AIPMT / NEET–2016 TEST PAPER WITH ANSWER & SOLUTIONS
(HELD ON SUNDAY 1st MAY, 2016)

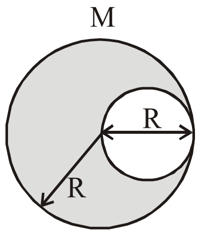
1. From a disc of radius R and mass M, a circular hole of diameter R, whose rim passes through the centre is cut. What is the moment of inertia of the remaining part of the disc about a perpendicular axis, passing through the centre ?

(1) $15\ MR^2/32$ (2) $13\ MR^2/32$

(3) $11\ MR^2/32$ (4) $9\ MR^2/32$

Ans. 2

Sol.



$$I_{\text{Total disc}} = \frac{MR^2}{2}$$

$$M_{\text{Removed}} = \frac{M}{4} \text{ (Mass} \propto \text{area)}$$

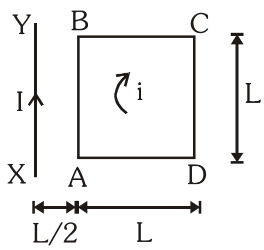
I_{Removed} (about same Perpendicular axis)

$$= \frac{M}{4}\frac{(R/2)^2}{2} + \frac{M}{4}\left(\frac{R}{2}\right)^2 = \frac{3MR^2}{32}$$

$$I_{\text{Remaing disc}} = I_{\text{Total}} - I_{\text{Removed}}$$

$$= \frac{MR^2}{2} - \frac{3}{32}MR^2 = \frac{13}{32}MR^2$$

2. A square loop ABCD carrying a current i, is placed near and coplanar with a long straight conductor XY carrying a current I, the net force on the loop will be :-



(1) $\frac{2\mu_0 Ii}{3\pi}$

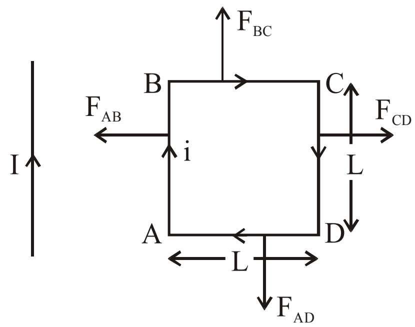
(2) $\frac{\mu_0 Ii}{2\pi}$

(3) $\frac{2\mu_0 IiL}{3\pi}$

(4) $\frac{\mu_0 IiL}{2\pi}$

Ans. 1

Sol.



$F_{AB} = i\ell B$ (Attractive)

$$F_{AB} = i(L).\frac{\mu_0 I}{2\pi\left(\frac{L}{2}\right)} (\leftarrow) = \frac{\mu_0 iI}{\pi} (\leftarrow)$$

F_{BC} ($\uparrow$) and F_{AD} ($\downarrow$) $\Rightarrow$ cancels each other

$F_{CD} = i\ell B$ (Repulsive)

$$F_{CD} = i(L)\frac{\mu_0 I}{2\pi\left(\frac{3L}{2}\right)} (\rightarrow) = \frac{\mu_0 iI}{3\pi} (\rightarrow)$$

$$\Rightarrow F_{net} = \frac{\mu_0 iI}{\pi} - \frac{\mu_0 iI}{3\pi} = \frac{2\mu_0 iI}{3\pi}$$

3. The magnetic susceptibility is negative for :

(1) diamagnetic material only

(2) paramagnetic material only

(3) ferromagnetic material only

(4) paramagnetic and ferromagnetic materials

Ans. 1

Sol. Magnetic susceptibility = χ

it is negative for dia-magnetic materials only

4. A siren emitting a sound of frequency 800 Hz moves away from an observer towards a cliff at a speed of $15ms^{-1}$. Then, the frequency of sound that the observer hears in the echo reflected from the cliff is :

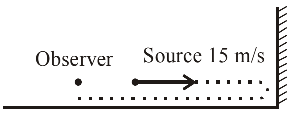
(Take velocity of sound in air = 330 ms^{-1})

(1) 765 Hz (2) 800 Hz

(3) 838 Hz (4) 885 Hz

Ans. 3

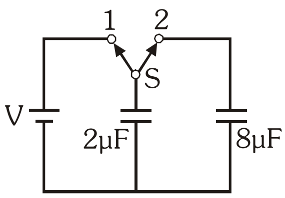
Sol.



$$n' = \frac{v}{v - v_s} n_0$$

$$n' = \frac{330}{330-15}(800) = \frac{330 \times 800}{315} = 838 \text{ Hz}$$

5.



A capacitor of 2μF is charged as shown in the diagram. When the switch S is turned to position 2, the percentage of its stored energy dissipated is:

(1) 0% (2) 20%

(3) 75% (4) 80%

Ans. 4

Sol. Initial energy stored in capacitor 2 μF

$$U_i = \frac{1}{2}2(V)^2 = V^2$$

Final voltage after switch 2 is ON

$$V_f = \frac{C_1V_1}{C_1 + C_2} = \frac{2V}{10} = 0.2 \text{ V}$$

Final energy in both the capacitors

$$U_f = \frac{1}{2}(C_1 + C_2)V_f^2 = \frac{1}{2}10\left(\frac{2V}{10}\right)^2 = 0.2 \text{ V}^2$$

So energy dissipated $= \dfrac{V^2 - 0.2V^2}{V^2} \times 100 = 80\%$

6. In a diffraction pattern due to a single slit of width 'a', the first minimum is observed at an angle 30° when light of wavelength 5000 Å is incident on the slit. The first secondary maximum is observed at an angle of :

(1) $\sin^{-1}\left(\frac{1}{4}\right)$ (2) $\sin^{-1}\left(\frac{2}{3}\right)$

(3) $\sin^{-1}\left(\frac{1}{2}\right)$ (4) $\sin^{-1}\left(\frac{3}{4}\right)$

Ans. 4

Sol. For first minima, $\sin 30° = \dfrac{\lambda}{a} = \dfrac{1}{2}$

First secondary maxima will be at

$$\sin\theta = \frac{3\lambda}{2a} = \frac{3}{2}\left(\frac{1}{2}\right) \Rightarrow \theta = \sin^{-1}\left(\frac{3}{4}\right)$$

7. At what height from the surface of earth the gravitation potential and the value of g are -5.4×10^7 J kg^{-2} and 6.0 ms^{-2} respectively ? Take the radius of earth as 6400 km :

(1) 2600 km (2) 1600 km

(3) 1400 km (4) 2000 km

Ans. 1

Sol. $V = \dfrac{-GM}{R+h} = -5.4 \times 10^7$ ..... (1)

and $g = \dfrac{GM}{(R+h)^2} = 6$ ..... (2)

dividing (1) and (2)

$$\Rightarrow \frac{5.4 \times 10^7}{(R+h)} = 6$$

$\Rightarrow$ R + h = 9000 km so h = 2600 km

8. Out of the following options which one can be used to produce a propagating electromagnetic wave ?

(1) A charge moving at constant velocity

(2) A stationary charge

(3) A chargeless particle

(4) An accelerating charge

Ans. 4

Sol. To generate electormagnetic waves we need accelerating charge particle.

