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.
1. Two particles of equal mass (m) each move in a circle of radius (r) under the action of their mutual gravitational attraction. Find the speed of each particle.

\[ \frac{Gm}{2r} \]

2. The height at which the weight of a body becomes \( \frac{1}{16} \)th its weight on the surface of earth (radius R), is :-

(1) 3R (2) 4R (3) 5R (4) 15R

3. The density of the atmosphere is 1.29 kg/m\(^3\), then how high would the atmosphere extend ? (g = 9.81 m/sec\(^2\)) :-

(1) 8 km (2) 1.2 km (3) 10.3 km (4) None of these

4. The water rises in the capillary to a height of 10 cm. If the surface tension of water is 73 \( \times \) 10\(^{-3} \) N/m, density is 10\(^3 \) kg/m\(^3\) and g = 9.8 m/sec\(^2\), then find radius of capillary :-

(1) 0.02 cm (2) 0.015 cm (3) 0.05 cm (4) 0.08 cm

5. An aeroplane of mass 3 \( \times \) 10\(^4 \) kg and total wing area of 120 m\(^2\) is in a level flight at some height. The difference in pressure between the upper and lower surfaces of its wings in kilopascals is (g=10 m/s\(^2\))

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

6. There is a 1 mm thick layer of glycerine between a flat plate of area 100 cm\(^2\) and a big plate. If the coefficient of viscosity of glycerine is 1.0 kg (m-s), then how much force is required to move the plate with a velocity of 7 cm/s ?

(1) 0.7N (2) 0.1N (3) 0.2N (4) 0.6N

7. Amplitude of an oscillating particle is A. When velocity of particle is one third of maximum velocity, determine position of particle :-

(1) \( \frac{A}{3} \) (2) \( \frac{2\sqrt{2}}{3} A \) (3) \( \frac{A}{2} \) (4) \( \frac{\sqrt{3}A}{2} \)
8. Two springs of force constant K and 2K are connected to a mass as shown below. The frequency of oscillation of the mass is:

\[
\frac{3K}{M} \quad (1) \quad \frac{3K}{2M} \quad (2) \quad \frac{3K}{M} \quad (3) \quad \frac{K}{6M} \quad (4)
\]

9. A train is moving towards a stationary observer. Which of the following curves best represents the frequency received by the observer as a function of time?

\[
(1) \quad f \quad t \quad (2) \quad f \quad t \quad (3) \quad f \quad t \quad (4) \quad f \quad t
\]

10. Two close organ pipes having length 20 cm and 20.5 cm produce 5 beats per second. Determine the frequency of both organ pipes.

(1) 205 Hz, 200 Hz \hspace{0.5cm} (2) 324 Hz, 320 Hz
(3) 155 Hz, 150 Hz \hspace{0.5cm} (4) 105 Hz, 100 Hz

11. Two vibrating tuning forks produce progressive waves given by \( Y_1 = 4 \sin 500\pi t \) and \( Y_2 = 2 \sin 506\pi t \). Number of beats produced per minute is:

(1) 3 \hspace{0.5cm} (2) 360 \hspace{0.5cm} (3) 180 \hspace{0.5cm} (4) 60

12. The velocities of sound at the same pressure in two monatomic gases of densities \( \rho_1 \) and \( \rho_2 \) are \( v_1 \) and \( v_2 \) respectively. If \( \rho_1/\rho_2 = 2 \), then the value of \( v_1/v_2 \) is:

(1) \( \frac{1}{\sqrt{2}} \) \hspace{0.5cm} (2) 2 \hspace{0.5cm} (3) \( \frac{1}{2} \) \hspace{0.5cm} (4) None of these
13. Certain quantity of water cools from 70°C to 60°C in first 10 minutes and to 54°C in the next 10 minutes. The temperature of the surrounding is:
   (1) 45°C (2) 20°C (3) 42°C (4) 10°C

14. During an adiabatic process, the volume of gas is found to be inversely proportional to the cube of its temperature. The ratio of \( \frac{C_p}{C_v} \) for the gas is:
   (1) \( \frac{3}{2} \) (2) \( \frac{4}{3} \) (3) 2 (4) \( \frac{5}{3} \)

15. A cyclic process ABCD is shown in the given P-V diagram. In the following answer, the one that represents the same process as in P-T diagram is:

16. One mole of ideal monoatomic gas (\( \gamma = 5/3 \)) is mixed with one mole of diatomic gas (\( \gamma = 7/5 \)). What is \( \gamma \) for the mixture? \( \gamma \) denotes the ratio of specific heat at constant pressure to that at constant volume:
   (1) 3/2 (2) 23/15 (3) 35/23 (4) 4/3

17. A mass of 0.5 kg moving with a speed of 1.5 m/s on a horizontal smooth surface, collides with a nearly weightless spring of force constant \( k=50 \text{N/m} \). The maximum compression of the spring would be:
   (1) 0.12 m (2) 1.5 m (3) 0.5 m (4) 0.15 m
18. A circular overbridge has radius 20m. What is the maximum speed with which a car can cross the bridge without leaving contact with the overbridge at the highest point? \( g = 9.8 \text{ m/s}^2 \)

(1) 14 m/s  
(2) 20 m/s  
(3) 22.3 m/s  
(4) 28 m/s

19. Write the dimensions of \( \frac{a}{b} \) in the relation \( P = \frac{a - t^2}{bx} \), where \( P \) is pressure, \( x \) is the distance and \( t \) is the time:

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

20. An experiment measures \( a, b \) and \( c \) and then \( x \) is calculated from \( x = \frac{a^{1/2}b^2}{c} \). If the percentage errors in \( a, b \) and \( c \) are \( \pm 1\% \), \( \pm 3\% \) and \( \pm 2\% \) then the maximum percentage error in \( x \) is:

(1) 12.5 \%  
(2) 7 \%  
(3) 1 \%  
(4) 4 \%

21. A ball thrown up from a location, returns back at the same location. Which of the following statements are correct.

(a) Distance travelled by ball can be zero  
(b) Displacement of ball is zero  
(c) Average velocity of ball is zero  
(d) Acceleration of the ball is zero

(1) a, b and c  
(2) b and c  
(3) b, c and d  
(4) All

22. A juggler maintains four balls in vertically upward motion. He attempts next ball after 1/4 sec. For the shows to go on, what should be the height for which he throws the ball? \( (g=10\text{m/s}^2) \)

(1) 5 m  
(2) 2.5 m  
(3) 1.25 m  
(4) 1.0 m
23. The graph shows the variation with time t of velocity v of an object moving along a straight line.

\[ \text{a-t graph will be} \]

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

24. A uniform rod of mass m and length l rotates in a horizontal plane with an angular velocity \( \omega \) about a vertical axis passing through one end. The tension in the rod at a distance x from the axis is:

(1) \( \frac{1}{2} m \omega^2 x \)  
(2) \( \frac{1}{2} m \omega^2 \frac{x^2}{l} \)  
(3) \( \frac{1}{2} m \omega^2 \left(1 - \frac{x}{l}\right) \)  
(4) \( \frac{1}{2} m \omega^2 \left(l^2 - x^2\right) \)

25. Graph is drawn between y–x axis. Which of the following equation is correct for graph:

(1) \( y = -\sqrt[3]{3x} + 3 \)  
(2) \( y = \sqrt[3]{3x} + 3 \)  
(3) \( y = \sqrt[3]{3x} - 3 \)  
(4) \( \sqrt[3]{3y} = x + 3 \)

26. If \( y = x^2 + \cos 2x + e^x \) then find \( \frac{dy}{dx} \):

(1) \( 2x - 2 \sin 2x + ae^x \)  
(2) \( 2x + 2\sin 2x + e^x \)  
(3) \( 2x - \sin 2x + e^x \)  
(4) \( 2x + 2\sin 2x + ae^x \)
27. Two blocks of masses 7 kg and 5 kg are placed in contact with each other on a smooth surface. If a force of 6 N is applied on the heavier mass, the force on the lighter mass is:

