



TARGET IIT JEE-PMT CLASSES™

(NTTSE) National Target Talent Search Examination

(FOR CLASS XI) (Medical)

TIME: 2:15 Hrs.

INSTRUCTIONS FOR THE CANDIDATES

M.M: 720

Section	Subject	No. of Questions	Mark per Question	Negative Marking	Total Marks
A	Physics	45	4	-1/4 th	180
B	Chemistry	45	4	-1/4 th	180
C	Biology	90	4	-1/4 th	360
	Total	180			720

- ❖ Read each question carefully.
- ❖ Do not use white – fluid or any other rubbing material on sheet. No change in the answer once marked.
- ❖ Student cannot use log tables and calculators or any other electronic material in the examination hall.
- ❖ Rough work is to be done on the rough sheet provided for this purpose with the booklet.
- ❖ Immediately after the prescribed examination time is over, the answer sheet to be returned to the invigilator.
- ❖ Marking Scheme:
 - a. If darkened bubble is RIGHT answer: **4 Marks**.
 - b. If no bubble is darkened in any question: **No Mark**.
 - c. If darkened bubble is WRONG answer: **1/4 Mark (Minus)**.
- ❖ If you are found involved in cheating or disturbing others then your OMR Sheet will be cancelled.
- ❖ Do not put any stain on OMR Sheet and hand it over back properly to the invigilator.

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SECTION -A: PHYSICS

This section contains **45 Multiple Choice Questions**. Each question has four choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

- 1) The pressure on a square plate is measured by measuring the force on the plate and the length of the sides of plate. If the maximum error in the measurement of force and length are respectively 4% and 2%, the maximum error in the measurement of pressure is :
 - a) 1%
 - b) 2%
 - c) 6%
 - d) 8%
- 2) What is the percentage error in the measurement of time period of a pendulum if maximum errors in the measurement of l and g are 2% and 4% respectively ?
 - a) 6%
 - b) 4%
 - c) 3%
 - d) 5%
- 3) A plane is inclined at an angle of 30° with horizontal. The component of a vector $\vec{A} = -10\hat{k}$ perpendicular to this plane is (here z -direction is vertically upwards)
 - a) $5\sqrt{2}$
 - b) $5\sqrt{3}$
 - c) 5
 - d) 2.5

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- 4) The unit of permittivity of free space ϵ_0 is :
- coulomb / newton - metre
 - newton - $\text{m}^2 / \text{coul}^2$
 - $\text{coul}^2 / (\text{newton} \cdot \text{m})^2$
 - $\text{coul}^2 / (\text{newton} \cdot \text{m}^2)$
- 5) A new system of units is evolved in which the values of μ_0 and ϵ_0 are 2 and 8 respectively. Then the speed of light in this system will be :
- 0.25
 - 0.5
 - 0.75
 - 1
- 6) What is angle between \vec{A} and the resultant of $(\vec{A} + \vec{B})$ and $(\vec{A} - \vec{B})$?
- 0°
 - $\tan^{-1}\left(\frac{A}{B}\right)$
 - $\tan^{-1}\left(\frac{B}{A}\right)$
 - $\tan^{-1}\left(\frac{A-B}{A+B}\right)$
- 7) A ball is dropped into a well in which the water level is at a depth h below the top. If the speed of sound be c , then the time after which the splash is heard will be given by :
- $h\left[\sqrt{\frac{2}{gh}} + \frac{1}{c}\right]$
 - $h\left[\sqrt{\frac{2}{gh}} - \frac{1}{c}\right]$
 - $h\left[\frac{2}{g} + \frac{1}{c}\right]$
 - $h\left[\frac{2}{g} - \frac{1}{c}\right]$

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- 8) A person travels along a straight road for the first half time with a velocity v_1 and the second half time with a velocity v_2 . Then the mean velocity \bar{v} is given by :
- $\bar{v} = \frac{v_1 + v_2}{2}$
 - $\frac{2}{\bar{v}} = \frac{1}{v_1} + \frac{1}{v_2}$
 - $\bar{v} = \sqrt{v_1 v_2}$
 - $\bar{v} = \sqrt{\frac{v_2}{v_1}}$
- 9) A particle returns to the starting point after 10 s. If the rate of change of velocity during the motion is constant in magnitude, then its location after 7 seconds will be same as that after :
- 1 s
 - 2 s
 - 3 s
 - 3.5 s
- 10) Two cars are moving in the same direction with the same speed of 30 km/hr. They are separated by 5 km. What is the speed of the car moving in the opposite direction if it meets the two cars at an interval of 4 minutes ?
- 15 km/hr
 - 30 km/hr
 - 45 km/hr
 - 60 kg/hr
- 11) A body of mass 5 kg starts from the origin with an initial velocity $\vec{u} = (30\hat{i} + 40\hat{j}) \text{ ms}^{-1}$. If a constant force $(-6\hat{i} - 5\hat{j}) \text{ N}$ acts on the body, the time in which the y component of the velocity becomes zero, is :
- 5 s
 - 20 s

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- c) 40 s
- d) 80 s
- 12) A particle of mass m is projected with a velocity u making an angle of 45° with the horizontal. The magnitude of the angular momentum of the projectile about the point of projection when the particle is at its maximum height h is:
- a) zero
- b) $\frac{mu^3}{4\sqrt{2}g}$
- c) $\frac{mu^3}{\sqrt{2}g}$
- d) $m\sqrt{2gh^3}$
- 13) A gun fires two bullets at 60° and 30° with the horizontal. The bullets strike at some horizontal distance. The ratio of maximum height for the two bullets is in the ratio.
- a) 2 : 1
- b) 3 : 1
- c) 4 : 1
- d) 1 : 1
- 14) A heavy block of mass M is slowly placed on a conveyor belt moving with a speed v . The coefficient of friction between the block and the belt is μ . Through what distance will the block slide on the belt
- a) $\frac{v}{\mu g}$
- b) $\frac{v^2}{\mu g}$
- c) $\frac{v}{2\mu g}$
- d) $\frac{v^2}{2\mu g}$

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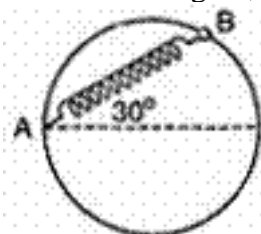
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15) An ice cube is kept on an inclined plane of angle 30° . The coefficient of kinetic friction between the block and the inclined plane is $(1/\sqrt{3})$. What is the acceleration of block ?

