ALLEN
OVERSEAS

HAVE CONTROL ⟶ HAVE PATIENCE ⟶ HAVE CONFIDENCE ⇒ 100% SUCCESS

BEWARE OF NEGATIVE MARKING

MENTAL ABILITY

This section contains **30 Multiple Choice Questions**. Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

1. A, B and C are sisters. D is the brother of E and E is the daughter of B. How is A related to D ?

    (1) Sister   (2) Cousin   (3) Niece   (4) Aunt

2. If the total no. of dots on opposite faces of a cubical block is always 7, find the figure which is correct?

    (1)   (2)   (3)   (4)

3. If **MATCH** is coded as **NCWGM** and **BOX** as **CQA**, then **OQWIGUVS** is encoded for what ?

    (1) NOTE BOOK   (2) NOTE BOKE   (3) NOTF BOPE   (4) MOKE BOOT

4. On what dates of February 1986 will sunday fall ?

    (1) 1, 8, 15, 22   (2) 5, 12, 19, 26   (3) 2, 9, 16, 23   (4) 3, 10, 17, 24

5. A cube of 4 cm has been painted on its surfaces in such a way that two opposite surfaces have been painted blue and two adjacent surfaces have been painted red. Two remaining surfaces have been left unpainted. Now the cube is cut into smaller cubes of side 1 cm each.
    How many cubes will have no side painted ?

    (1) 18   (2) 16   (3) 22   (4) 8

6. How many triangles are there in the following figure ?
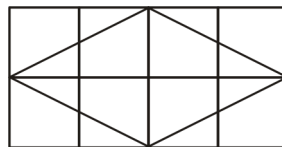
    (1) 22   (2) 18   (3) 20   (4) 24

7. If a clock strikes 12 in 33 seconds, it will strike 6 in how many seconds ?

    (1) $\dfrac{33}{2}$ (2) 15   (3) 12   (4) 22

8. I am facing South. I turn right and walk 20 m. Then I turn right and walk 10 m. Then I turn left and walk 10 m and then turning right walk 20 m. Then I turn right again and walk 60 m. In which direction am I from the starting point?

    (1) North   (2) North-West   (3) East   (4) North-East

9. What number should come in the place of question mark
    45, 54, 47, ?, 49, 56, 51, 57, 53

    (1) 48   (2) 50   (3) 55   (4) 53

10. If (i) P is taller than Q, (ii) R is shorter than P, (iii) S is taller than T but shorter than Q, then who among them is the tallest?

    (1) P   (2) Q   (3) S   (4) T

11. Find the mirror image.
    INCREDIBLE

    (1) ELBIDERCNI   (2) EBLIDERCNI   (3) ENICREDIBL   (4) INCREDIBLE (mirrored)

12. If in a certain language, MIRACLE is coded as NKUEHRL, then how is GAMBLE coded in that language?

    (1) JDOCMF   (2) CLEMNK   (3) HCPFQK   (4) AELGMN

13. How many degree does the minutes hand covers in the same time, in which the hour hand covers 20°?

    (1) 150°   (2) 200°   (3) 180°   (4) 240°

14. In a certain code 'DOWN' is writen as '5@9#' and 'NAME' is written as "#6%3". How is "MODE" written in that code ?

    (1) 6@53   (2) %@53   (3) 53%#   (4) %#35

15. Pointing to a man in a photograph, a woman said, 'His brother's father is the only son of my grandfather'. How is the woman related to the man in the photograph?

    (1) Aunt   (2) Daughter   (3) Mother   (4) Sister

16. Two positions of a dice are given below–
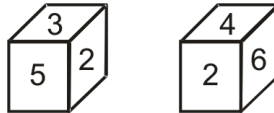
    When 4 is at the bottom, what number will be at the top ?

    (1) 5   (2) 6   (3) 1   (4) 3

17. In a certain code '345' means 'Veera is gentle'; '598' means 'Veera kind hearted' and '126' means 'Kanchan also good' then which digit in that code represents 'Gentle' ?

    (1) 3   (2) 4   (3) 5   (4) Either 3 or 4

18. What was the day of the week on 8th July 1983 ?

    (1) Monday   (2) Wednesday   (3) Friday   (4) Sunday

19. All surfaces of a cube are coloured. If a number of smaller cubes are taken out from it, each side 1/4 the size of the original cube's side, indicate the number of cubes with only one side painted.

    (1) 60   (2) 32   (3) 24   (4) 16

20. How many parallograms are there in the following figure.
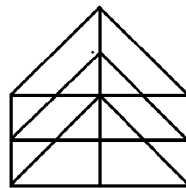
    (1) 15   (2) 12   (3) 17   (4) 16

21. If a mirror is placed opposite to a clock and the time shown in the clock is 4:30, then what will be time in the mirror's clock?

   (1) 8 : 30   (2) 9 : 30   (3) 7 : 30   (4) 4 : 30

22. A rat runs 20' towards east and turns to right, runs 10' and turns to right, runs 9' and again turns to left, runs 5' and then turns to left, runs 12' and finally turns to left and runs 6'. now, which direction is the rat facing ?

(1) East   (2) West   (3) North   (4) South

23. What number should come in the place of question mark

$4, 6, 9, 13\frac{1}{2}, ?$

(1) $17\frac{1}{2}$ (2) 19   (3) $20\frac{1}{4}$ (4) $22\frac{3}{4}$

24. If the alphabets were written in the reverse order, which letter will be the fifth letter to the left of the fourteenth letter from the left.

(1) R   (2) I   (3) S   (4) H

25. Choose the correct water-image of the Fig. (X) from amongst the four alternatives (1), (2), (3) and (4) give along with it.

