Do not open this Test Booklet until you are asked to do so

1. A seat marked with Reg. No. will be allotted to each student. The student should ensure that he/she occupies the correct seat only. If any student is found to have occupied the seat of another student, both the students shall be removed from the examination and shall have to accept any other penalty imposed upon them.

2. Duration of Test is 3 Hours and Questions Paper Contains 180 Questions. The Max. Marks are 720.

3. Student can not use log tables and calculators or any other material in the examination hall.

4. Student must abide by the instructions issued during the examination, by the invigilators or the centre incharge.

5. Before attempting the question paper ensure that it contains all the pages and that no question is missing.

6. Each correct answer carries 4 marks, while 1 mark will be deducted for every wrong answer. Guessing of answer is harmful.

7. A candidate has to write his / her answers in the OMR sheet by darkening the appropriate bubble with the help of Blue / Black Ball Point Pen only as the correct answer(s) of the question attempted.

8. Use of Pencil is strictly prohibited.

Note: In case of any Correction in the test paper, please mail to dlpcorrections@allen.ac.in within 2 days along with Paper code and Your Form No.
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| PHYSICS : | Basic Mathematics used in Physics, Vectors, Units, Dimensions and Measurement |
|           | Kinematics (Motion along a straight line and Motion in a plane)               |
|           | Laws of Motion and Friction                                                  |
|           | Work, Energy & Power and Circular Motion, Rotational Motion                   |
|           | Conservation Laws and Collisions, Centre of Mass                             |

| CHEMISTRY : | Some Basic Concept of Chemistry |
|             | Structure of Atom               |
|             | States of Matter: Gases and Liquids                                         |
|             | Thermodynamics                  |
|             | Equilibrium (Chemical Equilibrium & Ionic Equilibrium)                      |
|             | Solid State                     |
|             | Solutions                       |

| BIOLOGY : | Diversity in the Living World : (i) The living world |
|           | (ii) Biological Classification (iii) Plant Kingdom |
|           | (iv) Animal Kingdom               |
|           | Structural Organisation in Plants & Animals : |
|           | (i) Morphology of Flowering plants (ii) Anatomy of Flowering Plants (iii) Structural Organisation in Animals, Cockroach |
|           | Structure and Functions : (i) Cell : The Unit of Life |
|           | (ii) Biomolecules (Protoplasm) (iii) Cell cycle and Cell Division |
1. The average value of alternating current \( I = I_0 \sin \omega t \) in time interval \( \left[ 0, \frac{\pi}{\omega} \right] \) is :-

\[
(1) \frac{2I_0}{\pi} \quad (2) 2I_0 \quad (3) \frac{4I_0}{\pi} \quad (4) \frac{I_0}{\pi}
\]

2. A parachutist drops freely from an aeroplane for 10s before the parachute opens out. Then he descends with a net retardation of 2.5 m/s\(^2\). If he bails out of the plane at a height of 2495 m and \( g = 10 \) m/sec\(^2\), his velocity on reaching the ground will be :

\[
(1) 5 \text{ m/s} \quad (2) 10 \text{ m/s} \\
(3) 15 \text{ m/s} \quad (4) 20 \text{ m/s}
\]

3. System shown in figure is in equilibrium and at rest. The spring and string are massless, now the string is cut. The acceleration of mass 2m and m just after the string is cut will be :

\[
(1) \frac{g}{2} \text{ upwards, } g \text{ downwards} \\
(2) g \text{ upwards, } \frac{g}{2} \text{ downwards} \\
(3) g \text{ upwards, } 2g \text{ downwards} \\
(4) 2g \text{ upwards, } g \text{ downwards}
\]

4. A body of mass 200 gram is moving along XY plane. Work performed by the force given by \( \vec{F} = (2x\hat{i} + y\hat{j}) \) acting on it when the body gets displaced from (0, 0) to (1, 2) will be equal to

\[
(1) 3 \text{ unit} \quad (2) 6 \text{ unit} \\
(3) 5 \text{ unit} \quad (4) 1.5 \text{ unit}
\]
5. Three particles each of mass \( m \) are located at the vertices of an equilateral triangle \( ABC \). They start moving with equal speeds \( \mathbf{v} \) each along the medians of the triangle and collide at its centroid \( G \). If after collision, \( A \) comes to rest and \( B \) retraces its path along \( GB \), then \( C \)
   (1) also comes to rest
   (2) moves with a speed \( \mathbf{v} \) along \( CG \)
   (3) moves with a speed \( \mathbf{v} \) along \( BG \)
   (4) moves with a speed along \( AG \)

6. If \( y = 3 \sin x + 4 \cos x \) then find the maximum value of \( y \)
   (1) \(-5\)  (2) \(+5\)  (3) \(7\)  (4) \(1\)

7. Velocity-time graph corresponding to displacement-time graph shown in fig.

8. What is the maximum value of the force \( F \) such that the block shown in the arrangement, does not move:
   (1) 20 N  (2) 10 N
   (3) 12 N  (4) 15 N
9. A motorcycle is going on an overbridge of radius $R$. The driver maintains a constant speed. As the motorcycle is ascending on the overbridge, the normal forces on it is–
   (1) Increasing (2) Decreases (3) Remains the same (4) Fluctuates

10. The centre of mass of two particles lies
   (1) on the line perpendicular to the line joining the particles
   (2) on a point outside the line joining the particles
   (3) on the line joining the particles.
   (4) none of the above

11. The equation of the stationary wave is:
$$y = 2A \sin \left( \frac{2\pi ct}{\lambda} \right) \cos \left( \frac{2\pi x}{\lambda} \right).$$
Which statement is not true?
   (1) The unit of $ct$ is same as that of $\lambda$.
   (2) The unit of $x$ is same as that of $\lambda$.
   (3) The unit of $2\pi c/\lambda$ is same as that of $2\pi x/\lambda t$.
   (4) The unit of $c/\lambda$ is same as that of $x/\lambda$.

12. A body dropped from the top of a tower clears 7/16th of the total height of the tower in its last second of flight. The time taken by the body to reach the ground is:
   (1) 2 s (2) 3 s (3) 4 s (4) 5 s

13. In figure shown, both blocks are released from rest. The time to cross each other is
   (1) 2 second (2) 3 second (3) 1 second (4) 4 second

14. A particle of mass $m$ describes a circle of radius $r$. The centripetal acceleration of the particle is $\frac{4}{r^2}$. What will be the momentum of the particle?
   (1) $2mr$ (2) $2m/\sqrt{r}$ (3) $4m/\sqrt{r}$ (4) $4m/r$
15. A solid sphere of mass M, radius R and having moment of inertia about an axis passing through the centre of mass as I, is recast into a disc of thickness t, whose moment of inertia about an axis passing through its edge and perpendicular to its plane remains I. Then, radius of the disc will be:

(1) \( \frac{2R}{\sqrt{15}} \)  
(2) \( \frac{R}{4} \)  
(3) \( \frac{4R}{\sqrt{15}} \)  
(4) \( \frac{2R}{15} \)

16. The frequency of vibration of a string is given by:

\[ v = \frac{P \sqrt{\frac{F}{l^2}}}{m} \]

Here \( p \) is the number of segments in which the string is divided, \( F \) is the tension in the string and \( l \) is its length. The dimensional formula for \( m \) is:

(1) \([M^0L^0T^0]\)  
(2) \([M^1L^{-1}T^0]\)  
(3) \([M^0L^0T^{-1}]\)  
(4) \([M^0L^1T^{-1}]\)

17. If a stone is released from a balloon rising with acceleration \( a \) at the instant when its velocity is \( v \), then immediately after release, the acceleration and velocity of the stone are:

(1) \( a \) (upward), \( v \) (upward)  
(2) \( g \) (upward), \( v \) (upward)  
(3) \( g \) (downward), \( v \) (upward)  
(4) \( g - a \) (downward), \( v \) (upward)

18. A spring of force constant \( k \) is cut in two parts at its one third length. When both the parts are stretched by same amount, the work done in the two parts, will be

(1) equal in both  
(2) greater for the longer part  
(3) greater for the shorter part  
(4) data insufficient.