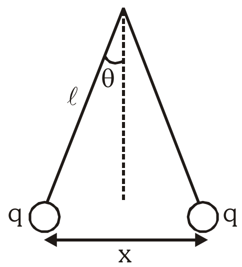
9. Two identical charged spheres suspended from a common point by two massless strings of lengths l, are initially at a distance d (d << l) apart because of their mutual repulsion. The charges begin to leak from both the spheres at a constant rate. As a result, the spheres approach each other with a velocity v. Then v varies as a function of the distance x between the spheres, as :

(1) $v \propto x^{\frac{1}{2}}$ (2) $v \propto x$

(3) $v \propto x^{-\frac{1}{2}}$ (4) $v \propto x^{-1}$

Ans. 3

Sol. $\tan\theta = \frac{F_e}{mg} \simeq \theta$



$\frac{Kq^2}{x^2mg} = \frac{x}{2\ell}$

or $\boxed{x^3 \propto q^2}$ ..... (1)

or $x^{3/2} \propto q$ .... (2)

differentiate eq.(i) w.r.t. time

$3x^2\frac{dx}{dt} \propto 2q\frac{dq}{dt}$ but $\frac{dq}{dt}$ is constant

so $x^2(v) \propto q$ replace q from eq. (2)

$x^2(v) \propto x^{3/2}$ or $\boxed{v \propto x^{-1/2}}$

10. A uniform rope of length L and mass m_1 hangs vertically from a rigid support. A block of mass m_2 is attached to the free end of the rope. A transverse pulse of wavelength λ_1 is produced at the lower end of the rope. The wavelength of the pulse when it reaches the top of the rope is λ_2. The ratio λ_2/λ_1 is :

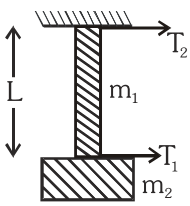
(1) $\sqrt{\frac{m_1}{m_2}}$ (2) $\sqrt{\frac{m_1+m_2}{m_2}}$

(3) $\sqrt{\frac{m_2}{m_1}}$ (4) $\sqrt{\frac{m_1+m_2}{m_1}}$

Ans. 2

Sol. $T_1 = m_2g$

$T_2 = (m_1 + m_2)g$



Velocity $\propto \sqrt{T}$

$\lambda \propto \sqrt{T}$

$\frac{\lambda_1}{\lambda_2} = \frac{\sqrt{T_1}}{\sqrt{T_2}}$

$\Rightarrow \frac{\lambda_2}{\lambda_1} = \sqrt{\frac{m_1+m_2}{m_2}}$

11. A refrigerator works between 4°C and 30°C. It is required to remove 600 calories of heat every second in order to keep the temperature of the refrigerated space constant. The power required is:

(Take 1 cal = 4.2 Joules)

(1) 2.365 W (2) 23.65 W

(3) 236.5 W (4) 2365 W

Ans. 3

Sol. $\beta = \frac{Q_2}{W} = \frac{T_2}{T_1 - T_2}$ (Where Q_2 is heat removed)

$\Rightarrow \frac{600 \times 4.2}{W} = \frac{277}{303-277}$

$\Rightarrow$ W = 236.5 joule

$\Rightarrow$ Power = $\frac{W}{t} = \frac{236.5\,\text{joule}}{1\,\text{sec}}$ = 236.5 watt.

12. An air column, closed at one end and open at the other, resonates with a tuning fork when the smallest length of the column is 50 cm. The next larger length of the column resonating with the same tuning fork is :

(1) 66.7 cm (2) 100 cm

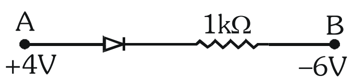
(3) 150 cm (4) 200 cm

Ans. 3

Sol. First minimum resonating length for closed organ pipe = $\frac{\lambda}{4} = 50\,\text{cm}$

$\therefore$ Next larger length of air column = $\frac{3\lambda}{4} = 150\,\text{cm}$

13. Consider the junction diode as ideal. The value of current flowing through AB is :



(1) 0 A (2) 10^{-2} A

(3) 10^{-1} A (4) 10^{-3} A

Ans. 2

Sol. Since diode is in forward bias

$i = \frac{\Delta V}{R} = \frac{4-(-6)}{1\times 10^3} = \frac{10}{10^3} = 10^{-2}$ A

14. The charge flowing through a resistance R varies with time t as $Q = at - bt^2$, where a and b are positive constants. The total heat produced in R is:

(1) $\frac{a^3R}{6b}$ (2) $\frac{a^3R}{3b}$

(3) $\frac{a^3R}{2b}$ (4) $\frac{a^3R}{b}$

Ans. 1

Sol. $Q = at - bt^2$

$i = a - 2bt$ $\{\text{ for } i = 0 \Rightarrow t = \frac{a}{2b}\}$

From joule's law of heating

$dH = i^2Rdt$

$$H = \int_0^{a/2b} (a-2bt)^2 R\,dt$$

$$H = \left.\frac{(a-2bt)^3 R}{-3\times 2b}\right|_0^{\frac{a}{2b}} = \frac{a^3R}{6b}$$

15. A black body is at a temperature of 5760 K. The energy of radiation emitted by the body at wavelength 250 nm is U_1, at wavelength 500 nm is U_2 and that at 1000 nm is U_3. Wien's constant, $b = 2.88 \times 10^6$ nmK. Which of the following is correct?

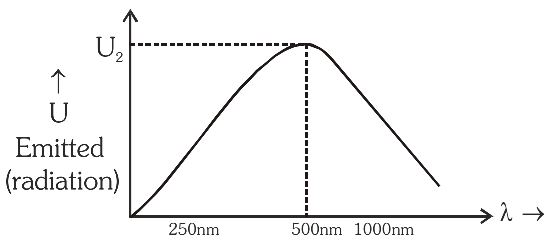
(1) $U_1 = 0$ (2) $U_3 = 0$

(3) $U_1 > U_2$ (4) $U_2 > U_1$

Ans. 4

Sol. Maximum amount of emitted radiation corresponding to $\lambda_m = \frac{b}{T}$

$$\lambda_m = \frac{2.88\times 10^6 \text{nmK}}{5760\text{K}} = 500 \text{ nm}$$



From the graph $U_1 < U_2 > U_3$

16. Coefficient of linear expansion of brass and steel rods are α_1 and α_2. Lengths of brass and steel rods are ℓ_1 and ℓ_2 respectively. If $(\ell_2 - \ell_1)$ is maintained same at all temperatures, which one of the following relations holds good ?

