All India Science Teachers' Association, West Bengal

SCIENCE APTITUDE AND TALENT SEARCH TEST - 2023

Time : 2 hr. 30 min. **Full Marks : 100**

Class X

INSTRUCTIONS:

1) Write your name, class, name of school and roll number both at left and right side on the answer sheet. 2) In the question paper you will find four probable answers: a), b), c) and d) against each question. Find out which one of the answers is correct or the best. There are four circles on the answer sheet corresponding to each question below a), b), c) and d). Now mark the circle below the letter of selected answer by putting a cross mark distinctly with a ball pen. If c) is the correct answer, you are to mark ◯◯ ⊗◯ . **3) 1 mark will be awarded for each correct answer and 1 mark will be deducted for 3 wrong answers.** 4) Don't write anything on the question paper. Don't mark answers on the question paper. Submit the answer sheet only after the examination. 5) You may use additional blank sheet for any rough work, if necessary. 6) Do not waste time for any question which appears difficult to you, better try next question. If you consider first answer to be wrong, blacken it like ● and put ⊗ on correct answer.

1. The muscles which control the autonomic nervous system of human body is
   a) voluntary b) involuntary
   c) myotome d) both a) & b)
2. In human brain 'Pons' is located in between
   a) thalamus and hypothalamus
   b) diencephalon and hind brain
   c) mid brain and medulla oblongata
   d) hind brain and spinal cord
3. Transversely phototropic movement is found in that part of the plant named
   a) leaf b) stem c) root d) flower
4. Name of hormones is given in column-I and their functions are given in column II. The correct matching of the columns I & II is

Column I	Column II
A. GHRH	(i) Secretion of MSH
B. PRH	(ii) Secretion of GH
C. GnRH	(iii) Secretion of prolactin
D. CRH	(iv) Secretion of ACTH
	(v) Secretion of GTH

a) A-(i), B-(iv), C-(ii), D-(iii) b) A-(ii), B-(iii), C-(v), D-(iv)
c) A-(v), B-(iv), C-(ii), D-(i) d) A-(ii), B-(i), C-(v), D-(iii)

5. The gas absent at the time of evolution of life in earth was
   a) H_2 b) O_2 c) CH_4 d) NH_3
6. On the basis of the relationship between the first pair choose the suitable word in the place of X in second pair :
   Diabetes : Insulin : : Polyuria : X
   a) Thyroxin b) ADH c) ACTH d) Glucagon
7. One of the following is incorrect, that one is
   a) thyroid is the largest endocrine gland
   b) duct is present in exocrine gland
   c) lacrymal gland is an endocrine gland
   d) ADH is synthesized in hypothalamus
8. Duckweeds reproduce by means of
   a) seed b) rhizome c) stolon d) offset
9. Conidia helps in propagation of
   a) Penicillium b) Aspergilus c) Hydra d) a & b both
10. Eutrophication : Algalbloom :: Myocardial infarction : X
    On the basis of the relationship in the first pair, write a suitable words in the place of X
    a) soil pollution b) sound pollution
    c) water pollution d) air pollution
11. The odd person among the following is
    a) Mendel b) Lamarck
    c) Darwin d) Hugo De Vries
12. Analogus organs follow the path of evolution which is called
    a) convergent b) parallel
    c) divergent d) a) & c) both

13. The correct sequence of evolution of horse according to changes of forelimbs is
    a) Eohippus→Pliohippus→Mesohippus→Merichippus→Equas
    b) Eohippus→Mesohippus→Merichippus→Pliohippus→Equas
    c) Pliohippus→Eohippus→Mesohippus→Equas→Merichippus
    d) Merichippus→Pliohippus→Mesohippus→Equas→Eohippus

14. What will be the percentage of haemophilic son if mother is homozygous normal and father is haemophilic ?
    a) 0% b) 100% c) 75% d) 50%

15. Select the wrong pair
    a) Fission — Bacteria b) Budding — Yeast
    c) Regeneration — Planeria d) Sporeformation—Spirogyra

16. In flowering plant components of egg apparatus of a flower are
    a) two antipodal cells b) two ova
    c) two synergids and ovum d) four haploid nucleus

17. The fastes technique used for quick reproduction of plants of preferred varieties is
    a) micropropagation b) cutting
    c) asexual reproduction d) sexual reproduction

18. In tritanopia the related gene is present in
    a) X chromosome b) Y chromosome
    c) autosome d) both a & b

19. Consider the four items : Nostoc, Anabaena Cyanobacteria and oscillatoria, of these three are included in the group
    a) Nostoc b) Oscillatoria
    c) Cyanobacteria d) Anabaena

20. Biosphere reserve is (are)
    a) Sundarban b) Kaziranga c) Kanha d) all of a) to c)

21. Assertion : A) Ex-situ conservation is done in artificial environment
    B) Evolution of living organism is interrupted in ex situ conservation.
    Read the above statements and choose the right one
    a) Both A & B are wrong
    b) B is right and A is wrong
    c) A is right and B is wrong
    d) A & B both are right and A is the right explanation of ‘B’.