(X)

(1)   (2)   (3)   (4)

26. A is father of X; B is mother of Y. The sister of X and Z is Y. Which of the following statements is definitely not true?

(1) B is the mother of Z   (2) X is the sister of Z

(3) Y is the son of A   (4) B has one daughter

27. How many days are there in X weeks X days ?

(1) $2X^2$ (2) $8X$ (3) $4X + 2$ (4) $7X^2 + 7$

28. What number should come in the place of question mark
20, 20, 19, 16, 17, 13, 14, 11, ?, ?

(1) 10, 10   (2) 10, 11   (3) 13, 14   (4) 13, 16

29. A cube painted red on two adjacent faces and black on the faces opposite to the red faces and green on the remaining faces is cut into sixty-four smaller cubes of equal size.
How many cubes are there which have no face painted :

(1) 0   (2) 4   (3) 8   (4) 16

30. Choose the alternative which is closely resembles the water-image of the given combination.


(1)   (2)   (3)   (4)
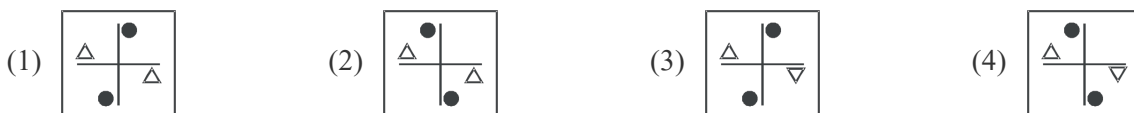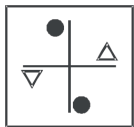
PHYSICS

This section contains **30 Multiple Choice Questions**. Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

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31. The angular velocity of a wheel is 70 rad/s. If the radius of the wheel is 0.5 m, then linear velocity of the wheel is :

    (1) 70 m/s (2) 35 m/s (3) 30 m/s (4) 20 m/s

32. The terminal velocity of a sphere moving through a medium is–

    (1) Directly proportional to viscosity

    (2) Inversely proportional to viscosity

    (3) Directly proportional to the square of viscosity

    (4) Inversely proportional to the square of viscosity

33. A motorcycle is going on an overbridge of radius R. The driver maintains a constant speed. As the motorcycle is ascending the overbridge, the normal force on it

    (1) Increases (2) Decreases

    (3) Remains the same (4) Fluctuate

34. If A, B, C are physical quantity having different dimension then which of following combination can never be a meaningful quantity–

    (1) $\dfrac{A + B}{C}$ (2) $AB - C$ (3) $\dfrac{AB}{C}$ (4) $\dfrac{AB - C^2}{C}$

35. A fan of moment of inertia 0.6 kg-m^2 is running by a working speed of 0.5 rad/s. Indicate the correct value of angular momentum of the fan.

    (1) $\dfrac{\pi}{0.6}$ kg-m^2/s (2) 0.6 kg-m^2/s (3) 0.6π kg-m^2/s (4) 0.3 kg-m^2/s

36. A system consists of mass M and m (<<M). The centre of mass of the system is–

    (1) At the middle (2) Nearer to M

    (3) Nearer to m (4) At the position of larger mass

37. The work done by all the forces on a system is equal to the change in

    (1) Total energy (2) Potential energy

    (3) Kinetic energy (4) None of these

38. Mass is distributed uniformly over a thin square plate. If two end points of a diagonal are (–2, 0) and (2, 2), what are the co-ordinates of the centre of mass of plate–

    (1) (2, 1) (2) (2, 2) (3) (1, 0) (4) (0, 1)

39. Four bodies of masses 2, 3, 5 and 8 kg are placed at the four corners of a square of side 2m. The position of centre of mass will be–
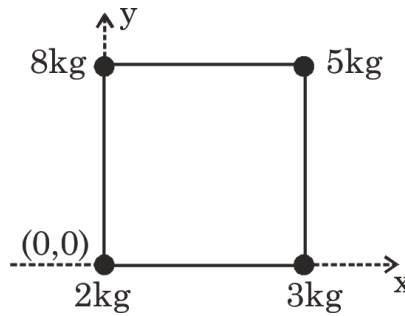
(1) $\left(\dfrac{8}{9}, \dfrac{13}{9}\right)$

(2) $\left(\dfrac{7}{9}, \dfrac{11}{9}\right)$

(3) $\left(\dfrac{11}{9}, \dfrac{13}{9}\right)$

(4) $\left(\dfrac{11}{9}, \dfrac{8}{9}\right)$

40. A stone is tied to one end of string 50 cm long and is whirled in a horizontal circle with constant speed. If the stone makes 10 revolutions in 20 s, then what is the magnitude of acceleration of the stone

(1) 493 cm/s^2 (2) 720 cm/s^2 (3) 860 cm/s^2 (4) 990 cm/s^2

41. A ball of density ρ_0 and radius r is released in viscous liquid. The value of its terminal velocity is proportional to–

(1) 1/r   (2) r^2 (3) r   (4) r^4

42. The masses M and m are connected by a weightless string. They are pulled by a force on a frictionless horizontal surface. If tension in the string connecting the masses is F, then the pulling force will be

(1) $\dfrac{FM}{(m+M)}$

(2) $\dfrac{F(M+m)}{M}$

(3) $\dfrac{Fm}{(M+m)}$

(4) $\dfrac{F(M+m)}{m}$

43. The velocity v of a particle at time t is given as $v = at - \dfrac{b}{c+t}$ where a, b, c are constant. The dimension of a, b, c are

(1) LT^{-2}, L, T

(2) LT, L, T

(3) L, LT, LT^{-2}

(4) LT^{-2}, LT, L

44. Two bodies of masses 2 kg and 4 kg are moving with velocities 2 m/s and 10 m/s respectively towards each other. What is the velocity of their centre of mass–

