CLASSEEM ROOM CONTACT PROGRAMME
(ACADEMIC SESSION 2012-2013)

ACHIEVER COURSE
(Phase: MAW)

TARGET: PRE-MEDICAL 2013

MAJOR TEST # 02

ALLEN NEET-UG

DATE: 23 - 03 - 2013

SYLLABUS # 02

INSTRUCTIONS (निर्देश)

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.

Your Target is to secure Good Rank in Pre-Medical 2013
1. Some mass of ice is kept in an aluminium container at –40°C. Heat is added to the system at a constant rate. The graph showing the variation in temperature of the system as a function of time would be:

\[\begin{align*}
&\text{(1)} \quad \theta(t) = -40 + 100t \\
&\text{(2)} \quad \theta(t) = -40 + 150t \\
&\text{(3)} \quad \theta(t) = -40 + 200t \\
&\text{(4)} \quad \theta(t) = -40 + 250t 
\end{align*}\]

2. A wall is made up of two layers A and B. The thickness of the two layers is the same but materials are different. The thermal conductivity of A is double than that of B. In thermal equilibrium the temperature difference between the two ends is 36°C. Then the difference of temperature at the two surfaces of A will be:

\[\begin{align*}
&\text{(1)} \quad 6ºC \\
&\text{(2)} \quad 12ºC \\
&\text{(3)} \quad 18ºC \\
&\text{(4)} \quad 24ºC 
\end{align*}\]

3. 1 g of ice at 0°C is added to 5 g of water at 10°C. If the latent heat is 80 cal/g. The final temperature of the mixture would be:

\[\begin{align*}
&\text{(1)} \quad 5ºC \\
&\text{(2)} \quad 0ºC \\
&\text{(3)} \quad -5ºC \\
&\text{(4)} \quad \text{None of these} 
\end{align*}\]

4. The energy spectrum of a black body exhibits a maximum around a wave length \(\lambda_0\). The temperature of the black body is now changed such that the energy is maximum around a wave length \(\frac{3\lambda_0}{4}\). The power radiated by the black body will now increase by a factor of:

\[\begin{align*}
&\text{(1)} \quad \frac{256}{81} \\
&\text{(2)} \quad \frac{64}{27} \\
&\text{(3)} \quad \frac{16}{9} \\
&\text{(4)} \quad \frac{4}{3} 
\end{align*}\]
5. Figure shows the P-V diagram of an ideal gas undergoing a change of state from A to B. Four different paths I, II, III and IV as shown in the figure may lead to the same change of state, then:-

1. Change in internal energy is same in IV and III cases, but not in I and II
2. Change in internal energy is same in all the four cases
3. Work done is maximum in case III
4. Heat supplied is minimum in case I

6. In figure-I is shown a sphere of mass m and radius r resting at the bottom of a large container filled with water. Depth of the container is h. Density of material of the sphere is the same as that of water. Now the whole sphere is slowly pulled out of water as shown in figure-II

Work done by the agent pulling the sphere equals to :-

1. mgr
2. 0.5 mgr
3. mg(0.5r + h)
4. mg(r + h)

7. Heat is supplied to a monoatomic ideal gas which expands at constant pressure. Fraction of heat that goes into work done by the gas is:-

1. 1
2. \(\frac{2}{3}\)
3. \(\frac{3}{5}\)
4. \(\frac{2}{5}\)
8. There are three different liquids, with densities \( \rho_1, \rho_2 \) and \( \rho_3 \), in a U-shaped container as shown in the picture. The lengths shown are \( H_1 = 15 \) cm and \( H_2 = 10 \) cm. Which of the following equations gives the correct relation between the densities of the fluids in the container?

\[
\begin{align*}
(1) & \quad 3\rho_3 = 2\rho_1 + \rho_2 \\
(2) & \quad \rho_3 = 2\rho_1 + 3\rho_2 \\
(3) & \quad 2\rho_3 = 3\rho_1 + \rho_2 \\
(4) & \quad \rho_3 = 3\rho_1 + 2\rho_2
\end{align*}
\]

9. In a container, a gas at NTP is slowly compressed to one fourth of its volume, its final pressure is \( P \). In another container, a gas at NTP is suddenly compressed to one fourth of its volume, its final pressure is \( P' \), then:

\[
(\gamma = \frac{3}{2})
\]

\[
\begin{align*}
(1) & \quad \frac{P'}{P} = 2 \\
(2) & \quad \frac{P'}{P} = \frac{1}{2} \\
(3) & \quad \frac{P'}{P} = 4 \\
(4) & \quad \frac{P'}{P} = \frac{1}{4}
\end{align*}
\]

10. A ball whose density is \( 0.4 \times 10^3 \) kg/m\(^3\) falls into water from a height of 9 cm. To what depth does the ball sink?

\[
\begin{align*}
(1) & \quad 9 \text{ cm} \\
(2) & \quad 6 \text{ cm} \\
(3) & \quad 4.5 \text{ cm} \\
(4) & \quad 2.25 \text{ cm}
\end{align*}
\]

11. If \( \gamma = \frac{C_p}{C_v} \), \( C_p \) being the molar specific heat of a gas at constant pressure and \( C_v \) its molar specific heat at constant volume, number of degree of freedom of a molecule of gas can be expressed as:

\[
\begin{align*}
(1) & \quad \frac{5}{2}(\gamma - 1) \\
(2) & \quad \frac{7\gamma - 1}{3\gamma - 1} \\
(3) & \quad \frac{3}{2}(\gamma - 1) \\
(4) & \quad \frac{2}{\gamma - 1}
\end{align*}
\]
12. The work done in blowing a soap bubble of 10 cm radius is :-

\[ \text{Surface tension of the soap solution is } \frac{3}{100} \text{N/m} \]

(1) 75.36 \times 10^{-4} \text{ J} \quad (2) 37.68 \times 10^{-4} \text{ J} \\
(3) 150.72 \times 10^{-4} \text{ J} \quad (4) 75.36 \text{ J}

13. The expansion of an ideal gas of mass \( m \) at a constant pressure \( P \) is given by the straight line \( L_2 \). The expansion of the same ideal gas of mass \( 4m \) at pressure \( 4P \) is given by the straight line:

(1) \( L_1 \) \quad (2) \( L_2 \) \quad (3) \( L_3 \) \quad (4) \( L_4 \)

14. A wire elongates by \( \ell \) mm when a load \( w \) is hanged from it. If the wire goes over a pulley and two weight \( w \) each are hung at the two ends, the elongation of the wire will be :-

(1) \( 2\ell \) mm \quad (2) \( \ell \) mm \\
(3) \( \frac{\ell}{2} \) mm \quad (4) Zero

15. A vessel contains a mixture of 7g of nitrogen and 11g of carbon dioxide at temperature \( T = 290 \text{ K} \). If pressure of the mixture \( P = 1 \text{ atm} \), calculate its density. \( \text{(R } = 8.31 \text{ J/mol K)} \) :-

(1) 0.5 kg/m\(^3\) \quad (2) 2.5 kg/m\(^3\) \\
(3) 3 kg/m\(^3\) \quad (4) 1.5 kg/m\(^3\)

16. The length of a wire is 1m and the area of cross section is \( 1 \times 10^{-2} \text{ cm}^2 \). If the work done for increase in length by 0.2 cm is 0.4 J then young's modulus of the material of the wire is:-

(1) \( 2 \times 10^{10} \text{ N/m}^2 \) \quad (2) \( 4 \times 10^{10} \text{ N/m}^2 \) \\
(3) \( 2 \times 10^{11} \text{ N/m}^2 \) \quad (4) \( 4 \times 10^{11} \text{ N/m}^2 \)

17. \( \frac{1}{2} \) mole of helium is contained in a container at STP. How much heat energy is needed to double the pressure of the gas, keeping the volume constnat ?

