AIPMT PRE- EXAMINATION PAPER 2012
Code-A

PHYSICS, CHEMISTRY , BIOLOGY

Time : - 3 Hours **Max. Marks:-800** **Date : 01/04/12**

Important Instructions:

1. The Answer Sheet is inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars on side-1 and side-2 carefully with blue/black ball point pen only.

2. The test is of 3 hours duration and Test Booklet contains 200 questions. Each question carries 4 marks. For each correct response, the candidate will get 4 marks. For each incorrect response, one mark will be deducted from the total scores. The maximum marks are 800.

3. Use Blue/Black Ball Point Pen only for writing particulars on this pagel marking responses.

4. Rough work is to be done on the space provided for this purpose in the Test Booklet only.

5. On completion of the test, the candidate must handover the Answer Sheet to the invigilator in the Room/Hall. The candidates are allowed to take away this Test Booklet with them.

6. The CODE for this Booklet is A. Make sure that the CODE printed on Side-2 of the Answer Sheet is the same as that on this Booklet. In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of-both the Test Booklets and the Answer Sheets.

7. The candidates should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet- Do not write your roll no. anywhere else except in the specified space in the Test Booklet/ Answer Sheet.

8. Use of white fluid for correction is NOT permissible on the Answer Sheet.

9. Each candidate must show on demand his/her Admission Card to the Invigilator.

10. No candidate, without special permission of the Superintendent or Invigilator, would leave his/her seat.

11. The candidates should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and sign the Attendance Sheet twice. Cases where a candidate has not signed the Attendance Sheet the second time will be deemed not to have handed over Answer Sheet and dealt with as an unfair means case.

12. Use of Electronic/Manual Calculator is prohibited.

13. The candidates are governed by all Rules and regulation of the Board with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules and Regulations of the Board.

14. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.

15. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/ Answer Sheet in the Attendance Sheet.

PART B – PHYSICS

1. The damping force on a oscillator is directly proportional to the velocity. The Unit of the constant of proportionality are

(1) kgs^{-1} (2) kgs

(3) $kgms^{-1}$ (4) $kgms^{-2}$

Ans.[1]

Sol. **F= Kv**

$$K = \frac{F}{v}$$

$$\text{Unit of } K = \frac{kg\ ms^{-2}}{ms^{-1}} = kg\,s^{-1}$$

2. The motion of a particle along a straight line is described by equation

$x = 8 + 12t - t^3$

where x is in metre and t in second. The retardation of the particle when its velocity becomes zero is

(1) $6\ ms^{-2}$ (2) $12\ ms^{-2}$

(3) $24ms^{-2}$ (4) zero

Ans.[2]

Sol. $x = 8 + 12t - t^3$

$$v = \frac{dx}{dt} = 12 - 3t^2$$

$$a = \frac{dv}{dt} = -6t$$

putting v = 0

$3t^2 = 12$

t = 2 sec

$\therefore\ a = -6 \times 2 = -12\ ms^{-2}$

$\therefore$ retardation = $12\ ms^{-2}$

3. The horizontal range and the maximum height of a projectile are equal . The angle of projection of the projectile is:

(1) θ = tan–1 (2) (2) θ = 45º

(3) $\theta = \tan^{-1}\left(\frac{1}{4}\right)$ (4) $\theta = \tan^{-1}(4)$

Ans.[4]

Sol. $\tan\theta = \frac{4H}{R}$

given H = R

$\therefore \theta = \tan^{-1}(4)$

4. A particle has initial velocity $\left(2\vec{i}+3\vec{j}\right)$ and acceleration $\left(0.3\vec{i}+0.2\vec{j}\right)$. The magnitude of velocity after 10 seconds will be

(1) 5 units (2) 9 units

(3) $9\sqrt{2}$ units (4) $5\sqrt{2}$ units

Ans.[4]

Sol. $\vec{v}=\vec{u}+\vec{a}\,t$

$\vec{v}=(2\hat{i}+3\hat{j})+(0.3\hat{i}+0.2\hat{j})\times 10$

$\Rightarrow \vec{v}=5\hat{i}+5\hat{j}$

$v=5\sqrt{2}$ units

5. A car of mass 1000 kg negotiates a banked curve of radius 90m on a frictionless road. If the banking angle is 45º, the speed of the car is

(1) 5 ms^{-1} (2) 10 ms^{-1}

(3) 20 ms^{-1} (4) 30 ms^{-1}

Ans.[4]

Sol. $v=\sqrt{rg\tan\theta}$

$\Rightarrow v=\sqrt{90\times 10\times \tan 45^\circ}$

= 30 m/s

6. A solid cylinder of mass 3 kg is rolling on a horizontal surface with velocity 4 ms^{-1}. It collides with a horizontal spring of force constant 200 Nm^{-1}. The maximum compression produced in the spring will be

(1) 0.7 m (2) 0.2 m

(3) 0.5 m (4) 0.6 m

Ans.[4]

Sol. $\frac{1}{2}mv^2\left[1+\frac{K^2}{R^2}\right]=\frac{1}{2}kx_{max}^2$

Putting m = 3kg, v = 4 m/s, $\frac{K^2}{R^2}$ = 1/2 (For solid cylinder), k = 200 Nm^{-1} we get

x_{max} = 0.6 m

7. The potential energy of a particle in a force field is : $U = \frac{A}{r^2} - \frac{B}{r}$, where A and B are positive constants and r is the distance of particle from the centre of the field. For stable equilibrium, the distance of the particle is

(1) A/B (2) B/A

(3) B/2A (4) 2A/B

Ans.[4]

Sol. For Stable equilibrium, $F = -\frac{dU}{dr} = 0$

we get r = 2A/B

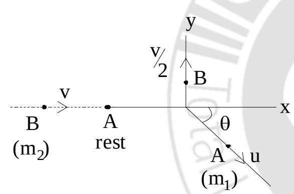
8. Two spheres A and B of masses m_1 and m_2 respectively collide. A is at rest initially and B is moving with velocity v along x-axis. After collision B has a velocity $\frac{v}{2}$ in a direction perpendicular to the original direction. The mass A moves after collision in the direction.

(1) $\theta = \tan^{-1}(1/2)$ to the x-axis (2) $\theta = \tan^{-1}(-1/2)$ to the x-axis

(3) same as that of B (4) opposite to the of B

Ans.[2]

Sol.



Applying the law of conservation of momentum we have

in y-direction, $m_1 u \sin\theta = m_2 v/2$ .....(i)

In x-direction, $m_1 u \cos\theta = m_2 v$ .....(ii)

9. Two persons of masses 55 kg and 65kg respectively, are at the opposite ends of a boat. The length of the boat is 30. m and weighs 100 kg. The 55 kg man walks up to the 65 kg man and sits with him. If the boat is in still water the center of mass of the system shift by:

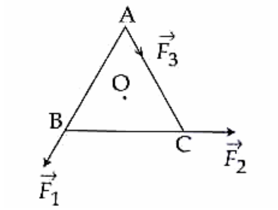
(1) zero (2) 0.75 m

(3) 3.0 m (4) 2.3 m

Ans.[1]

Sol. Since net external force on the system is zero hence C.O.M. remains unchanged.

10. ABC is an equilateral triangle with O as its centre $\vec{F_1}, \vec{F_2}$ and $\vec{F_3}$ represent three forces acting along the sides AB, BC and AC respectively. If the torque about O is zero then the magnitude of $\vec{F_3}$ is



(1) $\frac{F_1 + F_2}{2}$ (2) $2(F_1 + F_2)$

(3) $F_1 + F_2$ (4) $F_1 - F_2$

Ans.[3]

Sol. Taking anticlockwise torque

$F_1d + F_2d - F_3d = 0$ (where d = perpendicular distance of the centre O from each side)

$\therefore\ F_3 = F_1 + F_2$

11. When a mass is rotating in a plane about a fixed point, its angular momentum is directed along

(1) the radius (2) the tangent to the orbit

(3) a line perpendicular to the plane of rotation (4) the line making an angle of 45º to the plane of rotation.

Ans.[3]

Sol. $\vec{L} = \vec{r} \times m\vec{v}$

12. A spherical planet has a mass M_P and diameter D_P. A particle of mass m falling freely near the surface of this planet will experience an acceleration due to gravity, equal to

(1) GM_p / D_P^2 (2) $4GM_p m / D_P^2$

(3) $4GM_p / D_P^2$ (4) $GM_p m / D_P^2$

Ans.[3]

Sol. $g = \frac{GM_p}{R_p^2}$ where $R_p = D_p/2$

13. A geostationary satellite is orbiting the earth at a height of 5R above that surface of the earth, R being the radius of the earth. The time period of another satellite of the earth. The time period of another satellite in hours at a height of 2R from the surface of the earth is

(1) $6\sqrt{2}$ (2) $\frac{6}{\sqrt{2}}$

(3) 5 (4) 10

Ans.[1]

Sol. According to Kepler's third law, $T^2 \propto r^3$

$$\frac{T_2}{T_1} = \left(\frac{r_2}{r_1}\right)^{3/2}$$

Given $T_1 = 24$ h

$r_1 = R + h_1 = R + 5R = 6R$

$r_2 = R + h_2 = R + 2R = 3R$

On solving we get

$T_2 = 6\sqrt{2}$ h

14. The height at which the weight of a body becomes $1/16^{th}$, its weight on the surface of earth (radius R), is

(1) 3R (2) 4R

(3) 5R (4) 15 R

Ans. [1]

Sol. $$\frac{W_h}{W} = \frac{mg}{mg} = \left(\frac{R}{R+h}\right)^2 = \frac{1}{16}$$

$\therefore$ h = 3R

15. Two sources of sound placed close to each other, are emitting progressive waves given by

$y_1 = 4 \sin 600 \pi t$ and $y_2 = 5 \sin 608 \pi t$:

An observer located near these two sources of sound will hear

(1) 8 beats per second with intensity ratio 81 : 1 between waxing and waning

(2) 4 beats per second with intensity ratio 81 : 1 between waxing and waning

(3) 4 beats per second with intensity ratio 25 : 16 between waxing and waning

(4) 8 beats per second with intensity ratio 25 : 16 between waxing and waning

Ans.[2]

Sol. Comparing with $y_1 = a_1 \sin 2\pi f_1 t$ and $y_2 = a_2 \sin 2\pi f_2 t$ we get f1 = 300 Hz, f_2 = 304 Hz