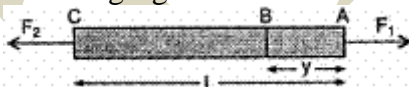
- a) zero
- b) 2m/s^2
- c) 1.5m/s^2
- d) 5m/s^2

16) A bead of mass m is attached to one end of a spring of natural length R and spring constant $k = \frac{(\sqrt{3} + 1)mg}{R}$. The other end of the spring is fixed at a point A on a smooth vertical ring of radius R as shown in the figure, tangential acceleration of bead just after it is released is :



- a) $g/2$
- b) $3g/4$
- c) $g/4$
- d) $2g/3$

17) A rod of length L and mass M is acted on by two unequal forces F_1 and F_2 ($F_2 < F_1$) as shown in the following figure: The tension in the rod at a distance y from the end A is given by :



- a) $F_1 \left(1 - \frac{y}{L}\right) + F_2 \left(\frac{y}{L}\right)$
- b) $F_2 \left(1 - \frac{y}{L}\right) + F_1 \left(\frac{y}{L}\right)$
- c) $(F_1 - F_2) \frac{y}{L}$
- d) none of these

- 18) Two masses of 10 kg and 20 kg respectively are connected by a massless spring as shown in figure. A force of 200 N acts on the 20 kg mass. At the instant when the 10 kg mass has an acceleration of 12 ms^{-2} , the acceleration of the 20 kg mass is :



- a) 2 ms^{-2}
 b) 4 ms^{-2}
 c) 10 ms^{-2}
 d) 20 ms^{-2}
- 19) Bullets of 0.03 kg mass each hit a plate at the rate of 200 bullets per second, with a velocity of 50 m/sec and reflect back with a velocity of 30 ms^{-1} . The average force acting on the plate in Newton is :
- a) 120
 b) 180
 c) 300
 d) 480
- 20) A particle of mass m is moving in a circular path of constant radius r such that its centripetal acceleration a_c is varying with time t as $a_c = k^2 r t^2$ where k is a constant. The power delivered to the particle by the forces acting on it, is :
- a) zero
 b) $mk^2 r^2 t^2$
 c) $mk^2 r^2 t$
 d) $mk^2 r t$

- 21) A block of mass m slides down a rough inclined plane of inclination θ with horizontal with zero initial velocity. The coefficient of friction between the block and the plane is μ with $\theta > \tan^{-1}(\mu)$. Rate of work done by the force of friction at time t is :
- $\mu mg^2 t \sin \theta$
 - $mg^2 t (\sin \theta - \mu \cos \theta)$
 - $\mu mg^2 t \cos \theta (\sin \theta - \mu \cos \theta)$
 - $\mu m g^2 t \cos \theta$
- 22) A uniform chain has a mass m and length l . It is held on a frictionless table with one-sixth of its length hanging over the edge. The work done in just pulling the hanging part back on the table is :
- $\frac{mgl}{72}$
 - $\frac{mgl}{36}$
 - $\frac{mgl}{12}$
 - $\frac{mgl}{6}$
- 23) Under the action of force a 2 kg body moves such that its position x as a function of time is given by $x = t^3 / 3$, where x is in metres and t in seconds. The work done by the force in the first two seconds is :
- 1.6 J
 - 16 J
 - 160 J
 - 1600 J
- 24) In a conservative force field we can find the radial component of force from the potential energy function by using $F = -\frac{dU}{dr}$. Here, a positive force means repulsion and a negative force means attraction. From the given potential energy function $U(r)$ we can find the equilibrium position where force is zero. We can also find the ionization energy which is the work done to move the particle from a certain position to infinity.
- Let us consider a case in which a particle is bound to a certain point at a distance r from the centre of the force. The potential energy of the particle is

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$U(r) = \frac{A}{r^2} - \frac{B}{r}$: where r is the distance from the centre of the force and A and B are positive constants.

Answer the following question.

The equilibrium distance is given by

- a) $\frac{A}{B}$
- b) $\frac{2A}{B}$
- c) $\frac{3A}{B}$
- d) $\frac{B}{2A}$

5) Two cars having masses m_1 and m_2 move in circles of radii r_1 and r_2 respectively. If they complete the circle in equal time, the ratio of their angular speeds ω_1 / ω_2 is

- a) m_1/m_2
- b) r_1/r_2
- c) m_1r_1/m_2r_2
- d) 1.

26) A particle of mass m is observed from an INERTIAL frame of reference and is found to move in a circle of radius r with a uniform speed v . the centrifugal force on it is

- a) $\frac{mv^2}{r}$ towards the centre
- b) $\frac{mv^2}{r}$ away from the centre
- c) $\frac{mv^2}{r}$ along the tangent through the particle
- d) zero.

27) Two bodies of mass m and $4m$ have equal kinetic energy. What is the ratio of their momentum?

- a) 1 : 4
- b) 1 : 2
- c) 1 : 1
- d) 2 : 1

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28) The dimension of k in the equation $W = \frac{1}{2}kx^2$ is

- a) $[M^1L^0T^{-2}]$
- b) $[M^0L^1T^{-1}]$
- c) $[M^1L^1T^{-2}]$
- d) $[M^1L^0T^{-1}]$

29) A block is kept on an inclined plane of inclination θ and length l . The velocity of particle at the bottom of incline (the coefficient of friction is μ) is

- a) $\sqrt{2gl(\mu \cos \theta - \sin \theta)}$
- b) $\sqrt{2gl(\sin \theta - \mu \cos \theta)}$
- c) $\sqrt{2gl(\sin \theta + \mu \cos \theta)}$
- d) $\sqrt{2gl(\cos \theta + \mu \sin \theta)}$

30) An object of mass m accelerates uniformly from rest to a speed v_F in time t_F . The work done on the object as a function of time t in terms of v_F and t_F is :

- a) $W = \frac{1}{2}mv_F^2 \frac{t_F^2}{t^2}$
- b) $W = \frac{1}{2}m \left(\frac{v_F}{t_F} \right) t^2$
- c) $W = \text{zero}$
- d) $W = \frac{1}{2}m \left(\frac{v_F}{t_F} \right)^2 t^2$

31) The potential energy of a certain spring when stretched through a distance x is 10 joule. The amount of work (in joule) that must be done on this spring to stretch it through additional distance x will be :

- a) 30
- b) 40
- c) 10
- d) 20

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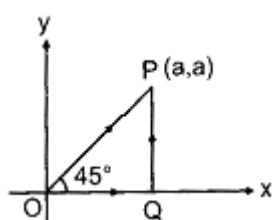
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32) A block of mass m is pulled along a horizontal surface by applying a force at an angle θ with the horizontal. If the block travels with a uniform velocity and has a displacement d and the coefficient of friction is μ , then the work done by the applied force is :