- (1) 3.5 N
- (2) 2.5 N
- (3) 5 N
- (4) 6 N

![Diagram of two blocks](image)

28. Two blocks, 4 kg and 2 kg are sliding down an inclined plane. The acceleration of the 2 kg block is:

- (1) 1.66 m/s²
- (2) 2.4 m/s²
- (3) 3.66 m/s²
- (4) 4.66 m/s²

![Diagram of inclined plane](image)

29. A wooden piece floats half submerged in a tub of water. If the system is transferred to a lift ascending with acceleration the wooden piece will:

- (1) Sink a little more
- (2) Rise a little
- (3) Remain half submerged
- (4) Sink to the bottom

![Diagram of wooden piece](image)

30. Two masses of 5 kg and 10 kg are connected to a pulley. What will be the acceleration if the pulley is set free: (g = acceleration due to gravity)

- (1) g
- (2) g/2
- (3) g/3
- (4) g/4

![Diagram of pulley](image)
31. A body of mass M at rest explodes into three pieces, two of which of mass \((M/4)\) each are thrown-off in perpendicular directions with velocities of 3 m s\(^{-1}\) and 4 m s\(^{-1}\) respectively. The third piece will be thrown-off with a velocity of:-

(1) 1.5 m s\(^{-1}\)  
(2) 2 m s\(^{-1}\)  
(3) 2.5 m s\(^{-1}\)  
(4) 3 m s\(^{-1}\)

32. Which of the following statements is incorrect?

(1) Most of the collisions on the macroscopic scale are inelastic collisions.
(2) In a perfectly inelastic collision, there is complete loss of KE.
(3) Forces involved in an elastic collision are conservative in nature.
(4) Oblique collision is that collision in which the colliding bodies do not move along the same straight line path.

33. The mass of the bob of a simple pendulum of length \(L\) is \(m\). If the bob is left from its horizontal position then the speed of the bob and tension in the thread in the lowest position of the bob will be respectively:-

(1) \(\sqrt{2gL}\) and \(3mg\)  
(2) \(3mg\) and \(\sqrt{2gL}\)  
(3) \(2mg\) and \(\sqrt{2gL}\)  
(4) \(2gL\) and \(3mg\)

34. Two particles \(A\) and \(B\), move with constant velocities \(\vec{v}_1\) and \(\vec{v}_2\). At the initial moment their position vectors are \(\vec{r}_1\) and \(\vec{r}_2\) respectively. The condition for their collision is:-

(1) \(\vec{r}_1 - \vec{r}_2 = \vec{v}_1 - \vec{v}_2\)  
(2) \(\frac{\vec{r}_1 - \vec{r}_2}{|\vec{r}_1 - \vec{r}_2|} = \frac{\vec{v}_2 - \vec{v}_1}{|\vec{v}_2 - \vec{v}_1|}\)  
(3) \(\vec{r}_1 \cdot \vec{v}_1 = \vec{r}_2 \cdot \vec{v}_2\)  
(4) \(\vec{r}_1 \times \vec{v}_1 = \vec{r}_2 \times \vec{v}_2\)

35. A projectile is fired from the surface of the earth with a velocity of 5 ms\(^{-1}\) and angle \(\theta\) with the horizontal. Another projectile fired from another planet with a velocity of 3 ms\(^{-1}\) at the same angle follows a trajectory which is identical with the trajectory of the projectile fired from the earth. The value of the acceleration due to gravity on the planet is (in ms\(^{-2}\)) is: (given \(g = 9.8\) m s\(^{-2}\))

(1) 3.5  
(2) 5.9  
(3) 16.3  
(4) 110.8

36. If the mass of the body of mass \(M\) at rest explodes into three pieces, two of which of mass \((M/4)\) each are thrown-off in perpendicular directions with velocities of 3 m s\(^{-1}\) and 4 m s\(^{-1}\) respectively. The third piece will be thrown-off with a velocity of:-

(1) 1.5 m s\(^{-1}\)  
(2) 2 m s\(^{-1}\)  
(3) 2.5 m s\(^{-1}\)  
(4) 3 m s\(^{-1}\)
36. A rod PQ of mass M and length L is hinged at end P. The rod is kept horizontal by a massless string tied to point Q as shown in figure. When string is cut, the initial angular acceleration of the rod is :-

(1) \( \frac{2g}{3} \)  
(2) \( \frac{3g}{2} \)  
(3) \( \frac{g}{L} \)  
(4) \( \frac{2g}{L} \)

37. A plank with a box on it at one end is gradually raised about the other end. As the angle of inclination with the horizontal reaches 30°, the box starts to slip and slides 4.0 m down the plank in 4.0s. The coefficients of static and kinetic friction between the box and the plank will be, respectively:

(1) 0.4 and 0.3  
(2) 0.6 and 0.6  
(3) 0.6 and 0.5  
(4) 0.5 and 0.6

38. The value of coefficient of volume expansion of glycerin is \( 5 \times 10^{-4} \) K\(^{-1} \). The fractional change in the density of glycerin for a rise of 40°C in its temperature, is :-

(1) 0.010  
(2) 0.015  
(3) 0.020  
(4) 0.025

39. A mass \( m \) moving horizontally (along the x-axis) with velocity \( v \) collides and sticks to a mass of \( 3m \) moving vertically upward (along the y-axis) with velocity \( 2v \). The final velocity of the combination is :-

(1) \( \frac{3}{2}vi + \frac{1}{4}vj \)  
(2) \( \frac{1}{4}vi + \frac{3}{2}vj \)  
(3) \( \frac{1}{3}vi + \frac{2}{3}vj \)  
(4) \( \frac{2}{3}vi + \frac{1}{3}vj \)

40. A particle of mass \( M \) starting from rest undergoes uniform acceleration. If the speed acquired in time \( T \) is \( V \), then power delivered to the particle in time \( T \) is :-

(1) \( \frac{1}{2} MV^2 \)  
(2) \( \frac{MV^2}{T^2} \)  
(3) \( \frac{1}{2} MV^2 \)  
(4) \( \frac{MV^2}{T} \)
41. In thermodynamic processes which of the following statements is not true :-
(1) In an adiabatic process \( PV^{\gamma} = \text{constant} \)
(2) In an adiabatic process the system is insulated from the surroundings
(3) In an isochoric process pressure remains constant
(4) In an isothermal process the temperature remains constant

42. Water falls from a height of 60m at the rate of 15kg/s to operate a turbine. The losses due to frictional forces are 10% of energy. How much power is generated by the turbine? \( g = 10 \text{m/s}^2 \)
(1) 12.3 kW (2) 7.0 kW
(3) 8.1 kW (4) 10.2 kW

43. Steam at 100°C is passed into 20 g of water at 10°C. When water acquires a temperature of 80°C, the mass of water present will be:
\[ \text{Take specific heat of water} = 1 \text{cal g}^{-1} \text{°C}^{-1} \text{and latent heat of steam} = 540 \text{cal g}^{-1} \]
(1) 24 g (2) 31.5 g (3) 42.5 g (4) 22.5 g

44. A mole of an ideal diatomic gas undergoes a transition from A to B along a path AB as shown in the figure. The change in internal energy of the gas during the transition is :-

\[
P(\text{in KPa}) \\
V(\text{in m}^3)
\]

(1) 10 kJ (2) – 10 kJ
(3) 5 kJ (4) – 5 kJ

45. A monoatomic gas at a pressure \( P \), having a volume \( V \) expands isothermally to a volume \( 4V \) and then adiabatically to volume \( 16V \). The final pressure of the gas is \( \text{Take} \gamma = \frac{3}{2} \) :-