(1) 5.3 m/s   (2) 6 m/s   (3) zero   (4) 8.1 m/s

45. Moment of inertia of a uniform circular disc about a diameter is I. Its moment of inertia about an axis perpendicular to its plane and passing through a point on its rim will be–

(1) 5I

(2) 3I

(3) 6I

(4) 4I

46. A body of mass 250 gram is projected vertically upwards with velocity 6 ms^{-1}. If attains maximum height 1.5m. Work done by air resistance during upward motion of the body nearly equal to

(1) −1.25 J
(2) −0.75 J
(3) −0.675 J
(4) −1.125 J

47. A car moving with speed 30 m/s on a circular path of radius 500 m. Its speed is increasing at the rate of 2m/s^2. The acceleration of the car is :

(1) 9.8 m/s^2
(2) 1.8 m/s^2
(3) 2 m/s^2
(4) 2.7 m/s^2

48. Two tubes A and B are in series. Radius of A is R and that of B is 2R. If water flows through A with velocity υ then velocity of water through B is–

(1) $\dfrac{\upsilon}{2}$
(2) υ
(3) $\dfrac{\upsilon}{4}$
(4) $\dfrac{\upsilon}{8}$

49. In a game of tug of wars, a condition of equilibrium exists. Both the teams pull the rope with a force of 10^{4}N. The tension in the rope is

(1) 10^4 N
(2) 10^8 N
(3) 0 N
(4) 2 × 10^4 N

50. In a new system of unit, mass is measured in grams, distance in kilometer and time in minutes. The unit of force in new system is Hilton which of the following is correct ?

(1) 1 Hilton = 3600 newton
(2) 1 newton = 3600 Hilton
(3) 1 Hilton = 60 newton
(4) 1 newton = 60 Hilton

51. 100 N force can stretch a spring through 0.5 cm. Elastic potential energy stored in the spring when it is stretched through 2 cm will be equal to

(1) 200 J
(2) 4 J
(3) 2 J
(4) 4×10^{-2} J

52. The diameter of a flywheel increases by 1%. What will be percentage increase in moment of inertia about axis of symmetry–

(1) 2%
(2) 4%
(3) 1%
(4) 0.5%

53. If the radius of a solid sphere is 35 cm, calculate the radius of gyration when the axis is along a tangent–

(1) $7\sqrt{10}$ cm
(2) $7\sqrt{35}$ cm
(3) 7/5 cm
(4) 2/5 cm

54. For a particle in a non-uniform accelerated circular motion :

(1) velocity is radial and acceleration is transverse only

(2) velocity is transverse and acceleration is radial only

(3) velocity is radial and acceleration has both radial and transverse components

(4) velocity is transverse and acceleration has both radial and transverse components

55. An areoplane of mass 3×10^4 kg and total wing area of 120 m² is in a level flight at some height. The difference in pressure between the upper and lower surface of its wings, in kilo pascals is–

(1) 2.5   (2) 5.0   (3) 10.0   (4) 12.5

56. A body of mass 1 kg is moving with a uniform velocity of 1 m s⁻¹. If the value of g is 5 m s⁻², then the force acting on the frictionless horizontal surface on which the body is moving is

(1) 5 N   (2) 1 N   (3) 0 N   (4) 10 N

57. Which of the following function of A and B is possible if A and B possess different dimensions–

(1) $\dfrac{A}{e^{(A/B)}}$ (2) $\dfrac{B}{\log(A/B)}$ (3) $\dfrac{A}{B}$ (4) $\dfrac{B}{e^{A+B}}$

58. A body of moment of inertia of 3 kg m² rotating with an angular speed of 2 rad/s has the same kinetic energy as a mass of 12 kg moving with a speed of–

(1) 2 m/s   (2) 1 m/s   (3) 4 m/s   (4) 8 m/s

59. When a mass is rotating in a plane about a fixed axis, its angular momentum is directed along–

(1) The radius

(2) The tangent to the orbit

(3) The line at an angle of 45° to the plane of rotation

(4) The axis of rotation

60. Instantaneous position of a small object of unit mass is given by $\vec{r} = (t^2 - 2t)\hat{i} + (t^3 + 1)\hat{j}$ where r is in m and t is in s. At t = 2s, instantaneous power delivered by force acting on the object will be equal to

(1) 72 W   (2) 84 W   (3) 148 W   (4) 196 W

CHEMISTRY

This section contains **30 Multiple Choice Questions**. Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

61. Which of the following is having highest dipole moment
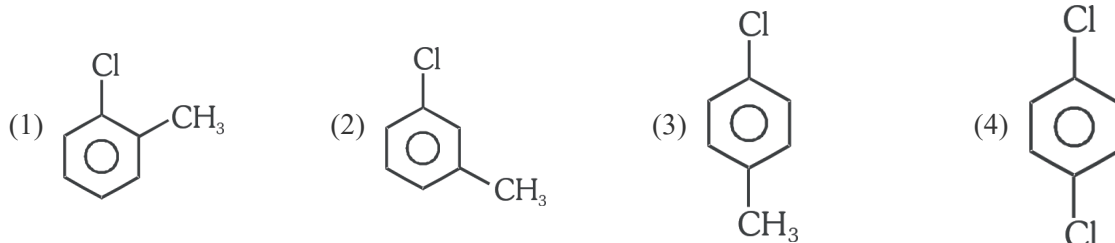
62. $\underset{(g)}{A} \rightleftharpoons \underset{(g)}{B} + \underset{(g)}{D}$ The amount of each A, B, D are 3 moles at equilibrium and the total pressure is 18 atm. The value of K_P will be