Number of beats = $f_2 - f_1 = 4s^{-1}$

$$\frac{I_{max}}{I_{min}} = \left(\frac{a_1 + a_2}{a_1 - a_2}\right)^2 = \frac{I_{max}}{I_{min}} = \left(\frac{4+5}{4-5}\right)^2 = \frac{81}{1}$$

16. When a string is divided into three segments of length l_1, l_2 and l_3, the fundamental frequencies of these three segments are v_1, v_2 and v_3 respectively. The original functamental frequency (v) of the string is :

(1) $\frac{1}{v} = \frac{1}{v_1} + \frac{1}{v_2} + \frac{1}{v_3}$

(2) $\frac{1}{\sqrt{v}} = \frac{1}{\sqrt{v_1}} + \frac{1}{\sqrt{v_2}} + \frac{1}{\sqrt{v_3}}$

(3) $\sqrt{v} = \sqrt{v_1} + \sqrt{v_2} + \sqrt{v_3}$

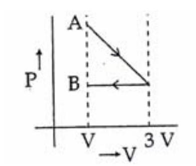
(4) $v = v_1 + v_2 + v_3$

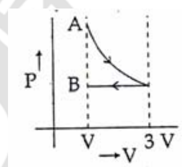
Ans.[1]

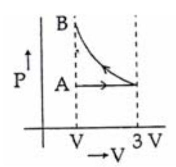
Sol. Length of the string $l = l_1 + l_2 + l_3$

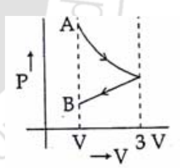
Also $\upsilon \propto \frac{1}{l}$

17. One mole of an ideal gas goes from an initial state A to final state B via two processes : It first undergoes isothermal expansion from volume V to 3V and then its volume is reduced from 3V to V at constant pressure. The correct P-V diagram representing the two processes is:

(1) 

(2) 

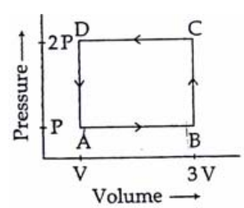
(3) 

(4) 

Ans.[2]

Sol. For isothermal expansion P-V curve is rectangular hyperbola (clockwise curve)

18. A thermodynamics system is taken trough the cycle ABCD as shown in figure. Heat rejected by the gas during the cycle is:



(1) $\frac{1}{2}$PV

(2) PV

(3) 2PV

(4) 4PV

Ans.[3]

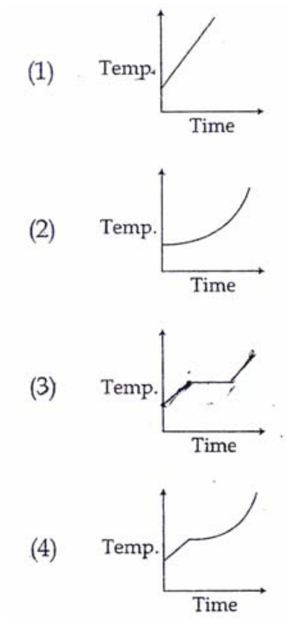
Sol. For given cyclic process, $\Delta U = 0$

$\therefore$ Q = W (From first law of thermodynamic $Q = \Delta U + W$)

Also W = – area enclosed by the curve = – P × 2V

$\therefore$ Heat rejected = 2PV

19. Liquid oxygen at 50 K is heated to 300 K at constant pressure of 1 atm. The rate of heating is constant. Which one of the following graphs represents the variation of temperature with time ?



Ans.[3]

Sol. At first temperature will increase then there will be state change from liquid to gas.

20 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 ?

(1) $(4\pi R^2 Q/\sigma)^{1/4}$ (2) $(Q/4\pi R^2\sigma)^{1/4}$

(3) $Q/4\pi R^2\sigma$ (4) $(Q/4\pi R^2\sigma)^{-1/2}$

(σ stands for Stefan's constant)

Ans.[2]

Sol. Using Stefan's law, the rate of energy production is $Q = E \times A = \sigma T^4 \times 4\pi R^2$

21. A coil of resistance 400Ω is placed in a magnetic filed. if the magnetic flux ϕ (wb) linked with the coil varies with times t(sec) as

$\phi = 50\ t^2 + 4.$

The current is the coil at t = 2 sec is

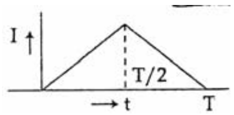
(1) 2A (2) 1A

(3) 0.5A (4) 0.1 A

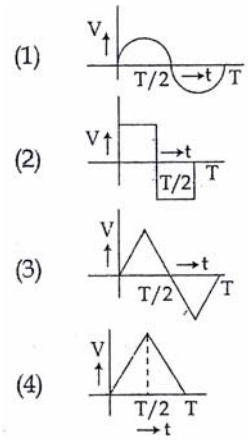
Ans.[3]

Sol. $|\,i\,| = \dfrac{\varepsilon}{R} = \left|-\dfrac{d\varphi/dt}{R}\right| = 0.5\ A$

22. The current (I) in the inductance is varying with time according to the plot shown in figure.



Which one of the following is the correct variation of voltage with time in the coil ?



Ans.[2]

Sol. $|V| = \left|-L\frac{di}{dt}\right|$ therefore answer will be best represented by graph -2

23. In an electrical circuit R, L, C and an a.c. voltage source are all connected in series. When L is removed from the circuit, the phase difference between the voltage and the current in the ciruit is $\pi/3$. If instead, C is removed from the circuit, the phase difference is again $\pi/3$. The power factor of the circuit is

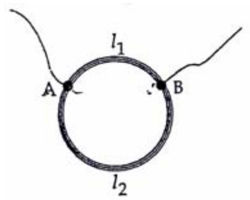
(1) 1 (2) $\frac{\sqrt{3}}{2}$

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

Ans.[1]

Sol. It is the condition of resonance therefore phase difference between voltage and current is zero and power factor cos ϕ = 1

24. A ring is made of a wire having a resistance $R_0 = 12\Omega$. Find the points A and B, as shown in the figure, at which a current carrying conductor should be connected so that the resistance R of the sub circuit between these points is equal to $\frac{8}{3}\Omega$:



(1) $\frac{l_1}{l_2} = \frac{3}{8}$ (2) $\frac{l_1}{l_2} = \frac{1}{2}$

(3) $\frac{l_1}{l_2} = \frac{5}{8}$ (4) $\frac{l_1}{l_2} = \frac{1}{3}$

Ans.[2]

Sol. Since $R \propto l$.

According to problem $R_1 + R_2 = 12\Omega$ and $\frac{R_1 \times R_2}{R_1 + R_2} = \frac{8}{3}\Omega$

On solving this we get $R_1 = 4\Omega$ and $R_2 = 8\Omega$ therefore the ratio $\frac{l_1}{l_2} = \frac{1}{2}$

25. If voltage across a bulb rated 220 Volts.- 100 Watt drops by 2.5% of its rated value the percentage of the rated value by which the power would decrease is

(1) 5% (2) 10%

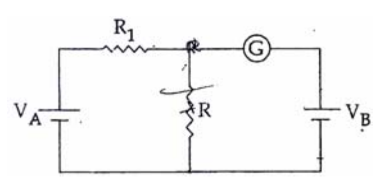
(3) 20% (4)2.5%

Ans.[1]

Sol. Power P = $\frac{V^2}{R}$.

For small variation, $\frac{\Delta P}{P} \times 100\% = \frac{2 \times \Delta V}{V} \times 100\%$ therefore power would decrease by 5%

26. In the circuit shown the cells A and B have negligible resistance. For $V_A = 12V$, $R_1 = 500\Omega$ and R = 100 Ω the galvanometer (G) shows no deflection. The value of V_B is



(1) 12V (2) 6V

(3) 4V (4) 2V

Ans.[4]

Sol. By using kirchoff voltage law the potential difference across R is 2 volt.

27. The electric field associated with an e. m. wave in vacuum is given by $\vec{E} = \hat{i}\ 40 \cos(kz - 6 \times 10^8 t)$, where E, z and t are in volt/m, meter and seconds respectively. The value of wave vector k is :

(1) $6\ m^{-1}$ (2) $3\ m^{-1}$

(3) $2\ m^{-1}$ (4) $0.5\ m^{-1}$

Ans.[3]

Sol. Equation of Electromagnetic wave is $E = E_0 \cos(kz - \omega t)$ and speed of EM wave $V = \frac{\omega}{k}$

By comparing $k = \omega/v = \frac{6 \times 10^8}{3 \times 10^8} = 2\ m^{-1}$ is the wave vector.

28. What is the flux through a cube of side 'a' if a point charge of q is at one of its corner.

(1) $\frac{q}{\epsilon_0}$ (2) $\frac{q}{2\epsilon_0} 6a^2$

(3) $\frac{2q}{\epsilon_0}$ (4) $\frac{q}{8\epsilon_0}$

Ans.[4]

Sol. flux $\phi = \frac{q}{8\epsilon_0}$

29. An electric dipole of moment 'p' is placed in an electric field of intensity 'E'. The dipole acquires a position such that the axis of the dipole makes an angle θ with the direction of the field. Assuming that the potential energy of the dipole to be zero when θ = 90º, the torque and the potential energy of the dipole will respectively be

(1) $pE \sin\theta$, $2pE \cos\theta$ (2) $pE \cos\theta$, $-pE \sin\theta$

(3) $pE \sin\theta$, $-pE \cos\theta$ (4) $pE \sin\theta$, $-2pE \cos\theta$

Ans.[3]

Sol. Toque $\tau = PE \sin\theta$ and Potential energy $U = -PE \cos\theta$

30. Four point charge –Q, –q, 2q and 2Q are placed, one at each corner of the square. The relation between Q and q for which the potential at the centre of the square is zero is

(1) $Q = q$ (2) $Q = \frac{1}{q}$

(3) $Q = -q$ (4) $Q = -\frac{1}{q}$

Ans.[3]

Sol. Potential V at centre of the square = $\frac{-kQ}{r} - \frac{kq}{r} + \frac{k2Q}{r} + \frac{k2q}{r} = 0$

So $Q = -q$

31. A compass needle which is allowed to move in a horizontal plane is taken to a geomagnetic pole. It.

(1) Will stay in north-south direction only

(2) Will stay in east-west direction only

(3) Will becomes rigid showing no movement

(4) Will stay in any position

Ans.[4]

Sol. Will remain in any position at geomagnetic north and south pole.