(1) \( \frac{P}{32} \) (2) \( \frac{P}{64} \)
(3) \( \frac{P}{64} \) (4) 64 P
46. Electronic configuration of last element of the volatile metal group is:
   (1) [Rn] 5f\(^{14}\) 6d\(^{10}\) 7s\(^{2}\)  (2) [Xe] 4f\(^{14}\) 5d\(^{10}\) 6s\(^{2}\)
   (3) [Rn]5f\(^{14}\) 6d\(^{7}\) 7s\(^{2}\)  (4) [Xe] 4f\(^{14}\) 5d\(^{5}\) 6s\(^{2}\)

47. From the following elements which of them has highest second ionisation potential:
   (1) N  (2) O  (3) C  (4) F

48. If A to E are element of a group from top to bottom then group can be:

```
I.P.       At. No.
A            13  (1) 13 group
B            2  (2) 1 group
C            1  (3) 2 group
D            4  (4) Inert gas
E            2  (5) 3 group
```

49. In which of the following arrangement the order is not according to the property indicated in bracket:
   (1) Al\(^{3+}\) < Mg\(^{2+}\) < Na\(^+\) < F\(^-\) (Ionic size)
   (2) B < C < N < O (1st IP)
   (3) I < Br < F < Cl (EA)
   (4) Li < Na < K < Rb (Metallic character)

50. Which of the following statement is not correct:
   (1) Ionic mobality of Na\(^+(aq)\) is greater than Mg\(^{2+}(aq)\)
   (2) The EA of 'F' atom is more than 'Cl' atom
   (3) Second IP of 'B' atom is greater than that of 'C' atom
   (4) IE of O\(^-\) is less than that of 'O' atom

51. Find the highest ratio of IP values of given pair of elements:
   (1) He : Ne  (2) Ne : Ar
   (3) He : Xe  (4) Kr : Xe

52. Select incorrect order of electronegativity of element:
   (1) N\(_2\)O\(_3\) (EN of N-atom) > NO\(_2\) (EN of N-atom)
   (2) CH\(_4\) (EN of C-atom) > CO\(_2\) (EN of C-atom)
   (3) Cu\(^{2+}\) > Cu\(^+\) (EN)
   (4) O–F < P–F (bond polarity)

53. In which of the following species are planar:
   (1) I\(_3\), XeF\(_2\), ClF\(_3\)
   (2) H\(_2\)O, OCl\(_-\), ICl\(_2\)_
   (3) XeF\(_6\), XeF\(_4\), BF\(_3\)
   (4) All are correct
54. The species having no \( \pi - \pi \) bond but has bond order equal to \( \text{O}_2 \) :-
   (1) \( \text{ClO}_3^- \) (2) \( \text{PO}_4^{3-} \) (3) \( \text{SO}_4^{2-} \) (4) \( \text{XeO}_3 \)

55. In which change bond order and number of unpaired \( e^- \) both are increased :-
   (1) \( \text{N}_2 \rightarrow \text{N}_2^2^- \) (2) \( \text{B}_2 \rightarrow \text{B}_2^- \) (3) \( \text{O}_2 \rightarrow \text{O}_2^- \) (4) \( \text{O}_2 \rightarrow \text{O}_2 \)

56. Incorrect statement is :-
   (1) \( \text{BeCl}_2 \) is a covalent compound
   (2) \( \text{BeCl}_2 \) is an electro deficient molecule
   (3) \( \text{BeCl}_2 \) can form dimer
   (4) The hybrid state of \( \text{Be} \) in solid \( \text{BeCl}_2 \) is sp²

57. Which of the following is not a peroxide :-
   (1) \( \text{Na}_2 \text{O}_2 \) (2) \( \text{CaO}_2 \) (3) \( \text{PbO}_2 \) (4) \( \text{H}_2\text{O}_2 \)

58. Identify the incorrect reaction :-
   (1) \( \text{Be} + \text{H}_2 \rightarrow \text{BeH}_2 \)
   (2) \( \text{Be} + \text{Cl}_2 \rightarrow \text{BeCl}_2 \)
   (3) \( \text{Be} + 2\text{HCl} \rightarrow \text{BeCl}_2 + \text{H}_2 \)
   (4) \( \text{Be} + \text{NaOH} \rightarrow \text{Na}_2\text{BeO}_2 + \text{H}_2 \)

59. Intra molecular hydrogen bonding is not present in:-
   (1) Urea (2) Chloralhydrate (3) Salicylaldehyde (4) o-fluro phenol

60. Incorrect match is :-
   (1) Permutit \( \rightarrow \) Hydroted silicate's of Na and Al
   (2) Calgon \( \rightarrow \) Sodium hexa meta phosphate
   (3) \( \text{BeH}_2 \) and \( \text{MgH}_2 \) \( \rightarrow \) Covalent polymeric hydride
   (4) Hydrolith \( \rightarrow \) Electron deficient hydride

61. Isoniazid is used in the treatment of tuberculosis and multiple sclerosis. Identify the least basic N present in it :-

![Image of Isoniazid structure]

   (1) I (2) II (3) III (4) Not comparable

62. Which of the following is true for geometry of different N present in histamine :-

![Image of Histamine structures]

   (1) (I) Trigonal planar (2) (II) Trigonal planar
   (3) (III) Tetrahedral (4) All
63. **IUPAC name of given compound is:**

(1) 5- Bromo-3- chloro hex-1- ene
(2) 2- Bromo-4- chloro hex-5- ene
(3) 3- Chloro-5- bromo hexene
(4) 4- Chloro-2- bromo hex-6-ene

64. **R–COOH \[\text{Reagent}\] \rightarrow R–CH\text{2–OH}**

suitable reagent for the above conversion is:
(1) NaBH₄
(2) B₂H₆
(3) P + HI
(4) DIBAL–H/low temperature

65. Which of the following can not react with NaHCO₃:

(1) [OH](2) [OH] (3) [C CH] (4) All

66. CH₃–C≡C–CH₃ \[\overset{(1)O}{(2)H₂O}\] \rightarrow X \[\overset{(\text{NaOH+CaO})}{\Delta}\] \rightarrow Y;

Y is:
(1) CH₃–CH₂–CH₃ (2) CH₃–CH₃ (3) CH₄ (4) CH₃–COONa

67. \[\overset{\text{NH}_₂–\text{OH}}{\text{Cl}}\] \rightarrow product; product is:

(1) \[\overset{\text{Cl}}{\text{NH}_₂}\] (2) \[\overset{\text{Cl}}{\text{OH}}\] (3) \[\overset{\text{Cl}}{\text{Cl}}\] (4) \[\overset{\text{Cl}}{\text{Cl}}\]

68. Which is biodegradable polymer:
(1) PMMA (2) PVC (3) PAN (4) PHBV

69. Which is incorrect match:
(1) Chloramphenicol : Narrow spectrum antibiotic
(2) Chlordiazepoxide : Mild tranquilizer
(3) Brompheniramine : Antihistamine
(4) All
70. \( \text{CH}_3\text{CH} = \text{CH} - \text{O} \xrightarrow{\text{H}^+ / \Delta} \text{X} + \text{Y} \) \( X \) and \( Y \) are:

- \( \text{CH}_3\text{CH} = \text{CH} - \text{I} + \text{Br}_3 \)
- \( \text{CH}_3\text{CH} = \text{CH} - \text{I} + \text{OH}_3 \)
- \( \text{CH}_3\text{CH} - \text{OH} + \text{Br}_3 \)
- \( \text{CH}_3\text{CH} - \text{OH} + \text{OH}_3 \)