\text{(Specific heat of the gas } = 3 \text{ J/g K)} :-

(1) 1638 J \quad (2) 2448 J \\
(3) 864 J \quad (4) 3276 J
18. A car is moving towards a high cliff. The car driver produced sounds a horn of frequency ‘f’. The reflected sound heard by the driver has a frequency 2f. If ‘v’ be the velocity of sound then the velocity of the car, in the same velocity units, will be :-

(1) \( \frac{v}{3} \)  
(2) \( \frac{v}{4} \)  
(3) \( \frac{v}{2} \)  
(4) \( \frac{v}{\sqrt{2}} \)

19. A closed vessel of volume 1 litre contains oxygen at 27°C. Translational kinetic energy of all the molecules of \( \text{O}_2 \) is 3735 joule. Pressure of the gas is nearly :-

(1) 10 atm  
(2) 5 atm  
(3) 18 atm  
(4) 25 atm

20. Wave of frequency 100 Hz travels along a string towards its fixed end. When this wave travels back, after reflection a node is formed at a distance of 10 cm from the fixed end. The speed of the wave (incident and reflected) is :

(1) 5 m/s  
(2) 10 m/s  
(3) 20 m/s  
(4) 40 m/s

21. Which one of the following methods will enable the volume of ideal gas to be increased four times:-

(1) Double the temperature and reduce the pressure to half  
(2) Double the temperature and also double the pressure  
(3) Reduce the temperature to half and double the pressure  
(4) Reduce the temperature to half and reduce the pressure to half

22. A tuning fork gives 4 beats with 50 cm length of a sonometer wire if the length of the wire is shortened by 1 cm. the no. of beats still the same. The frequency of the fork is –

(1) 396  
(2) 400  
(3) 404  
(4) 384

23. If the rms velocity of oxygen molecule at certain temperature is 0.5 km/s, the rms velocity for hydrogen molecule at the same temperature will be:-

(1) 2 km/s  
(2) 4 km/s  
(3) 9 km/s  
(4) 16 km/s
24. A source and an observer is coming towards each other with velocity \( v_s \) and \( v_0 \) respectively. Then the ratio of apparent frequency to actual frequency is (speed of sound is \( v \))

\[
\begin{align*}
&\frac{v + v_0}{v + v_s} & \text{(1)} \\
&\frac{v + v_0}{v - v_s} & \text{(2)} \\
&\frac{v - v_0}{v + v_s} & \text{(3)} \\
&\frac{v - v_0}{v - v_s} & \text{(4)}
\end{align*}
\]

25. It is known that for any polytropic process \( PV^x = \text{constant} \), molar heat capacity is given by

\[
C = C_v + \frac{R}{1-x}
\]

If a monoatomic gas follows law \( T \propto V^2 \), find its molar heat capacity :

\[
\begin{align*}
&\text{(1)} \ R & \text{(2)} \ \frac{3}{2}R & \text{(3)} \ 2R & \text{(4)} \ \frac{5}{2}R
\end{align*}
\]

26. An open pipe is suddenly closed with the result that the second overtone of the closed pipe is found to be higher in frequency by 100 Hz, than the first overtone of the original pipe. The fundamental frequency of open pipe will be :

\[
\begin{align*}
&\text{(1)} \ 100 \text{ Hz} & \text{(2)} \ 300 \text{ Hz} & \text{(3)} \ 150 \text{ Hz} & \text{(4)} \ 200 \text{ Hz}
\end{align*}
\]

27. A body cools from 80ºC to 64ºC in 5 min and same body cools from 80ºC to 52ºC in 10 min. What is the temperature of the surrounding :

\[
\begin{align*}
&\text{(1)} \ 24ºC & \text{(2)} \ 22ºC & \text{(3)} \ 28ºC & \text{(4)} \ 25ºC
\end{align*}
\]

28. Transverse wave of some frequency are generated in two steel wires A and B the diameter of A is twice of B and the tension in A is half that in B. The ratio of velocities of waves in A and B is –

\[
\begin{align*}
&\text{(1)} \ \frac{1}{\sqrt{2}} & \text{(2)} \ 1 : 2 & \text{(3)} \ 3 : 2 \sqrt{2} & \text{(4)} \ 1 : 2 \sqrt{2}
\end{align*}
\]

29. Two sphere A and B having radius 2m and 3m respectively are coated with carbon black on their outer surface. The wavelength corresponding to maximum intensity are 600 nm and 900 nm respectively. The ratio of power radiated by them is :-

\[
\begin{align*}
&\text{(1)} \ 2 & \text{(2)} \ 2.25 & \text{(3)} \ 1 & \text{(4)} \ 2/3
\end{align*}
\]
30. When a guitar string is sounded with a 440 Hz tuning fork a beat frequency of 5 Hz is heard if the experiment is repeated with a tuning fork of 437 Hz. The beat frequency is 8 Hz. The string frequency (Hz) is –

(1) 445  (2) 435  
(3) 429  (4) 448

31. Two identical rods AC and CB made of two different metals having thermal conductivities in the ratio 2 : 3 are kept in contact with each other at the end C as shown in the figure. A is at 100⁰C and B is at 25⁰C. Then the junction C is at :

\[
A \quad C \quad B
\]
\[
100⁰C \quad 25⁰C
\]

(1) 55⁰C  (2) 60⁰C  
(3) 75⁰C  (4) 50⁰C

32. In a string the speed of wave is 10 m/s and its frequency is 100 Hz. The value of the phase difference at a distance 2.5 cm will be :

(1) \[\pi/2\]  (2) \[\pi/8\]  
(3) \[3\pi/2\]  (4) \[2\pi\]

33. If the radius of a star is R and it acts as a black body, what would be the temperature of the star, in which the rate of energy production is Q:

\[
\left(\frac{4\pi R^2}{\sigma}\right)^{1/4}
\]

(1) \[\left(\frac{4\pi R^2}{\sigma}\right)^{1/4}\]  (2) \[\left(\frac{Q}{4\pi R^2\sigma}\right)^{1/4}\]  
(3) \[\frac{Q}{4\pi R^2\sigma}\]  (4) \[\left(\frac{Q}{4\pi R^2\sigma}\right)^{-1/2}\]

34. The equation of progressive wave is

\[
Y = 4\sin \left\{ \pi \left( \frac{t}{5} - \frac{x}{9} \right) + \frac{\pi}{6} \right\}
\]

where x and y are in cm. Which of the following statement is true?

(1) \[\lambda = 18 \text{ cm}\]
(2) amplitude = 0.04 cm
(3) velocity v = 50 cm/s
(4) frequency f = 20 Hz
35. The equation of motion of a particle of mass 1g is \[ \frac{d^2x}{dt^2} + \pi^2 x = 0 \] where \( x \) is displacement (in m) from mean position. The frequency of oscillation is (in Hz):

(1) \( \frac{1}{2} \)  
(2) 2  
(3) \( \sqrt{\frac{5}{10}} \)  
(4) \( \frac{1}{5\sqrt{10}} \)

36. The graph plotted between phase angle (\( \phi \)) and displacement (\( y \)) of a particle from equilibrium position is a sinusoidal curve as shown below. Then the best matching is

**Column-I**
(A) K.E. versus phase angle curve  
(B) P.E. versus phase angle curve  
(C) T.E. versus phase angle curve  
(D) Velocity versus phase angle curve

**Column-II**
(i)  
(ii)  
(iii)  
(iv)

(1) (A)-(i), (B)-(ii), (C)-(iii) & (D)-(iv)  
(2) (A)-(ii), (B)-(i), (C)-(iii) & (D)-(iv)  
(3) (A)-(ii), (B)-(i), (C)-(iv) & (D)-(iii)  
(4) (A)-(ii), (B)-(iii), (C)-(iv) & (D)-(i)
37. Two bodies performing S.H.M. have same amplitude and frequency. Their phases at a certain instant are as shown in the figure. The phase difference between them is

\[ (+x) \quad 0 \quad 0.5A \quad (+x) \]

\[ (-x) \quad 0 \quad A \quad A \]

(1) \[ \frac{11}{6} \pi \]
(2) \[ \pi \]
(3) \[ \frac{5}{3} \pi \]
(4) \[ \frac{3}{5} \pi \]