19. An insect crawls up a hemispherical surface very slowly (see figure). The coefficient of friction between the insect and the surface is 1/3. If the joining the centre of the hemispherical surface to the insect makes an angle \( \alpha \) with the vertical, the maximum possible value of \( \alpha \) is given by–

(1) \( \cot \alpha = 3 \)  
(2) \( \tan \alpha = 3 \)  
(3) \( \sec \alpha = 3 \)  
(4) \( \cosec \alpha = 3 \)
20. A thin uniform rod of length \( \ell \) and mass \( m \) is swinging freely about a horizontal axis passing through its end. Its maximum angular speed is \( \omega \). Its centre of mass rises to a maximum height of:

(1) \( \frac{1}{3} \ell^2 \omega^2 \frac{1}{g} \)
(2) \( \frac{1}{6} \ell \omega \frac{1}{g} \)
(3) \( \frac{1}{2} \ell^2 \omega^2 \frac{1}{g} \)
(4) \( \frac{1}{6} \ell^2 \omega^2 \frac{1}{g} \)

21. The length of a cylinder is measured with a metre rod having least count 0.1 cm. Its diameter is measured with Vernier callipers having least count 0.01 cm. Given that length is 5.0 cm and radius is 2.0 cm. The percentage error in the calculated value of the volume will be:

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

22. Figure shows four paths for a kicked football. Ignoring the effects of air on the flight, rank the paths according to initial horizontal velocity component, highest first:

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

23. A block of mass \( M \) is kept on a platform which starts accelerating upwards from rest with a constant acceleration \( a \). During the time interval \( T \) the work done by contact force on mass \( M \) is:

(1) \( \frac{1}{2} Ma^2T^2 \)  
(2) zero  
(3) \( \frac{1}{2} M(g+a)aT^2 \)  
(4) \( -MgaT^2 \)
24. A car is moving at a speed of 40 m/s on a circular track of radius 400 m. This speed is increasing at the rate of 3 m/s$^2$. The acceleration of car is–
(1) 4 m/s$^2$
(2) 7 m/s$^2$
(3) 5 m/s$^2$
(4) 3 m/s$^2$

25. A thin rod of length $L$ and mass $M$ is bent at its mid-point into two halves so that the angle between them is 90°. The moment of inertia of the bent rod about an axis passing through the bending point and perpendicular to the plane defined by the two halves of the rod is :
(1) $\frac{ML^2}{6}$
(2) $\frac{2\sqrt{2}ML^2}{24}$
(3) $\frac{ML^2}{24}$
(4) $\frac{ML^2}{12}$

26. If $\vec{a} = 3\hat{i} + 4\hat{j}$ & $\vec{b} = 7\hat{i} + 24\hat{j}$ then find the vector having the same magnitude as $\vec{b}$ and same direction as $\vec{a}$ is ____________.
(1) $15\hat{i} + 25\hat{j}$
(2) $14\hat{i} + 20\hat{j}$
(3) $10\hat{i} + 20\hat{j}$
(4) $15\hat{i} + 20\hat{j}$

27. The equation of projectile is $y = 16x - \frac{5x^2}{4}$. The horizontal range is :
(1) 16 m
(2) 8 m
(3) 3.2 m
(4) 12.8 m

28. A particle is made to move from the origin in three spells of equal distances, first along the x-axis, second parallel to y-axis and third parallel to z-axis. One of the forces acting on it is has constant magnitude of 50 N and always acts along the direction of motion. Work done by this force in the three spells of motion are equal and total work done in all the three spells is 300 J. The final coordinates of the particle will be :-
(1) (2, 2, 2) m
(2) (4, 4, 4) m
(3) (6, 6, 6) m
(4) (10, 10, 10) m
29. Six steel balls of identical size are lined up long a straight frictionless groove. Two similar balls moving with a speed \( V \) along the groove collide with this row on the extreme left hand then-

(1) all the balls will start moving to the right with speed \( \frac{V}{8} \) each  
(2) all the six balls initially at rest will move on with speed \( \frac{V}{6} \) each and two identical balls will come to rest  
(3) two balls from the extreme right end will move on with speed \( V \) each and the remaining balls will remain at rest  
(4) one ball from the right end will move on with speed \( 2V \), the remaining balls will be at rest.

30. A T-shaped object of uniform thickness & same material with dimensions shown in the figure, is lying on a smooth floor. A force \( \vec{F} \) is applied at the point \( P \) parallel to \( AB \), such that the object has only the translation motion without rotation. Find the location of \( P \) with respect to \( C \) :

(1) \( \frac{4 \ell}{3} \)  
(2) \( \ell \)  
(3) \( \frac{2 \ell}{3} \)  
(4) \( \frac{3 \ell}{2} \)

31. A particle is moving with speed 6 m/s along the direction of \( \vec{A} = 2 \hat{i} + 2 \hat{j} - \hat{k} \), then its velocity is :

(1) \( 4 \hat{i} + 2 \hat{j} - 4 \hat{k} \) units  
(2) \( 4 \hat{i} + 4 \hat{j} - 2 \hat{k} \) units  
(3) \( 4 \hat{i} + 4 \hat{j} - 4 \hat{k} \) units  
(4) \( 2 \hat{i} + 4 \hat{j} - 2 \hat{k} \) units
32. A body of mass $m_1$ exerts a force on another body of mass $m_2$. If the magnitude of acceleration of $m_2$ is $a_2$, then the magnitude of the acceleration of $m_1$ is (considering only two bodies in space)

(1) Zero  (2) $\frac{m_2 a_2}{m_1}$  (3) $\frac{m_1 a_2}{m_2}$  (4) $a_2$

33. A position dependent force $F$ acting on a particle and its force-position curve is shown in the figure. Work done on the particle, when its displacement 0 to 5 m is :-

(1) 35 J  (2) 25 J  (3) 15 J  (4) 5 J

34. A stationary body of mass $m$ gets exploded in 3 parts having mass in the ratio of 1 : 3 : 3. Its two fractions having equal mass moving at right angle to each other with velocity of 15 m/sec. Then the velocity of the third body is -

(1) $45 \sqrt{2}$ m/sec  (2) 5m/sec

(3) $5 \sqrt{32}$ m/sec  (4) none of these

35. A solid sphere rolls down without slipping on a 30º inclined plane. If $g = 10$ m/s², the acceleration of the rolling sphere is:

(1) 5 m s⁻²  (2) $\frac{7}{25}$ m s⁻²

(3) $\frac{25}{7}$ m s⁻²  (4) $\frac{15}{7}$ m s⁻²

36. The resultant of $\bar{A}$ and $\bar{B}$ makes an angle $\alpha$ with $\bar{A}$ and $\beta$ with $\bar{B}$,

(1) $\alpha < \beta$  (2) $\alpha < \beta$ if $A < B$

(3) $\alpha < \beta$ if $A > B$  (4) $\alpha < \beta$ if $A = B$
37. Three forces start acting simultaneously on a particle moving with velocity \( \vec{v} \). These forces are represented in magnitude and direction by the three sides of a triangle ABC (as shown). The particle will now move with velocity-

(1) Less than \( \vec{v} \)

(2) greater than \( \vec{v} \)

(3) \( |\vec{v}| \) in the direction of largest force BC

(4) \( \vec{v} \), remaining unchanged

38. In the figure shown all the surfaces are frictionless, and mass of the block 'm' is 1 kg. The block and wedge are held initially at rest. Now wedge is given a horizontal acceleration of 5 m/s\(^2\) by applying a force on the wedge, so that the block does not slip on the wedge. Then work done by the normal force in ground frame on the block in 2 sec is :