(1) $\alpha_1\ell_2 = \alpha_2\ell_1$

(2) $\alpha_1\ell_2^2 = \alpha_2\ell_1^2$

(3) $\alpha_1^2\ell_2 = \alpha_2^2\ell_1$

(4) $\alpha_1\ell_1 = \alpha_2\ell_2$

Ans. 4

Sol. Change in length for both rods should be same

$\Delta\ell_1 = \Delta\ell_2$

$\ell_1\alpha_1\Delta T = \ell_2\alpha_2\Delta T$

$\ell_1\alpha_1 = \ell_2\alpha_2$

17. A npn transistor is connected in common emitter configuration in a given amplifier. A load resistance of 800 Ω is connected in the collector circuit and the voltage drop across it is 0.8 V. If the current amplification factor is 0.96 and the input resistance of the circuit is 192Ω, the voltage gain and the power gain of the amplifier will respectively be :

(1) 4, 3.84 (2) 3.69, 3.84

(3) 4, 4 (4) 4, 3.69

Ans. 1

Sol. Given $\alpha = 0.96$

so, $\beta = \frac{\alpha}{1-\alpha} = \frac{0.96}{0.04} \Rightarrow \boxed{\beta = 24}$

Voltage gain for common emitter configuration

$$A_v = \beta.\frac{R_L}{R_i} = 24 \times \frac{800}{192} = 100$$

Power gain for common emitter configuration

$P_v = \beta A_v = 24 \times 100 = 2400$

Voltage gain for common base configuration

$$A_v = \alpha.\frac{R_L}{R_P} = 0.96 \times \frac{800}{192} = 4$$

Power gain for common base configuration

$P_v = A_v\alpha = 4 \times 0.96 = 3.84$

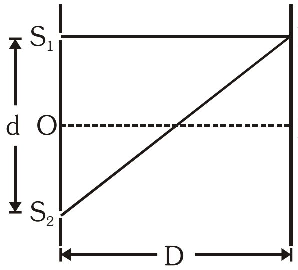
***In the question it is asked about common emitter configuration but we got above answer for common base configuration.**

18. The intensity at the maximum in a Young's double slit experiment is I_0. Distance between two slits is $d = 5\lambda$, where λ is the wavelength of light used in the experiment. What will be the intensity in front of one of the slits on the screen placed at a distance $D = 10\ d$?

(1) I_0 (2) $\frac{I_0}{4}$ (3) $\frac{3}{4}I_0$ (4) $\frac{I_0}{2}$

Ans. 4

Sol. Path difference



$= S_2P - S_1P$

$= \sqrt{D^2 + d^2} - D$

$= D\left(1 + \frac{1}{2}\frac{d^2}{D^2}\right) - D$

$= D\left[1 + \frac{d^2}{2D^2} - 1\right] = \frac{d^2}{2D}$

$\Delta x = \frac{d^2}{2 \times 10d} = \frac{d}{20} = \frac{5\lambda}{20} = \frac{\lambda}{4}$

$\Delta\phi = \frac{2\pi}{\lambda}.\frac{\lambda}{4} = \frac{\pi}{2}$

So, intensity at the desired point is

$I = I_0\cos^2\frac{\phi}{2} = I_0\cos^2\frac{\pi}{4} = \frac{I_0}{2}$

19. A uniform circular disc of radius 50 cm at rest is free to turn about an axis which is perpendicular to its plane and passes through its centre. It is subjected to a torque which produces a constant angular acceleration of 2.0 rad s^{-2}. Its net acceleration in ms^{-2} at the end of 2.0 s is approximately :

(1) 8.0 (2) 7.0 (3) 6.0 (4) 3.0

Ans. 1

Sol. Particle at periphery will have both radial and tangential acceleration

$a_t = R\alpha = 0.5 \times 2 = 1\ m/s^2$

$\omega = \omega_0 + \alpha t$

$\omega = 0 + 2 \times 2 = 4$ rad/sec

$a_c = \omega^2 R = (4)^2 \times 0.5 = 16 \times 0.5 = 8\ m/s^2$

$a_{total} = \sqrt{a_p^2 + a_c^2} = \sqrt{1^2 + 8^2} \approx 8\,m/s^2$

***In this question we have assumed the point to be located at periphery of the disc.**

20. An electron of mass m and a photon have same energy E. The ratio of de-Broglie wavelengths associated with them is :

(1) $\frac{1}{c}\left(\frac{E}{2m}\right)^{\frac{1}{2}}$ (2) $\left(\frac{E}{2m}\right)^{\frac{1}{2}}$

(3) $c(2mE)^{\frac{1}{2}}$ (4) $\frac{1}{xc}\left(\frac{2m}{E}\right)^{\frac{1}{2}}$

(c being velocity of light)

Ans. 1

Sol. For electron $\lambda_e = \frac{h}{\sqrt{2mE}}$

for Photon $E = pc \Rightarrow \lambda_{Ph} = \frac{hc}{E}$

$\Rightarrow \frac{\lambda_e}{\lambda_{Ph}} = \frac{h}{\sqrt{2mE}} \times \frac{E}{hc} = \left(\frac{E}{2m}\right)^{1/2}\frac{1}{c}$

21. A disk and a sphere of same radius but different masses roll off on two inclined planes of the same altitude and length. Which one of the two objects gets to the bottom of the plane first ?

(1) Disk

(2) Sphere

(3) Both reach at the same time

(4) Depends on their masses

Ans. 2

Sol. $a = \frac{g\sin\theta}{1 + \frac{K^2}{R^2}}$

for disc ; $\frac{K^2}{R^2} = \frac{1}{2} = 0.5$

for sphere ; $\frac{K^2}{R^2} = \frac{2}{5} = 0.4$

a(sphere) > a(disc)

$\therefore$ sphere reaches first

22. The angle of incidence for a ray of light at a refracting surface of a prism is $45°$. The angle of prism is 60°. If the ray suffers minimum deviation through the prism, the angle of minimum deviation and refractive index of the material of the prism respectively, are :

(1) $45°, \frac{1}{\sqrt{2}}$ (2) $30°, \sqrt{2}$

(3) $45°, \sqrt{2}$ (4) $30°, \frac{1}{\sqrt{2}}$

Ans. 2

Sol. $i = 45°;\ A = 60°;\ \delta_m = 2i - A = 30°$

$$\mu = \frac{\sin\left(\frac{A+\delta_m}{2}\right)}{\sin A/2} = \frac{\sin 45°}{\sin 30°} = \frac{1}{\sqrt{2}}.\frac{2}{1} = \sqrt{2}$$

23. When an α-particle of mass 'm' moving with velocity 'v' bombards on a heavy nucleus of charge 'Ze', its distance of closest approach from the nucleus depends on m as :

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

Ans. 1

Sol. At closest distance of approach, the kinetic energy of the particle will convert completely into electrostatic potential energy.

$$\Rightarrow \frac{1}{2}mv^2 = \frac{KQq}{d} \Rightarrow d \propto \frac{1}{m}$$

24. A particle of mass 10 g moves along a circle of radius 6.4 cm with a constant tangential acceleration. What is the magnitude of this acceleration if the kinetic energy of the particle becomes equal to 8×10^{-4} J by the end of the second revolution after the beginning of the motion?