32. A milli voltmeter of 25 milli volt range is to be converted into an ammeter of 25 ampere rage. The value (in ohm) of necessary shunt will be

(1) 1 (2) 0.05

(3) 0.001 (4) 0.01

Ans.[3]

Sol. If the resistance of the meter is G then the full scale deflection current $i_g = \frac{25mV}{G}$ ampere

The Value of shunt required for converting it into ammeter of range 25 ampere is $S = \frac{i_g G}{i - i_g}$

So $\approx \frac{25mV}{25} = 0.001\ \Omega$

33. Two similar coils of radius R are lying concentrically with their planes at right angles to each other. The currents flowing in them are I and 2I, respectively. The resultant magnetic field induction at the centre will be

(1) $\frac{\mu_0 I}{2R}$ (2) $\frac{\mu_0 I}{R}$

(3) $\frac{\sqrt{5}\mu_0 I}{2R}$ (4) $\frac{3\mu_0 I}{2R}$

Ans.[3]

Sol. Magnetic field at the centre of circular current carrying coil of radius R and current I is = $\frac{\mu_0 I}{2R} = B$

Magnetic field at the centre of circular current carrying coil of radius R and current 2I is = $\frac{\mu_0 2I}{2R} = 2B$

The resulting magnetic field will be = $\sqrt{B^2 + 4B^2} = \sqrt{5}B$

34. An alternating electric field, of frequency v, is applied across the dees (radius = R) of a cyclotron that is being used to accelerated protons (mass = m). The operating magnetic field (B) used in the cyclotron and the kinetic energy (K) of the proton beam, produced by it, are given by

(1) $B = \frac{2\pi m v}{e}$ and $K = 2m\pi^2 v^2 R^2$

(2) $B = \frac{mv}{e}$ and $K = m^2 \pi v R^2$

(3) $B = \frac{mv}{e}$ and $K = 2m\pi^2 v^2 R$

(4) $B = \frac{2\pi m v}{e}$ and $K = m^2 \pi v R^2$

Ans.[1]

Sol. Frequency $\upsilon = \frac{eB}{2\pi m}$ so $B = \frac{2\pi m v}{e}$

Kinetic energy $K = \frac{1}{2}mv^2$

radius $R = \frac{mv}{eB}$

35. The magnifying power of a teloscope is 9. When it is adjusted for parallel rays the distance between the objective and eyepiece is 20 cm. The focal length of lenses are

(1) 18 cm, 2 cm
(2) 11 cm, 9 cm
(3) 10 cm, 10 cm
(4) 15 cm, 5 cm

Ans.[1]

Sol. $L = f_o + f_e = 20\text{cm}$ and $M = \frac{f_0}{f_e} = 9$

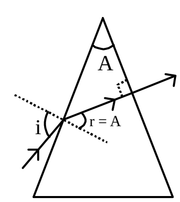
On solving, $f_o = 18\text{cm}$ $f_e = 2$ cm

36. A ray of light is incident at an angle of incidence, i, on one face of a prism of angle A (assumed to be small) and emerges normally from the opposite face. It the refractive index of the prism is μ, the angle of incidence i, is nearly equal to

(1) A/μ
(2) $A/2\mu$
(3) μA
(4) $\frac{\mu A}{2}$

Ans.[3]

Sol. $\mu = \sin\frac{\sin i}{\sin r} = \frac{\sin i}{\sin A} = \frac{i}{A}$ (for small angle)



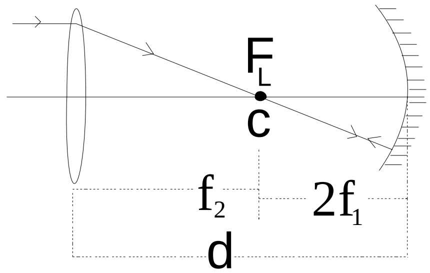
37. A concave mirror of focal length 'f_1' is placeed at a distance of 'd' from a convex lens of focal length 'f_2' A beam of light coming from infinity and falling on this convex lens- concave mirror combination returns to infinity. The dsitance 'd' must equal

(1) $2f_1 + f_2$ (2) $-2f_1 + f_2$

(3) $f_1 + f_2$ (4) $-f_1 + f_2$

Ans.[1]

Sol.



38. When a biconves lens of glass having refractive index 1.47 is dipped in a liqud, it acts as a plane sheet of glass. This implies that the liquid must have refractive index.

(1) greater than that of glass

(2) less than that of glass

(3) equal to that of glass

(4) less than one

Ans.[3]

Sol. $\frac{1}{f} = \left(\frac{\mu_2}{\mu_1} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

For power = $\frac{1}{f}$ = 0, $\mu_2 = \mu_1$

39. An α-particle moves in a circular path of radius 0.83 cm in the presence of a magnetic field of 0.25 Wb/m^2. The de-Broglie wavelength associated with the particle will be

(1) 10Å (2) 0.01 Å

(3) 1 Å (4) 0.1 Å

Ans.[2]

Sol. radius R = $\frac{mv}{qB}$ and de- Broglie wavelength $\lambda = \frac{h}{mv}$ on solving we get λ = 0.01Å

40. Monochromatic radiation emitted when electron on hydrogen atom jumps from first excited to the ground state irradiates a photosensitive material. The stopping potential is measured to be 3.57 V. The threshold frequency of the material is

(1) 1.6×10^{15} Hz (2) 2.5×10^{15} Hz

(3) $4. \times 10^{15}$ Hz (4) 5×10^{15} Hz

Ans.[1]

Sol. Energy released from emmition of electron is E = (– 3.4) –(–13.6) = 10.2 eV.

From photo-electric equation, work function $\phi = E - eV_0 = h\upsilon_0$

On Solving this $\upsilon_0 = 1.6 \times 10^{15}$ Hz

41. A 200 W sodium street lamp emits yellow light of wavelength 0.6 μm. Assuming it to be 25% efficient in converting electrical energy to light, the number of photons of yellow light it emits per second is .

(1) 62×10^{20} (2) 3×10^{19}

(3) 1.5×10^{20} (4) 6×10^{18}

Ans.[3]

Sol. Efficient power $P = \frac{N}{t} \times \frac{hc}{\lambda} = 200 \times 0.25$

'

On Solving $\frac{N}{t} = 50 \times \frac{\lambda}{hc} = 1.5 \times 10^{20}$

42. Electron in hydrogen atom first jumps from third excited state to second excited state and then from second excited to the first excited state. The ratio of the wavelengths $\lambda_1 : \lambda_2$ emitted in the two cases is

(1) 27/5 (2) 20/7

(3) 7/5 (4) 27/20

Ans.[2]

Sol. Wavelength observed from transition of n_i to n_f is $\lambda = \frac{1}{\left[\frac{1}{n_f^2} - \frac{1}{n_i^2}\right]}$

For λ_1, $n_i = 4$, $n_f = 3$

For λ_2, $n_i = 3$, $n_f = 2$

We get

$\lambda_1 : \lambda_2 = 20 : 7$

43. An electron of a stationary hydrogen atom passes from the fifth energy level to the ground level. The velocity that the atom acquired as a result of photon emission will be

(1) $\frac{25m}{24h\ R}$ (2) $\frac{24m}{24h\ R}$

(3) $\frac{24m}{25h\ R}$ (4) $\frac{25m}{24h\ R}$

Ans.[3]

Sol. Wavelength observed from transition of n_i to n_f is $\lambda = \frac{1}{\left[\frac{1}{{n_f}^2} - \frac{1}{{n_i}^2}\right]}$

$n_i = 5$ $n_f = 1$

Also. $v = \frac{h}{\lambda m}$.

44. If the nuclear radius of ^{27} Al is 3.6 Fermi, the approximate nuclear radius of ^{64} Cu in Fermi is

(1) 4.8 (2) 3.6

(3) 2.4 (4) 1.2

Ans.[1]

Sol. Nuclear radius $R \propto A^{1/3}$ where A is mass number

45. A mixture consists of two radioactive materials A_1 and A_2 with half lives of 20 s and 10s respectively. Initially the mixture has 40 g of A_1 and 160 g of A_2. The amount of the two in the mixture will become equal after :

(1) 20 s (2) 40 s

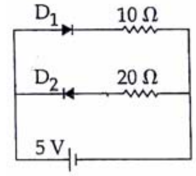
(3) 60 s (4) 80 s

Ans.[2]

Sol. For A, $40g \xrightarrow{20s} 20g \xrightarrow{20s} 10g$

For B, $160g \xrightarrow{10s} 80g \xrightarrow{10s} 40g \xrightarrow{10s} 20g \xrightarrow{10s} 10g$

46. Two ideal diodes are connected to a battery as shown in the circuit. The current supplied by the battery is



(1) 0.25 A (2) 0.5 A

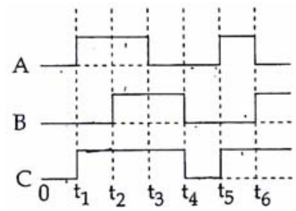
(3) 0. 75 A (4) Zero

Ans.[2]

Sol. Current will flow only in diode D_1 therefore current supplied by the battery is 0.5 A

Since D_1 is forward bias and D_2 is reverse bias.

47. The figure shown a logic circuit with two inputs A and B and the output C. The voltage wave farms across A, B and C are given. The logic circuit gate is



(1) AND gate (2) NAND gate

(3) OR gate (4) NOR gate

Ans.[3]

Sol. The Logic of the OR gate is if any of the input is one then output is one".

48. In a CE transistor amplifier, the audio singal voltage across the collector resistance of 2kΩ is 2V. If the v base resistance is 1 kΩ and the current amplification of the transistor is 100, the input signal voltage is

(1) 1 mV (2) 10 mV

(3) 0.1 V (4) 1.0 V

Ans.[2]

Sol. Voltage amplification $\frac{Vo}{Vi}$ = current gain × $\frac{Ro}{Ri}$.

49. C and Si both have same lattice structure, having 4 bonding electrons in each. However, C is insulator where as Si is intrinsic semiconductor. This is because.

(1) The four bonding electrons in the case of C lie in the second orbit, whereas in the case of Si they lie in the third.

(2) The four bonding electrons in the case of C lie in the third orbit, whereas for Si they lie in the fourth orbit.