38. Displacement of a particle is \( x = 3 \sin 2t + 4 \cos 2t \), the amplitude and the maximum velocity will be :-

\[ \begin{align*}
(1) & \quad 5, 10 \\
(2) & \quad 3, 2 \\
(3) & \quad 4, 2 \\
(4) & \quad 3, 8
\end{align*} \]

39. A particle performs S.H.M. with time period \( T \). The time taken by the particle to move from half the amplitude to the maximum displacement is

\[ \begin{align*}
(1) & \quad \frac{T}{2} \\
(2) & \quad \frac{T}{4} \\
(3) & \quad \frac{T}{6} \\
(4) & \quad \frac{T}{8}
\end{align*} \]

40. Some springs are combined in series and parallel arrangement as shown in the figure and a mass \( m \) is suspended from them. The ratio of their frequencies will be :-

\[ \begin{align*}
(1) & \quad 1:1 \\
(2) & \quad 2:1 \\
(3) & \quad \sqrt{3}:2 \\
(4) & \quad 4:1
\end{align*} \]
41. Two particles execute S.H.M. of same amplitude and frequency along the same straight line. They pass one another when going in opposite directions, each time their displacement is half of their amplitude. The phase difference between them is :-
(1) 30°  (2) 60°  (3) 90°  (4) 120°

42. The acceleration due to gravity at height $R$ above the surface of the earth is $\frac{g}{4}$. The periodic time of a simple pendulum in an artificial satellite at this height will be :-
(1) $T = 2\pi \sqrt{\frac{2\ell}{g}}$  (2) $T = 2\pi \sqrt{\frac{\ell}{2g}}$
(3) zero  (4) infinity

43. A heavy brass-sphere is hung from a spring and it executes vertical vibrations with period $T$. The ball is now immersed in nonviscous liquid with a density one-tenth that of brass. When set into vertical vibrations with the sphere remaining inside the liquid all the time, the period will be
(1) $T = 2\pi \sqrt{\frac{2\ell}{g}}$  (2) $T = 2\pi \sqrt{\frac{\ell}{2g}}$
(3) $T$  (4) $T = 2\pi \sqrt{\frac{9}{10}}$

44. A particle executes SHM on a line 8 cm long. Its K.E. and P.E. will be equal when its distance from the mean position is :-
(1) 4 cm  (2) 2 cm  (3) 2√2 cm  (4) √2 cm

45. A man of mass 60 kg standing on a platform executing SHM in the vertical plane. The displacement from the mean position varies as $y = 0.5 \sin (2\pi ft)$. The minimum value of $f$, for which the man will feel weightlessness at the highest point, is : ($y$ is in metres)
(1) $\frac{g}{4\pi}$  (2) $4\pi g$
(3) $\sqrt{\frac{2g}{2\pi}}$  (4) $2\pi \sqrt{2g}$
46. An element has successive ionization enthalpies.
   (1) AlCl_3  (2) Al(CH_3)_3  
   (3) BeCl_2  (4) BH_3

47. Second ionization potential for Li, Be and B is in the order:
   (1) Li > Be > B  (2) Li > B > Be  
   (3) Be > Li > B  (4) B > Be > Li

48. An element has successive ionization enthalpies as 940 (first), 2080, 3090, 4140, 7030, 7870, 16000 and 19500 kJ mol^{-1}. To which group of the periodic table does this element belong:
   (1) 14  (2) 15  (3) 16  (4) 17

49. Which is the correct order of ionization energies?
   (1) F^- > F > Cl^- > Cl  (2) F > Cl > Cl^- > F^-  
   (3) F^- > Cl^- > Cl > F  (4) F^- > Cl^- > F > Cl

50. The electron affinity of the following elements can be arranged:
   (1) Cl > O > N > C  (2) Cl > O > C > N  
   (3) Cl > N > C > O  (4) Cl > C > O > N

51. Which of the following are isoelectronic and isostructural:
   NO_3^-, CO_3^{2-}, ClO_4^{-}, SO_4^{2-}  
   (1) NO_3^-, CO_3^{2-}  (2) SO_3^-, NO_3^-
   (3) ClO_4^{-}, CO_3^{2-}  (4) CO_3^{2-}, ClO_4^{-}

52. The phosphate of a metal has the formula MHPO_4. The formula of its chloride would be:
   (1) MCl  (2) MCl_2  (3) MCl_3  (4) M_2Cl_3

53. In a compound:
   \[
   \text{NC} \overset{\text{C}}{\text{C}} \overset{\text{M(CO)_3}}{\text{C}} \overset{\text{C}}{\text{CH}_3}
   \]
   the number of sigma and pi bonds respectively are:
   (1) 19, 11  (2) 19, 5  
   (3) 13, 11  (4) 7, 3

54. Amongst the following trihalide, which one is least basic:
   (1) NF_3  (2) NCl_3  (3) NBr_3  (4) NI_3

55. The solubility of BeSO_4, MgSO_4 and BaSO_4 in water follow the order:
   (1) BaSO_4 > BeSO_4 > MgSO_4  (2) MgSO_4 > BeSO_4 > BaSO_4  
   (3) BeSO_4 > MgSO_4 > BaSO_4  (4) MgSO_4 > BaSO_4 > BeSO_4
56. The pair of species with similar shape is :-
   (1) PCl₃, NH₃   (2) CF₄, SF₄
   (3) PbCl₂, CO₂   (4) PF₅, IF₅

57. The hybridization of the central atom will change when :-
   (1) NH₃ combines with H⁺
   (2) H₂BO₃ combines with OH⁻
   (3) NH₃ forms NH₂
   (4) H₂O combines with H⁺

58. Amongst NO₃⁻, AsO₃³⁻, CO₃²⁻, ClO₃⁻, SO₃²⁻ and BO₃²⁻, the non-planar species are :-
   (1) CO₃²⁻, SO₃²⁻, BO₃²⁻
   (2) AsO₃³⁻, ClO₃⁻, SO₃²⁻
   (3) NO₃⁻, CO₃⁻, BO₃⁻
   (4) SO₃⁻, NO₃⁻, BO₃⁻

59. The correct order of dipole moment is :-
   (1) CH₄ < NF₃ < NH₃ < H₂O
   (2) NF₃ < CH₄ < NH₃ < H₂O
   (3) NH₃ < NF₃ < CH₄ < H₂O
   (4) H₂O < NH₃ < NF₃ < CH₄

60. Number of P–H, P–O–P, P–O–H and P–O bonds in sodium dihydrogen pyrophosphate respectively are :-
   (1) 1, 1, 1, 2    (2) 0, 1, 2, 2
   (3) 0, 1, 2, 4    (4) 2, 0, 0, 2

61. When iodine is dissolved in aqueous potassium iodide, the shape of the species formed is :-
   (1) Linear   (2) Angular
   (3) triangular   (4) See-saw

62.  𝜇 of the AX₄ type of molecule is zero. The geometry of it can be :-
   (1) Tetrahedral   (2) Square planar
   (3) Octahedral   (4) All

63. Which of the following molecule is not having π-dπ bonding :-
   (1) SO₂   (2) PO₁₀
   (3) PF₃   (4) B₃N₃H₆

64. In sp³d² hybridisation, which sets of d-orbitals is involved :-
   (1) dₓ²−ᵧ², dₓ², dₓᵧ   (2) dₓ, dₓᵧ
   (3) dₓᵧ, dᵧₓ   (4) dₓ₂−ᵧ₂, dₓᵧ
65. Which of the following species is paramagnetic:
(1) CN⁻  (2) NO⁺  (3) O₂⁻  (4) O₂

66. Which of the following processes is/are associated with no change of hybridization of the underlined compound:
(1) Al(OH)₃ ppt. dissolved in NaOH
(2) B₃H₆ is dissolved in THF
(3) SiF₄ vapour is passed through.liuid HF
(4) Solidification PCl₅ vapour

67. In which compound vacant hydride orbital take part in bonding:
(1) NH₃  (2) Al₂Cl₆
(3) C₃H₆Cl  (4) H₃BO₃

68. Glassy bead is of:
(1) B₂O₃ + NaBO₂  (2) NaBO₂ + Na₂BO₃
(3) Na₂B₄O₇ + B₂O₃  (4) SiO₂ + B₂O₃

69. The compound called microcosmic salt is:
(1) Na₂HPO₄. 2H₂O
(2) Na(NH₄)HPO₄. 4H₂O
(3) Na₂NH₄PO₄.2H₂O
(4) (NH₄)₂HPO₄.2H₂O