(1) 0.1 m/s^2 (2) 0.15 m/s^2
(3) 0.18 m/s^2 (4) 0.2 m/s^2

Ans. 1

Sol. $\frac{1}{2}mv^2 = E \Rightarrow \frac{1}{2}\left(\frac{10}{1000}\right)v^2 = 8 \times 10^{-4}$

$\Rightarrow v^2 = 16 \times 10^{-2} \Rightarrow v = 4 \times 10^{-1} = 0.4$ m/s

Now,

$v^2 = u^2 + 2a_t s$ $(s = 4\pi R)$

$$\Rightarrow \frac{16}{100} = 0^2 + 2a_t\left(4 \times \frac{22}{7} \times \frac{6.4}{100}\right)$$

$$\Rightarrow a_t = \frac{16}{100} \times \frac{7 \times 100}{8 \times 22 \times 6.4} = 0.1 \text{ m/s}^2$$

25. The molecules of a given mass of a gas have r.m.s. velocity of 200 ms^{-1} at 27°C and 1.0×10^5 Nm^{-2} pressure. When the temperature and pressure of the gas are respectively, 127°C and 0.05×10^5 Nm^{-2}, the r.m.s. velocity of its molecules in ms^{-1} is :

(1) $100\sqrt{2}$ (2) $\frac{400}{\sqrt{3}}$ (3) $\frac{100\sqrt{2}}{3}$ (4) $\frac{100}{3}$

Ans. 2

Sol. $v \propto \sqrt{T} \Rightarrow \frac{v}{200} = \sqrt{\frac{400}{300}} \Rightarrow v = \frac{200 \times 2}{\sqrt{3}}$ m/s

$$\Rightarrow v = \frac{400}{\sqrt{3}} \text{ m/s}$$

26. A long straight wire of radius a carries a steady current I. The current is uniformly distributed over its cross-section. The ratio of the magnetic fields B and B', at radial distances $\frac{a}{2}$ and 2a respectively, from the axis of the wire is :

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

(3) 1 (4) 4

Ans. 3

Sol. For points inside the wire

$$B = \frac{\mu_0 Ir}{2\pi R^2} \quad (r \le R)$$

For points outside the wire

$$B = \frac{\mu_0 I}{2\pi r} \quad (r \ge R)$$

according to the question

$$\frac{B}{B'} = \frac{\frac{\mu_0 I(a/2)}{2\pi a^2}}{\frac{\mu_0 I}{2\pi(2a)}} = 1 : 1$$

27. A particle moves so that its position vector is given by $\vec{r} = \cos\omega t\,\hat{x} + \sin\omega t\,\hat{y}$. Where ω is a constant. Which of the following is true ?

(1) Velocity and acceleration both are perpendicular to $\vec{r}$.

(2) Velocity and acceleration both are parallel to $\vec{r}$

(3) Velocity is perpendicular to $\vec{r}$ and acceleration is directed towards the origin

(4) Velocity is perpendicular to $\vec{r}$ and acceleration is directed away from the origin

Ans. 3

Sol. $\vec{r} = \cos\omega t\;\hat{x} + \sin\omega t\,\hat{y}$

$\vec{v} = -\omega\sin\omega t\;\hat{x} + \omega\cos\omega t\,\hat{y}$

$\vec{a} = -\omega^2\cos\omega t\;\hat{x} + \omega\sin\omega t\,\hat{y} = -\omega^2\vec{r}$

$\vec{r}.\vec{v} = 0$ hence $\vec{r} \perp \vec{v}$

$\vec{a}$ is directed towards the origin.

28. What is the minimum velocity with which a body of mass m must enter a vertical loop of radius R so that it can complete the loop ?

(1) $\sqrt{gR}$ (2) $\sqrt{2gR}$

(3) $\sqrt{3gR}$ (4) $\sqrt{5gR}$

Ans. 4

Sol. When minimum speed of body is $\sqrt{5gR}$, then **no matter from where it enters the loop, it will complete full vertical loop.**

29. When a metallic surface is illuminated with radiation of wavelength λ, the stopping potential is V. If the same surface is illuminated with radiation of wavelength 2λ, the stopping potential is $\frac{V}{4}$. The threshold wavelength for the metallic surface is :-

(1) 4λ (2) 5λ (3) $\frac{5}{2}\lambda$ (4) 3λ

Ans. 4

Sol. $eV = \frac{hc}{\lambda} - \frac{hc}{\lambda_0}$ ...(i)

$eV/4 = \frac{hc}{2\lambda} - \frac{hc}{\lambda_0}$ ...(ii)

From equation (i) and (ii)

$\Rightarrow 4 = \dfrac{\frac{1}{\lambda} - \frac{1}{\lambda_0}}{\frac{1}{2\lambda} - \frac{1}{\lambda_0}}$ On solving $\lambda_0 = 3\lambda$

30. A gas is compressed isothermally to half its initial volume. The same gas is compressed separately through an adiabatic process until its volume is again reduced to half. Then :-

(1) Compressing the gas isothermally will require more work to be done.

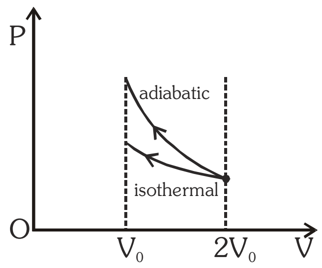
(2) Compressing the gas through adiabatic process will require more work to be done.

(3) Compressing the gas isothermally or adiabatically will require the same amount of work.

(4) Which of the case (whether compression through isothermal or through adiabatic process) requires more work will depend upon the atomicity of the gas.

Ans. 2

Sol.



W_{ext} = negative of area with volume-axis

W(adiabatic) > W(isothermal)

31. A potentiometer wire is 100 cm long and a constant potential difference is maintained across it. Two cells are connected in series first to support one another and then in opposite direction. The balance points are obtained at 50 cm and 10 cm from the positive end of the wire in the two cases. The ratio of emf's is :-

(1) 5 : 1 (2) 5 : 4

(3) 3 : 4 (4) 3 : 2

Ans. 4

Sol. $\frac{E_1 + E_2}{E_1 - E_2} = \frac{50}{10}$

$\Rightarrow \frac{2E_1}{2E_2} = \frac{50+10}{50-10} \Rightarrow \frac{E_1}{E_2} = \frac{3}{2}$

32. A astronomical telescope has objective and eyepiece of focal lengths 40 cm and 4 cm respectively. To view an object 200 cm away from the objective, the lenses must be separated by a distance :-

(1) 37.3 cm (2) 46.0 cm

(3) 50.0 cm (4) 54.0 cm

Ans. **4**

Sol. Using lens formula for objective lens

$$\frac{1}{v_0}-\frac{1}{u_0}=\frac{1}{f_0} \Rightarrow \frac{1}{v_0}=\frac{1}{f_0}+\frac{1}{u_0}$$

$$\Rightarrow \frac{1}{v_0}=\frac{1}{40}+\frac{1}{-200} = \frac{+5-1}{200}$$

$\Rightarrow v_0 = 50$ cm

Tube length $\ell = |v_0| + f_e = 50 + 4 = 54$ cm.