(1) 2 atm   (2) 18 atm   (3) 6 atm   (4) 9 atm

63. Which of the following can most easily form unipositive gaseous ion ?

(1) $1s^2\,2s^2\,2p^6\,3s^2$ (2) $1s^2\,2s^2\,2p^6\,3s^1$

(3) $1s^2\,2s^2\,2p^6\,3s^2\,3p^2$ (4) $1s^2\,2s^2\,2p^6\,3s^2\,3p^3$

64. The correct relation between K_{SP} and solubility for the salt $NaAl(SO_4)_2$ is

(1) $4S^3$ (2) $4S^4$ (3) $27S^4$ (4) $27S^3$
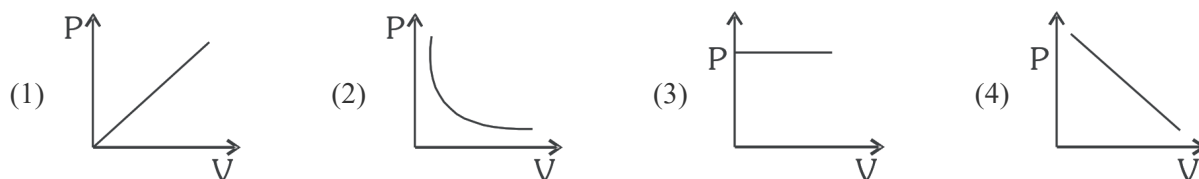
65. The side product of solvay process is

(1) CO_2 (2) $CaCl_2$ (3) NH_3 (4) $CaCO_3$

66. How much volume of oxygen will be required for complete combustion of 40ml of acetylene (C_2H_2) All volume are measured at NTP

(1) 40 mL   (2) 100 mL   (3) 80 mL   (4) 60 mL

67. Which of the following curve represents an isotherm?

68. In Heisenberg's uncertainty experiment incorrect statement is :-

(1) Use of high intensity light increases accuracy in the measurement of distance of electron from nucleus.

(2) Use of high frequency light increases accuracy in the measurement of distance of electron from the nucleus

(3) Use of long wavelength light increases accuracy in measurement of speed of electron

(4) If an experiment is designed to measure the distance of electron from nucleus, the speed measured in the same experiment would be highly imprecise.

69. Pi bond is formed :

(1) by transference of electrons

(2) by the overlapping of atomic orbitals on the axis of nuclei

(3) by sidewise overlapping of half filled p-orbitals

(4) by overlapping of s-orbitals with p-orbitals.

70. $A_{(s)} + 2B_{(g)} \rightleftharpoons C_{(g)}$.

For the above equilibrium relation between K_P and K_C is.

(1) $K_P = K_C (RT)$ (2) $K_P = K_C (RT)^2$ (3) $K_P = \dfrac{K_C}{RT}$ (4) $K_C = K_P$

71. In which of the compounds 'Cr' shows maximum radius.

(1) CrO (2) Cr_2O_3 (3) $K_2Cr_2O_7$ (4) $K_3[Cr(Cl)_6]$

72. What is the pH of the solution at half neutralization in the titration of 0.1 M HA (Weak acid) with 0.1 NaOH ($K_{a(HA)} = 10^{-5}$)

(1) 5   (2) 10   (3) 9   (4) Zero

73. Which of the following is not true for the solution of sodium in ammonia

(1) It contains ammoniated electrons and ammoniated sodium ions

(2) It is conducting is nature

(3) Blue color of the solution is due to formation of sodium azide

(4) Conductivity is because of the ammoniated electrons

74. Find the mole fraction of H_2SO_4 present in a solution in which 98 gm of H_2SO_4 is present in 278 gm solution

(1) $\dfrac{1}{10}$ (2) $\dfrac{1}{11}$ (3) $\dfrac{1}{16.44}$ (4) 0.35

75. Which of the following graph is correct
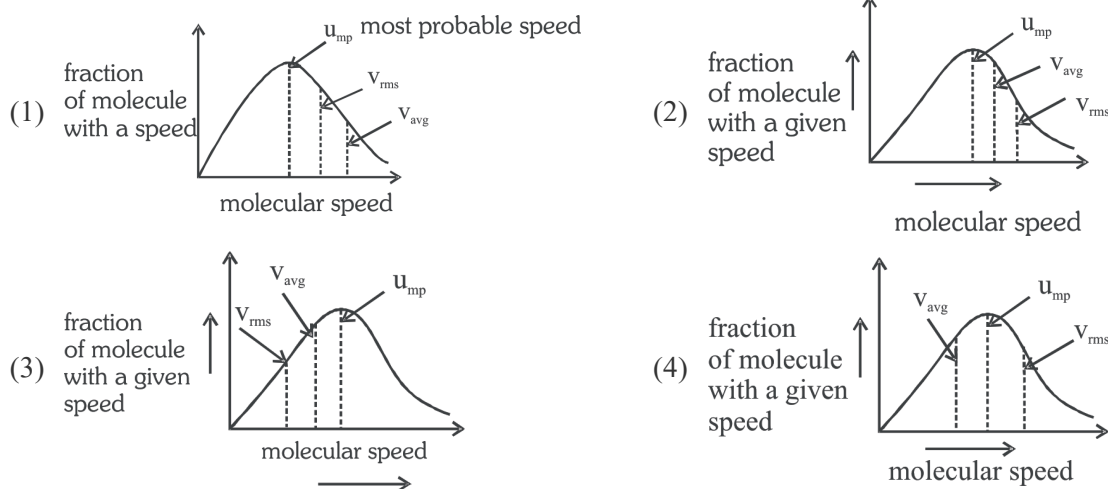
76. The ratio of time period taken by hydrogen electron in Bohr's 2nd and 3rd orbits for each revolution is