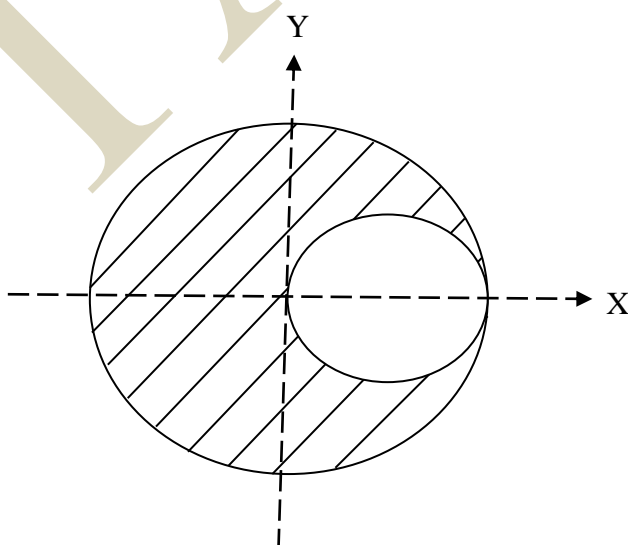
- a) $\frac{\mu mgd}{\cos\theta + \mu\sin\theta}$
- b) $\frac{\mu mgd\cos\theta}{\cos\theta + \mu\sin\theta}$
- c) $\frac{\mu mgd\sin\theta}{\cos\theta + \mu\sin\theta}$
- d) $\frac{\mu mgd\cos\theta}{\cos\theta - \mu\sin\theta}$

33) A particle is moved from $(0, 0)$ to (a, a) under a force $\vec{F} = (3\hat{i} + 4\hat{j})$ from two paths. Path 1 is OP and path 2 is OQP. Let W_1 and W_2 be the work done by this force in these two paths. Then



- a) $W_1 = W_2$
- b) $W_1 = 2W_2$
- c) $W_2 = 2W_1$
- d) $W_2 = 4W_1$

34) In figure shown is a hollow disc of radius 1m. The coordinates of centre of mass will be ?



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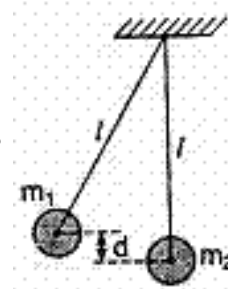
- a) $\left(0, \frac{-1}{6}\right)$
- b) $\left(0, \frac{1}{6}\right)$
- c) $\left(\frac{-1}{6}, 0\right)$
- d) $\left(\frac{1}{6}, 0\right)$

35) A tennis ball is thrown from a height h above the ground. If the ball strikes to the ground with inelastic collision, what height will the ball achieve after the third collision?

- a) $e^6 h$
- b) $e^2 h$
- c) $e^3 h$
- d) none of these

36) Two pendulum each of length l are initially situated as shown in figure. The first pendulum is released and strikes the second. Assume that the collision is completely inelastic and neglect the mass of string

and any frictional effects. How high does the centre of mass rise after the collision ?



- a) $d \left[\frac{m_1}{(m_1 + m_2)} \right]^2$
- b) $d \left[\frac{m_1}{(m_1 + m_2)} \right]$
- c) $\frac{d(m_1 + m_2)^2}{m_2}$
- d) $d \left[\frac{m_2}{(m_1 + m_2)} \right]^2$

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- 37) A ball falls vertically onto a floor, with momentum p and then bounces repeatedly; the coefficient of restitution is e . The total momentum imparted by the ball to the floor is
- $p(1 + e)$
 - $\frac{1}{1 - e}$
 - $p\left(\frac{1 + e}{1 - e}\right)$
 - $p\left(1 - \frac{1}{e}\right)$
- 38) A particle is projected making an angle of 45° with horizontal having kinetic energy K . The kinetic energy at highest point will be
- $K/\sqrt{2}$
 - $K/2$
 - $2K$
 - K
- 39) Consider a two particle system with particles having masses m_1 and m_2 . If the first particle is pushed towards the centre of mass through a distance d , by what distance should the second particle be moved, so as to keep the centre of mass at the same position?
- d
 - $\frac{m_2}{m_1}d$
 - $\frac{m_1}{m_1 + m_2}d$
 - $\frac{m_1}{m_2}d$
- 40) Distance of the centre of mass of a solid uniform cone from its vertex is z_0 . If the radius of its base is R and its height is h , then z_0 is equal to
- $\frac{h^2}{4R}$
 - $\frac{3h}{4}$
 - $\frac{5h}{8}$
 - $\frac{3h^2}{8R}$

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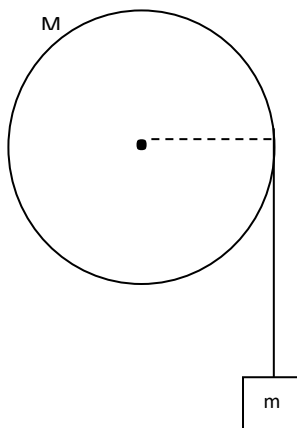
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41) A sphere of mass m rolls without slipping on an inclined plane of inclination θ . The force of friction on the sphere is :

- a) $\frac{1}{7} Mg \sin \theta$
- b) $\frac{2}{7} Mg \sin \theta$
- c) $\frac{3}{7} Mg \sin \theta$
- d) $\frac{5}{7} Mg \sin \theta$



42) A uniform disc of mass M and radius R is mounted on an axle supported in frictionless bearings. A light cord is wrapped around the rim of the disc and a steady downward pull T is exerted on the cord. If we hang a body of mass m from the cord, the tangential acceleration of the disc is :

- a) $\frac{mg}{M+m}$
- b) $\frac{mg}{M+2m}$
- c) $\frac{2mg}{M+2m}$
- d) $\frac{M+2m}{2mg}$

43) Two particles A and B initially at rest, move towards each other under mutual force of attraction. At the instant when the speed of A is V and the speed of B is $2V$, the speed of the center of mass of the system is

- a) $3V$
- b) V
- c) $1.5V$
- d) zero

44) When a force F is applied on a block of mass m resting on a horizontal surface then there are two

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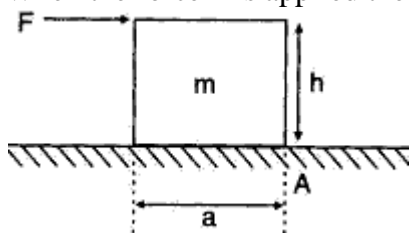
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possibilities, either the block moves by translation or it moves by toppling. If the surface is smooth then the block always translates but on a rough surface it topples only when the torque of the applied force F is greater than the torque of mg about a point in contact with the ground.

When the force F is applied the body may topple about A or it may translate.