22. Synapsis, bivalent and tetrad can be found in the cell division called
a) meiosis b) mitosis c) amitosis d) a and b both

23. The nature of the genes that form attached ear lobe in human body is
a) dominant b) recessive
c) mutated recessive d) natural

24. The percentage of white offsprings obtained during crossing of two hybrid black Guineapigs (Bb × Bb) is
a) 25% b) 50% c) 100% d) 75%

25. Genotype of white guineapig will be
a) Bb b) BB c) bb d) both b & c

26. In Mendel's dihybrid cross genotypic ratio of yellow and round seed in F_2 generation is
a) 5 : 2 : 1 : 1 b) 3 : 4 : 1 : 1
c) 1 : 2 : 2 : 4 d) 4 : 3 : 1 : 1

27. Genotype of colour blind father will be
a) X^CY b) XY c) X^CX^C d) Y^CY^C

28. Identify the most suitable option from the following regarding importance of 'Bee dance' for foreger bee. It helps to know
a) distance and smell of the source of food
b) direction of the source of food
c) smell of food
d) direction, distance and smell of the source of food

29. Part (s) of Biosphere reserve allow(s) human activities is(are)
a) buffer region b) transition region
c) core region d) both a and b

30. How many spore mother cells are required to create 200 nos. of spores ?
a) 100 b) 50 c) 25 d) 200

31. The power of a lens is P and its focal length is f. Then
a) P and f are directly proportional
b) P and f are inversely proportional
c) P is double of f
d) P is half of f

32. The number of refracting planes of a prism with triangular base is
a) 4 b) 3 c) 2 d) 1

33. According to international standard green wire is
a) earthing wire b) neutral wire c) live wire d) fuse wire

34. CGS unit of thermal conductivity is
a) $cal.cm^{-1}$ b) $cal.°C^{-1}$
c) $cal.cm^{-1}.\ s^{-1}$ d) $cal.cm^{-1}.°C^{-1}.\ s^{-1}$

35. 1 BOT is equal to
a) 3.6×10^6 J b) 3.6×10^3 J c) 3.6×10^2 kJ d) 36 MJ

36. Complementary colour of yellow is
a) blue b) red c) green d) pink

37. Among the following rays, wavelength is lowest for
a) infrared rays b) UV rays c) X rays d) gamma rays

38. Which one of the following resistors will be most acceptable in voltmeter construction?
a) 0.01 Ω b)100 Ω c) 10 KΩ d) 1 MΩ

39. The metal used as reducing agent in thermit process is
a) Fe b) AI c) Cu d) Zn

40. Angular deviation for refraction in case of perpendicular incidence is
a) 0° b) 90° c) 108° d)180°

41. Fuel with highest calorific value is
a) petrol b) coal c) methane d) kerosene

42. The catalyst used in the preparation of sulphuric acid in contact process is
a) manganese di-oxide b) vanadium penta-oxide
c) iron fillings d) platinum fillings

43. carbon-carbon triple bond is present in
a) ethane b) ethylene c) acetylene d) ethanol

44. Two wires of resistance 3Ω and 6Ω are joined in series and parallel combination respectively. The ratio of respective equivalent resistances is
a) 18:1 b) 2:9 c) 9:2 d) 1:18

45. In electrolysis electrical energy is converted into
a) sound energy b) heat energy
c) magnetic energy d) chemical energy

46. Volume of 0.02 mole nitrogen at STP is
a) 22.4 L b) 44.8 L c) 0.448 L d) 0.224 L

47. In the periodic table the most electronegative element belongs to the group no.
a) 17 b) 15 c) 14 d) 13

48. Which one of the following bulbs has the lowest resistance?
a) 220 V – 100 W b) 115 V – 100 W
c) 220 V – 60 W d) 115 V – 60 W

49. Which one is not a coin metal ?
a) Au b) Ag c) Sn d) Cu

50. In a closed electrical circuit rheostat controls
a) current b) potential difference
c) electromotive force d) both b and c

51. The vapour density of a gas is 16. The volume of 80 gm of the gas at STP is
a) 56 L b) 112 L c) 44.8 L d) 33.6 L

52. Two postulates of kinetic theory of gas accounts for the difference in behavior of ideal gas with real gases. Those are that gas molecules
a) are not spherical and are attracted to each other
b) are not spherical and have little volume
c) are not in motion and they do not collide with each other
d) attract each other slightly and they occupy a small volume