71. Which alcohol gives instant turbidity with Lucas reagent:

- \( \text{CH}_3\text{CH} = \text{CH} - \text{OH} \)
- \( \text{CH}_3\text{CH} = \text{CH} - \text{OH} \)
- \( \text{CH}_3\text{CH} = \text{CH} - \text{OH} \)
- \( \text{CH}_3\text{CH} = \text{CH} - \text{OH} \)

72. Which of the following give Hofmann's degradation reaction:

- \( \text{NH}_2 \text{O} \)
- \( \text{NH}_2 \text{O} \)
- \( \text{NH}_2 \text{O} \)
- All

73. Which is optically active:

- \( \text{Br} \text{I} \text{I} \text{Br} \)
- \( \text{OH} \)
- \( \text{N} \text{O} \text{H} \)
- All

74. \( \text{CH}_3\text{CH} = \text{CH} - \text{O} \xrightarrow{\text{KmnO}_4 / \Delta} \text{X} \xrightarrow{\text{Br}_2 / \text{H}_2\text{O}} \text{Y}; \text{Y} \) is:

- \( \text{COOH} \)
- \( \text{COOH} \)
- \( \text{Br} \text{COOH} \)
- All

70. \( \text{CH}_3\text{CH} = \text{CH} - \text{O} \xrightarrow{\text{H}^+ / \Delta} \text{X} + \text{Y} \) \( \text{X} \) and \( \text{Y} \) are:

- \( \text{CH}_3\text{CH} = \text{CH} - \text{I} + \text{Br}_3 \)
- \( \text{CH}_3\text{CH} = \text{CH} - \text{I} + \text{OH}_3 \)
- \( \text{CH}_3\text{CH} - \text{OH} + \text{Br}_3 \)
- \( \text{CH}_3\text{CH} - \text{OH} + \text{OH}_3 \)

71. Which alcohol gives instant turbidity with Lucas reagent:

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- \( \text{CH}_3\text{CH} = \text{CH} - \text{OH} \)
- \( \text{CH}_3\text{CH} = \text{CH} - \text{OH} \)
- All

72. Which of the following give Hofmann's degradation reaction:

- \( \text{NH}_2 \text{O} \)
- \( \text{NH}_2 \text{O} \)
- \( \text{NH}_2 \text{O} \)
- All

73. Which is optically active:

- \( \text{Br} \text{I} \text{I} \text{Br} \)
- \( \text{OH} \)
- \( \text{N} \text{O} \text{H} \)
- All

74. \( \text{CH}_3\text{CH} = \text{CH} - \text{O} \xrightarrow{\text{KmnO}_4 / \Delta} \text{X} \xrightarrow{\text{Br}_2 / \text{H}_2\text{O}} \text{Y}; \text{Y} \) is:

- \( \text{COOH} \)
- \( \text{COOH} \)
- \( \text{Br} \text{COOH} \)
- All
75. \[ \text{C} = \text{CH} \xrightarrow{(1) \text{BH}_3, \text{THF}} \text{Product; Product is:} \]

(1) \[ \begin{array}{c} \text{Ph} \hspace{1cm} \text{O} \\ \text{O} \hspace{1cm} \text{H} \end{array} \]
(2) \[ \begin{array}{c} \text{Ph} \hspace{1cm} \text{O} \\ \text{O} \hspace{1cm} \text{Me} \hspace{1cm} \text{Me} \end{array} \]
(3) \[ \begin{array}{c} \text{Ph} \hspace{1cm} \text{O} \\ \text{O} \hspace{1cm} \text{H} \end{array} \]
(4) \[ \begin{array}{c} \text{Ph} \hspace{1cm} \text{O} \\ \text{O} \hspace{1cm} \text{Me} \hspace{1cm} \text{Me} \end{array} \]

76. If the total energy of an electron in a hydrogen atom in an excited state is \(-3.4\) eV, then the de-Broglie wavelength of the electron is: 
(1) \(6.6 \times 10^{-10}\) m 
(2) \(3 \times 10^{-10}\) m 
(3) \(5 \times 10^{-9}\) m 
(4) \(9.3 \times 10^{-12}\) m

77. The two particles A and B have de Broglie wavelengths 1 nm and 5 nm respectively. If mass of A is four times the mass of B, the ratio of kinetic energies of A and B would be: 
(1) 5 : 1 
(2) 25 : 4 
(3) 20 : 1 
(4) 5 : 4

78. The equilibrium constant at a certain temperature for the reaction \(A_2 + B_2 \rightarrow 2AB\) is 2. Calculate the degree of dissociation of either \(A_2\) or \(B_2\): 
(1) 0.2 
(2) 0.5 
(3) \(\frac{1}{(1+\sqrt{2})}\) 
(4) \(\sqrt{2}\)

79. Silver ions are added to a solution with [Br\(^{-}\)] = [Cl\(^{-}\)] = [CO\(_3\)\(^{2-}\)] = [AsO\(_4\)\(^{3-}\)] = 0.1 M. Which compound will precipitate with lowest \([\text{Ag}^+]?\):
(1) AgBr \(K_{sp} = 5 \times 10^{-13}\) 
(2) AgCl \(K_{sp} = 1.8 \times 10^{-10}\) 
(3) Ag\(_2\)CO\(_3\) \(K_{sp} = 8.1 \times 10^{-12}\) 
(4) Ag\(_2\)AsO\(_4\) \(K_{sp} = 1 \times 10^{-22}\)

80. Oxidation state of sulphur in tetrathionic acid is 
(1) +6 
(2) +4 
(3) +6 and 0 
(4) +5 and 0

81. The vander wall's equation for 0.5 mol gas is 
(1) \(P + \frac{a}{4V^2} = \frac{2RT}{2}\) 
(2) \(P + \frac{a}{4V^2} = 2(2V - b)\) 
(3) \(P + \frac{a}{4V^2} = 2(2V - 4b)\) 
(4) \(P + \frac{a}{4V^2} = \frac{2RT}{2V - b}\)

82. 16.25 g metal chloride is obtained on complete conversion of 8 g metal oxide into metal chloride then what will be the equivalent weight of metal: 
(1) 18.66 
(2) 37.32 
(3) 9.33 
(4) 2.91

83. \[ \begin{array}{c} \text{O} \\ \text{H} \end{array} \]

(1) \[ \begin{array}{c} \text{Ph} \\ \text{O} \\ \text{H} \end{array} \]
(2) \[ \begin{array}{c} \text{Ph} \\ \text{O} \\ \text{Me} \\ \text{Me} \end{array} \]
(3) \[ \begin{array}{c} \text{Ph} \\ \text{O} \\ \text{H} \end{array} \]
(4) \[ \begin{array}{c} \text{Ph} \\ \text{O} \\ \text{Me} \\ \text{Me} \end{array} \]

84. \[ \begin{array}{c} \text{O} \\ \text{H} \end{array} \]

(1) \[ \begin{array}{c} \text{Ph} \\ \text{O} \\ \text{H} \end{array} \]
(2) \[ \begin{array}{c} \text{Ph} \\ \text{O} \\ \text{Me} \\ \text{Me} \end{array} \]
(3) \[ \begin{array}{c} \text{Ph} \\ \text{O} \\ \text{H} \end{array} \]
(4) \[ \begin{array}{c} \text{Ph} \\ \text{O} \\ \text{Me} \\ \text{Me} \end{array} \]
83. On reaction of 38.1 g iodine and 28.4 g chlorine, mixture of ICl and ICl₃ is obtained then total number of moles after reaction will be :-
(1) 0.45 (2) 0.40 (3) 0.30 (4) 0.25

84. Given that the bond energy of hydrogen-hydrogen bonds is 436 kJ/mol, that of hydrogen-oxygen bonds is 464 kJ/mol, and those in oxygen molecules 496 kJ/mol, what is the approximate heat of reaction for 2H₂ + O₂ → 2H₂O ?
(1) –488 kJ/mol (2) –440 kJ/mol (3) 440 kJ/mol (4) 488 kJ/mol