70. The pairs of compounds which cannot exist together in aqueous solution are:
(I) NaH₂PO₄ and NaHCO₃
(II) Na₂CO₃ and NaHCO₃
(III) NaOH and NaH₂PO₄
(IV) NaHCO₃ and NaOH
(1) I, II, III  (2) III, IV
(3) I, IV  (4) II, III

71. Salt A + S → B →BaCl₂ → White ppt.
A is paramagnetic in nature and contains about 55% K. Thus A is:
(1) K₂O  (2) K₂O₂  (3) KO₂  (4) K₂SO₄

72. Which of the following compounds is consumed during the preparation of Na₂CO₃ by Solvay’s process:
(1) NH₃ + CaCO₃ + NaCl
(2) NH₂Cl + CaO + NaCl
(3) CaCO₃ + NaCl
(4) NaCl + NH₄HCO₃
73. Select incorrect statement about alkaline earth metals :-
   (1) Solubility of sulphates decreases down the group
   (2) Solubility of hydroxides decreases down the group
   (3) Thermal stability of carbonates increases down the group
   (4) Basic nature increases down the group

74. Nitrogen dioxide cannot be obtained from :-
   (1) Cu(NO₃)₂   (2) Hg(NO₃)₂
   (3) NaNO₃   (4) AgNO₃

75. The dehydration of malonic acid CH₂(COOH)₂ with P₂O₅ gives :-
   (1) Carbon monoxide
   (2) Carbon suboxide
   (3) Carbon dioxide
   (4) All three

76. Anhydrous aluminium chloride fumes in moist air owing to the formation of :-
   (1) Gaseous aluminium chloride
   (2) Chlorine
   (3) Chlorine dioxide
   (4) hydrogen chloride

77. The mixed anhydride of nitrogen is :-
   (1) N₂O₂   (2) N₂O₄
   (3) N₂O₅   (4) N₂O₃

78. Concentrated nitric acid reacts with iodine to give:-
   (1) HOI   (2) HI
   (3) HOIO₂   (4) HOIO₃

79. K₄[Fe(CN)₆] reacts with ozone to give :-
   (1) FeO₃   (2) Fe(OH)₂
   (3) K₃[Fe(CN)₆]   (4) KNO₃

80. The compound that cannot be formed by xenon is:-
   (1) XeO₃   (2) XeF₄
   (3) XeCl₄   (4) XeO₂F₂

81. Heating of ammonium dichromate produces :-
   (1) NH₃, Cr₂O₃ and H₂O
   (2) N₂, Cr₂O₃ and H₂O
   (3) NO, CrO₃ and H₂O
   (4) N₂O, CrO₃ and H₂O

82. Borax in its crystal possess :-
   (1) 3 tetrahedral unit
   (2) 2 tetrahedral and 2 planar triangular units
   (3) 3 tetrahedral and 2 planar triangular units
   (4) All tetrahedral units
83. Which of the following halides cannot be hydrolysed?
(I) TeF₆  (II) SF₆
(III) NCl₃  (IV) NF₃
Choose the correct code: -
(1) III and IV  (2) I, II and III
(3) I, II and IV  (4) II and IV

84. SbF₅ reacts with XeF₄ to form an adduct. The shapes of cation and anion in the adduct are respectively:-
(1) Square planar, trigonal bipyramidal
(2) T-Shaped, octahedral
(3) Square pyramidal, octahedral
(4) Square planar, octahedral

85. By which of the following methods H₂O₂ can't be synthesised:
(1) Addition of ice cold H₂SO₄ on BaO₂
(2) Addition of ice cold H₂SO₄ on PbO₂
(3) Aerial oxidation of 2-ethyl anthraquinol
(4) Electrolysis of (NH₄)₂SO₄ at a high current density

86. Which of the following molecule does not have Pπ – dπ bond:
(1) P₄O₁₀  (2) (SiH₃)₃N
(3) P₂O₆  (4) ClO₂⁻

87. Correct order of basic nature:
(1) Pm(OH)₃ > Yb(OH)₃ > Eu(OH)₃ > Ho(OH)₃
(2) Pm(OH)₃ > Eu(OH)₃ > Yb(OH)₃ > Ho(OH)₃
(3) Pm(OH)₃ > Eu(OH)₃ > Ho(OH)₃ > Yb(OH)₃
(4) Pm(OH)₃ < Eu(OH)₃ < Yb(OH)₃ < Ho(OH)₃

88. If magnetic moment of M²⁺ is 4.92 Bm then M is:
(1) Fe  (2) Co
(3) Ni  (4) Mn

89. Which of the following change orange colour of K₂Cr₂O₇/H⁺ into green:
(1) CO₂  (2) SO₂
(3) SO₃  (4) All

90. Which is formed by mixing of Transition and non transition d-block metal:
(1) Brass  (2) Bronze
(3) Gun metal  (4) All
91. Match the column and find out the correct answer

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Type of joints)</td>
<td>(Example)</td>
</tr>
<tr>
<td>i. Cartilagenous joints</td>
<td>A Between atlas and axis</td>
</tr>
<tr>
<td>ii. Synovial joints</td>
<td>B Pubic symphysis</td>
</tr>
<tr>
<td>iii. fibrous joints</td>
<td>C Sutures</td>
</tr>
<tr>
<td></td>
<td>D Knee joint</td>
</tr>
<tr>
<td></td>
<td>E between adjacent vertebrae in the vertebral column</td>
</tr>
</tbody>
</table>

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

92. Which of the following structures are found in your brain but are absent in frog's brain:

(A) Hypothalamus  
(B) Corpus-Callosum  
(C) Optocoe  
(D) Arachnoid membrane  
(E) Corpora-quadrigemina

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

93. During muscle contraction which of the following event will occur?

(1) A-band decreases in length but I-band remains same  
(2) A-band and H-zone remains same  
(3) H-zone decreases in length but I-band remains same  
(4) I-band and H-zone decreases in length but A-band remains same
94. Given below is a diagram showing sagittal section of the human brain, select the option with the structures labelled as A, B, C and D with their correct functions:

(1) A-Controls the voluntary movements and also the site for processing of smell, hearing, vision, speech, thoughts, intelligence and memory
B-Connects II\textsuperscript{nd} ventricle with III\textsuperscript{rd} ventricle
C-Acts as major coordinating centre for sensory and motor signalling
D-Controls body posture and body balance.

(4) A-Left one is prominent in a right handed person
D-Control centre for respiration, cardiovascular reflex and gastric secretion

95. .....A.... pairs of ribs do not articulate directly with the sternum but join the rib with the help of hyaline cartilage. These are called .....B....

(1) A-Last 2 B-Floating ribs
(2) A-8\textsuperscript{th}, 9\textsuperscript{th} and 10\textsuperscript{th} B-Floating ribs
(3) A-8\textsuperscript{th}, 9\textsuperscript{th} and 10\textsuperscript{th} B-False ribs
(4) A-First seven B-True ribs
96. Mark the incorrectly matched pair of a structure and its description?
   (1) **Fovea**-Point on retina where only cones are densely packed and where visual acuity is the greatest
   (2) **Cristae**-Projecting ridge located in ampulla and helps in dynamic equilibrium
   (3) **Macula**-Projecting ridge located in saccule and utricle, and helps in static equilibrium
   (4) **Cone cells**-Related with twilight (Scotopic) vision and colour vision
   97. Consider the following four statement (a-d) with respect to human muscle and select the option which includes all the correct ones only-
   (a) Each skeletal muscle fibre is a syncytium
   (b) In the centre of each A-band is an elastic fibre called Z-line which bisects it
   (c) A sensory neuron along with the muscle fibres connected to it constitute a motor unit
   (d) Cardiac muscles are striated and involuntary
   Option :-
   (1) Statements (a) and (c)
   (2) Statements (b) and (c)
   (3) Statements (a) and (d)
   (4) Statements (a), (b) and (d)
   98. Arrange the following events involved in the mechanism of vision in a correct order :-
   (A) Change in permeability of membrane and generation of potential difference in photoreceptor cells
   (B) Light rays focussed on the retina through the cornea and lens
   (C) Dissociation of retinal from opsin resulting in change in the structure of opsin
   (D) Generation of action potential in ganglionic cell
   (E) Action potential is carried into visual cortex of brain where the impulse is analysed and the image is recognised
   (1) A, B, C, D, E
   (2) B, C, D, A, E
   (3) B, C, A, D, E
   (4) B, A, C, E, D
99. Given below is a diagrammatic sketch of frontal view of lower limb bones of human Identify A, B, C and D and select the correct option :