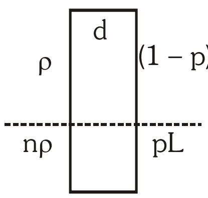
33. Two non-mixing liquids of densities ρ and $n\rho$ $(n > 1)$ are put in a container. The height of each liquid is h. A solid cylinder of length L and density d is put in this container. The cylinder floats with its axis vertical and length $pL(p < 1)$ in the denser liquid. The density d is equal to :-

(1) $\{1 + (n + 1)p\}\rho$ (2) $\{2 + (n + 1)p\}\rho$

(3) $\{2 + (n - 1)p\}\rho$ (4) $\{1 + (n - 1)p\}\rho$

Ans. **4**

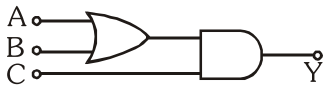
Sol.



$L\,A\,d\,g = (pL)\,A\,(n\rho)g + (1 - p)\,L\,A\,\rho\,g$

$\Rightarrow d = (1 - p)\rho + pn\,\rho = [1 + (n - 1)p]\rho$

34. To get output 1 for the following circuit, the correct choice for the input is



(1) A = 0, B = 1, C = 0

(2) A = 1, B = 0, C = 0

(3) A = 1, B = 1, C = 0

(4) A = 1, B = 0, C = 1

Ans. **4**

Sol. $(A + B)\,C = 1 \Rightarrow C = 1$

35. A piece of ice falls from a height h so that it melts completely. Only one-quarter of the heat produced is absorbed by the ice and all energy of ice gets converted into heat during its fall. The value of h is :

[Latent heat of ice is 3.4×10^5 J/kg and $g = 10$ N/kg]

(1) 34 km (2) 544 km (3) 136 km (4) 68 km

Ans. **3**

Sol. $\frac{mgh}{4} = mL$

$$\Rightarrow h = \frac{4L}{g} = \frac{4\times3.4\times10^5}{10} = 136 \text{ km.}$$

36. The ratio of escape velocity at earth (v_e) to the escape velocity at a planet (v_p) whose radius and mean density are twice as that of earth is :-

(1) 1 : 2 (2) 1 : $2\sqrt{2}$

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

Ans. **2**

Sol. $$Ve = \sqrt{\frac{2GM}{R}} = \sqrt{\frac{2G}{R}\cdot\left(\frac{4}{3}\pi R^3\rho\right)} \propto R\sqrt{\rho}$$

$\therefore$ Ratio = 1 : $2\sqrt{2}$

37. If the magnitude of sum of two vectors is equal to the magnitude of difference of the two vectors, the angle between these vectors is :-

(1) 0° (2) 90°

(3) 45° (4) 180°

Ans. 2

Sol. $\left|\vec{A}+\vec{B}\right|=\left|\vec{A}-\vec{B}\right| = \theta = 90°.$

38. Given the value of Rydberg constant is $10^7 m^{-1}$, the wave number of the last line of the Balmer series in hydrogen spectrum will be :-

(1) $0.025 \times 10^4\ m^{-1}$ (2) $0.5 \times 10^7\ m^{-1}$

(3) $0.25 \times 10^7\ m^{-1}$ (4) $2.5 \times 10^7\ m^{-1}$

Ans. 3

Sol. $\frac{1}{\lambda} = RZ^2\left(\frac{1}{n_2^2}-\frac{1}{n_1^2}\right) = 10^7 \times 1^2\left(\frac{1}{2^2}-\frac{1}{\infty^2}\right)$

$\Rightarrow$ wave number $= \frac{1}{\lambda} = 0.25 \times 10^7\ m^{-1}$

39. A body of mass 1 kg begins to move under the action of a time dependent force $\vec{F}=(2t\,\hat{i}+3t^2\hat{j})N$, where $\hat{i}$ and $\hat{j}$ are unit vectors along x and y axis. What power will be developed by the force at the time t ?

(1) $(2t^2 + 3t^3)W$ (2) $(2t^2 + 4t^4)W$

(3) $(2t^3 + 3t^4)W$ (4) $(2t^3 + 3t^5)W$

Ans. 4

Sol. $\vec{F} = 2t\hat{i} + 3t^2\hat{j}$

$m\frac{d\vec{v}}{dt} = 2t\hat{i} + 3t^2\hat{j}$ (m = 1 kg)

$\Rightarrow \int_0^{\vec{v}} d\vec{v} = \int_0^t (2t\hat{i}+3t^2\hat{j})dt \Rightarrow \vec{v} = t^2\hat{i}+t^3\hat{j}$

Power = $\vec{F}.\vec{v}$ = $(2t^3 + 3t^5)W$

40. An inductor 20 mH, a capacitor 50 μF and a resistor 40Ω are connected in series across a source of emf V = 10 sin 340 t. The power loss in A.C. circuit is :-

(1) 0.51 W (2) 0.67 W

(3) 0.76 W (4) 0.89 W

Ans. 1

Sol. $X_C = \frac{1}{\omega C} = \frac{1}{340 \times 50 \times 10^{-6}} = 58.8\ \Omega$

$X_L = \omega L = 340 \times 20 \times 10^{-3} = 6.8\ \Omega$

$Z = \sqrt{R^2+(X_C-X_L)^2}$

$= \sqrt{40^2+(58.8-6.8)^2} = \sqrt{4304}\,\Omega$

$P = i_{rms}^2 R = \left(\frac{V_{rms}}{Z}\right)^2 R$

$= \left(\frac{10/\sqrt{2}}{\sqrt{4304}}\right)^2 \times 40 = \frac{50 \times 40}{4304} = 0.47\ W$

So best answer (nearest answer) will be (1)

41. If the velocity of a particle is $v = At + Bt^2$, where A and B are constants, then the distance travelled by it between 1s and 2s is :-

(1) $\frac{3}{2}A+4B$ (2) 3A+7B

(3) $\frac{3}{2}A+\frac{7}{3}B$ (4) $\frac{A}{2}+\frac{B}{3}$

Ans. 3

Sol. $V = At + Bt^2 \Rightarrow \frac{dx}{dt} = At+Bt^2$

$\Rightarrow \int_0^x dx = \int_1^2 (At+Bt^2)dt$

$\Rightarrow x = \frac{A}{2}(2^2-1^2)+\frac{B}{3}(2^3-1^3) = \frac{3A}{2}+\frac{7B}{3}$

42. A long solenoid has 1000 turns. When a current of 4A flows through it, the magnetic flux linked with each turn of the solenoid is 4×10^{-3} Wb. The self inductance of the solenoid is :-

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

Ans. 4

Sol. Flux linked with each turn = 4×10^{-3} Wb

$\therefore$ Total flux linked = $1000[4 \times 10^{-3}]$ Wb

$\phi_{total} = 4 \Rightarrow Li = 4 \Rightarrow L = 1H$

43. A small signal voltage $V(t) = V_0 \sin \omega t$ is applied across an ideal capacitor C :-

(1) Current I(t), lags voltage V(t) by 90°.

(2) Over a full cycle the capacitor C does not consume any energy from the voltage source.

(3) Current I(t) is in phase with voltage V(t).

(4) Current I(t) leads voltage V(t) by 180°.