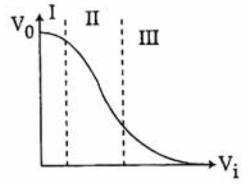
(3) In case of C the valence band is not completely filled at absolute zero temperature.

(4) In case of C the conduction bans is partly filled even at absolute zero temperature

Ans.[1]

Sol. The four bonding electrons in the case of C lie in the second orbit, whereas in the case of Si they lie in the third.

50. Transfer characteristics [output voltage (V_0) vs input voltage (V_i)] for a base biased transistor in CE configuration is as show in the figure. For using transistor as a switch, it is used.



(1) in region II (2) in region I

(3) in region III (4) both in region (I) and (III)

Ans.[4]

Sol. For using transistor as a switch, it is used in cut off state and saturation state only.

PART A – CHEMISTRY

51. In a zero-order reaction for every 10° rise of temperature, the rate is doubled. If the temperature is increased from 10°C to 100°C, the rate of the reaction will become:

(1) 64 times (2) 128 times

(3) 256 times (4) 512 times

Ans. [4]

Sol.

$2^9 = 2\times2\times2\times2\times2\times2\times2\times2\times2 = 512$ times

52. Which one of the following pairs is isostructural (i.e. having the same shape and hybridization) ?

(1) [NF_3 and BF_3] (2) [BF_4^- and NH_4^+]

(3) [BCl_3 and $BrCl_3$] (4) [NH_3 and NO_3^-]

Ans. [2]

Sol.
$$\begin{array}{ccc} & F & \\ & | & \\ F - & B & \leftarrow F^- \\ & | & \\ & F & \end{array} \qquad \begin{array}{ccc} & H & \\ & | & \\ H - & N & \rightarrow H^+ \\ & | & \\ & H & \end{array}$$

53. In which of the following reactions, standard reaction entropy change (ΔS°) is positive and standard gibb's energy change (ΔG°) decreases sharply with increasing temperature ?

(1) $Mg(s) + \frac{1}{2}O_2(g) \rightarrow MgO(s)$

(2) $\frac{1}{2}C\,\text{graphite} + \frac{1}{2}O_2(g) \rightarrow \frac{1}{2}CO_2(g)$

(3) $C\,\text{graphite} + \frac{1}{2}O_2(g) \rightarrow CO(g)$

(4) $CO(g) + \frac{1}{2}O_2(g) \rightarrow CO_2(g)$

Ans. [3]

Sol. $\Delta S = +ve$
$\Delta G = \Delta H - T\Delta S, \Delta H = -ve$

$\Delta G = +ve$

54. In a reaction, $A + B \rightarrow \text{Product}$, rate is doubled when the concentration of B is doubled, and rate increases by a factor of 8 when the concentrations of both the reactants (A and B) are doubled, rate law for the reaction can be written as

(1) $\text{Rate} = k[A][B]$ (2) $\text{Rate} = k[A]^2[B]$

(3) $\text{Rate} = k[A][B]^2$ (4) $\text{Rate} = k[A]^2[B]^2$

Ans. [2]

Sol. $r = K[A]^m[B]^n$

wrt B $r \quad 2^n$ $n = 1$

wrt $A \notin B$ $2^m \times 2^1$ $m = 2$

55. Limiting molar conductivity of NH_4OH $\left(\text{i.e.}\Lambda^o{}_m\ (NH_4OH)\right)$ is equal to

(1) $\Lambda^o{}_m\ (NH_4OH) + \Lambda^o{}_m\ (NH_4Cl) - \Lambda^o{}_m\ (HCl)$

(2) $\Lambda^o{}_m\ (NH_4Cl) + \Lambda^o{}_m\ (NHOH) - \Lambda^o{}_m\ (NaCl)$

(3) $\Lambda^o{}_m\ (NH_4Cl) + \Lambda^o{}_m\ (NaCl) - \Lambda^o{}_m\ (NaOH)$

(4) $\Lambda^o{}_m\ (NAOH) + \Lambda^o{}_m\ (NaCl) - \Lambda^o{}_m\ (NH_4Cl)$

Ans. [2]

Sol. $NH_4Cl + NaOH \rightarrow NH_4OH + NaCl$

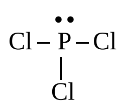
$\pi_{m_{NH_4Cl}} + \pi_{m_{NaOH}} - \pi_{m_{NaCl}} = \pi_{m_{NH_4OH}}$

56. Which of the following species contains three bond pairs and one lone pair around the central atoms ?

(1) NH_2^{-} (2) PCl_3

(3) H_2O (4) BF_3

Ans. [2]



57. Buffer solutions have constant acidity and alkalinity because

(1) They have large excess of H^+ or OH^- ions

(2) They have fixed value of pH

(3) These give unionised acid or base on reaction with added acid or alkali

(4) Acids and alkalies in these solutions are shielded from attack by other ions

Ans. [3]

58. In Freundlich Adsorption isotherm, the value of 1/n is :

(1) 1 in case of physical adsorption (2) 1 in case of chemisorption

(3) between 0 and 1 in all cases (4) between 2 and 4 in all cases

Ans. [3]

59. pH of a saturated solution of $Ba(OH)_2$ is 12. The value of solubility product (K_{SP}) of $Ba(OH)_2$ is

(1) 4.0×10^{-6} (2) 5.0×10^{-6}

(3) 3.3×10^{-7} (4) 5.0×10^{-7}

Ans. [4]

Sol. $Ba(OH)_2$

pH = 12

$\therefore$ pOH = 2

$\because$ $[OH]^- = 2S = 10^{-2}$

$\therefore$ $S = \frac{1}{2} \times 10^{-2} = 5 \times 10^{-3}$

$K_{SP} = 4S^3 = 4(5 \times 10^{-3})^3$

$= 4 \times 125 \times 10^{-9}$

$= 500 \times 10^{-9}$

$= 5 \times 10^{-7}$

60. When Cl_2 gas reacts with hot and concentrated sodium hydroxide solution, the oxidation number of chlorine changes from :

(1) Zero to -1 and zero to +3 (2) Zero to +1 and zero to -3

(3) Zero to +1 and zero to -5 (4) Zero to -1 and zero to +5

Ans. [4]

Sol. $Cl_2 + NaOH \xrightarrow[\text{Conc.}]{\text{Hot}} NaCl + NaClO_3$

61. Which one of the following statements is incorrect about enzyme catalysis ?

(1) Enzymes are denaturated by ultraviolet rays and at high temperature

(2) Enzymes are least reactive at optimum temperature

(3) Enzymes are mostly proteinous in nature

(4) Enzyme action is specific

Ans. [2]

62. P_A and P_B are the vapour pressure of pure liquid components, A and B, respectively of an ideal binary solution. If x_A represents the mole fraction of component A, the total pressure of the solution will be:

(1) $p_B + x_A(p_B - p_A)$ (2) $p_B + x_A(p_A - p_B)$

(3) $p_A + x_A(p_B - p_A)$ (4) $p_A + x_A(p_A - p_B)$

Ans. [2]

Sol. $P = P_A^o X_A + P_B^o X_B$

$P = P_A \times (X_A) + P_B^o(1 - X_A)$

$P = P_B + X_A(P_A - P_B)$

63. The protecting power of lyophilic colloidal sol is expressed in term of

(1) Critical miscelle concentration

(2) Oxidation number

(3) Coagulation value

(4) Gold number

Ans. [4]

64. Maximum number of electrons in a subshell with l = 3 and n = 4 is :

(1) 10 (2) 12

(3) 14 (4) 16

Ans. [3]

Sol. Subshell 4f = election = 14

65. 50 mL of each gas A and of gas B takes 150 and 200 seconds respectively for effusing through a pin hole under the similar conditions. If molecular mass of gas B is 36, the molecular mass of gas A will be ?

(1) 32 (2) 64

(3) 96 (4) 128

Ans. [Bonus]

Sol. $\frac{r_1}{r_2} = \sqrt{\frac{M_{w_2}}{M_{w_1}}}$

$\frac{V_1}{t_1} \times \frac{t_2}{V_2} = \sqrt{\frac{M_{w_2}}{M_{w_1}}}$

$\frac{50}{150} \times \frac{200}{50} = \sqrt{\frac{36}{M_{w_1}}}$

$\frac{4}{3} = \sqrt{\frac{36}{M_{w_1}}}$

$\frac{16}{9} = \frac{36}{M_{w_1}}$

$M_{w_1} = \frac{36 \times 9}{16} = 20.25$

66. Standard enthalpy of vapourisation $\Delta_{vap}H^{\Theta}$ for water at 100°C is 40.66 kJ mol^{-1}. The internal energy of vaporisation of water at 100°C (in kJmol^{-1}) is :

(1) +43.76 (2) +40.66

(3) +37.56 (4) –43.76

(Assume water vapour to behave like an ideal gas)

Ans. [3]

Sol. $H_2O_{(l)} \rightarrow H_2O_{(g)}$

$\Delta H = \Delta E + \Delta nRT$

$40.66 = \Delta E + 1 \times \frac{8.314}{1000} \times 373$

$\Delta E = 37.5\,kJ$

67. The number of octahedral void(s) per atom present in a cubic close-packed structure is :

(1) 2 (2) 4

(3) 1 (4) 3

Ans. [3]

68. The correct set of four quantum numbers for the valence electron of rubidium atom (Z = 37) is

(1) $5, 0, 0, +\frac{1}{2}$ (2) $5, 1, 0, +\frac{1}{2}$

(3) $5, 1, 1, +\frac{1}{2}$ (4) $6, 0, 0, +\frac{1}{2}$

Ans. [1]

Sol. Rb(37) = [kr]$5s^1$

n = 5, l = 0. m = 0, s = +1/2

69. A metal crystallizes with a face-centered cubic lattice. The edge of the unit cell is 408 pm. The diameter of the metal atom is

(1) 144 pm (2) 204 pm

(3) 288 pm (4) 408 pm

Ans. [3]

Sol. For FCC $r = \frac{a}{2\sqrt{2}}$

So diameter $= \frac{a}{\sqrt{2}} = \frac{408}{1.414} = 288.5\,\text{pm}$

70. The enthalpy of fusion of water is 1.435 kcal/mol. The molar entropy change for the melting of ice at 0ºC is :

(1) $5.260\,\text{cal}/(\text{mol K})$ (2) $0.526\,\text{cal}/(\text{mol K})$

(3) $10.52\,\text{cal}/(\text{mol K})$ (4) $21.04\,\text{cal}/(\text{mol K})$

Ans. [1]