When the block topples about A , the normal force

- a) passes through center of mass
- b) is zero
- c) shifts to the right and passes through rightmost edge containing A
- d) is zero if the surface is smooth

45) A uniform solid sphere rolls on a horizontal surface at 20 ms^{-1} . It then rolls up an incline having an angle of inclination at 30° with the horizontal. If the friction losses are negligible, the value of height h above the ground where the ball stops is :

- a) 43 m
- b) 28 m
- c) 57.2 m
- d) 9.8 m

SECTION -B: CHEMISTRY

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This section contains **45 Multiple Choice Questions**. Each question has four choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

46) Mass of one mole of protons is

- a) 0.20 mg
- b) 0.02 mg
- c) 0.55 mg
- d) 1.00 mg

47) Value of gas constant R is

- a) 0.082 litre atm
- b) 0.987 cal mol⁻¹ K⁻¹
- c) 8.3 J mol⁻¹ K⁻¹
- d) 83 erg mol⁻¹ K⁻¹

48) If the r.m.s. speed of a gaseous molecules is x m/sec at a pressure p atm, then what will be the r.m.s. speed at $2p$ atm and constant temperature ?

- a) x
- b) $2x$
- c) $4x$
- d) $x/4$

49) The rate of diffusion of a gas is directly proportional to :

- a) $\frac{P}{\sqrt{d}}$
- b) $\frac{\sqrt{P}}{\sqrt{d}}$
- c) $\frac{P}{d}$
- d) $\frac{\sqrt{P}}{d}$

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- 50) Value of universal gas constant 'R' depends upon
- temperature of the gas
 - volume of the gas
 - number of moles of the gas
 - none of these
- 51) Which type of crystals contain only one Bravais lattice ?
- Hexagonal
 - Triclinic
 - Rhombohedral
 - Monoclinic
- I, II
 - I, II, III
 - II, III, IV
 - I, II, IV
- 52) In a cubic packed structure of mixed oxides, the lattice is made up of oxide, one fifth of tetrahedral voids are occupied by divalent ions (A^{2+}) while one half of the octahedral voids are occupied by trivalent ions (B^{3+}), then the formula of the oxide is
- A_2BO_4
 - $A_4B_5O_{10}$
 - AB_2O_4
 - $A_5B_4O_{10}$
- 53) An element (with atomic mass = 250 g) crystallises in a simple cube. If the density of unit cell is 7.2 g cm^{-3} , what is the radius of the element ?
- $1.93 \times 10^{-6} \text{ cm}$
 - $1.93 \times 10^{-8} \text{ cm}$
 - $1.93 \times 10^{-8} \text{ \AA}$

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d) $1.93 \times 10^{-8} \text{ m}$

54) In hcp and bcc structure, the packing fractions are respectively :

a) 0.74, 0.74

b) 0.68, 0.68

c) 0.74, 0.68

d) 0.68, 0.74

55) Potassium crystallises in bcc lattice. Hence the co-ordination number of the element in the crystal structure is

a) 0

b) 4

c) 6

d) 8

56) The existence of a substance in more than one solid modifications is known as

a) Allotropy

b) Isomorphism

c) Polymorphism

d) None

57) Three dimensional arrangement of particles shown by regular pattern of points is known as :

a) Space lattice

b) Crystal lattice

c) Unit cell

d) All the three

58) The number of atoms in 100 g of a fcc crystal with density $d = 10 \text{ g/cm}^3$ and cell edges as 200 pm is equal to

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- a) 3×10^{25}
- b) 5×10^{24}
- c) 1×10^{25}
- d) 2×10^{25}

59) Number of atoms in the unit cell of Na (BCC type crystal) and Mg (FCC type crystal) are respectively.

- a) 4, 4
- b) 4, 2
- c) 2, 4
- d) 1, 1

60) The edge length of unit cell of a metal having molecular weight 75 g/mol is 5 \AA which crystallizes in cubic lattice. If the density is 2 g/cc then find the radius of metal atom ($N_A = 6 \times 10^{23}$)

- a) 212 pm
- b) 217 pm
- c) 106 pm
- d) 108.5 pm

61) Which is incorrect ?

- a) Hexagonal close packed arrangement is ABC ABC.....
- b) Orthorhombic crystal has $a \neq b \neq c$, $\alpha = \gamma = 90^\circ$ and $\beta \neq 90^\circ$
- c) In Zn crystallises in HCP structure, the nearest number of atoms is 12
- d) Quartz is an example of Rhombo-hedral crystal system

62) If NaCl is doped with 10^{-3} mole% SrCl_2 , then the concentration of cation vacancies will be :

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- a) 1×10^{-3} mol%
- b) 2×10^{-3} mol%
- c) 3×10^{-3} mol%
- d) 4×10^{-3} mol%

63) If N_A is the Avogadro number, then the number of valence electrons in 4.2 g of nitride ion (N^{3-}) is

- a) $2.4 N_A$
- b) $4.2 N_A$
- c) $1.6 N_A$
- d) $3.2 N_A$

64) The ionization energy of He^+ is $19.6 \times 10^{-18} \text{ J atom}^{-1}$. The energy of the first stationary state of Li^2 is

- a) $19.6 \times 10^{-18} \text{ J atom}^{-1}$
- b) $4.41 \times 10^{-18} \text{ J atom}^{-1}$
- c) $19.6 \times 10^{-19} \text{ J atom}^{-1}$
- d) $4.41 \times 10^{-17} \text{ J atom}^{-1}$

65) The total number of orbitals in a shell having principal quantum 'n' is

- a) $2n$
- b) n^2
- c) $2n^2$
- d) $(n + 1)$

66) The de-Broglie equation treats an electron to be

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- a) a particle
- b) a wave
- c) both
- d) none

67) Which d-orbital has lobes directed along the axis

- a) d_{xy}
- b) d_{yz}
- c) d_{xx}
- d) $d_{x^2 - y^2}$

68) An isotone of $^{76}_{32}\text{Ge}$ is

- a) $^{77}_{32}\text{Ge}$
- b) $^{77}_{33}\text{As}$
- c) $^{77}_{34}\text{Se}$
- d) $^{78}_{36}\text{Sc}$

69) The energy of the first electron in helium will be

- a) -13.6 eV
- b) -54.4 eV
- c) -5.44 eV
- d) zero

70) Which of the following electronic transitions from one orbit to another corresponds to the third line in

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the Balmer series of hydrogen spectrum ?

- a) $1 \rightarrow 2$
- b) $3 \rightarrow 2$
- c) $5 \rightarrow 2$
- d) $\infty \rightarrow 2$

71) Angular momentum of an electron in the n^{th} orbit of hydrogen atom is given by

- a) $\frac{2\pi}{nh}$
- b) $\frac{\pi}{2nh}$
- c) $\frac{nh}{2\pi}$
- d) nh

72) The number of nodal planes for 4d orbital is

- a) zero
- b) one
- c) two
- d) three

73) The following quantum numbers are possible for how many orbitals. $n = 3, l = 2, m = +2$

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

74) Principal, Azimuthal and magnetic quantum numbers are respectively related to :

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- a) size, shape, orientation
- b) shape, size, orientation
- c) size, orientation, shape
- d) none of these

75) Which is not correctly matched ?