Ans. 2

Sol. Power = $V_{rms} \cdot I_{rms} \cos\phi$

as $\cos\phi = 0$ (Because $\phi = 90°$)

$\therefore$ Power consumed = 0 (in one complete cycle)

44. Match the corresponding entries of **column-1** with **coloumn-2** (Where m is the magnefication produced by the mirror) :-

Column-1	**Column-2**
(A) $m = -2$	(a) Convex mirror
(B) $m = -\frac{1}{2}$	(b) Concave mirror
(C) $m = +2$	(c) Real image
(D) $m = +\frac{1}{2}$	(d) Virtual image

(1) A $\rightarrow$ b and c, B $\rightarrow$ b and c, C $\rightarrow$ b and d, D $\rightarrow$ a and d.

(2) A $\rightarrow$ a and c, B $\rightarrow$ a and d, C $\rightarrow$ a and b, D $\rightarrow$ c and d

(3) A $\rightarrow$ a and d, B $\rightarrow$ b and c, C $\rightarrow$ b and d, D $\rightarrow$ b and c

(4) A $\rightarrow$ c and d, B $\rightarrow$ b and d, C $\rightarrow$ b and c, D $\rightarrow$ a and d

Ans. 1

Sol. m = +ve $\Rightarrow$ virtual image

m = –ve $\Rightarrow$ real image

$|m| > 1 \Rightarrow$ magnified image

$|m| < 1 \Rightarrow$ diminished image

45. A car is negotiating a curved road of radius R. The road is banked at an angle θ. the coefficient of friction between the tyres of the car and the road is μ_s. The maximum safe velocity on this road is :-

(1) $\sqrt{gR^2 \frac{\mu_s + \tan\theta}{1 - \mu_s \tan\theta}}$

(2) $\sqrt{gR \frac{\mu_s + \tan\theta}{1 - \mu_s \tan\theta}}$

(3) $\sqrt{\frac{g}{R} \frac{\mu_s + \tan\theta}{1 - \mu_s \tan\theta}}$

(4) $\sqrt{\frac{g}{R^2} \frac{\mu_s + \tan\theta}{1 - \mu_s \tan\theta}}$

Ans. 2

Sol. $\frac{v^2}{Rg} = \left(\frac{\mu_s + \tan\theta}{1 - \mu_s \tan\theta}\right)$

$\Rightarrow v = \sqrt{Rg\left[\frac{\mu_s + \tan\theta}{1 - \mu_s \tan\theta}\right]}$

AIPMT / NEET–2016 TEST PAPER WITH ANSWER & SOLUTIONS (HELD ON SUNDAY 1st MAY, 2016)

46. Consider the molecules CH_4, NH_3 and H_2O. Which of the given statements is false ?

(1) The H –C–H bond angle in CH_4, the H–N–H bond angle in NH_3, and the H–O–H bond angle in H_2O ar all greater than 90°

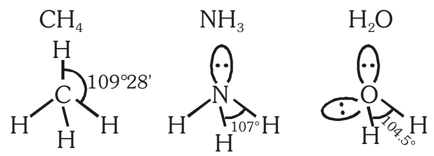
(2) The H–O–H bond angle in H_2O is larger than the H–C–H bond angle in CH_4.

(3) The H–O–H bond angle in H_2O is smaller than the H–N–H bond angle in NH_3.

(4) The H–C–H bond angle in CH_4 is larger than the H–N–H bond angle in NH_3.

Ans. (2)

Sol.



47. In the reaction

$$\text{H–C}\equiv\text{CH} \xrightarrow[\text{(2) } CH_3CH_2Br]{\text{(1) } NaNH_2/\text{liq.}NH_3} X \xrightarrow[\text{(2) } CH_3CH_2Br]{\text{(1) } NaNH_2/\text{liq.}NH_3} Y$$

X and Y are :

(1) X = 1-Butyne ; Y = 3-Hexyne

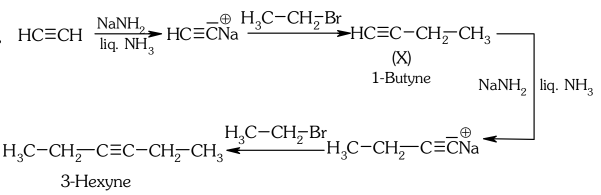
(2) X = 2-Butyne ; Y = 3-Hexyne

(3) X = 2-Butyne ; Y = 2-Hexyne

(4) X = 1-Butyne ; Y = 2-Hexyne

Ans. (1)

Sol.



48. Among the following, the correct order of acidity is

(1) $HClO_3 < HClO_4 < HClO_2 < HClO$

(2) $HClO < HClO_2 < HClO_3 < HClO_4$

(3) $HClO_2 < HClO < HClO_3 < HClO_4$

(4) $HClO_4 < HClO_2 < HClO < HClO_3$

Ans. (2)

Sol. Acidic strength ∝ EN ∝ +ve O.S.

$$\underset{+1}{HClO} < \underset{+3}{HClO_2} < \underset{+5}{HClO_3} < \underset{+7}{HClO_4}$$

49. The rate of a first-order reaction is 0.04 mol $\ell^{-1}s^{-1}$ at 10 seconds and 0.03 mol $\ell^{-1}s^{-1}$ at 20 seconds after initiation of the reaction. The half-life period of the reaction is :

(1) 24.1 s (2) 34.1 s

(3) 44.1 s (4) 54.1 s

Ans. (1)

Sol. $K = \dfrac{2.303}{(t_2 - t_1)}\log\dfrac{(a - x_1)}{(a - x_2)}$

$$K = \frac{2.303}{(20-10)}\log\left(\frac{0.04}{0.03}\right)$$

$$K = \frac{2.303 \times 0.1249}{10}$$

$$\frac{2.303 \times \log 2}{t_{1/2}} = \frac{2.303 \times 0.1249}{10}$$

$$t_{1/2} = \frac{0.3010 \times 10}{0.1249} = 24.1 \text{ sec}$$

50. Which one of the following characteristics is associated with adsorption ?

(1) ΔG is negative but ΔH and ΔS are positive

(2) ΔG, ΔH and ΔS all are negative

(3) ΔG and ΔH are negative but ΔS is positive

(4) ΔG and ΔS are negative but ΔH is positive

Ans. (2)

Sol. Adsorption is spontaneous process,

so ΔG = negative

Adsorption is exothermic process,

so ΔH = negative

In adsorpiton entropy decreases,

so ΔS = negative

so ΔG, ΔH and ΔS all are negative

51. In which of the following options the order of arrangement does not agree with the variation of property indicated against it ?

(1) $Al^{3+} < Mg^{2+} < Na^+ < F^-$ (increasing ionic size)

(2) $B < C < N < O$ (increasing first ionisation enthalpy)

(3) I < Br < Cl < F (increasing electron gain enthalpy)

(4) Li < Na < K < Rb (increasing metallic radius)

Ans. (2 & 3)

Sol. (2) B < C < N < O (given I.P. order)

B < C < O < N (correct)

(3) I < Br < Cl < F (given ΔH_{eg} order)

I < Br < F < Cl (Correct)

52. Which of the following statements is false ?

(1) Mg^{2+} ions form a complex with ATP

(2) Ca^{2+} ions are important in blood clotting

(3) Ca^{2+} ions are not important in maintaining the regular beating of the heart.