85. Based on Hess's law calculations, what is the average bond energy of S–O in SO₃ if ΔH° of SO₃ is –270 kJ mol⁻¹. Bond energy of O=O is 130 kJmol⁻¹ and heat of sublimation for S(s) is 100 kJ mol⁻¹ ?
(1) 188.5 kJmol⁻¹ (2) 120 kJmol⁻¹ (3) 12 kJmol⁻¹ (4) 100 kJmol⁻¹

86. ΔH° combustion of C₄H₁₀(g) is –2650 kJ mol⁻¹; the amount of heat evolve at constant pressure that can be obtained by burning 5.8 kg of C₄H₁₀ is approx :-
(1) 2.65 x 10⁵ kJ (2) 265 x 10⁵ kJ (3) 2.65 x 10⁶ kJ (4) 2.65 x 10⁷ kJ

87. Solubility of AgCl in 0.2M NaCl is x and that in 0.1 M AgNO₃ is y then which of the following is correct ?
(1) x = y (2) x > y (3) x < y (4) we can not predict

88. If ice and water are at equilibrium then which is correct. To obtain high amount of water :-
Ice → Water
(1) Increase of pressure and temperature (2) Decrease of pressure and temperature (3) Increase of pressure but decrease of temperature (4) Decrease of pressure but increase of temperature

89. For the redox reaction
MnO₄⁻ + C₂O₄²⁻ + H⁺ → Mn²⁺ + CO₂ + H₂O
the correct coefficients of the reactants for the balanced equation are :-

<table>
<thead>
<tr>
<th>reactant</th>
<th>coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>MnO₄⁻</td>
<td>2</td>
</tr>
<tr>
<td>C₂O₄²⁻</td>
<td>5</td>
</tr>
<tr>
<td>H⁺</td>
<td>16</td>
</tr>
</tbody>
</table>

90. Which is lewis acid ?
(1) H₂O (2) HCl (3) SO₂ (4) NH₃
91. Taxonomic aid which contains information on any one taxon, called :-
(1) Manuals
(2) Monograph
(3) Museums
(4) Flora

92. Cytotaxonomy is based on :
(1) Cytological information
(2) Chromosome number
(3) Chromosome structure and behaviour
(4) All

93. In gymnosperms, the endosperm is formed by the :
(1) Fusion of one male gamete with two polar nuclei
(2) Fusion of one male gamete with one polar nuclei
(3) Fusion of male gamete with the egg
(4) Megaspore

94. Unbranched stem is character of which gymnosperm :-
(1) Pinus
(2) Cycas
(3) Cedrus
(4) Lycopodium

95. Fungi resemble monerans on the basis of :-
(1) Structure of fruiting body
(2) Mycelium
(3) Absorptive heterotrophy
(4) Cellular structure

96. Heterothallism refers to :
(1) Fusion between the strains structurally, and physiologically similar
(2) Fusion between morphologically similar strain
(3) Fusion between the strains structurally similar but physiologically different
(4) Fusion between cytoplasm

97. Bacterial structure and behaviour are respectively:
(1) Simple, Simple
(2) Complex, Simple
(3) Simple, Complex
(4) Complex, Complex
98. Consider the following four statements (A-D) and select the option which includes all the correct ones only.

(A) Archaebacteria differ from other bacteria in having a different cell wall structure
(B) Bacteria as a group show the most extensive metabolic diversity
(C) Eubacteria have chlorophyll 'a' similar to green plants.
(D) Mycoplasma can survive without oxygen.

Option :-
(1) Statements B, C and D
(2) Statements A, C
(3) Statements B, D
(4) Statements A, B and D

99. Which of the following statements about viruses is correct :-

(1) Nucleic acid of viruses is known as plasmid
(2) Viruses possess their own metabolic system
(3) All viruses contain both DNA and RNA
(4) Viruses are obligate parasites

100. Match the column I with column-II:

<table>
<thead>
<tr>
<th>Diseases</th>
<th>Causaorganisms</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Citrus canker</td>
<td>(i) Bacteria</td>
</tr>
<tr>
<td>(B) Little leaf of Brinjal</td>
<td>(ii) Helminthosporium</td>
</tr>
<tr>
<td>(C) Brown leaf spot of Rice</td>
<td>(iii) Cephaluros</td>
</tr>
<tr>
<td>(D) Rust of Tea</td>
<td>(iv) Mycoplasma</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(iii)</td>
<td>(i)</td>
<td>(ii)</td>
</tr>
<tr>
<td>(2)</td>
<td>(i)</td>
<td>(ii)</td>
<td>(iv)</td>
</tr>
<tr>
<td>(3)</td>
<td>(i)</td>
<td>(iv)</td>
<td>(iii)</td>
</tr>
<tr>
<td>(4)</td>
<td>(ii)</td>
<td>(iv)</td>
<td>(iii)</td>
</tr>
</tbody>
</table>

Answer:

A       B        C        D
(1) (iii) (iv) (i) (ii)
(2) (i) (ii) (iv) (iii)
(3) (i) (iv) (ii) (iii)
(4) (ii) (iv) (iii) (i)
101. Which of the following is correct with respect to the given figure?

- Mucilagenous sheath
- Heterocyst

(1) This organism belongs to fungi
(2) This organism belongs to green algae
(3) This organism belongs to BGA
(4) This organism belongs to archeabacteria

102. Some members are given here. They all belong to how many genus, species and kingdom. Lion, Tiger, Potato, Brinjal, Mango, Wheat.

<table>
<thead>
<tr>
<th>Genus</th>
<th>Species</th>
<th>Kingdom</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Four</td>
<td>Two</td>
</tr>
<tr>
<td>(2)</td>
<td>Five</td>
<td>One</td>
</tr>
<tr>
<td>(3)</td>
<td>Five</td>
<td>Two</td>
</tr>
<tr>
<td>(4)</td>
<td>Three</td>
<td>Three</td>
</tr>
</tbody>
</table>

103. The group of heterotrophic, eukaryotic, multicellular organisms lacking cell wall will be:

(1) Monera
(2) Protista
(3) Plantae
(4) Animalia

104. In *Mangifera indica*, *Solanum nigrum*, and *Panthera pardus*, all the three names, *indica*, *nigrum* and *pardus* represent the:

(1) Names of species
(2) Names of specific epithets
(3) Names of genus
(4) Names of generic epithet

105. Find odd one out with respect to Endomembrane system:

(1) ER
(2) Golgicoplex
(3) Lysosome
(4) Peroxisome
106. The figures below show three phases of mitosis. Select the option giving correct identification together with the correct event?

(A) C – Telophase – Nuclear envelope assembles around the chromosome clusters.
(B) B – Anaphase – Segregation of homologous chromosomes.
(C) A – Prophase – Chromosomes get fully decondensed.
(D) C – Metaphase – Condensation of chromatin to from chromosome.