Sol. $\Delta S = \frac{\Delta H}{T} = \frac{1.435 \times 1000}{273} = 5.26 \frac{\text{Cal.}}{\text{mol} \times \text{k}}$

71. In which of the following compounds, nitrogen exhibits highest oxidation state ?

(1) N_3H (2) NH_2OH

(3) N_2H_4 (4) NH_3

Ans. [1]

Sol. Oxidation number of nitrogen -N_3H = –1/3, NH_2OH = –1, N_2H_4 = –2, NH_3 = –3

72. Aluminium is extracted from alumina (Al_2O_3) by electrolysis of a molten mixture of :

(1) Al_2O_3+Na_3AlF_6+CaF_2 (2) Al_2O_3+KF+Na_3AlF_6

(3) Al_2O_3+HF+$NaAlF_4$ (4) Al_2O_3+CaF_2+$NaAlF_4$

Ans. [1]

Sol. $Al_2O_3 + Na_3AlF_6\,(\text{cryolite}) + CaF_2$

73. Which of the statements is not true ?

(1) $K_2Cr_2O_7$ solution in acidic medium is orange

(2) $K_2Cr_2O_7$ solution becomes yellow on increasing the pH beyond 7

(3) On passing H_2S through acidified $K_2Cr_2O_7$ solution, a milky colour is observed

(4) Na_2Cr_2O7 is preferred over $K_2Cr_2O_7$ in volumetric analysis

Ans. [4]

Sol. Because $Na_2Cr_2O_7$ is hygroscopic

74. A mixture of potassium chlorate, oxalic acid and sulphuric acid is heated. During the reaction which element undergoes maximum change in the oxidation number ?

(1) Cl (2) C

(3) S (4) H

Ans. [1]

Sol. $KClO_3 + C_2O_4H_2 + H_2SO_4 \rightarrow K_2SO_4 + CO_2 + Cl_2 + H_2O$

Maximum change in oxidation number = Cl

75. Which one of the following is an outer orbital complex and exhibits paramagnetic behaviour :

(1) $[Cr(NH_3)_6]^{3+}$ (2) $[Co(NH_3)_6]^{3+}$

(3) $[Ni(NH_3)_6]^{2+}$ (4) $[Zn(NH_3)_6]^{2+}$

Ans. [3]

Sol. $[Ni(NH_3)_6]^{2+}$

Weak ligand with two unpaired electron.

76. The ease of adsorption of the hydrated alkali metal ions on an ion-exchange resins follows the order :

(1) $K^+ < Na^+ < Rb^+ < Li^+$ (2) $Na^+ < Li^+ < K^+ < Rb^+$

(3) $Li^+ < K^+ < Na^+ < Rb^+$ (4) $Rb^+ < K^+ < Na^+ < Li^+$

Ans.[4]

77. Equimolar solutions of the following substances were prepared separately. Which one of these will record the highest pH value ?:

(1) LiCl (2) $BeCl_2$

(3) $BaCl_2$ (4) $AlCl_3$

Ans.[3]

Sol. $BaCl_2 \Rightarrow Ba(OH)_2 + HCl$

$Ba(OH)_2$ is a strong base.

78. Sulphur trioxide can be obtained by which of the following reaction :

(1) $S + H_2SO_4 \xrightarrow{\Delta}$ (2) $H_2SO_4 + PCl \xrightarrow{\Delta}$

(3) $CaSO_2 + C \xrightarrow{\Delta}$ (4) $Fe_2 + (SO_4)_3 \xrightarrow{\Delta}$

Ans.[4]

Sol. $Fe_2(SO_4)_3 \xrightarrow{\Delta} Fe_2O_3 + 3SO_3$

79. In the extraction of copper from its sulphide ore, the metal is finally obtained by the reduction of cuprous oxide with :

(1) Iron sulphide (FeS) (2) Carbon monoxide (CO)

(3) Copper (I) sulphide (Cu_2S) (4) Sulphur dioxide (SO_2)

Ans.[3]

Sol. $2Cu_2O + Cu_2S \rightarrow 6Cu + SO_2$

80. Identity the wrong statement in the following

(1) Atomic radius of the elements increases as one moves down the first group of the periodic table

(2) Atomic radius of the elements decreases as one moves across from left to right in then 2nd period of the periodic table

(3) Amongst isoelectronic species, smaller the positive charge on the cation, smaller is the ionic radius

(4) Amongst isoelectronic species, greater the negative charge on the anion, large is the ionic radius

Ans.[3]

Sol. $\text{Ionic size} \propto \dfrac{1}{\text{charge on cation}}$.

81. Which of the following statements is not valid for oxoacids of phosphorus ?

(1) All oxoacids contain tetrahedral four coordinated phosphorous

(2) All oxoacids contain atleast one P = O units and one P – OH group

(3) Orthophosphoric acid is used in the manufacture of triple superphosphate

(4) Hypophosphorous acid is a diprotic acid

Ans. [4]

Sol. H_3PO_2

$$\begin{array}{c} \text{H} \\ | \\ \text{O} = \text{P} - \text{OH} \\ | \\ \text{H} \end{array}$$

82. Identify the alloy containing a non-metal as a constituent in it

(1) Bell metal (2) Bronze

(3) Invar (4) Steel

Ans. [4]

Sol. $\text{Steel} \rightarrow \text{Fe} + \text{C}$

83. The pair of species with the same bond order is

(1) NO, CO (2) N_2, O_2

(3) O_2^{2-}, B_2 (4) O_2^+, NO^+

Ans. [3]

Sol. O_2^{-2} & B_2 Bond order is one

84. Bond order of 1.5 is shown by:

(1) O_2^{2-} (2) O_2

(3) O_2^+ (4) O_2^-

Ans. [4]

Sol. O_2^- Bond order = 1.5

85. Which one of the following is a mineral of iron ?

(1) Pyrolusite (2) Magnetite

(3) Malachite (4) Cassiterite

Ans. [2]

Sol. Fe_3O_4

86. Which one of the alkali metals, forms only, the normal oxide, M_2O on heating in air ?

(1) Li (2) Na

(3) Rb (4) K

Ans. [1]

Sol. $4Li + O_2 \xrightarrow{\Delta} 2Li_2O$

87. The correct order of decreasing acid strength of trichloroacetic acid (A), trifluoroacetic acid (B), acetic acid (C) and formic acid (D) is :

(1) A > B > C > D (2) A > C > B > D

(3) B > A > D > C (4) B > D > C > A

Ans. [3]

Sol. $\underline{CF_3COOH > CCl_3COOH > HCOOH > CH_3COOH}$
$\text{Acidic strength due to} - \text{I effect}$

88. In the following reaction :

$$\begin{array}{c} CH_3 \\ | \\ H_3C-C-CH=CH_2 \\ | \\ CH_3 \end{array} \xrightarrow{H_2O/H^{\ominus}} \text{Major } \overset{A}{\text{Product}} + \text{Minor } \overset{B}{\text{Product}}$$

The major product is :

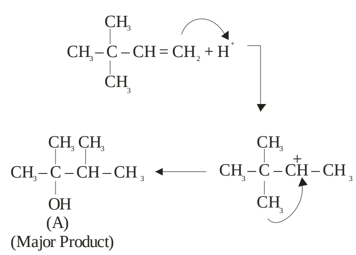
(1) $\begin{array}{l} \quad\;\; CH_3 \\ \quad\;\; | \\ H_3C-C-\;CH-CH_3 \\ \quad\;\; |\quad\;\; | \\ \quad\; CH_3\;\; OH \end{array}$

(2) $\begin{array}{l} \quad\;\; CH_3 \\ \quad\;\; | \\ H_3C-C-CH_2-CH_2 \\ \quad\;\; |\qquad\qquad | \\ \quad\; CH_3 \qquad\; OH \end{array}$

(3) $\begin{array}{l} \quad\;\; CH_3 \\ \quad\;\; | \\ H_3C-C-\;CH-CH_3 \\ \quad\;\; |\quad\;\; | \\ \quad\; OH\;\; CH_3 \end{array}$

(4) $\begin{array}{l} \qquad\quad CH_3 \\ \qquad\quad | \\ CH_2-C-CH_2-CH_3 \\ |\qquad\; | \\ OH \quad CH_3 \end{array}$

Ans. [3]



Sol.

89. Which nomenclature is not according to IUPAC system ?.

(1)	$CH_3-\underset{CH_3}{\underset{\vert}{CH}}-\underset{C_6H_5}{\underset{\vert}{CH}}-CH_2CH_3$, 2 – Methyl – 3 – phenylpentane
(2)	$CH_3-\underset{O}{\underset{\Vert}{C}}-CH_2-CH_2-CH_2COOH$, 5 – oxohexanoic acid
(3)	$Br-CH_2-CH=CH_2$, 1 – Bromo – prop – 2 – ene
(4)	$CH_3-CH_2-\underset{Br}{\underset{\vert}{\overset{CH_3}{\overset{\vert}{CH}}}}-CH_2-\underset{CH_3}{\underset{\vert}{CH}}CH_3$, 4 – Bromo, 2, 4 – di – methylhexane

Ans. [3]

Sol. $Br-CH_2-CH=CH_2$

Correct Name – 3 Bromo propene

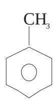
90. Among the following compounds the one that is most reactive towards electrophilic nitration is :

(1) Toluene (2) Benzene

(3) Benzoic acid (4) Nitrobenzene

Ans. [1]

Sol. Due to +R effect of methyl group



is more reactive towards ESR (Nitration).

91. Deficiency of vitamin B_1 causes the disease

(1) Cheilosis (2) Sterility

(3) Convulsions (4) Beri-Beri

Ans. [4]

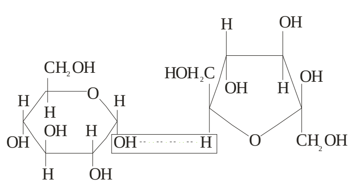
Sol. Deficiency of B_1 cause Beri-Beri.