(4) Mg^{2+} ions are important in the green parts of plants.

Ans. (3)

Sol.

53. Which of the following statements about hydrogen is **incorrect** ?

(1) hydrogen has three isotopes of which tritium is the most common.

(2) Hydrogen never acts as cation in ionic salts

(3) Hydronium ion, H_3O^+ exists freely in solution

(4) Dihydrogen does not act as a reducing agent

Ans. (1 & 4)

Sol.

54. The correct statement regarding a carbonyl compound with a hydrogen atom on its alphacarbon,is :-

(1) a carbonyl compound with a hydrogen atom on its alpha-carbon never equilibrates with its corresponding enol.

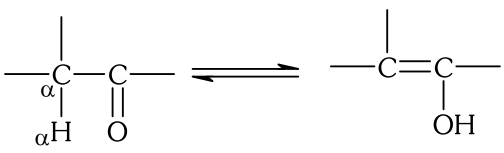
(2) a carbonyl compound with a hydrgen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as aldehyde-ketone equilibration.

(3) a carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as carbonylation.

(4) a carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as keto-enol tautomerism.

Ans. (4)

Sol. Keto-enol Tautomerism



(Keto) (enol)

55. MY and NY_3, two nearly insoluble salts, have the same K_{sp} values of 6.2×10^{-13} at room temperature. Which statement would be **true** in regard to MY and NY_3 ?

(1) The molar solubilities of MY and NY_3 in water are identical.

(2) The molar solubility of MY in water is less than that of NY_3

(3) The salts MY and NY_3 are more soluble in 0.5 M KY than in pure water.

(4) The addition of the salt of KY to solution of MY and NY_3 will have no effect on their solubilities.

Ans. (2)

Sol. $MY \rightarrow K_{sp} = s^2 = 6.2 \times 10^{-13}$

$s = \sqrt{6.2 \times 10^{-13}}$

$s = 7.87 \times 10^{-7}$ mol L^{-1}

$NY_3 \rightarrow K_{sp} = 27\ s^4 = 6.2 \times 10^{-13}$

$s = \left(\dfrac{6.2 \times 10^{-13}}{27}\right)^{1/4}$

$s = 3.89 \times 10^{-4}$ mol L^{-1}

$\therefore$ molar solubility of NY_3 is more than MY in water.

56. In a protein molecule various amino acids are linked together by :

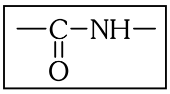
(1) α-glycosidic bond

(2) β-glycosidic bond

(3) peptide bond

(4) dative bond

Ans. (3)

Sol. Peptide bond 

57. Natural rubber has

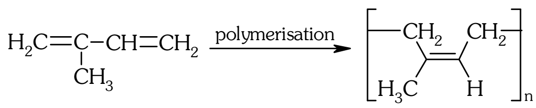
(1) All cis-configuration

(2) All trans-configuration

(3) Alternate cis-and trans-configuration

(4) Random cis-and trans-configuration

Ans. (1)

Sol. 

Isoprene cis-polyisoprene

58. Match items of **Column I** with the items of **Column II** and asign the correct code :

	Column-I		Column-II
(a)	Cyanide process	(i)	Ultrapure Ge
(b)	Froth floatation process	(ii)	Dressing of ZnS
(c)	Electrolytic reduction	(iii)	Extraction of Al
(d)	Zone refining	(iv)	Extraction of Au
		(v)	Purification of Ni

Code :

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

Ans. **(1)**

Sol.

59. Which one of the following statements is correct when SO_2 is passed through acidified $K_2Cr_2O_7$ solution ?

(1) The solution turns blue

(2) The solution is decolourized

(3) SO_2 is reduced

(4) Green $Cr_2(SO_4)_3$ is formed

Ans. **(4)**

Sol. $K_2Cr_2O_7 + SO_2 + H_2SO_4$

$\rightarrow K_2SO_4 + Cr_2(SO_4)_3 + H_2O$

green colour

60. The electronic configurations of Eu(Atomic No 63), Gd(Atomic No 64) and Tb (Atomic No. 65) are

(1) $[Xe]4f^76s^2$, $[Xe]4f^8\,6s^2$ and $[Xe]4f^85d^16s^2$

(2) $[Xe]4f^75d^16s^2$, $[Xe]4f^7\,5d^1\,6s^2$ and $[Xe]4f^96s^2$

(3) $[Xe]4f^65d^16s^2$, $[Xe]4f^75d16s^2$ and $[Xe]4f^85d^16s^2$

(4) $[Xe]4f^76s^2$, $[Xe]4f^75d^16s^2$ and $[Xe]4f^96s^2$

Ans. **(4)**

Sol.

61. Two electrons occupying the same orbital are distinguished by

(1) Principal quantum number

(2) Magnetic quantum number

(3) Azimuthal quantum number

(4) Spin quantum number

Ans. **(4)**

Sol. Two electrons occupying the same orbital differ by spin quantum number.

62. Which copper is heated with conc. HNO_3 it produces

(1) $Cu(NO_3)_2$ and NO_2

(2) $Cu\,(NO_3)_2$ and NO

(3) $Cu(NO_3)_2$, NO and NO_2

(4) $Cu(NO_3)_2$ and N_2O

Ans. **(1)**

Sol. $Cu + 4HNO_3\,(conc.) \rightarrow Cu(NO_3)_2 + 2NO_2 + 2H_2O$

63. Which of the following reagents would distingusih cis-cyclopenta-1,2-diol from the trans-isomer?

(1) Acetone

(2) Ozone

(3) MnO_2

(4) Aluminium isopropxide

Ans. **(1)**

Sol. $\Delta G = \Delta H - T.\Delta S$

For, $\Delta H < 0$ and $\Delta S > 0$, $\Delta G = -ve$ (always)

$\therefore$ spontaneous at all temperatures.

64. The correct thermodynamic conditions for the spontaneous reaction at all temperatures is

(1) $\Delta H < 0$ and $\Delta S = 0$

(2) $\Delta H > 0$ and $\Delta S < 0$

(3) $\Delta H < 0$ and $\Delta S > 0$

(4) $\Delta H < 0$ and $\Delta S < 0$

Ans. **(3)**

Sol. $\Delta G = \Delta H - T.\Delta S$

For, $\Delta H < 0$ and $\Delta S > 0$, $\Delta G = -ve$ (always)

$\therefore$ spontaneous at all temperatures.