107. Main arena of cellular activities is:
(1) Nucleus  (2) Cytoplasm  (3) Cell membrane  (4) Chromosome

108. At which stage of meiosis, do these events occur?
(1) Leptotene Zygotene Pachytene  (2) Zygotene Pachytene Diakinesis
(3) Pachytene Zygotene Diakinesis  (4) Zygotene Diplotene Diakinesis

109. The content of the nucleolus is continuous with the rest of the......... as it is a......... structure:-
(1) Nucleoplasm, Double membranous  (2) Nucleoplasm, Membrane less
(3) Cytoplasm, Membrane less  (4) Cytoplasm, Single membranous

110. Which cell organelle divides the intracellular space into two distinct compartments, i.e. luminal (inside) and extra luminal (cytoplasm) compartments?
(1) Golgi body  (2) Mitochondria  (3) Endoplasmic reticulum  (4) Lysosome
111. Which of the following structure(s) is/are not reformed during telophase stage?
(1) Nucleolus, ER  (2) Golgi complex  
(3) Nuclear envelope  (4) Chromosomes

112. Find out the A, B, C, D, E in the given diagram.

A Radial spoke  
B Central sheath  
C Interdoublet bridge  
D Central microtubule  
E Plasma membrane

113. Which cell organelle is found not only in cytoplasm, but also within organelles and on rough E.R.?
(1) Centriole  (2) Ribosome  
(3) Microbodies  (4) Golgi complex

114. Similarities shared between ornithorhynchus and Chelone. Include all except :-
(1) Amniota  (2) Internal fertilization  
(3) Regulate body temperature  (4) Intracellular haemoglobin
115. Four characters are given below. Which two are correct with respect to hemichordates?
   (A) Exclusively marine
   (B) Radial symmetry
   (C) Body is divided into proboscis, collar and trunk
   (D) Closed circulatory system

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

116. Find out the correct match from the following table:

<table>
<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
<th>Column III</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>Radula</td>
<td>Rasping organ</td>
</tr>
<tr>
<td>(ii)</td>
<td>Hooks and suckers</td>
<td>Taenia</td>
</tr>
<tr>
<td>(iii)</td>
<td>Tube feet</td>
<td>Asterias</td>
</tr>
<tr>
<td>(iv)</td>
<td>Comb plates</td>
<td>Pleurobrachia</td>
</tr>
</tbody>
</table>

   (1) i only  (2) ii and i
   (3) iii only  (4) ii and iii

117. Excretory system is absent, sexes are separate, fertilization is usually external this is correct for :-
118. Which of the following options gives the correct categorisation of the animals according to the type of respiratory organs.

<table>
<thead>
<tr>
<th></th>
<th><strong>A</strong></th>
<th><strong>B</strong></th>
<th><strong>C</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gills</td>
<td>Tracheal System</td>
<td>Cutaneous</td>
</tr>
<tr>
<td>(1)</td>
<td>Pila</td>
<td>Crab</td>
<td>Pheretima</td>
</tr>
<tr>
<td>(2)</td>
<td>Prawn</td>
<td>Locusta</td>
<td>Nereis</td>
</tr>
<tr>
<td>(3)</td>
<td>Apis</td>
<td>Periplaneta</td>
<td>Hirudinaria</td>
</tr>
<tr>
<td>(4)</td>
<td>Anopheles</td>
<td>Aedes</td>
<td>Culex</td>
</tr>
</tbody>
</table>

119. In the given list How many animals have vertebral column, Cranium, Jaw?
- Sea horse
- Herdmania
- Earthworm
- Frog
- Hagfish
- Amphioxus
- Petromyzon
- Snake
- Torpedo

(1) Three (2) Four (3) Five (4) Six

120. Select the correct option in respect of characteristics of each group:

<table>
<thead>
<tr>
<th></th>
<th><strong>Cyclostomes</strong></th>
<th><strong>Chondrichthyes</strong></th>
<th><strong>Osteichthyes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>Marine</td>
<td>Marine, Fresh water</td>
<td>Marine</td>
</tr>
<tr>
<td>(ii)</td>
<td>Sucking mouth</td>
<td>Ventral mouth</td>
<td>Terminal mouth</td>
</tr>
<tr>
<td>(iii)</td>
<td>6-15 Pairs of Gills</td>
<td>5-7 Pairs of Gills</td>
<td>4 Pairs of Gills</td>
</tr>
<tr>
<td>(iv)</td>
<td>Placoid scales</td>
<td>Cycloid Scales</td>
<td>Ctenoid/Ganoid</td>
</tr>
</tbody>
</table>

(1) (i), (ii) are correct
(2) (i), (iii), (iv) are correct
(3) (ii), (iii), (iv) are correct
(4) (ii), (iii), (iv) are correct

121. Given diagram represents T.S. of woody dicot stem passing through lenticel. Which of the following statement is true about labelled parts A, B & D.

1. They are collenchymatous
2. They are sclerenchymatous
3. They are parenchymatous
4. They are chlorenchymatous
122. Match the column-I with column-II and choose the correct option on the basis of codes given in column-I & II.

<table>
<thead>
<tr>
<th>Column-I</th>
<th>Column-II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Tracheids</td>
<td>p Perforated end wall</td>
</tr>
<tr>
<td>B Vessels</td>
<td>q Chisel like end</td>
</tr>
<tr>
<td>C Ray parenchymatous cells</td>
<td>r Obliterated central lumen</td>
</tr>
<tr>
<td>D Xylem fibres</td>
<td>s Radial conduction of water</td>
</tr>
</tbody>
</table>

(1) A-p, B-q, C-r, D-s
(2) A-p, B-q, C-s, D-r
(3) A-q, B-p, C-s, D-r
(4) A-q, B-s, C-p, D-r

123. A T.S. of young monocot root can be distinguished from that of a young dicot stem by presence of :-
(1) Intra fascicular cambium
(2) Inter fascicular cambium
(3) Radial arrangement of xylem and phloem
(4) Collateral arrangement of xylem and phloem

124. Axillary bud is derived from :-
(1) Root apical meristem
(2) Shoot apical meristem
(3) Lateral meristem
(4) Leaf primordium

125. Which of the following is incorrectly matched pair
(1) Hypogynous flower – Mustard
(2) Axile placentaion – Argeome
(3) Asymmetric flower – Canna
(4) Imbricate aestivation – Gulmohur

126. Function of petiole is :-
(1) Hold the leaf blade
(2) Leaf blades to flutter in wind
(3) Bringing fresh air to leaves surface
(4) All of the above

127. The side of a flower facing the mother axis is called :-
(1) Anterior
(2) Posterior
(3) Dorsal
(4) Ventral
128. Pick up the correct match –

**Family**
- I Compositae
- II Papilionatae
- III Poaceae
- IV Cucurbitaceae

**Plant**
- A Caryopsis
- B Pepo
- C Legume
- D Cypsela

(1) II III I IV
(2) III IV II I
(3) I II III IV
(4) III II I IV

129. Identify the family from the below given floral diagram and which technical term used for androecium :-

(1) Solanaceae - Monoadelphous
(2) Papilionoideae - Diadelphous
(3) Papilionoideae - Didynamous
(4) Cruciferae - Tetradyndous

130. Transmission of an impulse across **A** synapse is very similar to impulse conduction along a single **B**.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Chemical</td>
<td>Axon</td>
</tr>
<tr>
<td>(2)</td>
<td>Electrical</td>
<td>Cyton</td>
</tr>
<tr>
<td>(3)</td>
<td>Chemical</td>
<td>Cyton</td>
</tr>
<tr>
<td>(4)</td>
<td>Electrical</td>
<td>Axon</td>
</tr>
</tbody>
</table>

131. Which of the following epithelium their main function is to provide protection against chemical and mechanical stresses :-

(1) Simple epithelium
(2) Compound epithelium
(3) Columnar epithelium
(4) Cuboidal Epithelium
132. Which of the following is not the function of connective tissue?
   (1) Diffusion, Absorption and secretion
   (2) Binds the various structures of body
   (3) Forms the framework of the body
   (4) Transport of substances

133. Cells of adipose tissues store fats because:
   (1) These are very large in size
   (2) These are smaller in size
   (3) Excess of nutrients which are not used immediately converted into fats
   (4) Excess of nutrients which are used immediately converted into fats

134. Which is not true with respect to the vision of cockroach?
   (1) Mosaic vision
   (2) Superposition vision
   (3) More sensitivity
   (4) Less resolution

135. Identify correctly matched (a), (b), (c)
   (a) Colon, Mesentron, Crop
   (b) Ileum, Mesentron, Gizard
   (c) Ileum, Mesentron, Crop
   (d) Colon, Mesentron, Gizzard

136. Glucose is stored in human body in which of the following form?
   (1) Glycogen
   (2) Collagen
   (3) Starch
   (4) Sucrose

137. A list of different metabolites is given below in this list find out the number of primary & secondary metabolites, respectively & choose the correct option:
   Alkaloids, Abrin, Ricin, Carotenoids, Amino acids, Glucose, Fructose, Fatty acids, Thymine, Uracil, Lectins, Drugs.
   (1) Five and Six
   (2) Six and Six
   (3) Seven and five
   (4) Four and Eight
138. Which one is the correct average composition of cell in respect of % of total cellular mass?