(1) 30 J  (2) 50 J  (3) 100 J  (4) 150 J

39. Two particles whose masses are 10 kg and 30 kg and their position vectors are \( \hat{i} + \hat{j} + \hat{k} \) and \( -\hat{i} - \hat{j} - \hat{k} \) respectively would have the centre of mass at -

(1) \( \frac{\hat{i} + \hat{j} + \hat{k}}{2} \)

(2) \( \frac{\hat{i} + \hat{j} + \hat{k}}{2} \)

(3) \( \frac{\hat{i} + \hat{j} + \hat{k}}{4} \)

(4) \( \frac{\hat{i} + \hat{j} + \hat{k}}{4} \)

40. A loop rolls down on an inclined plane. The fraction of its total kinetic energy that is associated with the rotational motion is:

(1) 1 : 2  (2) 1 : 3  (3) 1 : 4  (4) 2 : 3
41. The distance travelled by a particle is directly proportional to \( t^{1/2} \), where \( t \) = time elapsed. What is the nature of motion?
   (1) Increasing acceleration
   (2) Decreasing acceleration
   (3) Increasing retardation
   (4) Decreasing retardation

42. If block A is moving with an acceleration of 5 m/s\(^2\), the acceleration of B w.r.t. ground is:
   (1) 5 m/s\(^2\)
   (2) \( 5\sqrt{2} \) m/s\(^2\)
   (3) \( 5\sqrt{5} \) m/s\(^2\)
   (4) 10 m/s\(^2\)

43. A uniform chain (mass M, length L) is released from rest from a smooth horizontal surface as shown in the figure. Velocity of the chain at the instant it completely comes out of the table will be:
   (1) \( V = \sqrt{gL} \)
   (2) \( V = \sqrt{\frac{3gL}{4}} \)
   (3) \( V = \frac{1}{2}\sqrt{5gL} \)
   (4) \( V = \frac{1}{2}\sqrt{gL} \)

44. Two blocks of masses 10 kg and 4 kg are connected by a spring of negligible mass and placed on a frictionless horizontal surface. An impulse gives a velocity of 14 m/s to the heavier block in the direction of the lighter block. The velocity of the centre of mass is:
   (1) 30 m/s
   (2) 20 m/s
   (3) 10 m/s
   (4) 5 m/s

45. A solid sphere, a hollow sphere and an ring are released from top of an inclined plane (frictionless) so that they slide down the plane. Then maximum acceleration down the plane is for (no rolling):
   (1) solid sphere
   (2) hollow sphere
   (3) ring
   (4) all same
46. On the basis of Bohr's model, the radius of 3rd orbit is:
   (1) Equal to the radius of first orbit
   (2) Three times the radius of first orbit
   (3) Nine times the radius of first orbit
   (4) Five times the radius of first orbit

47. At Boyle's temperature, compressibility factor Z for a real gas is
   (1) Z = 0
   (2) Z = 1
   (3) Z > 1
   (4) Z < 1

48. If liquid A and B form ideal solution, then:
   (1) \( \Delta G_{\text{mix}} = 0 \)
   (2) \( \Delta H_{\text{mixing}} = 0 \)
   (3) \( \Delta G_{\text{mix}} = 0, \Delta S_{\text{mix}} = 0 \)
   (4) \( \Delta S_{\text{mix}} = 0 \)

49. Which of the following relation is incorrect:
   (1) \( K_p = \left( \frac{e^{\Delta G^o}}{RT} \right) \)
   (2) \( K_p = e^{-\frac{\Delta G^o}{RT}} \)
   (3) \( \Delta G^o = -2.303 \text{ RT} \log K_p \)
   (4) \( \log K_{eq} = \frac{-\Delta G^o}{2.303RT} \)

50. When 100 mL of 0.1 M NaCN solution is titrated with 0.1 M HCl solution the variation of pH of solution with volume of HCl added will be:

   (1) ![](graph1.png)
   (2) ![](graph2.png)
   (3) ![](graph3.png)
   (4) ![](graph4.png)

51. Fluoride ion is isoelectronic with:
   (1) Ne
   (2) \( O^{2-} \)
   (3) \( N^{3-} \)
   (4) All of these

52. Which of the following relation is incorrect:
   (1) \( G = K_p \frac{RT}{e^{\Delta G}} \)
   (2) \( G = K_p \frac{RT}{e^{\Delta G}} \)
   (3) \( \Delta G = -2.303 \text{ RT} \log K_p \)
   (4) \( \log K_{eq} = \frac{-\Delta G}{2.303RT} \)

53. When 100 mL of 0.1 M NaCN solution is titrated with 0.1 M HCl solution the variation of pH of solution with volume of HCl added will be:

   (1) ![](graph1.png)
   (2) ![](graph2.png)
   (3) ![](graph3.png)
   (4) ![](graph4.png)

54. Fluoride ion is isoelectronic with:
   (1) Ne
   (2) \( O^{2-} \)
   (3) \( N^{3-} \)
   (4) All of these

Take it Easy and Make it Easy
52. The degree of dissociation of PCl₃ (α) obeying the equilibrium, \( \text{PCl}_3 \rightleftharpoons \text{PCl}_2 + \text{Cl}_2 \), is approximately related to the pressure at equilibrium by (given \( \alpha << 1 \)):

(1) \( \alpha \approx P \)
(2) \( \alpha \approx \frac{1}{\sqrt{P}} \)
(3) \( \alpha \approx \frac{1}{P^2} \)
(4) \( \alpha \approx \frac{1}{P^4} \)

53. pH of a 0.1 M monobasic acid is found to be 2. Hence the degree of dissociation of PCl₃ is 

(1) \( \alpha \approx P \)
(2) \( \alpha \approx \frac{1}{\sqrt{P}} \)
(3) \( \alpha \approx \frac{1}{P^2} \)
(4) \( \alpha \approx \frac{1}{P^4} \)

54. For the reaction \( \text{FeCO}_3(s) \rightarrow \text{FeO}(s) + \text{CO}_2(g) \)

\[ \Delta H = 82.8 \text{ kJ at } 25^\circ\text{C} \]
(1) 82.8 kJ
(2) 80.32 kJ
(3) –394.77 kJ
(4) 85.28 kJ

55. The pH of two equimolar weak acids are 3.0 and 5.0 respectively. Their relative strength is:

(1) 3 : 5
(2) 5 : 3
(3) 100 : 1
(4) 1 : 100

56. Which of the following set of quantum numbers represents the highest energy of an atom?

(1) \( n = 3, \ell = 0, m = 0, s = +\frac{1}{2} \)
(2) \( n = 3, \ell = 1, m = 1, s = +\frac{1}{2} \)
(3) \( n = 2, \ell = 2, m = 1, s = +\frac{1}{2} \)
(4) \( n = 4, \ell = 0, m = 0, s = +\frac{1}{2} \)

57. Adding inert gas to system

\( \text{N}_2(g) + 3\text{H}_2(g) \rightleftharpoons 2\text{NH}_3(g) \)

at equilibrium at constant volume will lead to:

(1) \( \text{N}_2 \) and \( \text{H}_2 \) are formed in abundance
(2) \( \text{N}_2, \text{H}_2 \) and \( \text{NH}_3 \) will have the same molar concentration
(3) The production of ammonia increases
(4) No change in the equilibrium

58. What volume of decimolar solution should be mixed in a solution of same solute (0.5 M, 200 ml) to make it 0.25 molar.