- a) XeO_3 ; Trigonal bipyramidal
- b) ClF_3 ; T-shape
- c) XeOF_4 ; Square pyramidal
- d) XeF_2 ; Linear shape

76) The compound MX_4 is tetrahedral. The number of $\angle \text{XMX}$ angles in the compound is

- a) Three
- b) Four
- c) Five
- d) Six

77) The bond angle in Cl_2O is nearly 111° whereas bond angle in F_2O is nearly 103° . This is because

- a) electronegativity of fluorine is greater than that of oxygen.
- b) size of chlorine atom is greater than that of fluorine.
- c) chlorine contains d-orbitals whereas fluorine does not.
- d) the number of lone pairs present on fluorine and chlorine is not equal.

78) Identify the state function among the following

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- a) q
- b) $q - w$
- c) q/w
- d) $q + w$

79) Bond formation

- a) is always exothermic
- b) is always endothermic
- c) may be exothermic or endothermic
- d) depends upon the nature of the compound to be formed

80) For the reaction $A(g) + 2B(g) \rightarrow 2C(g) + 3D(g)$. The value of ΔH at 27°C is 19.0 kcal . The value ΔU for the reaction would be : (Given $R = 2.0 \text{ cal K}^{-1} \text{ mol}^{-1}$)

- a) 20.8 kcal
- b) 19.8 kcal
- c) 18.8 kcal
- d) 17.8 kcal

81) The internal energy change when a system goes from state A to B is 40 kJ/mole . If the system goes from A to B by a reversible path and returns to state A by an irreversible path, what would be the net change in internal energy ?

- a) 40 kJ
- b) $> 40 \text{ kJ}$
- c) $< 40 \text{ kJ}$
- d) Zero

82) For the reaction, $\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \rightleftharpoons 2\text{HI}(\text{g})$ the equilibrium constant K_p changes with :

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- a) total pressure
- b) catalyst
- c) the amounts of H_2 and I_2 present
- d) temperature

83) The concentration of reactants is increased by x, then equilibrium constant K becomes

- a) $\ln K/x$
- b) K/x
- c) $K + x$
- d) K

84) Which of the following cannot act as buffer?

- a) $NaH_2PO_4 + H_3PO_4$
- b) $CH_3COOH + CH_3COONa$
- c) $HCl + NH_4Cl$
- d) $H_3PO_4 + NaH_2PO_4$

85) The strongest conjugate base is:

- a) NO_3^-
- b) Cl^-
- c) SO_4^{2-}
- d) CH_3COO^-

86) Which of the following will favour the reverse reaction in a chemical equilibrium ?

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- a) increasing the concentration of the reactants
- b) removal of at least one of the products at regular intervals
- c) increasing the concentration of one or more of the products
- d) increasing the pressure

87) For the homogeneous gas reaction



the equilibrium constant, K_c has the dimensions of

- a) $(\text{mol L}^{-1})^{10}$
- b) mol L^{-1}
- c) L mol^{-1}
- d) It is dimensionless

88) The solubility product of barium sulphate is 1.5×10^{-9} at 18°C . Its solubility in water at 18°C is:

- a) 1.5×10^{-9}
- b) 1.5×10^{-5}
- c) 3.9×10^{-9}
- d) 3.9×10^{-5}

89) Which of the following is not a lewis base?

- a) NH_3
- b) H_2O
- c) AlCl_3
- d) none of these

90) The pH of a 0.1 M aqueous solution of a weak acid (HA) is 4. What is its degree of dissociation?

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- a) 1%
 - b) 10%
 - c) 50%
 - d) 25%
-

SECTION -C: BIOLOGY

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This section contains **90 Multiple Choice Questions**. Each question has four choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

- 91) The deficiencies of micronutrients, not only affects growth of plants but also vital functions such as photosynthetic and mitochondrial electron flow. Among the list given below, which group of three elements shall affect most, both photosynthetic and mitochondrial electron transport
- a) Cu, Mn, Fe
 - b) Co, Ni, Mo
 - c) Mn, Co, Ca
 - d) Ca, K, Na
- 92) The limiting factor in nitrification of soil is
- a) Soil nature (pH)
 - b) Light
 - c) Temperature
 - d) Air
- 93) The technique of growing plants in a nutrient solution, in complete absence of soil is called as
- a) Aeroponics
 - b) Water culture
 - c) Hydroponics
 - d) Soil culture
- 94) The inorganic essential elements which are obtained from the soil are called as
- a) Mineral elements
 - b) Non mineral elements
 - c) Non essential elements

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- d) Both (b) and (c)
- 95) Which one of the following essential elements plays an important role in opening and closing of stomata?
- a) Mg
- b) K
- c) Mn
- d) P
- 96) Select the correct statement regarding heterocysts
- a) These are present in some filamentous cyanobacteria such as Nostoc and Anabaena
- b) These cells are specialized to perform N_2 fixation
- c) These cells contain enzyme nitrogenase
- d) All of these
- 97) Red tides in warm coastal water develop due to the abundance of
- a) Dinoflagellates
- b) Euglenoids
- c) Diatoms and desmids
- d) Slime moulds
- 98) Which of the following statements regarding viruses are correct?
- (i) These are cellular, infectious, nucleoprotein particles
- (ii) They can be grown in culture medium
- (iii) Genetic material is either DNA or RNA, but never both
- (iv) They can be crystallized
- a) (i) and (ii)
- b) (ii) and (iii)
- c) (iii) and (iv)

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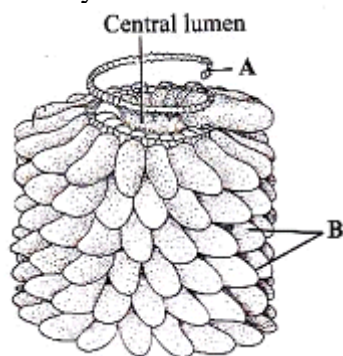
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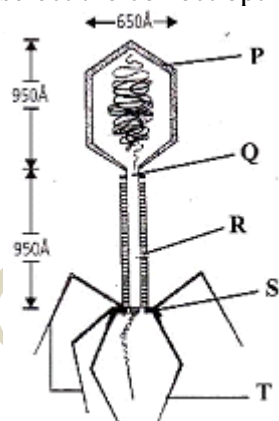
- d) (i), (ii) (iii) and (iv)

99) Study the given figure of structure of TMV (Tobacco Mosaic Virus) and select the option that correctly identifies the labellings A and B.



- a) ssDNA - Capsomeres
- b) dsDNA - Capsomeres
- c) ssRNA - Capsomeres
- d) dsRNA - Tail fibres

100) Given is an electron microscopic structure of a T_2 bacteriophage. Identify the unlabelled parts and select the correct option for P, Q, R, S and T.