<table>
<thead>
<tr>
<th>Water</th>
<th>Protein</th>
<th>Carbohydrates</th>
<th>Lipid</th>
<th>Nucleic Acid</th>
<th>Ions</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) 70-90</td>
<td>10-15</td>
<td>3</td>
<td>2</td>
<td>5-7</td>
<td>1</td>
</tr>
<tr>
<td>(2) 70-90</td>
<td>3</td>
<td>10-15</td>
<td>2</td>
<td>5-7</td>
<td>1</td>
</tr>
<tr>
<td>(3) 70-90</td>
<td>10-15</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>5-7</td>
</tr>
<tr>
<td>(4) 70-90</td>
<td>3</td>
<td>10-15</td>
<td>2</td>
<td>5-7</td>
<td>1</td>
</tr>
</tbody>
</table>

139. Among the following which one is the sweetest sugar?
(1) Sucrose  
(2) Glucose  
(3) Fructose  
(4) Maltose

140. Read the following statement (A-D):
(a) Each protein is a polymer of amino acids  
(b) A protein is a hetero polymer and not a homopolymer  
(c) Dietary proteins are the source of essential amino acid  
(d) Collagen is the most abundant protein in whole of the biosphere
How many of the above statement are right?
(1) Three  
(2) One  
(3) Two  
(4) Four

141. Which one of following is produced during light reaction of photosynthesis?
(1) ATP  
(2) NADPH  
(3) Both ATP & NADPH  
(4) Carbohydrate

142. Refer the given reaction:

$$2\text{H}_2\text{O} \rightarrow 4\text{H}^+ + 4e^- + \frac{1}{2}\text{O}_2$$

Where does this reaction take place in chloroplast of plant?
(1) Outer surface of thylakoid membrane  
(2) Inner surface of thylakoid membrane  
(3) Stroma  
(4) Intermembrane space

143. Identify the correct sequence of stages of calvin cycle:
(1) Reduction → Carboxylation → Regeneration  
(2) Carboxylation → Regeneration → Reduction  
(3) Carboxylation → Reduction → Regeneration  
(4) Reduction → Regeneration → Carboxylation

144. During non-cyclic photophosphorylation, electrons are continuously lost from the reaction centre of PS II. Which source is used to replace these electrons?
(1) Sunlight  
(2) O$_2$  
(3) H$_2$O  
(4) CO$_2$
145. Which statement is wrong?
(1) Aerobic respiration founds only in Eukaryotes
(2) Aerobic respiration is 19 times more useful than anaerobic
(3) Cytochrome $a_3$ contains Fe and Cu both
(4) Respiration also occurs in green cells

146. How many ATP equivalent produces by EMP-pathway or glycolysis
(1) 12 ATP (2) 8 ATP (3) 24 ATP (4) 30 ATP

147. Which one of the following option gives the correct categorisation of three steps (ABC) of Respiration?

<table>
<thead>
<tr>
<th></th>
<th>A Glycolysis</th>
<th>B TCA-cycle</th>
<th>C ETS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Matrix</td>
<td>Cytosol</td>
<td>Cristae</td>
</tr>
<tr>
<td>(2)</td>
<td>Pyruvate</td>
<td>2,CO$_2$</td>
<td>34 ATP</td>
</tr>
<tr>
<td>(3)</td>
<td>PS-I</td>
<td>3 NADH$_2$</td>
<td>Matrix</td>
</tr>
<tr>
<td>(4)</td>
<td>10step</td>
<td>12 ATP</td>
<td>with out O$_2$</td>
</tr>
</tbody>
</table>

148. Activator of carboxypeptidase is :-
(1) Mn$^{++}$ (2) Fe$^{++}$
(3) Mg$^{++}$ (4) Zn$^{++}$

149. NAD and NADP contain :-
(1) Niacin and Biotine respectively
(2) Riboflavin and Biotine respectively
(3) Riboflavin and Niacin respectively
(4) Niacin and Niacin respectively

150. In a girdled plant :-
(1) The root dies first
(2) The shoot and root die together
(3) Neither root nor shoot will die
(4) The shoot dies first

151. Manganese required for :-
(1) Oxygen liberation
(2) Plastocyanin
(3) Nitrogenase
(4) All

152. Which pair is wrong?
(1) ABA - Stomatal closing.
(2) Potometer - Transpiration measuring.
(3) COCl$_2$ Method - Comparative study of transpiration
(4) Stomata - Guttation
153. Triple response hormone on stem is: -
(1) Abscisic acid  (2) Ethylene
(3) Cytokinin  (4) Auxin

154. Hormone related with α–amylase induction-
(1) Cytokinin  (2) ABA
(3) Ethylene  (4) GA

155. Identify correct match from the column I, II and III

<table>
<thead>
<tr>
<th>Column-I</th>
<th>Column-II</th>
<th>Column-III</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Salivary gland</td>
<td>a. Lacteal</td>
<td>i. Secretion of pancreatic juice</td>
</tr>
<tr>
<td>2. Villi</td>
<td>b. Goblet cells</td>
<td>ii. Bartholin duct</td>
</tr>
<tr>
<td>3. Intestinal epithelium</td>
<td>c. Acinar cells</td>
<td>iii. Absorption of fat</td>
</tr>
</tbody>
</table>

(1) 4 - c - iv, 3 - b - i, 2 - a - ii, 1 - d - iii
(2) 2 - a - ii, 1 - d - iii, 3 - b - iv, 4 - c - i
(3) 4 - c - i, 3 - b - iv, 1 - d - iii, 2 - a - ii
(4) 1 - d - ii, 2 - a - iii, 3 - b - iv, 4 - c - i

156. Read the following statements:
(a) Human liver is the largest endocrine gland of body and having two lobes
(b) Hepatic lobules are structural and functional unit of liver and contained hepatocytes which are arranged in cord like manner
(c) Glisson's capsule is covering of each lobules and made up by connective tissue
(d) Bile juice is formed and secreted by hepatocytes and is stored into liver sinusoid

Out of these which statements are correct and incorrect?
(1) Statements a and b are correct while c & d are incorrect
(2) Statements a and d are correct while b & c are incorrect
(3) Statements b & c are correct while a & d are incorrect
(4) Statements b and d are correct while a & c are incorrect
157. Observe the list of various digestive enzymes:—
Pepsin, Trypsinogen, ptylin, chymotrypsinogen,
procarboxypeptidase, nucleosidase, nuclease,
amylase, dipeptidase.
Out of these how many enzymes are found in
pancreatic juice ?
(1) Four (2) Five
(3) Six (4) Seven

158. Match the column I with column II :—

<table>
<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Vomiting</td>
<td>(a) Inadequate enzyme</td>
</tr>
<tr>
<td></td>
<td>secretion</td>
</tr>
<tr>
<td>(ii) Diarrhoea</td>
<td>(b) Irregular bowel</td>
</tr>
<tr>
<td></td>
<td>movement</td>
</tr>
<tr>
<td>(iii) Constipation</td>
<td>Increased liquidity</td>
</tr>
<tr>
<td></td>
<td>of faecal discharge</td>
</tr>
<tr>
<td>(iv) Indigestion</td>
<td>(d) A feeling of nausea</td>
</tr>
</tbody>
</table>

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

159.