(1) $9:4$ (2) $4:9$ (3) $8:27$ (4) $27:8$

77. In which of the following process hybridisation of the central atom changes :

(1) $H_2O + H^+ \rightarrow H_3O^+$ (2) $NF_3 + F^+ \rightarrow NF_4^+$

(3) $BF_3 + F^- \rightarrow BF_4^-$ (4) $NH_3 + H^+ \rightarrow NH_4^+$

78. Which of the following represents the incorrect order of electronegativity?

(1) $C < N < O < F$ (2) $sp^3 < sp^2 < sp$

(3) $Fe < Fe^{2+} < Fe^{3+}$ (4) $I^- < Cl^- < Br^- < F^-$

79. The pH of 0.1 M solution of the following Increases in the order

(1) $KCl < NH_4Cl < KCN < HCl$

(2) $HCl < NH_4Cl < KCl < KCN$

(3) $KCN < NH_4Cl < KCl < HCl$

(4) $HCl < KCl < KCN < NH_4Cl$

80. What is the molality of 3M solution of NaCl having density 1.25 g/ml ?

(1) 3   (2) 2.79   (3) 3.25   (4) 4.25

81. If methane and helium are allowed to diffuse out of a container under identical conditions of temperature and pressure, the ratio of rate of diffusion of methane to helium is

(1) 4.0   (2) 2.0   (3) 1.0   (4) 0.5

82. this electronic configuration deviates from (I) Hund's rule, (II) Aufbau principle, (III) Pauli's exclusion principle.

(1) Only I, II   (2) Only I and III   (3) Only II and III   (4) Only II

83. The correct order of increasing ionic character is

(1) $BeCl_2 < MgCl_2 < CaCl_2 < BaCl_2$ (2) $BeCl_2 < MgCl_2 < BaCl_2 < CaCl_2$

(3) $BeCl_2 < BaCl_2 < MgCl_2 < CaCl_2$ (4) $BaCl_2 < CaCl_2 < MgCl_2 < BeCl_2$

84. Which curve does not represent Boyle's law?
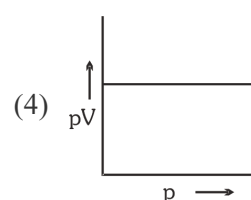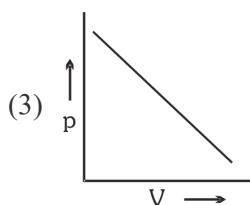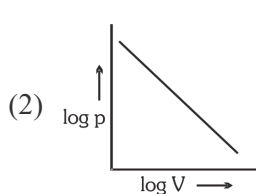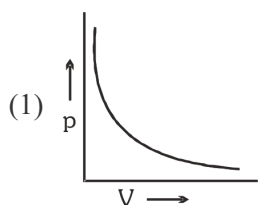
85. Time taken for an electron to complete one revolution in Bohr orbit of hydrogen atom is–

(1) $\dfrac{4\pi^2 mr^2}{nh}$

(2) $\dfrac{nh}{4\pi^2 mr}$

(3) $\dfrac{2\pi mr}{n^2 h^2}$

(4) $\dfrac{h}{2\pi mr}$

86. The octet rule is not valid for the molecule

(1) CO_2

(2) H_2O

(3) O_2

(4) NO

87. pH of 10^{-7}M HCl solution will be :

(1) 7

(2) 1

(3) 6.7

(4) 7.3

88. Which of following does not depend upon temperature

(1) Molarity

(2) Molality

(3) Normality

(4) % v/V

89. Two gaes A" and B" having pressure ratio 3:1, Molecular weight ratio 1:3 at same temperature then the ratio of density is ?

(1) 1 : 1

(2) 2 : 1

(3) 1 : 3

(4) 1 : 4

90. If the radius of first Bohr orbit is x pm, then the radius of the third orbit would be

(1) (3 × x) pm

(2) (6 × x) pm

(3) $\left(\dfrac{1}{2} \times x\right)$ pm

(4) (9 × x) pm

MATHEMATICS

This section contains **30 Multiple Choice Questions**. Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

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91. In the expansion of $\left(2x^2 - \dfrac{3}{x} \right)^{11}$, the coefficient of x^6 is

    (1) 0   (2) 2   (3) 11   (4) 4

92. If $|z_1| = 2, |z_2| = 3, |z_3| = 4$ and $|2z_1 + 3z_2 + 4z_3| = 9$, then value of $|8z_2 z_3 + 27 z_3 z_1 + 64 z_1 z_2|$ is equal to
    (where z_1, z_2, z_3 are complex numbers) :

    (1) 216   (2) 18   (3) 64   (4) 81

93. If r_1 and r_2 are the radii of smallest and largest circles which passes through (5, 6) and touches the circle $(x - 2)^2 + y^2 = 4$, then $r_1 r_2$ is :

    (1) $\dfrac{4}{41}$ (2) $\dfrac{41}{4}$ (3) $\dfrac{5}{41}$ (4) $\dfrac{41}{6}$

94. The number of integers n such that the quadratic equation $nx^2 + (n + 1)x + (n + 2) = 0$ has rational root is :

    (1) 0   (2) 1   (3) 2   (4) 3

95. Number of integral values of 'a' for which every solution of the inequality $x^2 + 1 > 0$ is also the solution of the inequality
    $(a - 1)x^2 - (a + |a - 1| + 2)x + 1 \geq 0$, is