53. According to kinetic theory of gas average kinetic energy of molecules of gas is proportional to the
a) square of absolute temperature of gas
b) absolute temperature of gas
c) pressure of gas
d) inverse of absolute temperature of gas

54. The halogen found in solid form in nature is
a) chlorine b) bromine c) iodine d) fluorine

55. There is a spherical hole in a metallic solid ball. The volume of the hole when the ball is heated will
a) remain same b) increase
c) decrease d) increase at first and then decrease

56-57. Read the text below and answer the questions 56-57.
A girl cannot see writings on the black board from the last bench.

But she can see the board clearly from first or second bench. Doctor gave spectacles and she could see from all distances.

56. The glasses in the spectacles are
    a) convex mirror b) concave mirror
    c) convex lens d) concave lens
57. The defect of her eye was found to be
    a) astigmatism b) myopia
    c) hyper metropia d) presbiopia
58. Dynamo works on the principle of
    a) electromagnetic induction b) heating effect of current
    c) magnetic effect of current d) may be either of a and c
59. The substance whose resistance decreases with increasing temperature is called
    a) conductor b) super conductor
    c) semi conductor d) insulator
60. The quantity that remains constant in all household electrical appliances is
    a) resistance b) potential difference
    c) current d) capacitance
61. During electrolysis
    a) oxidation occurs in cathode and reduction occurs in anode
    b) oxidation occurs in both cathode and anode
    c) reduction occurs in both cathode and anode
    d) reduction occurs in cathode and oxidation occurs in anode
62. In which one of the given ionic compounds, none of the ions has an octant?
    a) LiH b) CaO c) NaCl d) KBr
63. Which one of the following properties is not a periodic property of elemets?
    a) Melting point b) Density
    c) Electron affinity d) Radioactivity
64. The functional group of an aldehyde compound is
    a) –OH b) –CHO c) > CO d) – COOH
65. Hematite is an ore of the metal
    a) iron b) copper c) aluminum d) zinc

66. Temperature equal to 292 K is

a) 39°C b) 27°C c) 19°C d) 17°C

67. Wet blue litmus paper is inserted into a tube full of carbon di-oxide. The colour will change to

a) colourless b) red c) yellow d) violet

68. The dehydrating agent used to dry moist ammonia gas is

a) cone. Sulphuric acid b) phosphorus penta-oxide

c) calcium chloride d) quicklime

69. The colour of the precipitate obtained by passing hydrogen sulphide gas through an aqueous solution of copper sulphate is

a) red b) blue c) black d) green

70. The main hydrocarbon present in LPG is

a) methane b) ethane c) propane d) butane

71. In a circle of radius 5 cm, the distance between the centre and a chord CD of the circle is 3 cm. Then the length of CD is

a) 9 cm b) 8 cm c) 4 cm d) $\sqrt{15}$ cm

72. If a sum of money becomes double in 20 years, then the rate of simple interest per annum is

a) 5% b) 10% c) 15% d) 20%

73. If the total surface area of a sphere be S and radius be r, then r =

a) $\frac{S}{4\pi}$ b) $\left(\frac{S}{4\pi}\right)^{\frac{1}{2}}$ c) $\left(\frac{S}{4\pi}\right)^{\frac{1}{3}}$ d) none of these

74. The value of $(2 - 4x - 10x^2)$ is maximum when x =

a) $-\frac{3}{8}$ b) $-\frac{1}{2}$ c) $-\frac{1}{5}$ d) 0

75. Jay, Rabi and Ramesh invest in a partnership business in the ratio $\frac{1}{6} : \frac{1}{5} : \frac{1}{4}$. If after one year there is a total profit of ₹3700, the profit of Ramesh is

a) ₹1500 b) ₹1400 c) ₹1300 d) ₹1200

76. If $y \propto x^3$ and y = 21 when x = 3, then the relation between x and y is

a) $7y = 9x^3$ b) $y = 7x^3$ c) $9y = 7x^3$ d) $9y = x^3$

77. In a quadratic equation $ax^2 + bx + c = 0$ $(a \neq 0)$ if $b^2 = 4ac$, then the roots are

a) real and unequal b) real and equal

c) imaginary and equal d) imaginary and unequal

78. The volume of a cone is 154 cm^3 and height of the cone is 12 cm. Then the diameter of the base of the cone is

a) 3.5 cm b) 5 cm c) 6 cm d) 7 cm

79. If $\tan\theta + \sec\theta = a$, then $\sin\theta =$

a) $\frac{a+1}{a-1}$ b) $\frac{a-1}{a+1}$ c) $\frac{a^2+1}{a^2-1}$ d) $\frac{a^2-1}{a^2+1}$