Which of the following statement is true for
structure marked 'A' in the given figure?
(1) In it centripetal conduction takes place.
(2) Nissl's granules are present
(3) Present in non polar neuron
(4) present in pseudounipolar neuron.
Identify A, B, C, D in the given figure:

<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>Scala vestibuli</td>
<td>Scala tympani</td>
<td>Reissner's membrane</td>
<td>Basilar membrane</td>
</tr>
<tr>
<td>(2)</td>
<td>Scala tympani</td>
<td>Scala vestibuli</td>
<td>Basilar membrane</td>
<td>Reissner's membrane</td>
</tr>
<tr>
<td>(3)</td>
<td>Scala tympani</td>
<td>Scala vestibuli</td>
<td>Reissner's membrane</td>
<td>Basilar membrane</td>
</tr>
<tr>
<td>(4)</td>
<td>Scala vestibuli</td>
<td>Scala tympani</td>
<td>Basilar membrane</td>
<td>Reissner's membrane</td>
</tr>
</tbody>
</table>

Which of the following statement is false for the reflex action shown in the given figure?

1. Response towards stimulus
2. Poly synaptic reflex
3. Monosynaptic reflex
4. Example of stretch reflex

How many hormones in the given list are not produced by anterior pituitary?

- Prolactin (PRL)
- Growth hormone (GH)
- Oxytocin
- Thyroid stimulating hormone (TSH)
- Vasopressin
- Somatostatin
- Gonadotrophin releasing hormone (GnRH)

1. 6
2. 5
3. 4
4. 3
163.

For the given diagram which labelling and function is correctly matched/described?

(1) (a) → Fovea → Rods are densely packed
(2) (b) → Blind spot → No image formed
(3) (c) → Choroid → Coloured part of the eye which regulates diameter of pupil.
(4) (d) → Ciliary body → No role in accommodation.

164.
Which of the following is not a correct combination of the hormone with its source organ and target organ:

<table>
<thead>
<tr>
<th>Hormone</th>
<th>Source organ</th>
<th>Target organ</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Somatostatin</td>
<td>Hypothalamus</td>
<td>Adenohypophysis</td>
</tr>
<tr>
<td>(2) FSH</td>
<td>Ovary</td>
<td>Uterus</td>
</tr>
<tr>
<td>(3) TSH</td>
<td>Adenohypophysis</td>
<td>Thyroid</td>
</tr>
<tr>
<td>(4) ACTH</td>
<td>Pituitary gland</td>
<td>Adrenal cortex</td>
</tr>
</tbody>
</table>

165.
Which of the following structure is under the direct control of nervous system?

(1) Thyroid
(2) Adrenal cortex
(3) Anterior pituitary
(4) Adrenal medulla.

166.
Read all statements carefully and find out how many statements are correct?

(a) Neural system provides an organised network of point to point connection’s for a quick co-ordination
(b) Impulse transmission across a chemical synapse is always faster than that across a electrical synapse
(c) Cerebral aqueduct passes through the mid-brain
(d) The hypothalamus contain centre’s which control respiration and gastric secretions

(1) one (2) two (3) three (4) four
167. Which of the following is not the function of hypothalamus?
   (1) Behaviour and emotions
   (2) Biological clock
   (3) Thermoregulation
   (4) Intelligence

168. The four sketches (A, B, C and D) given below, represent four different types of epithelial tissue. Which one of these is correctly identified in the option given along with its correct location and function.

<table>
<thead>
<tr>
<th>Epithelial Tissue</th>
<th>Location</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) (D) Compound</td>
<td>Skin</td>
<td>Protection</td>
</tr>
<tr>
<td>(2) (A) Cuboidal</td>
<td>Duct of gland</td>
<td>Secretion</td>
</tr>
<tr>
<td>(3) (B) Squamous</td>
<td>Wall of blood vessels</td>
<td>Excretion</td>
</tr>
<tr>
<td>(4) (C) Ciliated</td>
<td>Trachea</td>
<td>Absorption</td>
</tr>
</tbody>
</table>

169. Consider the following four statements (a-d) and select the option which includes all the correct:
   (a) Coronary Artery disease, (CAD) often referred to as Atherosclerosis
   (b) Heart failure means when the heart muscle is suddenly damaged by an inadequate blood supply
   (c) High blood pressure leads to heart diseases and also affects vital organs like brain and kidney
   (d) Angina occurs due to conditions that affect the blood flow

Options:
   (1) Statements (b), (c) and (d)
   (2) Statements (a), (b)
   (3) Statements (b), (d)
   (4) Statement (a), (c) and (d)
170. Which is not reabsorbed actively in nephron?
   (1) Glucose
   (2) Na⁺
   (3) Amino acid
   (4) Nitrogenous wastes

171. Which of the following group of animals are ammonotelic in nature?
   (1) Many bony fishes, amphibians, Insects.
   (2) Marine Fishes, amphibians, aquatic insects
   (3) Mammals, birds, Reptiles
   (4) Many bony fishes, aquatic amphibians, aquatic insects.

172. Reabsorption and secretion of major substances at different parts of the Nephron are shown in the given figure. In this figure A, B, C, D are:

- A: HCO₃⁻, Nutrients, Urea, NaCl
- B: NaCl, Urea, K⁺, HCO₃⁻
- C: NaCl, Urea, HCO₃⁻, Ammonia
- D: H₂O, Urea, NaCl, HCO₃⁻

173. CO₂ which is released out of tissues, what is correct for its transportation?
   (1) 70% of CO₂ is transported by blood in the form of bicarbonate
   (2) 70% of CO₂ is transported by blood in form of Carbaminohaemoglobin, bicarbonate
   (3) 7% of CO₂ is transported by blood in form of Carbaminohaemoglobin
   (4) 20–25% of CO₂ is transported by plasma in dissolved state

174. Trachea divides into two primary bronchi at the levels of:
   (1) 7th thoracic vertebrae in mid thoracic cavity
   (2) 5th lumbar vertebrae in mid thoracic cavity
   (3) 5th thoracic vertebrae in lower thoracic cavity
   (4) 5th thoracic vertebrae in mid thoracic cavity
175. The state of heart when it not pumping blood effective enough to meet the needs of the body is called
(1) CAD  (2) Atherosclerosis  (3) Angina  (4) Heart failure

176. In the rest state, a subunit of troponin masks :-
(1) Active binding sites for actin on the myosin filaments.
(2) Active binding sites for myosin on the myosin filaments.
(3) Active binding sites for myosin on the actin filaments.
(4) Active binding sites for actin on the actin filaments

177. Contraction of muscle fibre takes place by the sliding of :-
(1) Thin filaments over the actin filaments
(2) Thick filaments over the thin filaments
(3) Thin filaments over the thick filaments
(4) Thick filaments over the myosin filaments

178. How many vertebrochondral ribs are found in human?
(1) 12 pairs  (2) 5 pairs  (3) 3 pairs  (4) 2 pairs

179. The condition which is favourable for dissociation of oxyhaemoglobin is :-
(1) High PO$_2$  (2) Low PCO$_2$
(3) High H$^+$ conc.  (4) Low temp

180. Given below are four statements (a-d) regarding human blood circulatory system :
(a) Arteries are thick-walled and have narrow lumen as compared to veins
(b) Angina is acute chest pain when the blood circulation to the brain is reduced
(c) Persons with blood group AB can donate blood to any person with any blood group under ABO system
(d) Calcium ions play a very important role in blood clotting.
Which two of the above statements are correct?
(1) a and b  (2) b and c  (3) c and d  (4) a and d