    (1) 0   (2) 1   (3) 2   (4) 3

96. The complete set of real values of x, which satisfy the system of inequalities $|x+1| \leq 1$ and $|2x + 3| < 2$ simultaneously, is :

    (1) $\left[-2, -\dfrac{1}{2} \right)$ (2) $\left(-2, -\dfrac{1}{2} \right]$ (3) $\left(-\dfrac{5}{2}, -\dfrac{1}{2} \right)$ (4) (–2, 0]

97. Given $b = 2, c = \sqrt{3}, \angle A = 30°$, then the in-radius of $\triangle ABC$ is

    (1) $\dfrac{\sqrt{3} - 1}{2}$ (2) $\dfrac{\sqrt{3} + 1}{2}$ (3) $\dfrac{\sqrt{3} - 1}{4}$ (4) $\dfrac{\sqrt{3} + 1}{4}$

98. If $a_1, a_2, \ldots\ldots a_{300}$ are in Arithmetic progression such that $\displaystyle\sum_{n=1}^{100} a_{3n} = 200$ & $\displaystyle\sum_{n=1}^{100} a_{3n-2} = 100$, then a_1 is :

    (1) $-\dfrac{95}{4}$ (2) $-\dfrac{297}{4}$ (3) –73   (4) –74

99. Sum of the 8 terms of the series $\dfrac{3}{1^2} + \dfrac{5}{1^2 + 2^2} + \dfrac{7}{1^2 + 2^2 + 3^2} + \ldots$ is :

    (1) $\dfrac{16}{9}$ (2) $\dfrac{32}{9}$ (3) $\dfrac{16}{3}$ (4) $\dfrac{64}{9}$

100. If the line, $y = \sqrt{3}\,x$ cut the curve $x^3 + y^3 + 3xy + 5x^2 + 3y^2 + 4x + 5y - 1 = 0$ at the points A, B, C then OA . OB . OC is : (where 'O' is origin)

(1) $\dfrac{4}{13}(3\sqrt{3} - 1)$ (2) $3\sqrt{3} + 1$ (3) $\dfrac{2}{\sqrt{3}} + 7$ (4) $3\sqrt{3} + 2$

101. If $\sin\theta + \operatorname{cosec}\theta = 2$ then value of $\sin^{10}\theta + \operatorname{cosec}^{10}\theta$ is :

(1) 1 (2) 2 (3) 2^5 (4) 2^{10}

102. If sum of the coefficient of the first, second and third terms of the expansion of $\left(x^2 + \dfrac{1}{x}\right)^m$, $m \in N$ is 46, then the coefficient of the term that does not contain x, is :

(1) 84 (2) 92 (3) 98 (4) 106

103. If z_1, z_2, z_3 are 3 distinct complex numbers such that $\dfrac{3}{|z_2 - z_3|} = \dfrac{4}{|z_3 - z_1|} = \dfrac{5}{|z_1 - z_2|}$, then the value of $\dfrac{9}{z_2 - z_3} + \dfrac{16}{z_3 - z_1} + \dfrac{25}{z_1 - z_2}$ equals :

(1) 0 (2) 3 (3) 4 (4) 5

104. Three circles each of radius 3 are drawn with centers at (0, 16), (3,0) and (5,8). A line of slope m passing through (3,0) is such that the total area of the part of the three circles to one side of the line is equal to the total area of the part of the three circles to the other side of it. Then $\left|\dfrac{m}{8}\right|$ is equal to:

(1) 1 (2) 2 (3) 3 (4) 4

105. The number of values of 'k' for which $(16x^2 + 12x + 39) + k(9x^2 - 2x + 11)$ is a perfect square with rational coefficients-

(1) 2 (2) 0 (3) 1 (4) Infinite

106. If x is an integer satisfying $3x + 8 > 2$ then least possible value of x is :

(1) 0 (2) –2 (3) –1 (4) 1

107. In a $\triangle ABC$, $A = \dfrac{2\pi}{3}$, $b - c = 3\sqrt{3}$ cm and ar $(\triangle ABC) = \dfrac{9\sqrt{3}}{2}$ cm^2. Then a is

(1) $6\sqrt{3}$ cm (2) 9 cm (3) 18 cm (4) $3\sqrt{6}$ cm

108. The sum $\displaystyle\sum_{n=1}^{\infty} \dfrac{1}{n^2 + 2n}$ equals :

(1) $\dfrac{1}{2}$ (2) $\dfrac{2}{3}$ (3) $\dfrac{3}{4}$ (4) 1

109. Consider line L which is perpendicular to the line $2x + 3y = 5$ and passes through the point (3, 1). It's x intercept is

(1) $\dfrac{7}{3}$ (2) $\dfrac{7}{2}$ (3) 1 (4) $\dfrac{3}{2}$

110. Minimum value of the expression $4\sec^2\theta + \operatorname{cosec}^2\theta$ is :

(1) 4 (2) 5 (3) 9 (4) 11

111. If ω is an imaginary cube root of unity, then $(1 + \omega - \omega^2)^7$ equals

(1) $128\,\omega$ (2) $-128\,\omega$ (3) $128\,\omega^2$ (4) $-128\,\omega^2$

112. The number of common tangents of the circles $(x + 2)^2 + (y - 2)^2 = 49$ and $(x - 2)^2 + (y + 1)^2 = 4$ is

(1) 0   (2) 1   (3) 2   (4) 3

113. If in a ΔABC, $\dfrac{2\cos A}{a} + \dfrac{\cos B}{b} + \dfrac{2\cos C}{c} = \dfrac{a}{bc} + \dfrac{b}{ac}$, then angle A equals to