(1) 333.33 ml
(2) 500 ml
(3) 233.33 ml
(4) 133.33 ml

59. Enthalpy of neutralization of HCl by NaOH is 

\( -55.84 \text{ kJ/mol} \)

by NH₃H₂O is 

\( -51.34 \text{ kJ/mol} \)

The enthalpy of ionization of NH₂OH is 

(1) \( -107.18 \text{ kJ} \)
(2) \( 107.18 \text{ kJ} \)
(3) \( 4.5 \text{ kJ} \)
(4) \( -4.5 \text{ kJ} \)
60. A precipitate of CaF₂ (K_{sp} = 1.7 \times 10^{-10}) will be obtained when equal volume of the following are mixed - 
(1) 10^{-4} M Ca^{2+} and 10^{-4} M F^{-}
(2) 10^{-2} M Ca^{2+} and 10^{-3} M F^{-}
(3) 10^{-5} M Ca^{2+} and 10^{-3} M F^{-}
(4) 10^{-3} M Ca^{2+} and 10^{-5} M F^{-}

61. Maximum number of spectral lines possible when an electron jumps from 5^{th} excited state to ground state in a sample containing only one Hydrogen atom will be –
(1) 4
(2) 14
(3) 5
(4) 15

62. In which of the following \( K_p \) is less than \( K_c \) ?
(1) \( N_2O_4 \rightleftharpoons 2NO_2 \)
(2) \( 2HI \rightleftharpoons H_2 + I_2 \)
(3) \( 2SO_2 + O_2 \rightleftharpoons 2SO_3 \)
(4) \( N_2 + O_2 \rightleftharpoons 2NO \)

63. Vapour density of a gas is 5.6, volume of 5.6 gm of it at STP is -
(1) 5.6 L
(2) 11.2 L
(3) 22.4 L
(4) 2.8 L

64. Calculate the work done (in J) when 4.5 g of H₂O₂ reacts against a pressure of 1.0 atm at 25°C, \([2H_2O_2(l) \rightarrow O_2(g) + 2H_2O(l)]\)
(1) \(-1.63 \times 10^2\)
(2) \(4.5 \times 10^2\)
(3) \(3.2 \times 10^2\)
(4) \(-6.1 \times 10^2\)

65. In the closest packing of atoms,
(1) the size of tetrahedral void is greater than that of octahedral void
(2) the size of tetrahedral void is smaller than that of octahedral void
(3) the size of tetrahedral void is equal to that of octahedral void
(4) the size of tetrahedral void may be greater or smaller or equal to that of octahedral void depending upon the size of atoms.

66. The energy of an electron in the 3^{rd} orbit of a hydrogenic atom is \(-E\). The energy of an electron in the first orbit will be -
(1) \(-3E\)
(2) \(-E/3\)
(3) \(-E/9\)
(4) \(-9E\)
67. The equilibrium constant \( K_c \) for the reaction,
\[ \text{CaSO}_4 \cdot 5\text{H}_2\text{O} (s) \rightleftharpoons \text{CaSO}_4 \cdot 3\text{H}_2\text{O} (s) + 2\text{H}_2\text{O} (g) \]
is equal to:
(1) \([\text{H}_2\text{O}]^2\)
(2) \([\text{CaSO}_4 \cdot 3\text{H}_2\text{O}]\)
(3) \([\text{H}_2\text{O}]\)
(4) \([\text{CaSO}_4 \cdot 5\text{H}_2\text{O}][\text{H}_2\text{O}]^2\)
\[
\frac{[\text{CaSO}_4 \cdot 3\text{H}_2\text{O}][\text{H}_2\text{O}]^2}{[\text{CaSO}_4 \cdot 5\text{H}_2\text{O}]} \]

68. The largest no. of molecules are in:
(1) 36 g \( \text{H}_2\text{O} \)
(2) 28 g \( \text{CO} \)
(3) 46 g \( \text{C}_2\text{H}_5\text{OH} \)
(4) 54 g \( \text{N}_2\text{O}_5 \)

69. Temperature of 1 mole of an ideal gas is increased by 2°C at constant pressure, work done is:
(1) \( R \)
(2) \(-2R\)
(3) \( \frac{R}{2} \)
(4) \( 3R \)

70. In a face centered lattice of X and Y, X atoms are present at the corners while Y atoms are at face centers. Then the formula of the compound would be if two atoms of X are missing from the corners:
(1) \( \text{X}_4\text{Y} \)
(2) \( \text{X}_3\text{Y}_4 \)
(3) \( \text{XY}_4 \)
(4) \( \text{X}_2\text{Y}_4 \)

71. Which orbital notation does not have spherical node:
(1) \( n = 2, \ell = 0 \)
(2) \( n = 3, \ell = 1 \)
(3) \( n = 3, \ell = 0 \)
(4) \( n = 1, \ell = 0 \)

72. V. P. of pure A \( p_A^o = 100 \text{ mmHg} \)
V. P. of pure B \( p_B^o = 150 \text{ mmHg} \)
A solution containing 2 moles A and 3 moles B will have total vapour pressure, approximately, on condensation
(1) 135 mm
(2) 130 mm
(3) 140 mm
(4) 145 mm

73. For the reaction: \( \text{A} + 2\text{B} \rightarrow \text{C} \), 5 mole of A and 8 mole of B will produce:
(1) 5 mole of C
(2) 4 mole of C
(3) 8 mole of C
(4) 13 mole of C

74. What is the final temperature of 0.10 mole monoatomic ideal gas that performs 75 cal of work adiabatically if the initial temperature is 227°C?
(use \( R = 2 \text{ cal/K-mol} \))
(1) 250 K
(2) 300 K
(3) 350 K
(4) 750 K

75. The final temperature of 0.10 mole monoatomic ideal gas that performs 75 cal of work adiabatically if the initial temperature is 227°C?
(use \( R = 2 \text{ cal/K-mol} \))
(1) 250 K
(2) 300 K
(3) 350 K
(4) 750 K
75. In the Schottky defect:
   (1) cations are missing from the lattice sites and occupy the interstitial sites
   (2) equal number of cations and anions are missing
   (3) anion is missing and electrons are present in their place
   (4) equal number of extra cations and electrons are present in the interstitial sites

76. There is no difference between a 2p and 3p orbital regarding?
   (1) Shape       (2) Size
   (3) Energy      (4) Value of n

77. PtCl₄ · 6H₂O can exist as a hydrated complex. Its 1 molal aq. solution has depression in freezing point of 3.72. Assume 100% ionisation and Kᵣ (H₂O) = 1.86°C mol⁻¹ kg, then complex is:
   (1) [Pt(H₂O)₄]Cl₄
   (2) [Pt(H₂O)₄Cl₂]Cl₂ . 2H₂O
   (3) [Pt(H₂O)₃Cl]Cl . 3H₂O
   (4) [Pt(H₂O)Cl]Cl₂ . 4H₂O

78. 25 mL of 3.0 M HNO₃ are mixed with 75 mL of 4.0 M HNO₃. If the volumes are additive, the molarity of the final mixture would be:
   (1) 3.25 M       (2) 4.0 M
   (3) 3.75 M       (4) 3.50 M

79. If a gas expands adiabatically from 1 L to 12 L against a constant pressure of 0.75 atm. The ΔU of the gas is:
   (1) –853.9 J     (2) 835.9 J
   (3) 853.9 J      (4) –835.9 J

80. Correct coordination number for zinc ion in zinc blend crystal structure is:
   (1) 4           (2) 8
   (3) 6           (4) 12

81. Which of the following sets consists of gases with the same rate of diffusion?
   (1) CO₂, NO₂, C₃H₈      (2) CO₂, N₂O₂, C₃H₈
   (3) H₂, D₂, He           (4) N₂, CO₂, C₂H₄

82. When a solution containing non-volatile solute freezes, which equilibrium would exist?
   (1) solid solvent ⇌ liquid solvent
   (2) solid solute ⇌ liquid solution
   (3) solid solute ⇌ liquid solvent
   (4) solid solvent ⇌ solvent in solution