- a) Head - Collar - Sheath-Basal plate - Tail fibre
- b) Head - Collar - Capsid - Tail - Tail fibre
- c) Capsid - Sheath - Basal plate - Tail - Tail fibre
- d) Head - Collar - Sheath - Capsomere - Tail fibre

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101) Blood leaving liver and moving to the heart has usually high concentration of

- a) Urea
- b) Bile
- c) Glucose
- d) Erythrocytes

102) Blood vessel which brings deoxygenated blood from the heart muscle is

- a) Coronary artery
- b) Coronary vein
- c) Pulmonary artery
- d) Pulmonary vein

103) In amphibia, the heart has

- a) Two auricles and two ventricle
- b) Two auricles and one ventricle
- c) One auricle and two ventricles
- d) One auricle and one ventricle

104) Bundle of His is a part of which one of the following organs in humans

- a) Pancreas
- b) Brain
- c) Heart
- d) Kidney

105) In humans, blood passes from the post caval to the diastolic right atrium of heart due to

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- a) Stimulation of the sino auricular node
- b) Pressure difference between the post caval and atrium
- c) Pushing open of the venous valves
- d) Suction pull

106) Mammals are said to have a "double circulatory system". This means

- a) That the blood vessels are paired
- b) That there are two types of blood vessels attached to every organ, an artery and a vein
- c) That there are two system, one from the heart to the lungs and back to the heart and other to and from rest of the body
- d) That the blood circulates twice as quickly

107) P-wave of ECG occur before the

- a) Onset of ventricular ejection
- b) End of arterial contraction
- c) Beginning of atrial contraction
- d) None of these

108) Sphygmomanometer measure

- a) Nerve conduction rate
- b) Heart beat rate
- c) Blood pressure
- d) Pulse rate

109) We feel sleepy just after taking meals because

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- a) Blood pressure increases
- b) Blood pressure decreases
- c) Body weight increases
- d) We feel lethargic

110. Which of the following is made up of dead cells?

- (a) Phloem
- (b) Xylemparenchyma
- (c) Collenchyma
- (d) Phellem

111. The Vascular cambium normally gives rise to

- (a) Periderm
- (b) Phelloderm
- (c) Primary phloem
- (d) Secondary Xylem

112. Which of the following options gives the correct sequence of events during mitosis?

- (a) condensation → arrangement at equator → centromere division → segregation → telophase
- (b) condensation → nuclear membrane disassembly → crossing over → segregation → telophase
- (c) condensation → nuclear membrane disassembly → arrangement at equator → centromere division → segregation → telophase
- (d) condensation → crossing over → nuclear membrane disassembly → segregation → telophase

113. When cell has stalled DNA replication fork, which checkpoint should be predominantly activated?

- (a) G1/S
- (b) G2/M
- (c) M only
- (d) Both G2/M and M

114. Match the stages of meiosis in Column-I to their characteristic features in Column-II and select the correct option using the codes given below:

Column 1

1. Pachytene
2. Metaphase
3. Diakinesis
4. Zygotene

Column 2

- (i) Pairing of homologous chromosomes
- (ii) Terminalisation of chiasmata
- (iii) Crossing over
- (iv) Chromosomes align at equatorial plate

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Codes:

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

115. Read the following list of components of the structure of a dicot stem and arrange them in the order of arrangement from outside to inside

1. Secondary cortex
2. Wood
3. Sec Phloem
4. Phellem

Codes

- (a) D,c,a,b
- (b) C,d,b,a
- (c) A,d,b,c
- (d) d,a,c,b

116. Tracheids differ from other tracheary elements in

- (a) Being imperforate
- (b) Lacking nucleus
- (c) Being lignified
- (d) Having casparian strips

117. During which phase(s) of cell cycle, the amount of nucleus remains $4c$, given the initial amount was $2c$?

- (a) G1 and S
- (b) Only G2
- (c) G2 and M
- (d) G0 and G1

118. Plants having little or no secondary growth are:

- (a) Grasses
- (b) Conifers
- (c) Deciduous angiosperms
- (d) Cycads

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119. Fibres associated with Phloem are

- (a) Harfibres
- (b) Wood Fibres
- (c) Surface Fibres
- (d) Bastfibres

120. Which is correct?

- (a) Trecheids are unicellular with wide lumen
- (b) Vessels are multicellular with wide lumen
- (c) Tracheids are multicellular with narrow lumen
- (d) Vessels are unicellular with wide lumen

121. Which one has perforated wall

- (a) Tracheid
- (b) Vessel
- (c) Fibre
- (d) Scleried

122. Stem of grasses and related plants elongate by the activity of

- (a) Lateral meristem/
- (b) Apical meristem
- (c) Both apical and intercalary meristem
- (d) Intercalary meristem

123. Assertion: Collenchyma is thick walled tissue

Reason: Collenchyma has pectin dipositions in the cell wall

- (a) Both the A and R are true and R explains the A
- (b) Both A and R are true but R does not explains A
- (c) A true and R false
- (d) A and R both are false

124) In electron microscope source of light is

- a) White light
- b) Beam of electrons
- c) X-rays
- d) None of these

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125) If living cells similar to those found on earth, were found on another planet where there was no oxygen. Which cell organelle would most probably be absent

- a) Cell membrane
- b) Ribosomes
- c) Mitochondria
- d) Chromosomes

126) Currency of cell is

- a) Mitochondria
- b) Chloroplast
- c) ATP
- d) Glucose

127) The plant cell wall is made up of cellulose. This is believed to be

- a) A liquid
- b) A protein
- c) A polysaccharide
- d) An amino acid

128) Which one of the following does not differ in E. coli and Chlamydomonas

- a) Ribosomes
- b) Chromosomal Organization
- c) Cell wall
- d) Cell membrane

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129) Which one of the following is a non-protoplasmic cell inclusion

- a) Ribosomes
- b) Mitochondria
- c) Lysosomes
- d) Cystoliths

130) In mitochondria, protons accumulate in the

- a) Intermembrane space
- b) Matrix
- c) Outer membrane
- d) Inner membrane

131) In chloroplasts, chlorophyll is present in the

- a) Thylakoids
- b) Stroma
- c) Outer membrane
- d) Inner membrane

132) Increase in CO_2 concentration around leaf results in

- a) Rapid opening of stomata
- b) Partial closing of stomata
- c) Complete closure of stomata
- d) There will be no effect on stomatal opening

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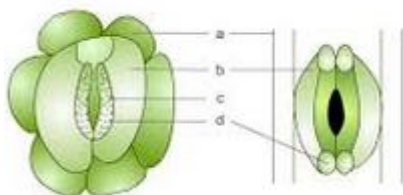
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133) Basis of stomatal opening is