(1) 90º   (2) 45º   (3) 135º   (4) 120º

114. In the expansion of $\left(\dfrac{x + 1}{x^{\frac{2}{3}} - x^{\frac{1}{3}} + 1} - \dfrac{x - 1}{x - x^{\frac{1}{2}}} \right)^{10}$, the term which does not contain x is :

(1) $^{10}C_0$ (2) $^{10}C_7$ (3) $^{10}C_4$ (4) $^{10}C_5$

115. If z_1, z_2, z_3 are vertices of a triangle in argand plane such that $|z_1 - z_2| = |z_1 - z_3|$, then $\arg\left(\dfrac{2z_1 - z_2 - z_3}{z_3 - z_2} \right)$ is :

(1) $\pm\dfrac{\pi}{3}$ (2) 0   (3) $\pm\dfrac{\pi}{2}$ (4) $\pm\dfrac{\pi}{6}$

116. If the circle $C_1 : x^2 + y^2 = 16$ intersects another circle C_2 of radius 5 in such a manner that the common chord is of maximum length and has a slope equal to $\dfrac{3}{4}$, then the co-ordinates of the centre of C_2 are

(1) $\left(\dfrac{9}{5}, \dfrac{12}{5} \right)$ (2) $\left(\dfrac{12}{5}, \dfrac{9}{5} \right)$ (3) $\left(-\dfrac{9}{5}, -\dfrac{12}{5} \right)$ (4) $\left(-\dfrac{12}{5}, \dfrac{9}{5} \right)$

117. Find the smallest natural number x which satisfies the inequality $\dfrac{2(x - 4)}{(x - 1)(x - 7)} \geqslant \dfrac{1}{x - 2}$.

(1) 8   (2) 10   (3) 11   (4) 6

118. If $\dfrac{1 - \cos A}{1 + \cos A} + \dfrac{1 - \cos B}{1 + \cos B} + \dfrac{1 - \cos C}{1 + \cos C} = 1$ where A, B, C are angles of triazngle ABC and its side AB $\in \{1, 2, 3\}$, then the number of such triangle(s) is :

(1) 1   (2) 3   (3) 9   (4) infinite

119. Let A $\equiv$ (4, 4), B $\equiv$ (8, 4), C $\equiv$ (4, 8). If P, Q, R are the midpoint of sides AB, BC & CA respectively & (α, β) be the co-ordinates of orthocentre of ΔPQR, then the value of $\alpha + \beta$ is :

(1) 8   (2) 6   (3) 12   (4) 16

120. Let x = sin 1º, then the value of the expression $\dfrac{1}{\cos 0^\circ \cos 1^\circ} + \dfrac{1}{\cos 1^\circ \cos 2^\circ} + \ldots + \dfrac{1}{\cos 44^\circ \cos 45^\circ}$ is equal to :

(1) x   (2) $\dfrac{1}{x}$ (3) $\dfrac{\sqrt{2}}{x}$ (4) $\dfrac{x}{\sqrt{2}}$

BIOLOGY

This section contains **30 Multiple Choice Questions**. Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

121. Phase of cell cycle when DNA polymerase is active

    (1) G_1 - phase   (2) S - phase   (3) G_2 - phase   (4) M - phase

122. Consider the percentage weight of elements in Earth crust and find out the **incorrect** match –

    (1) Calcium – 3.6 %   (2) Carbon – 0.03 %

    (3) Oxygen – 18.5 %   (4) Silicon – 27.7 %

123. Which of the following is given as a gift in Japan?

    (1) *Euplectella*   (2) *Euspongia*   (3) *Spongilla*   (4) *Euglena*

124. Phylogeny refers to

    (1) Natural classification   (2) Environmental history

    (3) Evolutionary history   (4) Origin of life

125. Which of the following statement is not correct about bryophyta

    (1) Thallus of riccia is monoecious   (2) Thallus of marchantia is dioecious.

    (3) Bryophytes are tracheophytes   (4) Bryophytes are first archegoniates.

126. Match the following–

	Column I		Column II
a.	Brush bordered cuboidal epithelium	(i)	Cornea of eye
b.	Pseudostratified columnar ciliated epithelium	(ii)	Mammary glands
c.	Non-keratinised stratified squamous epithelium	(iii)	PCT
d.	Myoepithelium	(iv)	Trachea and large bronchi

    (1) a-(ii), b-(i), c-(iv), d-(iii)   (2) a-(i), b-(iv), c-(ii), d-(iii)

    (3) a-(iii), b-(iv), c-(i), d-(ii)   (4) a-(iii), b-(ii), c-(i), d-(iv)

127. Longest phase of cell cycle is

    (1) G_1 phase   (2) S phase   (3) G_2 phase   (4) Prophase

128. The protein which enables glucose transport into cells is–

   (1) Collagen   (2) Trypsin   (3) Insulin   (4) GLUT–4

129. Which one of the following is a correct matching pair of a body feature with the animal possessing it?

    (1) Ventral central nervous system – Leech

    (2) Pharyngeal gill slits absent in embryo – *Chameleon*

    (3) Ventral heart – *Scorpion*

    (4) Post-anal tail-*Octopus*

130. Who is regarded as "Darwin of 20th century"

    (1) John Ray   (2) Lamarck   (3) Ernst Mayer   (4) Darwin

131. Prothallus is gametophyte in

    (1) Moss   (2) Liverworts   (3) Ferns   (4) Conifers
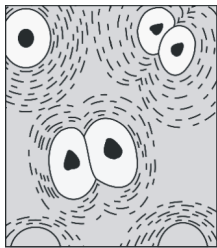
132.