92. Which one of the following sets of monosaccharides forms sucrose ?

(1) β – D – Glucopyranose and α – D – fructofuranose (2) α – D – Glucopyranose and β – D – fructofuranose

(3) α – D – Glucopyranose and α – D – fructofuranose (4) α – D – Glucopyranose and β – D – fructofuranose

Ans. [4]



Sol. α D glucopyronase β D fructofuranose

93. Which one of the following statements regarding photochemical smog is not correct ?:

(1) Photochemical smog is formed through photochemical reaction involving solar energy

(2) Photochemical smog does not cause irritation in eyes and throat

(3) Carbon monoxide does not play any role in photochemical smog formation

(4) Photochemical smog is an oxidising agent in character

Ans. [2]

Sol. Photo chemical smog causes irritation in eyes & throat

94. In the following sequence of reactions

$$CH_3 - Br \xrightarrow{KCN} A \xrightarrow{H_3O^+} B \xrightarrow{LiAlH_4} C,$$

the end product (C) is :

(1) Acetaldehyde (2) Ethyl alcohol

(3) Acetone (4) Methane

Ans. [2]

Sol. $CH_3 - Br \xrightarrow{KCN} CH_3 - CN \xrightarrow{H_3O^+} CH_3COOH \xrightarrow{LiAlH_4} CH_3CH_2OH$

95. Which one of the following is not a condensation polymer ?

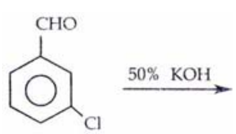
(1) Dacron (2) Neoprene

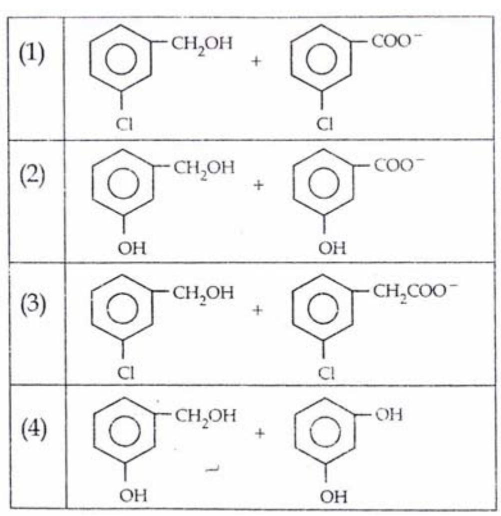
(3) Melamine (4) Glyptal

Ans. [2]

Sol. $\underset{\substack{(2-\text{Chloro}1,3-\text{butadiene})\\(\text{chloroprene})}}{CH_2 = \underset{\substack{|\\ Cl}}{C} - HC = CH_2} \xrightarrow{\text{Addition Polymerisation}} \text{Neoprene}$

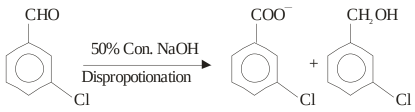
96. Predict the products in the given reaction





Ans.[1]

Sol. Cannizaro reaction



97. Which of the following acids does not exhibit optical isomerism ?

(1) Lacetic acid (2) Tartaric acid

(3) Maleic acid (4) α-amino acids

Ans.[3]

Sol. HOOC–CH = CH – COOH (Maleic acid) almost show optical isomerism

98. CH_3CHO and $C_6H_5CH_2CHO$ can be distinguised chemically by :

(1) Tollen's reagent test (2) Fehling solution test

(3) Benedict test (4) Iodoform test

Ans.[4]

Sol. CH_3CHO give positive iodoform test

C6H5CH2CHO donot gives due to absence of $CH_3-\overset{\overset{\large O}{\|}}{C}-$ **group.**

$$CH_3-\overset{\overset{\large O}{\|}}{C}-H \xrightarrow{I_2/NaOH} CHI_3 + HCOONa$$

99. Which of the following statements is false ?

(1) The repeat unit in natural rubber is isoprene

(2) Both starch and cellulose are polymers of glucose

(3) Artificial silk is derived from cellulose

(4) Nylon-66 is an example of elastomer

Ans.[4]

Sol. Nylon 6, 6 is a fibre not an elastomer.

100. Acetone is treated with excess of ethanol in the presence of hydrochloric acid. The product obtained is

(1)	$(CH_3)_2C\begin{smallmatrix}\diagup OH\\ \diagdown OC_2H_5\end{smallmatrix}$
(2)	$(CH_3)_2C\begin{smallmatrix}\diagup OC_2H_5\\ \diagdown OC_2H_5\end{smallmatrix}$
(3)	$CH_3CH_2CH_2-\overset{\overset{\large O}{\|}}{C}-CH_3$
(4)	$CH_3CH_2CH_2-\overset{\overset{\large O}{\|}}{C}-CH_2CH_2CH_3$

Ans.[2]

Sol. Nucleophilic addition

$$CH_3-\overset{\overset{\large O}{\|}}{C}-CH_3 + 2C_2H_5OH \xrightarrow{HCl} \begin{matrix}CH_3\\CH_3\end{matrix}\!>\!C\!<\!\begin{matrix}OC_2H_5\\OC_2H_5\end{matrix}$$
(Ketal)

PART A – BIOLOGY

101. *Cycas* and *adiantum* resemble each other in having

(1) Cambium (2) Vessels

(3) Seeds (4) Motile sperms

Ans. [4]

102. Gymnosperms are also called soft wood spermatophytes because they lack

(1) Thick - walled tracheids (2) Xylem fibres

(3) Cambium (4) Phloem fibres

Ans. [1]

103. Maximum nutritional diversity is found in the group

(1) Monera (2) Plantae

(3) Fungi (4) Animalia

Ans. [1]

104. Which one of the following is common to multicellular fungi, filamentous algae and protonema of mosses

(1) Mode of Nutrition (2) Multiplication by fragmentation

(3) Diplontic life cycle (4) Members of kingdom plantae

Ans. [2]

105. Which statement is wrong for viruses

(1) They have ability to synthesiz nucleic acids and proteins

(2) Antibiotics have no effect on them

(3) All are parasites

(4) All of them have helical symmetry

Ans. [4]

106. Which one of the following is correct statement

(1) Antheridiophores and archegoniophores are present in pteridophytes

(2) Origin of seed habit can be traced in pteridophytes

(3) Pteridophyte gametophyte has a protonemal and leafy stage

(4) In gymnosperm female gametophyte is free living

Ans. [2]

107. Nuclear membrane is absent in

(1) *Volvox*

(2) *Nostoc*

(3) *Penicillium*

(4) *Agaricus*

Ans. [2]

108. During gamete formation, the enzyme recombinase participates during

(1) Prophase - I (2) Prophase -II

(3) Metaphase - I (4) Anaphase -II

Ans. [1]

109. Which one of the following does not differ in *E.coli* and *Chlamydomonas*

(1) Cell wall (2) Cell membrane

(3) Ribosomes (4) Chromosomal Organization

Ans. [2]

110 PCR and Restriction Fragment Length Polymorphism are the methods for

(1) DNA sequencing (2) Genetic Fingerprinting

(3) Study of enzymes (4) Genetic transformation

Ans. [2]

111. Removal of RNA polymerase -III from nucleoplasm will affect the synthesis of

(1) mRNA (2) rRNA

(3) tRNA (4) hnRNA

Ans. [3]

112. Evolution of different species in a given area starting from a point and spreading to other geographical areas is known as

(1) Migration (2) divergent evolution

(3) Adaptive radiation (4) Natural selection

Ans. [3]

113. Removal of introns and joining of exons in a defined order during transcription is called

(1) Slicing (2) Splicing

(3) Looping (4) Inducing

Ans. [2]

114 Which one of the following is not a part of a transcription unit in DNA

(1) A promoter (2) The structural gene

(3) the inducer (4) A terminator

Ans. [3]

115. An organic substance that can withstand environmental extremes and cannot be degraded by any enzyme is

(1) Lignin (2) Cellulose

(3) Cuticle (4) Sporopollenin

Ans. [4]

116. Best defined function of manganese in green plants is

(1) Nitrogen fixation (2) Water absorption

(3) Photolysis of water (4) Calvin cycle

Ans. [3]

117. Water containing cavities in vascular bundles are found in

(1) *Cycas* (2) *Pinus*

(3) Sunflower (4) Maize

Ans. [4]

118. Closed vascular bundles lack

(1) Cambium (2) Pith

(3) Ground tissue (4) Conjunctive tissue

Ans. [1]

119. Placentation in Tomato and lemon is

(1) Marginal (2) Axile

(3) Parietal (4) Free central

Ans. [2]

120. Companion cells are closely associated with

(1) Trichomes (2) Guard cells

(3) Sieve elements (4) Vessel elements

Ans. [3]

121. Vexillary aestivation is characteristic of the family

(1) Solanaceae (2) Brassicaceae

(3) Fabaceae (4) Asteraceae

Ans. [3]

122. Phyllode is present in

(1) Australian Acacia (2) *Opuntia*

(3) *Asparagus* (4) *Euphorbia*

Ans. [1]

123. The common bottle cork is a product of

(1) Xylem (2) Vascular Cambium

(3) Dermatogen (4) Phellogen

Ans. [4]

124. Which one of the following is wrong statement

(1) Phosphorus is a constituent of cell membranes, certain nucleic acids and all proteins

(2) *Nitrosomonas* and *Nitrobacter* are chemoautotrophs

(3) *Anabaena* and *Nostoc* are capable of fixing nitrogen in free- living state also

(4) Root nodule forming nitrogen fixers live as aerobes under free living conditions

Ans. [1]

125. How many plants in the list give below have composite fruits that develop from an inflorescence

Walnut, poppy, radish, fig, pineapple, apple, tomato, mulberry

(1) Two (2) Three

(3) Four (4) Five

Ans. [2]

126. Cymose inflorescence is present in

(1) *Trifolium* (2) *Brassica*

(3) *Solanum* (4) *Sesbania*

Ans.[3]

127. Which one of the following is correctly matched

(1) Potassium - Readily immobilisation

(2) Bakane of rice seedlings - F skoog

(3) Passive transport of nutrients - ATP

(4) Apoplast - Plasmodesmata

Ans.[1]

128 A process that makes important difference between C_3 and C_4 plants is

(1) Photosynthesis (2) Photorespiration

(3) Transpiration (4) Glycolysis

Ans.[2]

129. The correct sequence of cell organelles during photorespiration is

(1) Chloroplast, mitochondria, peroxisome

(2) Chloroplast, - vacuole - peroxisome

(3) Chloroplast, - Golgiboidies - mitochondria

(4) Chloroplast, Rough Endoplasmic reticulum- Dictyosomes

Ans.[1]

130. The coconut water and the edible part of coconut are equivalent to

(1) Mesocarp (2) Embryo

(3) Endosperm (4) Endocarp

Ans.[3]