- a) Exosmosis
- b) Endosmosis
- c) Decrease in cell sap concentration
- d) Plasmolysis of guard cells

134) Choose the correct combination of labelling of stomatal apparatus of dicot and monocot leaves



- a) A = epidermal cells, B = subsidiary cells, C = chloroplast, D = guard cells, E = stomatal aperture
- b) A = epidermal cells, B = guard cells, C = chloroplast, D = subsidiary cells, E = stomatal aperture
- c) A = epidermal cells, B = subsidiary cells, C = chloroplast, D = stomatal aperture, E = guard cells
- d) A = subsidiary cells, B = epidermal cells, C = chloroplast, D = stomatal aperture, E = guard cells

135) The process of the escape of liquid from the tip of uninjured leaf is called

- a) Evaporation
- b) Transpiration
- c) Guttation
- d) Evapo-transpiration

136) Plant cells do not burst in distilled water, because

- a) Cell wall is elastic, rigid and get stretched
- b) Cell wall is living

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- c) Cell wall is the outer most layer of plant cell
- d) Cell wall is permeable

137) Assertion: Light is very important factor in transpiration.

Reason: It induces stomatal opening and darkness closing. Therefore, transpiration increases in light and decreases in dark.

- a) If both the assertion and the reason are true and the reason is a correct explanation of the assertion
- b) If both the assertion and reason are true but the reason is not a correct explanation of the assertion
- c) If the assertion is true but the reason is false
- d) If both the assertion and reason are false
- e) If the assertion is false but reason is true

138) Movement of the molecules of solids, gases or liquids from the region of their higher concentration to the region of their lower concentration is known as

- a) Diffusion
- b) Osmosis
- c) Imbibition
- d) Active transport

139) Which reserve food a starving man first consumes

- a) Fat
- b) Protein
- c) Glycogen
- d) Vitamin

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- 140) *E. coli* in human colon behave as
- a) Parasite
 - b) Commensal
 - c) Saprophyte
 - d) Mutualism
- 141) Which one of the following is the correct matching of a vitamin, its nature and its deficiency disease
- a) Vitamin A - Fat-soluble - Beri-beri
 - b) Vitamin K - water-soluble - Pellagra
 - c) Vitamin A - Fat-soluble - Night blindness
 - d) Vitamin K - Fat-soluble - Beri-beri
- 142) Which one of the following pairs is not correctly matched
- a) Vitamin B₆ - Beri-beri
 - b) Vitamin C - Scurvy
 - c) Vitamin B₅ - Pellagra
 - d) Vitamin B₁₂ - Pernicious anaemia
- 143) Gastric juice contains
- a) Pepsin, rennin, lipase
 - b) Pepsin, amylase, rennin
 - c) Pepsin, amylase, trypsin
 - d) Lipase, rennin, trypsin

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- 144) Digestion is the conversion of large molecules into small ones. This is due to
- a) Better taste
 - b) More saliva
 - c) Enzymatic action
 - d) None of these
- 145) The food that enters in intestine from stomach is called
- a) Chyle
 - b) Chyme
 - c) Fundus
 - d) None of these
- 146) The first phase in the breakdown of glucose in animal cell is
- a) Glycolysis
 - b) Electron transport system
 - c) Fermentation
 - d) Krebs cycle
- 147) Wisdom teeth in human is
- a) 3rd molar & 4 in number
 - b) 3rd molar & 2 in number
 - c) 2nd molar & 4 in number
 - d) 2nd molar & 2 in number
- 148) One of the following is needed for the conversion of trypsinogen into trypsin
- a) HCl
 - b) Enterokinase

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- c) Lipase
- d) Zymase

149) Protein deficiency in children is called

- a) Obesity
- b) Marasums
- c) Diabetes
- d) Kwashiorkor

150) Crypts of Lieberkuhn are present in

- a) Pancrease and secrete pancreatic juice
- b) Small intestine and secrete digestive enzymes
- c) Stomach and secrete dilute HCl
- d) Stomach and secrete trypsin

151. Lungs are made up of air-filled sacs, the alveoli. They do not collapse even after forceful *expiration*, because of

- (a) Residual Volume (RV)
- (b) Inspiratory Reserve Volume (IRV)
- (c) Tidal Volume (TV)
- (d) Expiratory Reserve Volume (ERV)

152. Name the chronic respiratory disorder caused mainly by cigarette smoking

- (a) Asthma
- (b) Respiratory acidosis
- (c) Respiratory alkalosis
- (d) Emphysema

153. Reduction in pH of blood will

- (a) Reduce the blood supply to the brain
- (b) Decrease the affinity of hemoglobin with oxygen
- (c) Release bicarbonate ions by the liver
- (d) Reduce the rate of heartbeat

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154.Lungs do not collapse between breaths and some air always remains in the lungs which can never be expelled because

- (a) There is a negative pressure in the lungs
- (b) There is a negative intrapleural pressure pulling at the lung walls
- (c) There is a positive intrapleural pressure
- (d) Pressure in the lungs is higher than the atmospheric pressure

155.The partial pressure of oxygen in the alveoli of the lungs is

- (a) Equal to that in the blood
- (b) More than that in the blood
- (c) Less than that in the blood
- (d) Less than that of carbon dioxide

156.Name the pulmonary disease in which alveolar surface area involved in gas exchange is drastically reduced due to damage in the alveolar walls.

- (a) Pleurisy
- (b) Emphysema
- (c) Pneumonia
- (d) Asthma

157.Approximately seventy percent of carbon dioxide absorbed by the blood will be transported to the lungs

- (a) As bicarbonate ions
- (b) In the form of dissolved gas molecules
- (c) By binding to RBC
- (d) As carbamino haemoglobin

158.Which of the following is the correct statement for respiration in humans?

- (a) Cigarette smoking may lead to inflammation of bronchi
- (b) Neural signals from pneumotoxic centre in pons region of brain can increase the duration of inspiration
- (c) Workers in grinding and stone breaking industries may suffer, from lung fibrosis
- (d) About 90% of carbon dioxide (CO₂) is carried by haemoglobin as carbamino haemoglobin.

159.People who have migrated from the plains to an area adjoining Rohtang Pass about six months back

- (a) Have more RBCs and their haemoglobin has a lower binding affinity to O₂.
- (b) Are not physically fit to play games like football
- (c) Suffer from altitude sickness with symptoms like nausea, fatigue, etc.
- (d) Have the usual RBC count but their haemoglobin has very high binding affinity to O₂

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160.Two friends are eating together on a dining table. One of them suddenly starts coughing while swallowing some food. This coughing would have been due to improper movement of

- (a) Diaphragm
- (b) Neck
- (c) Tongue
- (d) Epiglottis

161.Listed below are four respiratory capacities (1-4) and four jumbled respiratory volumes of a normal human adult

**Respiratory
Capacities**

- 1. Residual volume
- 2. Vital capacity
- 3. Inspiratory reserve volume
- 4. Inspiratory capacity

**Respiratory
Volumes**

- 2500 mL
- 3500 mL
- 1200 mL
- 4500 mL

Which of the following is the correct matching of two capacities and volumes?