A   B   C    D
(1) Ischium Pubis Ilium Femur
(2) Ilium Pubis Ischium Femur
(3) Ilium Ischium Pubis Humerus
(4) Pubis Ilium Ischium Radius

100. Given below is a diagrammatic presentation of knee jerk reflex, select the option with correct identification of the structures labelled as A, B, C and D in the same :

A   B   C    D
(1) Afferent fibre, B-Interneuron, C-Sensory fibre
(2) B-Interneuron, C-Efferent fibre, D-Receptor
(3) A-Sensory fibre, C-Afferent fibre, D-Motor end plate (Effector)
(4) A-Afferent fibre, B-Interneuron, D-Motor end plate (Effector)
101. Which of the following is incorrect?
   (1) Ball and socket joint—between humerus and pectoral girdle
   (2) Hinge joint—knee joint
   (3) Pivot joint—between atlas and axis
   (4) Gliding joint—between carpal and metacarpal of thumb

102. Given below is a graph showing change of potential difference occurring during conduction of nerve impulse through an axon, which one is correct about the shaded area-A in this graph:

![Graph showing potential difference](image)

   (1) Shows depolarisation, due to opening of Na\(^+\) VGC
   (2) Shows repolarisation, due to opening of K\(^+\) VGC
   (3) Shows hyperpolarisation, due to on time closing of Na\(^+\) VGC and K\(^+\) VGC
   (4) Shows hyperpolarisation, due to late closing of K\(^+\) VGC

103. Macrophages of our blood show:
   (1) Ciliary movement
   (2) Amoeboid movement
   (3) Muscular movement
   (4) None of these

104. Neurons are excitable cells because their membranes are in a polarised state, which of the following would not help the neurons in maintaining such a polarised state/Resting state:
   (1) The membrane is more permeable to K\(^+\) ions and nearly impermeable to Na\(^+\) ions
   (2) The membranes are impermeable to negatively charged proteins present in the axoplasm
   (3) Active transport of ions by Na\(^+\)-K\(^+\)-pump which transport 3Na\(^+\) outwards for 2K\(^+\) in to the cell
   (4) K\(^+\) moves into axoplasm rapidly than Na\(^+\) ions moves outside by passive transport
105. Given below is a diagrammatic sketch of human skull. Identify A, B, C and D and select correct answer?

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Ethmoid bone</td>
<td>Occipital bone</td>
<td>Sphenoid bone</td>
<td>Temporal bone</td>
<td></td>
</tr>
<tr>
<td>(2) Ethmoid bone</td>
<td>Temporal bone</td>
<td>Sphenoid bone</td>
<td>Occipital bone</td>
<td></td>
</tr>
<tr>
<td>(3) Lacrimal bone</td>
<td>Temporal bone</td>
<td>Parietal bone</td>
<td>Occipital bone</td>
<td></td>
</tr>
<tr>
<td>(4) Zygomatic bone</td>
<td>Occipital bone</td>
<td>Ethmoid bone</td>
<td>Temporal bone</td>
<td></td>
</tr>
</tbody>
</table>

106. Consider the following body activities regarding their regulation by different parts of our brain:
- (A) Respiratory rate
- (B) Gastric secretion
- (C) Urge for eating and drinking
- (D) Body temperature
- (E) Cardiovascular reflex

Select the correct option:
- (1) A and C by hypothalamus
- (2) C and D by medulla
- (3) C, D and E by hypothalamus
- (4) A, B and E by medulla

107. If a tissue is placed in contact of inhibitors that react with protein side chains then which of the following transport methods may affected across the cells?
- (1) Osmosis and simple diffusion
- (2) Active transport and facilitated diffusion
- (3) Simple diffusion and facilitated diffusion
- (4) Active transport and simple diffusion
108. Read the following five statements (A-E) and answer as asked next to them:

(A) Dendrons are short and branched fibres which contains Nissl's granules and transmit impulses towards the cell body
(B) Somatic neural system relays impulses from the CNS to the involuntary organs and smooth muscles
(C) Nissl's granules are found in cyton and dendron, and acts as protein factory in the neurons
(D) Myelinated nerve fibres are found in spinal & cranial nerves where myelin sheath is synthesised by Schwann cells
(E) Unmyelinated fibres commonly found in autonomic and somatic neural system, don't have schwann cells around them

How many of the above statements are right?

(1) One (2) Two (3) Three (4) Four

109. Two chambers A and B containing solutions, are separated by a semipermeable membrane and are under only atmospheric pressure. Chamber 'A' contains 1M solution of NaCl and chamber 'B' contains 1M solution of sucrose. Which of the following statements are correct regarding this system?

(a) Net osmosis will occur B to A
(b) both the chambers have same water potential
(c) chamber 'B' has higher solute potential
(d) chamber 'A' has higher water potential

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

110. Catecholamines particularly adrenaline causes all of the following during the emergency except?

(1) Pupillary dilation
(2) Stimulates glycogenolysis to increase glucose level in blood
(3) Increases heart rate and rate of respiration
(4) Increases salivary and gastric secretion
111. Imbibition:
(a) involves the water movement against water potential gradient
(b) is a special type of diffusion
(c) require affinity between the adsorbent and the liquid
(d) is characteristic of phospholipids
Choose the statements which are not correct:
(1) a and b  
(2) a and d  
(3) b and c  
(4) c and d

112. Identify the structure/Hormone marked as A, B, C and D in the following flow chart and select the correct option?

113. Which of the following statements is/are correct regarding mass or bulk flow?
(a) It is an long distance transport method
(b) It occurs from one point to another as a result of pressure difference between the two points
(c) In this method, unlike diffusion, all the substances swept along at the same pace
(d) It can be achieved either through a positive or negative hydrostatic pressure gradient
(1) a and b  
(2) a, b, c and d  
(3) b, c and d  
(4) c and d
114. Given below are four statements (a-d) each with two blanks. Select the option which correctly fills up the blanks in any two statements.

(A) Corticoids, which regulate the balance of water and electrolytes in our body are called _ _ (i) _ _ . They are secreted by the _ _ (ii) _ _ layer of adrenal cortex

(B) The _ _ (i) _ _ cells secrete a hormone called glucagon. Glucagon acts mainly on the hepatocytes and stimulate _ _ (ii) _ _.

(C) The _ _ (i) _ _ cells which are present in the intertubular spaces produce a group of hormone called _ _ (ii) _ _.

(D) Atrial natriuretic factor (ANF) is secreted by _ _ (i) _ _ and it _ _ (ii) _ _ blood pressure.

1. (A) (i) Mineralocorticoids (ii) Zona glomerulosa

2. (B) (i) Beta (ii) Glycogenesis

3. (C) (i) Leydig (ii) Androgens

4. (D) (i) Atrial walls of heart (ii) Decreases

115. Which of the following hormones promotes sprouting of potato tubers?

1. Ethylene

2. Auxin

3. ABA

4. Cytokinin

116. Mark the incorrect statement with respect to oxytocin hormone:

1. Acts on the smooth muscles of our body and stimulate their contraction

2. Stimulates a vigorous contraction of uterus at the time of childbirth

3. Stimulates ejection of milk from the mammary glands

4. Stimulates synthesis of milk in mammary glands and popularly called “maternity hormone”
117. Which of the following plant growth regulators is derivative of carotenoids?