131. The gynoecium consists of many free pistils in flowers of

(1) *Papaver* (2) *Michelia*

(3) *Aloe* (4) Tomato

Ans.[2]

132. Which one of the following is correctly matched

(1) *Chlamydomonas* - Conidia (2) yeast - Zoospores

(3) Onion - Bulb (4) Ginger - Sucker

Ans.[3]

133. Both, autogamy and geitonogamy are prevented in

(1) Castor (2) Maize

(3) Papaya (4) Cucumber

Ans.[3]

134. Even in absence of pollinating agents seed seting is assured in

(1) *Salvia* (2) Fig

(3) *Commellina* (4) *Zostera*

Ans.[3]

135. Which one of the following areas in India, is a hotspot of biodiversity

(1) Sunderbans (2) Western Ghats

(3) Eastern Ghats (4) Gangetic plain

Ans.[2]

136. Which one of the following is not a functional unit of an ecosystem

(1) Productivity (2) Stratification

(3) Energy flow (4) Decomposition

Ans.[2]

137. The upright pyramid of number is absent in

(1) Lake (2) Grassland

(3) Pond (4) Forest

Ans.[4]

138. Which one of the following is not a gaseous biogeochemical cycle in ecosystem

(1) Nitrogen Cycle (2) Carbon Cycle

(3) Sulphur Cycle (4) Phosphorus Cycle

Ans.[4]

139. Which one of the following is a wrong statement

(1) Greenhouse effect is a natural Phenomenon

(2) Eutrophication is a natural phenomenon in freshwater bodies

(3) Most of the forests have been lost in tropical areas

(4) Ozone in upper part of atmosphere is harmful to animals

Ans.[4]

140. The highest number of species in the world is represented by

(1) Algae (2) Lichens

(3) Fungi (4) Mosses

Ans.[2]

141. Yeast is used in the production of

(1) Bread and beer (2) Cheese and butter

(3) Citric acid and lactic acid (4) Lipase and pectinase

Ans.[1]

142. Which one of the following microbes forms symbiotic association with plants and helps then in their nutrition

(1) *Glomus* (2) *Trichoderma*

(3) *Azotobacter* (4) *Aspergillus*

Ans.[1]

143. A single strand of nucleic acid tagged with a radioactive molecule is called

(1) Plasmid (2) Probe

(3) Vector (4) Selectable marker

Ans.[2]

144. A patient brought to a hospital with myocardial infarction is normally immediately given

(1) Cyclosporin - A (2) Statins

(3) Penicillin (4) Streptokinase

Ans.[4]

145. A nitrogen - fixing microbe associated with *Azolla* in rice fields is

(1) *Frankia* (2) *Tolypothrix*

(3) *Spirulina* (4) *Anabaena*

Ans.[4]

146. Which one is a true statement regarding DNA polymerase used in PCR

(1) It is isolated from a virus

(2) It remains active at high temperature

(3) It is used to ligate introduced DNA in recipient cell

(4) It serves as a selectable marker

Ans.[2]

147. Consumption of which one of the following foods can prevent the kind of blindness associated with vitamin 'A' deficiency

(1) golden rice (2) Bt- Brinjal

(3) Flaver Savr Tomato (4) Canolla

Ans.[1]

148. Which one of the following is a case of wrong matching

(1) Micropropagation - In vitro production of plants in large numbers

(2) Callus - Unorganised mass of cells produced in tissue culture

(3) Somatic hybridization - Fusion of two diverse cells

(4) Vector DNA - site for tRNA synthesis

Ans.[4]

149. Which part would be most suitable for raising virus free plants for microporpagation

(1) Meristem (2) Node

(3) Bark (4) Vascular tissue

Ans.[1]

150 For transformation, micro - particles coated with DNA to be bombarded with gene are made up of

(1) Silicon or platinum (2) Gold or Tungsten

(3) Silver or platinum (4) Platinum or zinc

Ans.[2]

151. The cyanobacteria are also referred to as

(1) Slime moulds (2) Blue green algae

(3) Protists (4) Golden algae

Ans. [1]

152. Which one single organism or the pair of organisms is correctly assigned to its or their named taxonomic group

(1) Yeast used in making bread and beer is a fungus

(2) *Nostoc* and *Anabaena* are examples of protista

(3) *Paramecium* and *Plasmodium* belong to the same kingdom as that of *Penicillium*

(4) Lichen is composite organism formed from the symbiotic association of an algae and a protozoan

Ans. [1]

153. In which one of the following the genus name its two characters and its phylum are not correctly matched, whereas the remaining three are correct

	Genus Name		Two characters	Phylum
(1)	*Asterias*	(a)	Spiny skinned	Echinodermata
		(b)	Water vascular system	
(2)	*Sycon*	(a)	Pore bearing	Porifera
		(b)	Canal system	
(3)	*Periplaneta*	(a)	Jointed appendages	Arthropoda
		(b)	Chitinous exoskeleton	
(4)	*Pila*	(a)	body segmented	Mollusca
		(b)	Mouth with Radula	

Ans. [3]

154. Select the the correct statement from the following regarding cell membrane

(1) Lipids are arranged in bilayer with polar heads towards the inner part

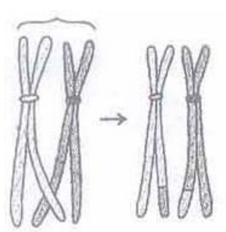
(2) Fluid mosaic model of cell membrane was proposed by singer and Nicolson

(3) Na^+ and K^+ ions move across cell membrane by passive transport

(4) Proteins make up 60 to 70% of the cell membrane

Ans. [2]

155. Given below is the representation of a certain event at a particular stage of a type of cell division which is this stage



(1) Prophase of Mitosis

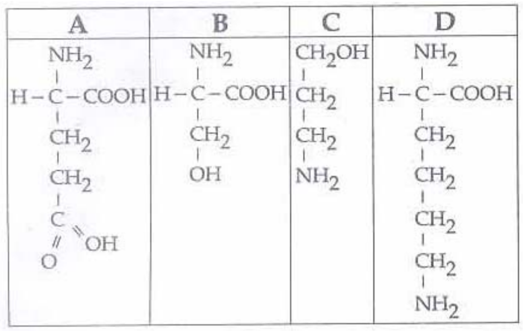
(2) Both prophase and metaphase of mitosis

(3) Prophase I during meiosis

(4) Prophase -II during meiosis

Ans. [3]

156. Which one out of A - D given below correctly represents the structural formula of the basic amino acid



Options :

(1) A (2) B

(3) C (4) D

Ans. [4]

157. What is true about ribosomes

(1) These are found only in eukaryotic cells

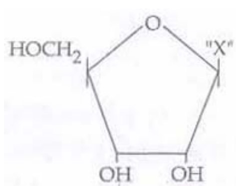
(2) These are self - splicing introns of some RNAs.

(3) The prokaryotic ribosomes are 80 S, where 'S' stands for sedimentation coefficient.

(4) There are composed of ribonucleic acid and proteins

Ans. [4]

158. Given below is the diagrammatic representation of one of the categories of small molecular weight organic compounds in the living tissues. Identify the category shown and the one blank component 'X' in it



Category	Component
(1) Nucleotide	Adenine
(2) Nucleoside	Uracil
(3) Cholesterol	Guanin
(4) Amino acid	NH_2

Ans. [2]

159. Ribosomal RNA is actively synthesized in

(1) Nucleoplasm (2) Ribosomes

(3) Lysosomes (4) Nucleolus

Ans. [4]

160. F_2 generation in a Mendelian cross showed that both genotypic and phenotypic ratios are same as 1 : 2 : 1. It represents a case of

(1) Monohybrid cross with complete dominance

(2) Monohybrid cross with incomplete dominance

(3) Co - dominance

(4) Dihybrid cross

Ans. [2]

161. What was the most significant trend in the evolution of modern man (Homo sapiens) from his ancestors

(1) Increasing cranial capacity (2) Uprigth posture

(3) Shortening of jaws (4) Binocular vision

Ans. [1]

162. If one strand of DNA has the nitrogenous base sequence as ATCTG, what would be the complementary RNA stand sequence

(1) AACTG (2) ATCGU

(3) TTAGU (4) UAGAC

Ans. [4]

163. Which one of the following options gives one correct example each of convergent evolution and divergent evolution

	Convergent evolution	**Divergent evolution**
(1)	Bones of forelimbs of vertebrates	Wings of butterfly and birds
(2)	Thorns of Bougainvillia and tendrils of cucurbita	Eyes of Octopus and mammals
(3)	Eyes of octopus and mammals	Bones of forelimpbs of vertebrates
(4)	Thorns of Bougainvillia and ten drils of cucurbita	Wings of butterflies and birds

Ans. [3]

164. A normal - visioned man whose father was colour bilind, marries a woman whose father was also colour - blind. They have their first child as a daughter. What are the chances that this child would be colour blind

(1) 25% (2) 50%

(3) 100% (4) Zero percent

Ans. [4]

165. Select the correct statement regarding the specific disorder of muscular or skeletal system

(1) *Myasthenia gravis* - Auto immune disorder which inhibits sliding of myosin filaments

(2) *Gout*- inflammation of joints due to extra deposition of calcium

(3) *Muscular dystrophy* - age related shorting of muscles

(4) *Osteoporosis* - decrease in bone mass and higher chances of fractures with advancing age

Ans. [4]

166. A certain road accident patient with unknown blood group needs immediate blood transfusion. His one doctor friend at once offers his blood. What was the blood group of the donor

(1) Blood group O (2) Blood group A

(3) Blood group B (4) Blood group AB

Ans. [1]

167. The maximum amount of electrolytes and water (70 - 80 percent) from the glomerular filtrate is reabsorbed in which part of the nephron

(1) Proximal convoluted tubule

(2) Descending limb of loop of Henle

(3) Ascending limb of loop of Henle

(4) Distal convoluted tubule

Ans. [1]

168. The human hind brain comprises three parts, one of which is

(1) Cerebellum (2) Hypothalamus

(3) Spinal (4) Corpus callosum

Ans. [1]

169. Which one of the following pairs of hormones are the examples of those that can easily pass through the cell membrane of the target cell and bind to a receptor inside is (mostly in the nucleus)

(1) Somatostatin, oxytocin (2) Cortisol, testosterone

(3) Insulin, glucagon (4) Thyroxin, Insulin

Ans. [2]

