coded in that language?
- a) ADYMYUAT b) ADMYUATT c) DAUAMYTT d) DUAAMYTT
84. The given options show four time instances. In which of these cases, the hour hand and minute hand will be closest to each other when this time is seen on a clock?
- a) 4:00 b) 10:00 c) 6:30 d) 2:15

85. A boy walked 931m to the north, then he turns to his left and walks 31 m. After that, he moves 931m to his left and finally he turns to the right and moves 23 m. How far is he from the starting point?
- a)31m b)54m c)93m d)99m
86. If L stands for +, M stands for -, N stands for \times , P stands for \div , then What is the value of $14N10L42P2M8$?
- a)150 b)143 c)153 d)160
87. Select one of the following four option that will make the second pair analogous to the first pair given as:
- KABADDI : 7 :: BASKETBALL : ?
- a)5 b)6 c)8 d)9
88. Find out the conclusions which logically follows from the given statements disregarding commonly known facts.
- statements: some dogs are cats
All cats are pigs.
- Conclusions: I) some cats are dogs.
II) some dogs are pigs.
- a) only conclusion I follows
b) only conclusion II follows
c) either conclusion I OR II follows
d) both conclusion I and II follows.
89. Find out the conclusions which logically follows from the given statements disregarding commonly known facts.
- Statements: All stones are water.
Some water are clean.
- Conclusions: I) some water are stones.
II) all clean are water.
- a) only conclusion I follows
b) only conclusion II follows
c) either conclusion I OR II follows
d) both conclusion I and II follows.
90. A list of meaningful words are given in the option. In which case, the word formed has atleast a pair of consecutive alphabets?
- a) CLEAR b) FORCE c) CRANE d) BLUSH
91. A woman said to a man, "The daughter of your only sister is the sister of my husband". What is the relation of man's sister to the woman?
- a) Mother b) Mother-in-law c) Data inadequate d) None of these.

92. If Thursday falls 2 days after tomorrow, then what day of the week was it in three days before yesterday?

- a) Monday b) Tuesday c) Wednesday d) Thursday

93. Thailand : Baht :: Myanmar : -----?

- a) Peso b) Kyat c) Dinar d) Rial

94. Rabbit : Leap :: Duck : -----?

- a) Fly b) Swoop c) Flit d) Waddle

95. Mohan and Sujit are ranked seventh and eleventh respectively from the top in a class of 31 students. What will be their respective ranks from the bottom in the class ?

- a) 20th and 24th b) 24th and 20th
c) 25th and 21st d) 26th and 22nd

96. Vishal is elder than Akash but younger than Shivansh, Yaksh is younger than Deepak but elder than Akash. If Shivansh is younger than Deepak, then who is eldest?

- a) Akash b) Vishal c) Shivansh d) Deepak

Directions(97-98): A big cube is painted with red color. Then it is cut into some small cubes in such a way that the length of small cube is $(1/7)$ th of the length of big cube. now answer the following questions.

97. How many small cubes are there in all?

- a) 342 b) 343 c) 340 d) 431

98. How many small cubes do not have any of the faces painted?

- a) 120 b) 115 c) 124 d) 125

Direction(99-100): Read the following information carefully. And answer the following questions.

D, E, F, H, I are seated in a circle facing toward the center. A, B, C are also seated in the same circle but two of them are not facing the center. F is sitting 2nd to the left of C. E is 3rd to the right of A. B is 3rd to the left of D, who is immediate neighbour of H and I. C is second to the right of D and third to the right of B.

99. If H is sitting on the immediate right of E then what is possible position of H with respect to C?

- a) Immediate right b) 3rd to the right c) 3rd to the left d) 2nd to the left

100. Which of the following pair facing outside?

- a) AE b) CE c) CB d) HI

SPACE FOR ROUGH WORK