77. PtCl₄ . 6H₂O एक जटिल जलक जिसके मिश्रण में प्लाज्मा का कालम दर 1.86°C है । हैक्सण में लेने के परिस्थितियों में कोई उपरोक्त क्षेत्र में अनलस्स दर 1.86°C में है, तब संयुक्त है -
   (1) [Pt(H₂O)₄]Cl₄
   (2) [Pt(H₂O)₄Cl₂]Cl₂ . 2H₂O
   (3) [Pt(H₂O)₃Cl]Cl . 3H₂O
   (4) [Pt(H₂O)Cl]Cl₂ . 4H₂O

78. 3.0 M HNO₃ के 25 मिली तक 14.0 M HNO₃ के 75 मिली के संयुक्त मिश्रण हो जाता है । इसके लेने या गायन होता है , परंतु इस मिश्रण के मिश्रण दर में अंततः हो जाता है?
   (1) 3.25 M       (2) 4.0 M
   (3) 3.75 M       (4) 3.50 M

79. जिकी के गैस सबसे स्थानीय 0.75 atm के हवा रद्द के बिना बचत की अनुमान दर 1 L से 12 L तक किया जाता है, तब संयुक्त हो जाता है:
   (1) –853.9 J     (2) 835.9 J
   (3) 853.9 J      (4) –835.9 J

80. जिकी के गैस के संयुक्त स्थान में जिकी के लेने या गायन दर में कविता की समय व्यक्त हो गई है?
   (1) 4           (2) 8
   (3) 6           (4) 12

81. निर्देशन में से गैस के बीच नस्से स्थान के चिपक की दर सूची है।
   (1) CO₂, NO₂, C₃H₈      (2) CO₂, N₂O₂, C₃H₈
   (3) H₂, D₂, He           (4) N₂, CO₂, C₂H₄

82. जब जो रासायनिक संयुक्त या स्थायी स्थान में कविता की अलगता तकनीक जाता है, तब के संयुक्त दर 8°C में पिटी गया -
   (1) संयुक्त दर 8°C में कविता का विलयन
   (2) संयुक्त दर 8°C में कविता का विलयन
   (3) संयुक्त दर 8°C में कविता का विलयन
   (4) संयुक्त दर 8°C में कविता का विलयन
83. A metal oxide has 40% oxygen. The equivalent weight of the metal is:
   (1) 12   (2) 16
   (3) 24   (4) 48

84. The conjugate base of H₂PO₄⁻ is:
   (1) H₃PO₄   (2) H₂PO₄⁻
   (3) HPO₄²⁻   (4) PO₄³⁻

85. Copper crystallizes in f.c.c. with a unit cell length of 361 pm. What is the radius of copper atom?
   (1) 108 pm   (2) 127 pm
   (3) 157 pm   (4) 181 pm

86. At low pressure, Vander Waal's equation is reduced to
   \[ P + \frac{a}{V^2} = RT \]
   The compressibility factor (Z) can be given as
   (1) \[ 1 - \frac{a}{RTV} \]
   (2) \[ 1 - \frac{RTV}{a} \]
   (3) \[ 1 + \frac{a}{RTV} \]
   (4) \[ 1 + \frac{RTV}{a} \]

87. The Henry's law constant for the solubility of N₂ gas in water at 298 K is 1.0 × 10⁵ atm. The mole fraction of N₂ in air is 0.8. The number of moles of N₂ from air dissolved in 10 moles of water at 298 K and 5 atm pressure will be
   (1) 4.0 × 10⁻⁴   (2) 4.0 × 10⁻⁵
   (3) 5.0 × 10⁻⁴   (4) 4.0 × 10⁻⁶

88. The density (in mL⁻¹) of a 3.60 M sulphuric acid solution that is 29% H₂SO₄ (Molar mass = 98 g mol⁻¹) by mass will be:
   (1) 1.64   (2) 1.88
   (3) 1.22   (4) 1.45

89. A beer has a pH of 4.30. What is the [H₃O⁺]? (1) 3.0 × 10⁻⁴   (2) 2.0 × 10⁻⁴
   (3) 2.0 × 10⁻⁵   (4) 5.0 × 10⁻⁵

90. CsBr has b.c.c. structure with edge length 4.3 Å. The shortest inter ionic distance between Cs⁺ and Br⁻ is:
   (1) 3.72 Å   (2) 1.86 Å
   (3) 7.44 Å   (4) 4.3 Å
91. Which of the following is not correct
   (1) The brown adipose tissue cell has a single large droplet surrounded by a small amount of cytoplasm whereas the white adipose tissue cell has many small droplets of fat suspended in a larger amount cytoplasm.
   (2) Brown fat cells contain comparatively more mitochondria, than white fat cells.
   (3) Brown fat has a larger capacity for generating heat than white fat.
   (4) Brown fat is mainly found in new born mammals.

92. Fill in the blanks marked in the classification table from the choices in the box with respect to A, B, C, D, E and F choose the correct option.

<table>
<thead>
<tr>
<th>Vertebrata</th>
<th>Division</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Class C</td>
<td>D</td>
</tr>
<tr>
<td>Super-class</td>
<td>E</td>
</tr>
<tr>
<td>Tetrapoda</td>
<td>F</td>
</tr>
</tbody>
</table>

   I. Pisces              II. Osteichthyes
   III. Agnatha           IV. Gnathostomata
   V. Chondrichthyes      VI. Cyclostomata

A B C D E F
(1) VI I V II III IV
(2) III IV VI I V II
(3) I VI IV II III V
(4) IV V III II IV I

93. A true coelom is a
   (1) cavity between body wall and gut wall
   (2) body cavity lined by mesoderm
   (3) body cavity not lined by mesoderm
   (4) body cavity lined by endoderm

94. 'Key' is a taxonomical aid used for the identification of organism each statement in key is called .....?
   (1) Couplet
   (2) Lead
   (3) Both (1) and (2)
   (4) None of these

95. Rich source of iodine is -
   (1) Laminaria
   (2) Chara
   (3) Volvox
   (4) Nostoc
96. Root of pea is :-

(1) Diarch   
(2) Monarch   
(3) Triarch   
(4) Polyarch

97. Find the correct statement regarding cell wall

(1) Universal structure of cell. 
(2) Living and Rigid structure 
(3) It protects the cell from mechanical damage and infection 
(4) Primary wall is not capable of expansion.

98. Plant cells are held together with the help of

(1) Cellulose   
(2) Calcium Pectate   
(3) Lamin Proteins   
(4) Phospholipid

99. Which type of aestivation is found in Cassia and gulmohur :-

(a)
(b)
(c)
(d)

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

100. Which one of following is not a part of transcription unit in DNA?

(1) Promoter   
(2) Structural gene   
(3) Inducer   
(4) Terminator

101. Consider the above diagram, and pick out the correct statement–

(1) It is columnar epithelium, composed of single layer of tall and slender cells. 
(2) It is commonly found in the tubular parts of nephron
(3) In PCT (nephron) it has microvilli
(4) It is a multi layered epithelium
102. Acoelomates animal with flame cells for osmoregulation is –
(1) Fasciola (2) Pleurobrachia 
(3) Sycon (4) Ctenoplena

103. Water vascular system is found in phylum
(1) Mollusca (2) Arthropoda 
(3) Annelida (4) Echinodermata

104. A microspore develops into microgametophyte in how many of the following groups?
Rose, Selaginella, Salvinia, Sequoia, Pinus, Cycas, Cedrus, Adiantum, Pteris, Psilotum
(1) 5 (2) 7 (3) 3 (4) 10

105. Post fertilization event is complex in
(1) Blue green algae (2) Green algae 
(3) Red algae (4) Phaeophyceae

106. Zoodiogamy is most common in
(1) Pheronogamous (2) Cryptogamous 
(3) Gymnosperm (4) Dicot

107. X-ray interacts directly with the genetic material and induces DNA breaks. The maximum damages are expected when the cells are irradiated at :
(1) G₁ (2) S (3) G₂ (4) M