(1) Ethylene
(2) Abscisic acid
(3) Gibberellic acid
(4) Indole acetic acid

118. A student goes to see a doctor and comes to know that he is suffering from anaemia. The doctor advise him to take balanced diet and go to any hill station after exams are over, do you know, what will help the student to overcome that situation at hill station?

(1) Thyroxin hormone secreted by thyroid gland
(2) ANF secreted by heart wall
(3) Erythropoietin hormone secreted by kidney
(4) Epinephrine secreted by adrenal gland

119. In photosynthesis, the O$_2$ released comes from water, this was proved by using:-

(1) Chromatography technique
(2) Radioisotopic technique
(3) Gel electrophoresis technique
(4) Recombinant DNA technique

120. Which of the following group of hormones will not bind to members bound receptors but they bind to receptors present inside the target cells:

(1) Insulin and glucagon
(2) Iodothyronines (eg-Thyroxin)
(3) Amino acid derivatives (eg-Epinephrine)
(4) Pituitary and hypothalamic hormones

121. In photosynthesis, the electrons that are moved from photosystem II must be replaced. This is achieved by electrons available:

(1) from the photosystem I
(2) from the NADPH + H$^+$
(3) from the splitting of water
(4) from the cytochrome
122. Read the following statements and fill up the blanks A, B, C and D with suitable words : -
(i) Some hypothalamic hormones reach the pituitary through _ _ [A] _ _ and regulate the function of anterior pituitary
(ii) _ _ [B] _ _ from the hypothalamus inhibits the release of growth hormone from the pituitary
(iii) The posterior pituitary works under the direct _ _ [C] _ _ regulation of the _ _ [D] _ _
Select the correct option :
(1) A-Axons, B-Somatostatin, D-Brain
(2) B-Somatotropin, C-neural, D-Hypothalamus
(3) A-Portal circulation, B-Somatostatin, C-Neural
(4) A-portal circulation, C-Hormonal, D-Hypothalamus

123. During oxidation of one glucose, by oxidative phosphorylation, the net gain of ATP is :-
(1) 40 (2) 32 (3) 36 (4) 38

124. Which of the following organ also produce hormone along with the organised endocrine bodies in our body : -
(1) Kidney
(2) Heart
(3) Gastro-intestinal tract
(4) All of these

125. Auxin widely used in plant propagation as :-
(1) Apical dominance promotor
(2) Flowering promotor
(3) Root initiatior
(4) Cell division promotor

126. If spleen of human is removed from its body then the :-
(1) Person will die
(2) Number of blood platelets will decrease
(3) Number of antibodies will increase
(4) There will be no effect on the number of blood platelets

127. 6-furfuryl amino purine, 2, 4 dichloro-phenoxy acetic acid and indole-3-acetic acid are respectively :-
(1) Synthetic auxin, kinetin and natural auxin
(2) Kinetin, synthetic auxin and natural auxin
(3) Gibberellin, Kinetin, natural auxin
(4) Synthetic auxin, kinetin, GA

128. If spleen of human is removed from its body :-
(1) के अंबानी व्यक्ति के व्यक्ति के साथ होगा बहुत अधिक हरम्म
(2) तब व्यक्ति के व्यक्ति के साथ होगा बहुत अधिक वरीयता 
(3) के अंबानी व्यक्ति के साथ होगा बहुत अधिक हरम्म तरह नहीं होगा बहुत अधिक हरम्म
(4) ते व्यक्ति के साथ होगा बहुत अधिक हरम्म तरह नहीं होगा बहुत अधिक हरम्म
128. Which one of the following is the correct description of a certain part of a normal human skeleton?

(1) First vertebra is axis which articulates with the occipital condyles.
(2) The 9th and 10th pairs of ribs are called the floating ribs.
(3) Glenoid cavity is a depression to which the thigh bone articulates.
(4) Parietal bone and the temporal bone of the skull are joined by fibrous joint.

129. Given below are four statements (A – D) each with one blank. Select the option, which correctly fill up the blanks:

(A) ______ has key role in sugar translocation.
(B) Along with ______, chlorine is essential for photolysis of water.
(C) For the synthesis of IAA, ______ is essential.
(D) Cation-anion balance in cells is maintained with the help of ______.

(1) (A) – Mn, (B) - Zn, (C) - Cl, (D) - Mg
(2) (A) - B, (B) - Mg, (C) - Mn, (D) - Zn
(3) (A) - B, (B) - Mn, (C) - Zn, (D) - Cl
(4) (A) - Mg, (B) - Mn, (C) - Zn, (D) - K

130. Fastest distribution of some injectable material/medicine and with no risk of any kind can be achieved by injecting it into the:

(1) Arteries (2) Veins (3) Lymph vessels (4) Muscles

131. In CAM plants, photophosphorylation occurs in:

(1) Bundle sheath cell, during night
(2) Mesophyll cell, during day time
(3) Mesophyll cell, during night
(4) Bundle sheath cell, during day time

132. In which one of the following organisms its excretory organs are correctly stated?

(1) Earthworm – Pharyngeal, integumentary and septal nephridia
(2) Cockroach – Malpighian tubules and enteric caeca
(3) Frog – Kidneys, skin and buccal epithelium
(4) Humans – Kidneys, sebaceous glands and tear glands.
133. (A) \( \square \rightarrow \square \rightarrow \square \rightarrow \square \rightarrow \square \)  
(B) \( \square \rightarrow \square \rightarrow \square \rightarrow \square \rightarrow \square \)  
\( \square \) = Cells capable of division  
\( \Box \) = Cells those lose capacity to divide  
A and B are two different types of growth. Choose the correct match for A and B:  
(1) A = Geometric growth and Sigmoid curve  
B = Arithmetic growth and Linear curve  
(2) A = Arithmetic growth and Linear curve  
B = Geometric growth and Sigmoid curve  
(3) A = Arithmetic growth and Sigmoid curve  
B = Geometric growth and Linear curve  
(4) A = Geometric growth and Sigmoid curve

134. Which one of the following statements in regard to the excretion by the human kidneys is correct?  
(1) Ascending limb of Loop of Henle is impermeable to electrolytes  
(2) Descending limb of Loop of Henle is impermeable to water  
(3) Distal convoluted tubule is incapable of reabsorbing \( \text{HCO}_3^- \);  
(4) Nearly 99 per cent of the glomerular filtrate is reabsorbed by the renal tubules

135. Which of the following are correct regarding glycolysis?  
(A) Occurs in the cytoplasm of the cell  
(B) Hydrogen atoms are removed from \( \text{NAD}^+ \) and transferred to \( \text{PGAL} \)  
(C) ATP is utilized during the conversion of \( \text{PEP} \) to pyruvic acid  
(D) Conversion of \( \text{BPGA} \) to \( \text{PGA} \) is an energy yielding process.  
(1) A and B  
(2) A and D  
(3) B and C  
(4) B and D

136. The principal nitrogenous excretory compound in humans is synthesised:  
(1) in the liver, but eliminated mostly through kidneys  
(2) in kidneys but eliminated mostly through liver  
(3) in kidneys as well as eliminated by kidneys  
(4) in liver and also eliminated by the same through bile

133. (A) \( \square \rightarrow \square \rightarrow \square \rightarrow \square \rightarrow \square \)  
(B) \( \square \rightarrow \square \rightarrow \square \rightarrow \square \rightarrow \square \)  
\( \Box \) = \( \text{Cells capable of division} \)  
\( \square \) = \( \text{Cells those lose capacity to divide} \)  
A and B are two different types of growth. Choose the correct match for A and B:  
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B = \( \text{Geometric growth and Sigmoid curve} \)  
(3) A = \( \text{Arithmetic growth and Sigmoid curve} \)  
B = \( \text{Geometric growth and Linear curve} \)  
(4) A = \( \text{Geometric growth and Sigmoid curve} \)
137. Which of the following is correct about the process in which protoplast of a plant cell shrinks away from its cell wall?
(1) This process is usually reversible
(2) This process occurs when plant cell is placed in a solution with low $\Psi_w$ as compared to cell
(3) Water loss occurs first from the cytoplasm and then from the vacuole
(4) All of the above

138. Which one of the following is a possibility for most of us in regard to breathing, by making a conscious effort?
(1) The lungs can be made fully empty by forcefully breathing out all air from them
(2) One can breathe out air totally without oxygen.
(3) One can breathe out air through eustachian tubes by closing both the nose and the mouth
(4) One can consciously breathe in and breathe out by moving the diaphragm alone, without moving the ribs at all.