170. The lydig cell as found in the human body are the secretory source of

(1) Glucagon (2) Androgens

(3) Progesterone (4) Intestinal mucus

Ans. [2]

171. Select the correct statement from the ones given below with respect to Periplaneta americana

(1) There are 16 very long Malpighian tubules present at the junctions of midgut and hindgut

(2) Grinding of food is carried out only by the mouth parts

(3) Nervous system located dorsally, consists of segmentally arranged ganglia joined by a pair of longitudinal connective

(4) Males bear a pair of short thread like anal styles

Ans. [4]

172. Anxiety and eating spicy food together in a otherwise normal human, may lead to

(1) Diarrhoea (2) Vomiting

(3) Indigestion (4) Jaundice

Ans. [3]

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

(1) Workers in grinding and stone-breaking industries may suffer, from lung fibrosis

(2) About 90% of carbon dioxide (CO_2) is carried by haemoglobin as carbamino haemoglobin

(3) Cigarette smoking may lead to inflammation of bronchi

(4) Neural signals from pneumotoxic centre in pons region of brain can increase the duration of inspiration

Ans. [1]

174. What is correct to say about the hormone action in humans ?

(1) In females, FSH first binds with specific receptors on ovarian cell membrane

(2) FSH stimulates the secretion of estrogen and progesterone

(3) Glucagon is secreted by β- cells of islets of langerhans and stimulates glycogenolysis

(4) Secretion of thymosins is stimulated with aging

Ans. [1]

175. *Pheretima* and its close relatives derive nourishment from :

(1) Soil insects
(2) Small pieces of fresh fallen leaves of maize, etc
(3) Sugarcane roots
(4) Decaying fallen leaves and soil organic matter

Ans. [4]

176. Compared to those of humans, the erythrocytes in frog are :

(1)Very much smaller and fewer

(2) Nucleated and without haemoglobin

(3) Without nucleous but with haemoglobin

(4) Nucleated and with haemoglobin

Ans.[4]

177. Which one is the most abundant protein in the animal world ?

(1) Collagen
(2) Insulin
(3) Trypsin
(4) Haemoglobin

Ans.[1]

178. Which part of the human ear plays no role in hearing as such but is otherwise very much required ?

(1) Vestibular apparatus
(2) Ear ossicles
(3) Eustachian tube
(4) Organ of corti

Ans.[1]

179. A person entering an empty room suddenly finds a snake right in front on opening the door. Which one of the following is likely to happen in his neuro-hormonal control system ?

(1) Hypothalamus activates the parasympathetic division of brain

(2) Sympathetic nervous system is activated releasing epinephrin and norepinephrin from adrenal cortex

(3) Sympathetic nervous system is activated releasing epinephrin and norepinephrin from adrenal medulla

(4) Neurotransmitters diffuse rapidly across the cleft and transmit a nerve impulse

Ans.[3]

180. In a normal pregnant woman, the amount of total gonadotropin activity was assessed. The results expected was :

(1) High levels of FSH and LH in uterus to stimulate endometrial thickening

(2) High level of circulating HCG to stimulate estrogen and progesterone synthesis

(3) High level of circulating FSH and LH in the uterus to stimulate implantation of the embryo

(4) High level of circulating HCG to stimulate endometrial thickening

Ans.[2]

181. The test-tube baby programme employs which one of the following techniques ?

(1) Gamete intra fallopian transfer (GIFT)

(2) Zygote intra fallopian transfer (ZIFT)

(3) Intra cytoplasmic sperm injection (ICSI)

(4) Intra uterine insemination (IUI)

Ans. [2]

182. Signals for parturition originate from :

(1) Placenta only

(2) Fully developed foetus only

(3) Both placenta as well as fully developed foetus

(4) Oxytocin released from maternal pituitary

Ans. [3]

183. Which one of the following statements is false in respect of viability of mammalian sperm ?

(1) Viability of sperm is determined by its motility

(2) Sperms must be concentrated in a thick suspension

(3) Sperm is viable for only up to 24 hours

(4) Survival of sperm depends on the pH of the medium and is more active in alkaline medium

Ans. [3]

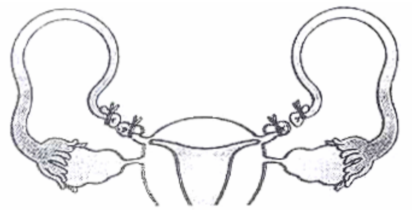
184. The extinct human who lived 1,00,000 to 40,000 years ago, in Europe, Asia and parts of Africa, with short stature, heavy eye brows, retreating fore heads, large jaws with heavy teeth, stocky bodies, a lumbering gait and stooped posture was :

(1) Cro-magnan humans (2) *Ramapithecus*

(3) *Homo habilis* (4) Neanderthal human

Ans. [4]

185. What is the figure given below showing in particular ?



(1) Tubectomy (2) Vasectomy

(3) Ovarian cancer (4) Uterine cancer

Ans. [1]

186. In an area where DDT had been used extensively, the population of birds declined significantly because :

(1) Cobras were feeding exclusively on birds

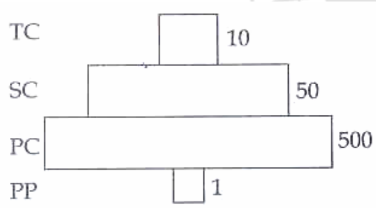
(2) Many of the birds eggs laid, did not hatch

(3) Birds stopped laying eggs

(4) Earthworms in the area got eradicated

Ans. [2]

187. Giiven below is an imaginary pyramid of numbers. What could be one of the possibilities about certain organisms at some of the different levels ?



(1) Level one PP is "pipal trees" and the level SC is "sheep"

(2) Level PC is "rats" and level SC is "cats"

(3) Level PC is "insects" and level SC is "small insectivorous birds"

(4) Level PP is "phytoplanktons" in sea and "Whale" on top level TC

Ans. [3]

188. Common cold differs from pneumonia in, that :

(1) Pneumonia is caused by a virus while the common cold is caused by the bacterium *haemophilus influenzae*

(2) Pneumonia pathogen infects alveoli wheras the common cold affects nose and respiratory passage but not the lungs

(3) Pneumonia is a communicable disease whereas the common cold is a nutritional deficiency disease

(4) Pneumonia can be prevented by a live attenuated bacterial vaccine whereas the common cold has no effective vaccine

Ans. [2]

189. Identify the possible link "A" in the following food chain :

$\text{Plant} \rightarrow \text{in sec t} \rightarrow \text{frog} \rightarrow \text{"A"} \rightarrow \text{Eagle}$

(1) Cobra (2) Parrot

(3) Rabbit (4) Wolf

Ans. [1]

190. Which one of the following is an example of carrying out biological control of pests/diseases using microbes ?

(1) Bt-cotton to increase cotton yield

(2) Lady bird beetle against aphids in mustard

(3) *Trichoderms sp.* against certain plant pathogens

(4) Nucleopoly hedrovirus against white rust in *Brassica*

Ans. [3]

191. Widal Test is carried out to test :

(1) HIV/AIDS (2) Typhoid fever

(3) Malaria (4) Diabetes mellitus

Ans. [2]

192. Cirrhosis of liver is caused by the chronic intake of

(1) Tobacco (Chewing) (2) Cocaine

(3) Opium (4) Alcohol

Ans. [4]

193. Which one of the following in not a property of cancerous cells whereas the remaining three are ?

(1) They divide in an uncontrolled manner

(2) They show contact inhibition

(3) They compete with normal cells for vital nutrients

(4) They do not remain confined in the area of formation

Ans. [2]

194. Motile zygote of *Plasmodium* occurs in

(1) Human RBCs (2) Human liver

(3) Gut of female Anopheles (4) Salivary glands of Anopheles

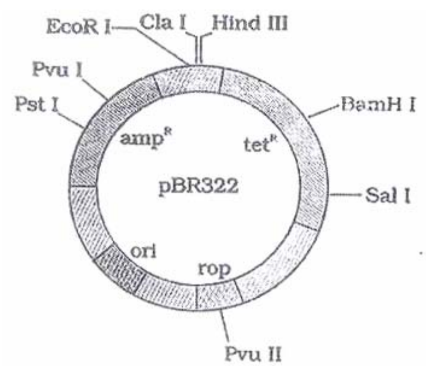
Ans. [3]

195. In which one of the following options the two examples are correctly matched with their particular type of immunity ?

	Examples	**Type of immunity**
(1)	Saliva in mouth and tears in eyes	Physical barriers
(2)	Mucus coating of epithelium lining the urinogenitial tract and the HCl in stomach	Physiological barriers
(3)	Polymorphonuclear leukocytes and monocytes	Cellular barriers
(4)	Anti-tetanus and anti-snake bite injections	Active immunity

Ans. [3]

196. The figure below is the diagrammatic respesentation o the E.Coli vector pBR 322. Which one of the given options correctly identifies its certain component(s) ?



(1) Hind III, EcoRI-selectable markers

(2) amp^R, tet^R-antibiotic resistance genes

(3) ori- original restriction enzyme

(4) rop-reduced osmotic pressure

Ans.[2]

197. Measuring biochemical oxygen demand (BOD) is a method used for

(1) Measuring the activity of *Saccharomyces cerevisae* in producing curd on a commercial scale

(2) Working out the efficiency of R.B.Cs. about their capacity to carry oxygen

(3) Estimating the amount of organic matter in sewage water

(4) Working out the efficiency of oil driven automobile engines

Ans.[3]

198. The most abundant prokaryotes helpful to humans in making curd from milk and in production of antibiotics are the ones categorised as :

(1) Chemosynthetic autotrophs

(2) Heterotrophic bacteria

(3) Cyanobacteria

(4) Archaebactera

Ans.[2]

199. People who have migrated from the planes to an area adjoining Rohtang Pass about six months back :

(1) Suffer from altitude sickness with symptons like nausea, fatigue, etc.

(2) Have the usual RBC count but their haemoglobin has very high binding affinity to O_2.

(3) Have more RBCs and their haemoglobin has a lower binding affinity to O_2

(4) Are not physically fit to play games like football

Ans.[3]

200. *Monascus purpureus* is a yeast used commercially in the production of :

(1) Citric acid

(2) Blood cholesterol lowering statins

(3) Ethanol

(4) Streptokinase for removing clots from the blood vessels

Ans.[2]