The false fact about above diagram is–

    (1) Matrix is solid and non-pliable   (2) Cells are chondrocytes

    (3) Mostly are replaced by bones   (4) Found at tip of nose

133. Movement of the chromosomes towards the spindle equator (equatorial plate) occurs during

    (1) Anaphase   (2) Metaphase   (3) Prophase   (4) Anaphase-I

134. Match Column–I and Column II for average composition of cell.

	Column–I		Column–II
(i)	Water	(a)	10–15%
(ii)	Protein	(b)	70–90%
(iii)	Carbohydrate	(c)	5–7%
(iv)	Lipids	(d)	2%
(v)	Nucleic acids	(e)	3%

    (1) (i)–b, (ii)–a, (iii)–d, (iv)–e, (v)–c   (2) (i)–b, (ii)–a, (iii)–e, (iv)–d, (v)–c

    (3) (i)–b, (ii)–e, (iii)–a, (iv)–d, (v)–c   (4) (i)–e, (ii)–b, (iii)–a, (iv)–d, (v)–c

135. Which of these fishes eradicates the mosquito larvae?

    (1) Cuttle fish   (2) *Anabas*   (3) *Gambusia*   (4) *Rohu*

136. Choose incorrect statement

(1) Keys are generally analytical in nature

(2) Each statement in the key is called a lead

(3) The keys are based on the contrasting characters

(4) They are useful in providing information for identification of names of species found in an area.

137. Green filamentous juvenile gametophyte of *Funaria* is

(1) Protonema   (2) Sporangium   (3) Prothallus   (4) Strobilus

138. Mosaic vision is with -

(1) more sensitivity but less resolution   (2) more sensitivity but more resolution

(3) less sensitivity but less resolution   (4) less sensitivity but more resolution

139. When are dyad of chromosomes first clearly visible in meiosis

(1) Zygotene   (2) Diplotene   (3) Pachytene   (4) Diakinesis

140. Which one is incorrect match?

(1) Alkaloids – Morphine   (2) Toxins – Ricin

(3) Lectins – Curcumin   (4) Pigments – Anthocyanin

141.

Identify the animal shown in above figure and find the correct statement from following option about the animal–

(a) Mouth is located ventrally.

(b) Notochord is persistent throughout life.

(c) Gill slits are separate and with operculum.

(d) Commonly called sting ray.

(e) Possess poison stings.

(1) a only   (2) a, b   (3) a, b, c   (4) a, b, c, d, e

142. Full form of ICNB

(1) International code of Biological Nomenclature

(2) International code of Botanical Nomenclature

(3) International code of Nomenclature for bacteria

(4) International code for Biological Nomenclature.

143. Seed habit first time developed in

(1) Homosporous pteridophytes   (2) Heterosporous pteridophytes

(3) Dicots   (4) Monocots

144. Where is the following epithelium shown is present in the human body?
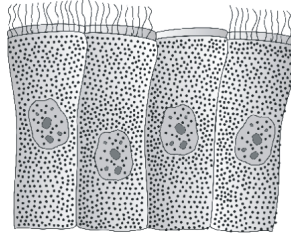
(1) Ducts of glands and proximal convoluted tubule of nephron in kidney

(2) Lining of stomach and thyroid follicles

(3) Bronchioles and fallopian tubes

(4) Wall of blood vessels and urinary bladder

145. Identify the phase of mitosis from given diagrams :-
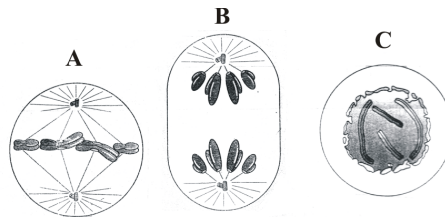
	A	B	C
(1)	Metaphase	Telophase	Prophase
(2)	Metaphase	Telophase	Anaphase
(3)	Metaphase	Anaphase	Prophase
(4)	Metaphase	Anaphase	Telophase

146. Macromolecule chitin is–

(1) Simple polysaccharide

(2) Sulphur containing polysaccharide

(3) Nitrogen containing polysaccharide

(4) Phosphorus containing polysaccharide

147. Find the incorrect match–

(1) *Carcharodon* – Great white shark

(2) *Clarias* – Magur

(3) *Betta* – Fighting fish

(4) *Hippocampus* – River horse

148. In hierarchy of classification order is present between

(1) Family and genus

(2) Phylum and kingdom

(3) Family and class

(4) Family and species

149. Agar-agar is commercially extracted from which of the following algae

(1) *Fucus*

(2) *Sargassum*

(3) *Gelidium*

(4) *Ulothrix*

150. Brush bordered cuboidal epithelium is present in–

(1) Intestine

(2) Proximal convoluted tubule

(3) Duodenum

(4) Gall bladder

ASAT CLASS-XII

SAMPLE PAPER ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A.	4	3	1	3	1	1	2	4	3	1	4	3	4	2	4	1	4	3	3	3
Q.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
A.	3	3	3	1	3	3	2	1	3	3	2	2	1	1	4	2	3	4	1	1
Q.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
A.	2	2	1	2	3	2	4	3	1	2	2	1	2	4	1	1	3	2	4	3
Q.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
A.	3	3	2	2	2	2	2	1	3	3	1	1	3	2	2	3	3	4	2	2
Q.	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
A.	4	4	1	3	1	4	3	2	1	4	1	1	2	3	1	1	1	1	3	1
Q.	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
A.	2	1	1	3	2	3	2	3	1	3	4	2	1	3	3	2	1	2	3	2
Q.	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
A.	2	3	1	3	3	3	1	4	1	3	3	1	2	2	3	4	1	1	1	3
Q.	141	142	143	144	145	146	147	148	149	150
A.	2	3	2	3	3	3	4	3	3	2