139. Which of the following essential elements of plants is needed in amount less than 10m mole kg$^{-1}$ of dry matter?
(1) Molybdenum
(2) Magnesium
(3) Phosphorus
(4) Potassium

140. Bulk of carbon dioxide ($CO_2$) released from body tissues into the blood is present as:
(1) Carbamino-haemoglobin in RBCs
(2) Bicarbonate in blood plasma
(3) Free $CO_2$ in blood plasma
(4) 70% carbamino-haemoglobin and 30% as bicarbonate

141. The enzyme nitrogenase which is capable of nitrogen fixation is present:
(1) in all prokaryotes and some eukaryotes
(2) exclusively in prokaryotes
(3) exclusively in eukaryotes
(4) in all eukaryotes and some prokaryotes

142. The rate of conduction of impulse in the conduction pathway of heart, is fastest in:
(1) S.A. node
(2) A.V. node
(3) Bundle of His
(4) Purkinje's fibres

137. Which of the following is correct about the enzyme nitrogenase which is capable of nitrogen fixation?
(1) This enzyme is present in all prokaryotes and some eukaryotes
(2) It is present in all prokaryotes and some eukaryotes
(3) It is present in some prokaryotes and some eukaryotes
(4) It is not present in any prokaryotes or eukaryotes

138. Which of the following statements about the lungs is correct:
(1) The lungs can be made fully empty by forcefully breathing out all air from them
(2) One can breathe out air totally without oxygen.
(3) One can breathe out air through eustachian tubes by closing both the nose and the mouth
(4) One can consciously breathe in and breathe out by moving the diaphragm alone, without moving the ribs at all.

139. Which of the following elements is not essential for plants?
(1) Molybdenum
(2) Magnesium
(3) Phosphorus
(4) Potassium

140. Which of the following statements about the process of respiration is correct?
(1) The process occurs when plant cell is placed in a solution with low $\Psi_w$ as compared to cell
(2) Water loss occurs first from the cytoplasm and then from the vacuole
(3) This process is usually reversible
(4) All of the above

141. The lungs can be made fully empty by forcefully breathing out all air from them.

142. The rate of conduction of impulse in the conduction pathway of heart, is fastest in the:
(1) S.A. node
(2) A.V. node
(3) Bundle of His
(4) Purkinje's fibres
143. According to chemiosmotic hypothesis, ATP synthase form ATP when protons (H⁺) :-
   (1) Move from stroma to thylakoid lumen by simple diffusion
   (2) Move from stroma to thylakoid lumen by facilitated diffusion
   (3) Move from thylakoid lumen to stroma by active transport
   (4) Move from thylakoid lumen to stroma by facilitated diffusion

144. Which of the following can't be taken as an example of parasympathetic stimulation?
   (1) Increase in the intestinal peristalsis
   (2) Increased secretion of gastric juice
   (3) Contraction of the detrusor muscles of urinary bladder.
   (4) Increase in ventricular force of contraction.

145. Water stress causes decrease in photosynthesis because :-
   (1) it reduces the CO₂ availability
   (2) it reduces the surface area of the leaves
   (3) it reduces the metabolic activities of leaves
   (4) All of the above

146. Which of the following substance are absorbed by passive transport?
   (1) Glucose
   (2) Amino acids
   (3) Na⁺
   (4) Nitrogenous wastes

147. Which of the following enzymes catalyse the conversion of pyruvic acid to CO₂ and ethanol?
   (1) Pyruvic acid decarboxylase and alcohol dehydrogenase
   (2) Pyruvic acid decarboxylase and alcohol dehydrogenase
   (3) Pyruvic acid dehydrogenase and alcohol decarboxylase
   (4) Pyruvic acid dehydrogenase and alcohol dehydrogenase

148. Binding of oxygen with haemoglobin is primarily related to which of the following factor?
   (1) Partial pressure of CO₂
   (2) Partial pressure of O₂
   (3) H⁺ concentration
   (4) Temperature
149. When tripalmitin is used in respiration, the R.Q. is :-
(1) less than 1  (2) more than 1  
(3) zero  (4) 1

150. We can produce a concentrated/dilute urine. This is facilitated by a special mechanism. Identify the mechanism :-
(1) Reabsorption from PCT  
(2) Reabsorption from Collecting Duct  
(3) Reabsorption/Secretion in DCT  
(4) Counter current mechanism in Henle's loop/ Vasa recta

151. One molecule of enzyme is needed to convert 5 molecules of substrate into product in 20 minutes. 5 molecules of enzyme and 50 molecules of substrate are mixed in a test tube. After 40 minutes the test tube will having–
(1) Products and 25 molecules of unreacted substrate  
(2) Products and enzymes  
(3) Products, enzymes and 25 molecules of unreacted substrate  
(4) Products only

152. Match the following and mark the correct option:-

<table>
<thead>
<tr>
<th>Animal</th>
<th>Respiratory organ</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Earthworm</td>
</tr>
<tr>
<td>B</td>
<td>Arthropods</td>
</tr>
<tr>
<td>C</td>
<td>Fishes</td>
</tr>
<tr>
<td>D</td>
<td>Birds/Reptiles</td>
</tr>
</tbody>
</table>

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

153. Suppose complete oxidation of 1 glucose molecule provides 40 ATP, respiration efficiency is 50% and energy of 1 ATP is 8 Kcal then total energy liberated from glucose molecule will be :-
(1) 686 kcal  (2) 640 kcal  
(3) 320 kcal  (4) 1280 kcal

154. Mark the correct pair of muscles involved in the normal breathing in humans :-
(1) External and internal intercostal muscles  
(2) Diaphragm and abdominal muscles  
(3) Diaphragm and external intercostal muscles  
(4) Diaphragm and internal intercostal muscles

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**Multiple Choice Questions**

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155. Thigmomastatic movement is shown by :-
(1) Movement in tendril
(2) Insectivorous plants
(3) Movement in Desmodium
(4) Movement of pollen tube in ovary

156. A person suffers punctures in his chest cavity in an accident, without any damage to the lungs its effect could be :-
(1) Reduced breathing rate
(2) Rapid increase in breathing rate
(3) No change in respiration
(4) Cessation of breathing

157. (i) Which process is shown in given diagram?
(ii) Which type of process is this?
(iii) Enzyme responsible for this process is sensitive to........
Choose the correct answers :-
(1) (i) Electrical nitrogen fixation
(ii) Oxidation
(iii) N₂
(2) (i) Biological nitrogen fixation
(ii) Oxidation
(iii) O₂
(3) (i) Biological nitrogen fixation
(ii) Reduction
(iii) O₂
(4) (i) Industrial nitrogen fixation
(ii) Reduction
(iii) H₂

158. Which of the following is incorrect match regarding the segment of nephron and osmotic concentration of filtrate?

<table>
<thead>
<tr>
<th>Segment of Nephron</th>
<th>Osmotic concentration of filtrate (than blood plasma)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) PCT</td>
<td>Hypotonic</td>
</tr>
<tr>
<td>(2) Bowman's capsule</td>
<td>Isotonic</td>
</tr>
<tr>
<td>(3) Descending limb of Henle's loop</td>
<td>Hypertonic</td>
</tr>
<tr>
<td>(4) Ascending limb of Henle's loop</td>
<td>Hypotonic</td>
</tr>
</tbody>
</table>
159. Excess of manganese in plants induce deficiency of :-
   (1) One macronutrient and two micronutrients
   (2) One micronutrient and two macronutrients
   (3) Three micronutrients and two macronutrients
   (4) Three macronutrients and Two micronutrients

160. Which of the following lung volumes or capacities can be measured by spirometer :
   (1) Functional residual capacity [FRC]
   (2) Residual volume
   (3) Total lung capacity [TLC]
   (4) Vital capacity