108. Inflorescence of family compositae –
(1) Uniparous cymose (2) Corymb 
(3) Capitulum (4) Hypenthodium

109. Branched inflorescence is ?
(1) Spike (2) Spedix 
(3) Penicle (4) Corymb

110. Removal of RNA polymerase III from nucleoplasm will affect synthesis of
(1) mRNA (2) r-RNA 
(3) t-RNA (4) hnRNA

111. During an injury, nasal septum gets damaged and for its recovery which cartilage is preferred
(1) Hyaline cartilage (2) Elastic cartilage 
(3) Calcified cartilage (4) Fibro cartilage

112. Which of the following groups of animals is correctly matched with its one characteristic feature without even a single exception?
(1) Chordata – possess a mouth provided within upper and a lower jaw. 
(2) Chondrichthyes – possess cartilagenous endoskeleton. 
(3) Mammalia – give birth to young ones. 
(4) Reptilia – possess 3-chambered heart.
113. Balancing organ in Arthropoda are–
   (1) Radula  (2) Antennae
   (3) Statocyst  (4) Compound eyes

114. All seed plants have -
   (1) Fruits
   (2) Flowers
   (3) Pollen tubes
   (4) Sperm carried by windborne pollen

115. Of the following types of organism, which do not have a membrane surrounding their chromosome?
   (a) Archaebacteria  (b) Eubacteria
   (c) Fungi  (d) Protozoa
   (e) Blue-green algae
   Options :-
   (1) a, c, d, e  (2) a, b, c
   (3) a, b, d  (4) a, b, e

116. Which of the following is non-defining property of living organisms ?
   (1) Metabolism  (2) Reproduction
   (3) Consciousness  (4) Cellular organisation

117. Identify the parts labelled A, B, C and D and select the right option.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Central Microtubule</td>
<td>Peripheral Microtubule</td>
<td>Plasma Membrane</td>
<td>Radial Spoke</td>
</tr>
<tr>
<td>(2)</td>
<td>Peripheral Microtubule</td>
<td>Plasma Membrane</td>
<td>Radial Spoke</td>
<td>Central Microtubule</td>
</tr>
<tr>
<td>(3)</td>
<td>Plasma Membrane</td>
<td>Radial Spoke</td>
<td>Central Microtubule</td>
<td>Peripheral Microtubule</td>
</tr>
<tr>
<td>(4)</td>
<td>Radial Spoke</td>
<td>Central Microtubule</td>
<td>Peripheral Microtubule</td>
<td>Plasma Membrane</td>
</tr>
</tbody>
</table>
118. Match the following -

<table>
<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Opuntia</td>
<td>i Stem thorns</td>
</tr>
<tr>
<td>B Asparagus</td>
<td>ii Phylloclades</td>
</tr>
<tr>
<td>C Citrus</td>
<td>iii Cladodes</td>
</tr>
</tbody>
</table>

A B C
(1) (i) (ii) (iii)
(2) (ii) (iii) (i)
(3) (iii) (ii) (i)
(4) (ii) (i) (iii)

119. Match column A and B

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Heart wood</td>
<td>a Large and colourless cell</td>
</tr>
<tr>
<td>II Phellogen</td>
<td>b Casparian strips</td>
</tr>
<tr>
<td>III Endodermis</td>
<td>c Presence of tannins, resins</td>
</tr>
<tr>
<td>IV Bulliform cells</td>
<td>d Cork cambium</td>
</tr>
</tbody>
</table>

(1) I-a, II-b, III-c, IV-d
(2) I-b, II-c, III-d, IV-a
(3) I-c, II-d, III-b, IV-a
(4) I-c, II-d, III-a, IV-b

120. Most abundant intracellular cation

(1) K⁺ (2) Na⁺ (3) Ca²⁺ (4) H⁺

121. How many of the following contain simple squamous epithelium?

Air sacs of lungs, blood vessels, PCT of nephrons, fallopian tubes, bronchioles
(1) Two (2) Three (3) Four (4) Five

122. Which of the following are true to the prototherians?

I. Pinna are absent.
II. Mammary glands are modified sebaceous glands.
III. Corpus callosum is absent in brain
IV. Vertebrae are with epiphyses.
(1) I and III (2) I and II (3) I and IV (4) II and III

123. The metagenesis is seen in-

(1) Hydra
(2) Adamsia (sea anemone)
(3) Aurelia
(4) Obelia

119. निर्देशाक्रमण -

<table>
<thead>
<tr>
<th>स्तंभ भाग</th>
<th>स्तंभ भाग</th>
</tr>
</thead>
<tbody>
<tr>
<td>A अंबवल</td>
<td>i तम्बू में लित की जिन्हें</td>
</tr>
<tr>
<td>ब एकं गधि</td>
<td>ii फा का रस-संधि</td>
</tr>
<tr>
<td>स रिस-स</td>
<td>iii क्लेडिंग्स</td>
</tr>
</tbody>
</table>

A B C
(1) (i) (ii) (iii)
(2) (ii) (iii) (i)
(3) (iii) (ii) (i)
(4) (ii) (i) (iii)

122. जन्तुओं के अनुसार किस वर्ग में उपलब्ध पत्ता पैदा होता है?

(1) K⁺ (2) Na⁺ (3) Ca²⁺ (4) H⁺

123. निम्नलिखित तम्बू वालों में संक्षेप में स्वाद की उपलब्धता पैदा होते हैं?

(1) दूध (2) दूध (3) दूध (4) पौधे
124. In small heart-shaped gametophyte called a prothallus is part of the life cycle of the
(1) Mosses   (2) Ferns
(3) Liverworts   (4) Ginkgoes

125. The basis for the division of the kingdom fungi into various classes is
(1) Morphology of the mycelium
(2) Mode of spore formation
(3) Fruiting bodies form
(4) All of these

126. Which of the following statement is not true for a chloroplast?
(1) It contains DNA
(2) It produces ATP
(3) It has an electron transport chain
(4) It contains a transcription apparatus but no translational apparatus

127. Match the Column

<table>
<thead>
<tr>
<th>Column - I</th>
<th>Column - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Telophase</td>
<td>(I) Nucleolus, ER disappear</td>
</tr>
<tr>
<td>(B) Anaphase</td>
<td>(II) Chromosomes at equator</td>
</tr>
<tr>
<td>(C) Metaphase</td>
<td>(III) Centromere Split</td>
</tr>
<tr>
<td>(D) Prophase</td>
<td>(IV) Nucleolus, ER Reform</td>
</tr>
</tbody>
</table>

(1) A–I, B–II, C–III, D–IV
(2) A–I, B–III, C–IV, D–II
(3) A–III, B–IV, C–I, D–II

128. Find out the wrongly matched pair -
(1) Tuber - Potato
(2) Rhizome - Ginger
(3) Bulbil - Agave
(4) Runner - Banana

129. Select incorrect statement with respect to xylem fibres.
(1) Thickened cell wall
(2) Obliterated central lumens
(3) Branched pit canals
(4) It may be septate or aseptate

130. What is true about ribosome?
(1) They are found only in Eukaryotic cells.
(2) They are self splicing introns of some RNA
(3) Prokaryotic ribosome are 80S where’s stand for sedimentation coefficient.
(4) They are composed of Ribonucleic acid & protein.
131. Macrophages of liver are called :-
   (1) Dust cells (2) Kupffer cells
   (3) Microglial cells (4) Monocytes

132. Match the following columns:

<table>
<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A These possess electric organs</td>
<td>I Trygon</td>
</tr>
<tr>
<td>B Animals of this class are poikilothermous</td>
<td>II Cyclostomata</td>
</tr>
<tr>
<td>C These possess poison sting</td>
<td>III Torpedo</td>
</tr>
<tr>
<td>D These migrate for spawning to freshwater</td>
<td>IV Chondrichthyes</td>
</tr>
</tbody>
</table>