80. If $a + b = \sqrt{17}$ and $a - b = \sqrt{13}$, then the value of ab is

a) –1 b) 1 c) 2 d) –2

81. If $\frac{1}{x} - \frac{1}{x+b} = \frac{1}{a} - \frac{1}{a+b}$, then one value of x is

a) – (a + b) b) –a c) b d) –b

82. $\cos(40° + \theta) - \sin(50° - \theta) =$

a) $2\cos\theta$ b) $7\sin\theta$ c) 0 d) 1

83. If the numbers 8, 9, 12, 17, x + 2, x + 4, 30, 31, 34, 39 be in ascending order and their median be 24, then the value of x is

a) 22 b) 21 c) 20 d) 24

84. O is the centre of a circle. AB and CD are two equal chords of the circle. If $\angle AOB = 60°$, then $\angle COD =$

a) 120° b) 60° c) 30° d) 15°

85. If the ratio of curved surface areas of two hemispheres be 1 : 9, then the ratio of their volumes is

a) 1 : 27 b) 8 : 27 c) 1 : 3 d) 1 : 81

86. If $x \propto \frac{1}{y}; y \propto \frac{1}{z}$, then the correct option among the following is

a) $x \propto y$ b) $x \propto z$ c) $x \propto yz$ d) $x \propto \frac{1}{yz}$

87. If ₹500 be invested for 8 months and ₹2000 be invested for 2 months at the same rate of profit, then the ratio of profit portion is

a) 2 : 1 b) 3 : 1 c) 1 : 1 d) 1 : 2

88. If $0 \le x \le \frac{\pi}{2}$, then number of solution of the equation $\sin x + \cos x = 2$ is

a) 0 b) 1 c) 2 d) infinite number

89. If $\sqrt{15} = x$, then $\sqrt{\frac{3}{5}} =$

a) $\sqrt[3]{x}$ b) 5x c) $\frac{x}{5}$ d) $3\sqrt{x}$

90. If $(5x - 2y) : (2x + 3y) = 2 : 3$, then the correct option among the following is

a) $x < y$ b) $x = y$ c) $x = 1$ d) $x > y$

91. If the length of the longest rod kept in a cubical room be $4\sqrt{3}$ m. then the area of the floor of the room is

a) 16 m^2 b) $12\sqrt{3}\ m^2$ c) 8 m^2 d) 20 m^2

92. $\cot 1°.\cot 2°.\cot 3° \ldots \cot 87°.\cot 88°.\cot 89° =$

a) –1 b) $\frac{1}{\sqrt{3}}$ c) 0 d) 1

93.

Variable	20	22	24	26	28	30	32	34
Cumulative frequency	2	3	5	12	18	23	28	32

The mode of the above distribution is

a) 26 b) 34 c) 30 d) 28

94. If two circles touch each other externally and AB is a direct common tangent of the circles where r_1 and r_2 are the radii of them, then $AB^2 =$

a) $2r_1r_2$ b) $r_1^2r_2^2$ c) $r_1.r_2$ d) $4r_1.r_2$.

95. The correct option among the following is

a) $\left(\sqrt{15} + \sqrt{3}\right) > \left(\sqrt{10} + \sqrt{8}\right)$ b) $\left(\sqrt{15} + \sqrt{3}\right) < \left(\sqrt{10} + \sqrt{8}\right)$

c) $\sqrt{15} + \sqrt{3} = \sqrt{10} + \sqrt{8}$ d) $\left(\sqrt{15} + \sqrt{3}\right) = 2\left(\sqrt{10} + \sqrt{8}\right)$

96. If the roots of the quadratic equation $5x^2 + 13x + K = 0$ be reciprocal to each other, then K =

a) 3 b) 4 c) 5 d) –5

97. By what number 15 should be replaced so that the mean of the observations 9, 12, 15, 18, 20, 22 be increased by 1 ?

a) 16 b) 17 c) 19 d) 21

98. AB and CD are the two chords of a circle. BA and DC are produced to meet at an external point P. If $\angle PCB = 140°$, then $\angle DAB =$

a) 60° b) 40° c) 90° d) 120°

99. If $\cos^2 x + \cos^4 x = 1$, then $\tan^2 x + \tan^4 x =$

a) 1 b) –1 c) 0 d) 2

100. Divide ₹3400 in three shares such that the simple interests for 4, 6 and 10 months at 3%, 4% and 6% rate of interest per annum respectively are equal. Then the third share equals to

a) ₹400 b) ₹2000 c) ₹1000 d) ₹500

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