- (a) (2) 2500 mL, (3) 4500 mL
- (b) (3) 1200 mL, (4) 2500 mL
- (c) (4) 3500 mL, (1) 1200 mL
- (d) (1) 4500 mL, (2) 3500 mL

162.Which of the following changes (1-4) usually tend to occur in the plain dwellers when they move to high altitudes (3, 500 m or more)?

- 1. Increase in red blood cell size
- 2. Increase in red blood cell production
- 3. Increased breathing rate
- 4. Increase in thrombocyte count

Changes occurring are

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

163.The haemoglobin of a human foetus

- (a) Has a lower affinity for oxygen than that of the adult
- (b) Its affinity for oxygen is the same as that of an adult
- (c) Has only 2 protein sub-units instead of 4
- (d) Has a higher affinity for oxygen than that of an adult

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164. What is the vital capacity of our lungs?

- (a) Inspiratory reserve volume plus tidal volume
- (b) Total lung capacity minus expiratory reserve volume
- (c) Inspiratory reserve volume plus expiratory reserve volume
- (d) Total lung capacity minus residual volume.

165) Which of the following is the nitrogenous waste

- a) Creatinine
- b) Creatine
- c) Guanine
- d) All the above

166) Animal which excrete urea produced during metabolism of amino acids is

- a) Ureotelism
- b) Uricotelism
- c) Ammonotelism
- d) Aminotelism

167) Which of the following nitrogenous substance is highly toxic

- a) Urea
- b) Uric acid
- c) Amino acid
- d) Ammonia

168) Columns of Bertini in the kidney of mammals are formed as the extension of

- a) Medulla into cortex
- b) Cortex into medulla
- c) Medulla into pelvis

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- d) Pelvis into ureter

169) Each human kidney has nearly

- a) 10,000 nephrons
- b) 50,000 nephrons
- c) 1,00,000 nephrons
- d) 1 million nephrons

170) Bowmans capsule and glomerulus together constitute

- a) Nothing
- b) A nephron
- c) Malpighian corpuscle
- d) Nephric corpuscle

171) The collecting tubules lead into ducts called

- a) Tertiary duct
- b) Duct of Bellini
- c) Henles loop
- d) Bowmans duct

172) The proximal convoluted tubule has a brush border which is due to

- a) Microvilli
- b) Minute hairs
- c) Endothelium
- d) Folded tubes

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- 173) The substance which is completely reabsorbed from the filtrate in the renal tubule under normal conditions is
- a) Salt
 - b) Glucose
 - c) Water
 - d) Urea
- 174) Ultrafiltration takes place in
- a) Tissue fluid
 - b) Glomerulus
 - c) Urinary bladder
 - d) Blood capillaries
- 175) Two pigment system theory of photosynthesis was proposed by or Concept of evidence for existence of two photosystems in photosynthesis was given by
- a) Hill
 - b) Blackman
 - c) Emerson
 - d) Arnon
- 176) Who received the Nobel Prize for working out the early carbon pathway of photosynthesis
- a) Calvin
 - b) Krebs
 - c) Khorana
 - d) Watson

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- 177) The path of CO_2 in the dark reaction of photosynthesis was successfully traced by the use of the following or The dark reaction is traced by
- a) O_2^{18}
 - b) $\text{C}^{14} \text{O}_2$
 - c) p^{36}
 - d) X – rays
- 178) Blackman demonstrated that increasing illumination increased the photosynthetic rate upto a point when CO_2 becomes limiting. If light was not limiting, temperature becomes limiting. Emerson found that maximum CO_2 fixation could be achieved with brief flashes of light. Mark the correct statement in the following
- a) Only one factor can be limited in photosynthesis
 - b) Photosynthesis consists of a light and dark reaction
 - c) The trapping of light by chloroplast is temperature dependent
 - d) The trapping of light by chloroplast can occur only if CO_2 is present
- 179) In photosynthesis, energy from light reaction to dark reaction is transferred in the form of
- a) ADP
 - b) ATP
 - c) RUDP
 - d) Chlorophyll
- 180) Which process is related with photosynthesis
- a) Phosphorylation
 - b) Translation
 - c) Transcription
 - d) None of these

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Physics

1. D
2. C
3. B
4. D
5. A
6. A
7. A
8. A
9. C
10. C
11. C
12. B
13. B
14. D
15. A
16. A
17. A
18. B
19. D
20. C
21. C
22. A
23. B
24. B
25. D

26. D
27. B
28. A
29. C
30. D
31. A
32. B
33. A
34. C
35. A
36. A
37. C
38. B
39. D
40. B
41. B
42. C
43. D
44. C
45. B

Chemistry

- Q46: c Q47: c Q48: a Q49: a Q50: d Q51: b Q52: b Q53: b Q54: c Q55: d
- Q56: c Q57: a Q58: b Q59: c Q60: b Q61: b Q62: a Q63: a Q64: d Q65: b
- Q66: c Q67: d Q68: b Q69: b Q70: c Q71: c Q72: c Q73: a Q74: a Q75: a
- Q76: d Q77: a Q78: d Q79: a Q80: d Q81: d Q82: d Q83: d Q84: c Q85: d
- Q86: b Q87: b Q88: d Q89: c Q90: b

Biology

- Q91: a Q92: a Q93: c Q94: a Q95: b Q96: d Q97: a Q98: c Q99: c Q100: a
- Q101: a Q102: b Q103: b Q104: c Q105: b Q106: c Q107: c Q108: c Q109: a Q110: d
- Q111: d Q112: c Q113: b Q114: b Q115: d Q116: a Q117: c Q118: a Q119: d Q120: b
- Q121: b Q122: c Q123: a Q124: b Q125: c Q126: c Q127: c Q128: d Q129: d Q130: a
- Q131: a Q132: b Q133: b Q134: a Q135: c Q136: c Q137: a Q138: a Q139: a Q140: d
- Q141: c Q142: c Q143: a Q144: c Q145: b Q146: a Q147: a Q148: b Q149: d Q150: b
- Q151: a Q152: d Q153: b Q154: b Q155: b Q156: b Q157: a Q158: c Q159: a Q160: d
- Q161: c Q162: a Q163: d Q164: d Q165: d Q166: a Q167: d Q168: b Q169: d Q170: c
- Q171: b Q172: a Q173: b Q174: b Q175: c Q176: a Q177: a Q178: b Q179: b Q180: a

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