V Hagfish
VI Exocoetus

Codes:
A B C D
(1) VI I III II
(2) I IV VI V
(3) III IV I V
(4) III IV VI II

133. Match the column correctly -

<table>
<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Leprosy</td>
<td>i Mycobacterium</td>
</tr>
<tr>
<td>B Plague</td>
<td>ii Yersinia</td>
</tr>
<tr>
<td>C Tetanus</td>
<td>iii Clostridium</td>
</tr>
<tr>
<td>D Cholera</td>
<td>iv Vibrio cholerae</td>
</tr>
</tbody>
</table>

(1) A - (i), B - (ii), C - (iii), D - (iv)
(2) A - (ii), B - (i), C - (iii), D - (iv)
(3) A - (iii), B - (ii), C - (i), D - (iv)
(4) A - (iv), B - (iii), C - (ii), D - (i)

134. In Carl Woese's classification system, the domain that includes the blue-green algae, nitrogen-fixing bacteria and mycoplasma is
   (1) Bacteria (2) Eukarya
   (3) Monera (4) Archaea

135. Find out the correct statement
   (1) All bacteria are autotrophs
   (2) All bacteria are photosynthetic
   (3) All bacteria are parasite
   (4) Majority of bacteria are heterotrophic, while some bacteria are autotrophs
136. Choose the statement that is not correct for golgi apparatus of the cell :-

(1) Degradation of foreign compounds occur in golgi bodies
(2) Golgi apparatus has cis and trans faces
(3) Golgi apparatus is predominant in cells that are specialized for secretion
(4) It is involved in oligosaccharide modification.

137. Plasmodesmata connection helps in

(1) Cytoplasmic streaming
(2) Synchronous mitotic division
(3) Locomotion of unicellular organism
(4) Movement of substances between cells

138. Match the Column-I and Column-II :-

<table>
<thead>
<tr>
<th>Column-I</th>
<th>Column-II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Pea</td>
<td>(I)</td>
</tr>
<tr>
<td>(B) Lemon</td>
<td>(II)</td>
</tr>
<tr>
<td>(C) Argemone</td>
<td>(III)</td>
</tr>
<tr>
<td>(D) Dianthus</td>
<td>(IV)</td>
</tr>
<tr>
<td>(E) Sunflower</td>
<td>(V)</td>
</tr>
</tbody>
</table>

(B) A – I, B – II, C – III, D – IV, E – V
(C) A – V, B – II, C – III, D – I, E – IV
(D) A – V, B – II, C – I, D – I, E – IV

136. को शिव की गांठ जें से उ फट्टा के लिए कृपें त्याने नहीं है?

(1) वा हाना था ‘‘ का अफा न म गांठ जें बांधि है।
(2) गांठ जें से उ फट्टा में सिर टु ‘‘ सफे सुख होता है।
(3) रस विल के लिए पी‘‘ का शिव में गांठ जें से उ फट्टा आ खास तक है।
(4) आ ई से गांठ से के राइड के स्प से में शामिल हो रही है?

137. Plasmodesmata मददगा रहे ते है?

(1) के शिव का डे ‘‘ ये बांधि चा र
(2) तु ‘‘ कब लिक सरू त्र विभिन्न जा
(3) कुछे शिव की यौरे बांधि न म गति लला
(4) पा था ‘‘ की के शिव अभी के मन्दिगति

138. के तकनिक भिन्न न के ही-के-रूप शिविर :-

(A) मटर- (I)
(B) औं बू- (II)
(C) आ जै मो न- (III)
(D) डाय थास- (IV)
(E) सुरज खी- (V)

(B) A – I, B – II, C – III, D – IV, E – V
(C) A – V, B – II, C – III, D – I, E – IV
(D) A – V, B – III, C – II, D – I, E – IV
139. Which of the following statement(s) is/are correct?

A. Growth in plants is not restricted to specialised regions.
B. Apical meristems are primary meristematic tissue.
C. Apical meristem produces dermal tissues, ground tissues and vascular tissues.
D. In roots the protoxylem lies towards centre and metaxylem lies towards periphery.

(1) A and B  (2) B and C  
(3) C and D  (4) D and A

140. Which one of the following is not applicable to RNA?

(1) Chargaff rule  
(2) Complementary base pairing  
(3) 5’ Phosphoryl & 3’ hydroxyl  
(4) Heterocyclic nitrogenous base

141. Match the following with reference to cockroach and choose the correct option

A Anal styles i. Jointed filamentous structures present in both sexes
B Gonopore ii. Opens into ejaculatory duct through seminal vesicles
C Anal cerci iii. Thread like structures, absent in females
D Vas deferens iv. Opening of ejaculatory duct in male cockroach

(1) a(ii), b(i), c(iv), d(iii)  
(2) a(iii), b(ii), c(i), d(iv)  
(3) a(i), b(iv), c(iii), d(ii)  
(4) a(iii), b(iv), c(i), d(ii)
142. Match the items labelled A, B, C and D in the given diagram, with the given characters and choose the correct answer.

I. Nerve cord  II. Post - anal part
III. Notochord  IV. Gill Slits

Codes:

A  B  C  D
(1) II  IV  III  I
(2) I  III  II  IV
(3) III  I  IV  III
(4) IV  II  III  I

143. Match the column correctly -

<table>
<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Order</td>
<td>i Ales</td>
</tr>
<tr>
<td>B Suborder</td>
<td>ii Ineae</td>
</tr>
<tr>
<td>C Sub family</td>
<td>iii Oideae</td>
</tr>
<tr>
<td>D Class</td>
<td>iv Opsida</td>
</tr>
</tbody>
</table>

(1) A - (i), B - (ii), C - (iii), D - (iv)
(2) A - (ii), B - (i), C - (iii), D - (iv)
(3) A - (iii), B - (ii), C - (i), D - (iv)
(4) A - (iv), B - (iii), C - (ii), D - (i)

144. One of tallest tree species belongs to a group which does not possess ovary wall. This group is :-
(1) Naked seeded plants (2) Flowering plants
(3) Horsetails  (4) Ferns

145. Match the following :

<table>
<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
</tr>
</thead>
<tbody>
<tr>
<td>p Halophiles</td>
<td>i Protein particle</td>
</tr>
<tr>
<td>q Cyanobacteria</td>
<td>ii Bacteria</td>
</tr>
<tr>
<td>r Clostridium</td>
<td>iii Habitat in saline area</td>
</tr>
<tr>
<td>s Prion</td>
<td>iv Photosynthetic bacteria</td>
</tr>
</tbody>
</table>

(1) p–i, q–ii, r–iii, s–iv
(2) p–iv, q–iii, r–ii, s–i
(3) p–iii, q–iv, r–ii, s–i
(4) p–ii, q–i, r–iii, s–iv
146. Generally accepted features of biological membrane include all of the following except
   (1) Asymmetric structure
   (2) Rapid diffusion of inorganic ions across lipid bilayer
   (3) Lateral movement of lipids
   (4) Lateral movement of integral and peripheral proteins

147. Mark the incorrect statement regarding plasma membrane.
   (1) It is extremely thin and have phospholipid bilayer
   (2) Spectrin Provides support for the plasma membrane and maintains cell shape.
   (3) Detergents can disrupt them
   (4) Proteins show more lateral movement in tight junction area.

148. Add the missing floral organs in the given floral formula of family fabaceae

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>K₀</td>
</tr>
<tr>
<td>(1) C₁+₂+₂</td>
<td></td>
<td>A₉+₁ G₃</td>
</tr>
<tr>
<td>(2) C₁+₂+₄(2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) C₁+₂+₃</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

149. Which meristem regenerates leaves in monocot removed by the grazing herbivores?
   (1) Primary meristems
   (2) Intercalary meristems
   (3) Secondary meristem
   (4) Lateral meristem

150. In sea urchin DNA which is double stranded 17% of base were shown to be cytosine. The % of other three base to be present in DNA are.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) G</td>
<td>17%</td>
<td>A</td>
<td>16.5%</td>
</tr>
<tr>
<td>(2) G</td>
<td>17%</td>
<td>A</td>
<td>33%</td>
</tr>
<tr>
<td>(3) G</td>
<td>8.5%</td>
<td>A</td>
<td>50%</td>
</tr>
<tr>
<td>(4) G</td>
<td>34%</td>
<td>A</td>
<td>24.5%</td>
</tr>
</tbody>
</table>

146. Generally accepted features of biological membrane include all of the following except
   (1) Asymmetric structure
   (2) Rapid diffusion of inorganic ions across lipid bilayer
   (3) Lateral movement of lipids
   (4) Lateral movement of integral and peripheral proteins
151. Following is the diagram showing the external features of cockroach in which the wings are marked as A and B. Select the option which is correct identification of A and B with functions / characteristics / location.