161. In the absence of enzyme, reaction
\[
\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_3
\]
is very slow, formation of 200 molecules of \(\text{H}_2\text{CO}_3\) per hour. However by the use of carbonic anhydrase enzyme reaction speeds with about :-
   (1) formation of \(6 \times 10^5\) molecules of \(\text{H}_2\text{CO}_3\) every second
   (2) formation of \(36 \times 10^5\) molecules of \(\text{H}_2\text{CO}_3\) every minute
   (3) formation of \(36 \times 10^6\) molecules of \(\text{H}_2\text{CO}_3\) every second
   (4) formation of \(6 \times 10^6\) molecules of \(\text{H}_2\text{CO}_3\) every minute

162. Hypertonicity of filtrate is minimum at :
   (1) Base of loop of Henle
   (2) Outer part of Medulla
   (3) Inner part of Medulla
   (4) Cortical region

163. Following is the graph related to enzyme activity:-

Choose the correct option :-
   (1) \(A = \text{pH}\), \(B = \text{Enzyme activity}\), \(C = K_m\) constant, \(D = V_{\text{max}}\).
   (2) \(A = \text{velocity of reaction}\), \(B = \text{pH}\), \(C = \frac{V_{\text{max}}}{2}\), \(D = \text{concentration of substrate}\)
   (3) \(A = \text{concentration of substrate}\), \(B = \frac{V_{\text{max}}}{2}\), \(C = K_m\) constant, \(D = \text{velocity of reaction}\)
   (4) \(A = \text{concentration of substrate}\), \(B = \frac{V_{\text{max}}}{2}\), \(C = \text{Temperature}\), \(D = \text{Enzyme activity}\)
164. Which one of the following statement is incorrect?

1. The Principle of countercurrent flow facilitates efficient respiration in gills of fishes.
2. In insects, circulating body fluids serve to distribute oxygen to tissues.
3. The residual air in lungs slightly decreases the efficiency of respiration in mammals.
4. The presence of non-respiratory air sacs, increase the efficiency of respiration in birds.

165. How many statements of the following are correct?

(i) In plants both growth and differentiation are open
(ii) Increased vacuolation and new cell wall deposition are the characteristics of the cells in the phase of elongation.
(iii) Plant growth promoters play an important role in plant responses to wounds and stresses of biotic and abiotic origin.
(iv) Decapitation usually results in the growth of apical buds.
(v) Hormonal substance that is responsible for flowering migrates from leaves to shoot apices for inducing flowering.

(1) Three (2) Four
(3) Two (4) One

166. The conducting part of respiratory tract does not help in:

1. Transport the atmospheric air to the alveoli.
2. Clear air from foreign particles.
3. Humidify and bring the air to body temperature.
4. Diffusion of O₂ and CO₂ between blood and air.

167. How many of the following organisms not fix the atmospheric nitrogen in free living condition?

Frankia, Anabaena, Rhodospirillum, Beijernickia, Rhizobium, Azotobacter, Nostoc

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

Time Management is Life Management
168. Which of the following is correct :-
(1) Starch $\xrightarrow{Amylase} \text{disaccharides}$
(2) Fats $\xrightarrow{Bile} \text{Diglycerides}$
(3) Nucleic acid $\xrightarrow{Nuclease} \text{Nucleotide}$
$\xrightarrow{Nucleosidase} \text{nucleoside}$
(4) All the above

169. How many molecules of reduced coenzymes are produced inside mitochondria during complete oxidation of one glucose ?
(1) Five - 4 NADH$_2$ + 1 FADH$_2$
(2) Twelve - 6 NADH$_2$ + 6 FADH$_2$
(3) Ten - 8 NADH$_2$ + 2 FADH$_2$
(4) Four - 3 NADH$_2$ + 1 FADH$_2$

170. Deficiency of which of the following results in anemia ?
(1) Castle intrinsic factor
(2) Vit.–B$_{12}$
(3) Folic acid, Iron
(4) All the above

171. Choose the correct combinations of labelling for the molecules involved in the Calvin cycle:-

(1) (i) RuBP (ii) Triose phosphate (iii) PGA
(2) (i) PGA (ii) RuBP (iii) Triose phosphate
(3) (i) PGA (ii) Triose phosphate (iii) RuBP
(4) (i) RuBP (ii) PGA (iii) Triose phosphate
172. Consider the following four statements (a-d) and select the option which includes all the correct ones only:

(a) Small intestine is principle organ for absorption of nutrients.
(b) Reflex action for vomiting is controlled by medulla.
(c) Frequent bowel movements cause diarrhoea.
(d) Mucosa forms gastric gland in the stomach.

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

173. If deficiency symptoms of element ‘A’ appear first in older tissues and of element ‘B’ appear first in younger tissues, then choose the correct one from the following regarding these elements–

(1) A = Nitrogen, B = Magnesium
(2) A = Calcium, B = Sulphur
(3) A = Sulphur, B = Potassium
(4) A = Magnesium, B = Calcium

174. The below diagram is a duct system of liver, gall bladder and pancreas. The names of ducts from A to D:

Gal bladder

A

B

C

D

(1) A - Cystic duct, B - Bile duct, C - Pancreatic duct, D - Hepato-pancreatic duct.
(2) A - Bile duct, B - Cystic duct, C - Pancreatic duct, D - Hepato-pancreatic duct.
(3) A - Cystic duct, B - Bile duct, C - Hepato-pancreatic duct, D - Pancreatic duct.
(4) A - Cystic duct, B - Pancreatic duct, C - Bile duct, D - Hepato-pancreatic duct.
175. Which of the following is not correct regarding translocation of food in plants?
(1) In food transport the source-sink relationship is variable depending on the season or the plant’s need.
(2) Phloem sap is mainly water and sucrose but other sugars, hormones and amino acids are also translocated through phloem.
(3) In sugar utilizing sink cells the osmotic pressure must be very high so that they can get water along with sugar from the phloem.
(4) Active transport is required for the process of loading and unloading of sugar.

176. If tongue of a person is completely removed, then which of the following situation will describe the person that he will not be able to-
(1) Taste sweet & salty.
(2) Not able to taste sweet, but able to taste salty.
(3) Perceive the odour of rose but not able to taste sweet and salt.
(4) Taste sweet and salty, but not perceive to the odour of rose.

177. (A) Attraction between water molecules
(B) Attraction between water and tracheary element's surface
(C) Negative tension

(i) Which process is shown in above diagram?
(ii) Some other terms can be utilise for A, B, and C, choose the correct option regarding this:-
(1) (i) Food translocation
(ii) A = Cohesion, B = adhesion, C = surface tension
(2) (i) Guttation
(ii) A = Adhesion, B = cohesion, C = root pressure
(3) (i) Ascent of sap
(ii) A = Surface tension, B = Transpiration pull, C = Root pressure
(4) (i) Ascent of sap
(ii) A = cohesion, B = Adhesion, C = Transpiration pull
178. Read the following five statements and answer as asked next to them:
(a) Peptic cells secrete the proenzyme pepsinogen
(b) Enterokinase is enzyme of pancreatic juice
(c) Haustra are found in large intestine
(d) For its activity carboxypeptidase requires zinc
(e) Spicy food may cause indigestion

How many of the above statements are correct?
(1) Four (2) One (3) Two (4) Three

179. Read the following four statements (A–D):
(A) Infection in alimentary canal can be caused by roundworm
(B) Rennin enzyme found in gastric juice of infants helps in digestion of milk sugar.
(C) Principle organ for absorption of nutrients is small intestine
(D) Mucosa is the outermost layer of alimentary canal

How many of the above statements are correct?
(1) Four (2) One (3) Two (4) Three

180. How many enzymes in the list given below are found in pancreatic juice?
Lactase, Trypsinogen, Pepsin, Chymotrypsinogen, Aminopeptidase, Rennin, Pro Carboxypeptidase, Maltase

How many enzymes in the list given below are found in pancreatic juice?
(1) Six (2) Three (3) Four (4) Five

Your moral duty is that to prove Allen is Allen.