(1) A – Forewings (prothoracic), which are used in flight.
(2) B – Hindwings (mesothoracic), thick and leathery.
(3) A – Tegmina, arise from prothorax.
(4) B – Hindwings, they are second pair of wings which arise from metathorax, are transparent, membranous and are used in flight.

152. Radial symmetry is seen in
(1) Echinodermata, Ctenophora and Cnidaria
(2) Mollusca, Porifera and Echinodermata
(3) Porifera, Annelida and Arthropoda
(4) Annelida, Chordata and Mollusca

153. Cynobacteria are not included in plant because-
(1) Absence of cell wall
(2) Have glactance and manose in cell wall
(3) Absence of membrane bound organelles
(4) Absence of reproduction

154. The algae that may grow to 100 m in length is in the group
(1) Chlorophyceae
(2) Phaeophyceae
(3) Rhodophyceae
(4) Bacillariophyta

155. Match the followings:

<table>
<thead>
<tr>
<th>Column – I</th>
<th>Column – II</th>
</tr>
</thead>
<tbody>
<tr>
<td>p. Nostoc</td>
<td>(i) Colonial</td>
</tr>
<tr>
<td>q. Chlamydomonas</td>
<td>(ii) Filamentous</td>
</tr>
<tr>
<td>r. Spirogyra</td>
<td>(iii) Unicellular</td>
</tr>
<tr>
<td>s. Volvox</td>
<td>(iv) Blue green</td>
</tr>
</tbody>
</table>

156. 

(1) A – आ पंख (प्रोथॉराकिस) ये गठ, ने में होते हैं
(2) B – भुख पंख (मेथॉराकिस) ये भुख, ने में होते हैं
(3) A – अपराक्त, ये दिखाए जाते हैं
(4) B – भुख पंख, ये भुख, ये दिखाए जाते हैं

152. 

(1) इन्हें जिसमें हैं
(2) में इन्हें
(3) हैं
(4) हैं

153. 

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

154. 

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

155. 

(1) इन्हें
(2) इन्हें
156. The process by which a cell secretes macromolecules by fusing a vesicle to the plasma membrane is called :-
(1) endocytosis  
(2) pinocytosis  
(3) phagocytosis  
(4) exocytosis

157. Mark the stages A, B, C and D in the given diagram

158. Unbranched, erect, cylindrical stout axis/stem with distinct nodes and internodes and with jointed appearance is called as–
(1) Runner  
(2) Sucker  
(3) Culm  
(4) Caudex

159. Which is not the function of parenchyma?
(1) Mechanical support  
(2) Storage  
(3) Secretion  
(4) Photosynthesis
160. Given below is diagrammatic representation of one of categories of small molecular weight organic compound in living tissue. Identify the category shown and one blank component.

\[
\begin{array}{c}
\text{HOCH}_2 \\
\text{OH} \\
\text{O} \\
\text{X} \\
\text{OH}
\end{array}
\]

**Category** | **Component**
---|---
(1) Nucleotide | - Adenine
(2) Nucleoside | - Uracil
(3) Cholesterol | - Guanine
(4) Amino Acid | - \(\text{NH}_2\)

161. Which structures are helpful in removal of excretory products from hemolymph in cockroach?

(1) Proventriculus  
(2) Malphigran tubules  
(3) Spiracles  
(4) Ommatidia

162. Which of the following are amphibians?

(1) A and C  
(2) B and D  
(3) C and D  
(4) A and D

163. In Cycas

(1) Archegonia are absent  
(2) Antheridia are present  
(3) Archegonia are present  
(4) Both (1) and (2)

164. Maximum number of antibiotic are obtained from.

(1) Fungi  
(2) Virus  
(3) Bacteria  
(4) Plants

165. Main plant body is totally parenchymatous in :-

(1) Bryophytes  
(2) Gymnosperm  
(3) Angiosperm  
(4) Monocot
166. Which of the following molecules moves regularly from nucleus to cytoplasm?
(1) Glycogen (2) RNA (3) DNA (4) Cholesterol

167. Sexually reproducing organisms starts its life cycle as
(1) Spore (2) Zygote (3) Seed (4) Gamete

168. In *Euphorbia*, the function of photosynthesis is carried out by–
(1) Cladode (2) Phyllode (3) Phylloclade (4) Stipules

169. Match the columns:
<table>
<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
</tr>
</thead>
<tbody>
<tr>
<td>a Vessels</td>
<td>1 Storage of food</td>
</tr>
<tr>
<td>b Tracheids</td>
<td>2 Septate/aseptate</td>
</tr>
<tr>
<td>c Xylem fibres</td>
<td>3 Ring like deposition</td>
</tr>
<tr>
<td>d Xylem parenchyma</td>
<td>4 Pointed ends</td>
</tr>
</tbody>
</table>

170. Which of the following statement is incorrect?
(1) In competitive inhibition inhibitor molecule is not chemically changed by enzyme
(2) Competitive inhibitor does not affect breakdown of Enzyme - substrate complex
(3) Presence of competitive inhibitor decrease \( k_m \) of Enzyme for substrate.
(4) A competitive inhibitor reacts reversible with the enzyme inhibitor complex.

171. Animal in which body is covered by dry cornified skin and epidermal scutes are –
(1) Chameleon (2) Pavo (3) Salamander (4) Trapa

172. The generic name of tusk shell or elephant tusk shell is
(1) Dentalium (2) Pila (3) Chiton (4) Neopilina

173. Select the *incorrect* statement with respect to the category – 'genus'.
(1) It is a group or assemblage of related species.
(2) A genus essentially possesses more than one number of species.
(3) Related genera are kept in the same family
(4) *Triticum* and *Mangifera* are the examples of genera.
174. During translation initiation in prokaryotes a GTP
  (1) Alteration of generation
  (2) Double fertilization
  (3) Ovule convert in to seed
  (4) Dependend gametophytic generation.

175. Classical systematics is mainly based on the study
  of –
  (1) Cytology (2) Ecology
  (3) Embryology (4) Morphology

176. Which of the following cells can divide?
  (1) Sclerid (2) Sieve cells
  (3) Phellogen cell (4) Xylem tracheid

177. How many of the following are not the part of
  endomembrane system?
  ER, Peroxosome, Golgi complex, Lysosome, Mitochondria, Vacuole, Chloroplast.
  (1) One (2) Two (3) Three (4) Four

178. Euglena, Nostoc, Chlorella and Spirogyra.
  Choose correct option regarding above
  organism:-
  (1) All are unicellular eukaryotes
  (2) All are autotrophic multicellular
  (3) All have chlorophyll’a and photosynthetic ability
  (4) All are belong to green algae

179. Ribosomal RNA is actively synthesised in
  (1) Nucleolplasm (2) Ribosomes
  (3) Lysosomes (4) Nucleolus

180. During translation initiation in prokaryotes a GTP
  molecule needed in
  (1) Formation of formylmet - tRNA
  (2) Binding of 30s subunit of ribosome with mRNA
  (3) Association of formyl-met-tRNA with
  Initiation codon on mRNA
  (4) Formation of peptide bond

Your moral duty
is to prove that **ALLEN is ALLEN**