65. Lithium has a bcc structure. Its density is 530 kg m^{-3} and its atomic mass is 6.94 g mol^{-1}. Calculate the edge length of a unit cell of Lithium metal. ($N_A = 6.02 \times 10^{23}\ mol^{-1}$)

(1) 154 pm (2) 352 pm

(3) 527 pm (4) 264 pm

Ans. **(2)**

Sol. $\rho = \dfrac{Z \times M}{N_A \times a^3}$

For bcc structure

$Z = 2$, $\rho = 530$ kg $m^{-3} = 0.530$ g cm^{-3}

$$0.530 = \frac{2 \times 6.94}{6.02 \times 10^{23} \times a^3}$$

$a^3 = 4.348 \times 10^{-23}\ cm^3$

$a = 3.52 \times 10^{-8}$ cm

$a = 352$ pm

66. Which one of the following orders is correct for the bond dissociation enthalpy of halogen molecules?

(1) $I_2 > Br_2 > Cl_2 > F_2$

(2) $Cl_2 > Br_2 > F_2 > I_2$

(3) $Br_2 > I_2 > F_2 > Cl_2$

(4) $F_2 > Cl_2 > Br_2 > I_2$

Ans. **(2)**

Sol. $C\ell_2 > Br_2 > \underset{\substack{\downarrow \\ \text{due to high } \ell p\text{-}\ell p \text{ repulsion}}}{F_2} > I_2$

67. Which of the following is an analgesic ?

(1) Novalgin

(2) Penicillin

(3) Streptomycin

(4) Chloromycetin

Ans. **(1)**

Sol. Novalgin used as analgesic

68. Equal moles of hydrogen and oxygen gases are placed in a container with a pin-hole through which both can escape. What fraction of the oxygen escapes in the time required for one-half of the hydrogen to escape ?

(1) 1/8 (2) 1/4

(3) 3/8 (4) 1/2

Ans. **(1)**

Sol. $n_{H_2} = n_{O_2}$ and $t_{H_2} = t_{O_2}$

According to Graham's law

$$\frac{r_{H_2}}{r_{O_2}} = \sqrt{\frac{M_{O_2}}{M_{H_2}}} \Rightarrow \frac{v_1/t_1}{v_2/t_2} = \sqrt{\frac{32}{2}}$$

$$\frac{1/2}{1/x} = \sqrt{16} = 4$$

$$\frac{x}{2} = 4$$

$\therefore$ x = 8

$\therefore$ Fraction of O_2 = 1/8

69. Consider the nitration of benzene using mixed conc. H_2SO_4 and HNO_3. If a large amount of $KHSO_4$ is added to the mixture, the rate of nitration will be:-

(1) faster (2) slower

(3) unchanged (4) doubled

Ans. **(2)**

Sol. Slower, as large amount of HSO_4^- will decrease ionisation of H_2SO_4 that result in lesser ionisation of nitric acid and lesser formation of nitronium ion [NO_2^+]

70. Predict the correct order among the following :-

(1) lone pair- lone pair > lone pair - bond pair > bond pair - bond pair

(2) lone pair - lone pair > bond pair - bond pair > lone pair - bond pair

(3) bond pair - bond pair > lone pair - bond pair > lone pair - lone pair

(4) lone pair - bond pair > bond pair - bond pair > lone pair - lone pair

Ans. **(1)**

Sol.

71. The product obtained as a result of a reaction of nitrogen with CaC_2 is :-

(1) $Ca(CN)_2$ (2) CaCN

(3) $CaCN_3$ (4) Ca_2CN

Ans. **(Bonus)** (Question should beBonous)

Sol. $CaC_2 + N_2 \rightarrow CaCN_2 + C$

72. Consider the following liquid - vapour equilibrium.

Liquid $\rightleftharpoons$ Vapour

Which of the following relations is **correct** ?

(1) $\frac{d\ell nG}{dT^2} = \frac{\Delta H_v}{RT^2}$

(2) $\frac{d\ell nP}{dT} = \frac{-\Delta H_v}{RT}$

(3) $\frac{d\ell nP}{dT^2} = \frac{-\Delta H_v}{T^2}$

(4) $\frac{d\ell nP}{dT} = \frac{\Delta H_v}{RT^2}$

Ans. **(4)**

Sol. Clausius - Clapeyron's equation

$$\frac{d\ln P}{dT} = \frac{\Delta H_V}{RT^2}$$

73. Match the compounds given in column I with the hybridisation and shape given in column II and mark the **correct** option.

Column-I		**Column-II**	
(a)	XeF_6	(i)	Distorted octahedral
(b)	XeO_3	(ii)	Square planar
(c)	$XeOF_4$	(iii)	pyramidal
(d)	XeF_4	(iv)	Square pyramidal

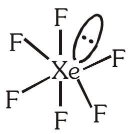
Code :-

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

Ans. (1)

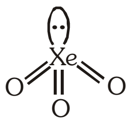
Sol.

XeF_6



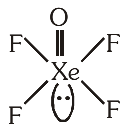
distorted octahedral

XeO_3



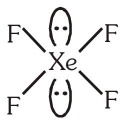
Pyramidal

$XeOF_4$



Square pyramidal

XeF_4



Square planar

74. Which of the following has longest C–O bond length? (Free C–O bond length in Co is 1.128Å).

(1) $Ni(CO)_4$

(2) $[Co(CO)_4]^{\ominus}$

(3) $[Fe(CO)_4]^{2-}$

(4) $[Mn(CO)_6]^+$

Ans. (3)

Sol. $[Fe(CO)_4]^{2-}$

Since metal atom is carrying maximum –ve charge therefore it would show maximum synergic bonding as sa resultant C–O bond length would be maximum.

75. The pressure of H_2 required to make the potential of H_2-electrode zero in pure water at 298 K is :-

(1) 10^{-14} atm

(2) 10^{-12} atm

(3) 10^{-10} atm

(4) 10^{-4} atm

Ans. (1)

Sol. $2H^+(aq) + 2e^- \rightarrow H_2(g)$

$$\therefore E = E^0 - \frac{0.0591}{2}\log\frac{P_{H_2}}{[H^+]^2}$$

$$0 = 0 - 0.0295 \log \frac{P_{H_2}}{(10^{-7})^2}$$

$$\frac{P_{H_2}}{(10^{-7})^2} = 1$$

$$P_{H_2} = 10^{-14} \text{ atm}$$

76. The addition of a catalyst during a chemical reaction alters which of the following quantities ?

(1) Entropy

(2) Internal energy

(3) Enthalpy

(4) Activation energy

Ans. (4)

Sol. The addition of catalyst during a chemical reaction alters the activation energy.

77. The ionic radii of A^+ and B^- ions are 0.98×10^{-10}m and 1.81×10^{-10} m. The coordination number of each ion in AB is :-

(1) 6 (2) 4

(3) 8 (4) 2

Ans. (1)

Sol. radii ratio $= \frac{r_+}{r_-} = \frac{0.98\times10^{-10}}{1.81\times10^{-10}} = 0.54$

radii ratio is in between 0.414 to 0.732

so, coordination number is 6

78. Which is the **correct** statement for the given acids?

(1) Phosphinic acid is a diprotic acid while phosphonic acid is a monoprotic acid

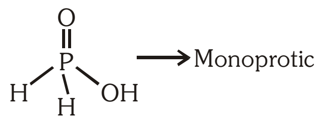
(2) Phosphinic acid is a monoprotic acid while phosphonic acid is a diprotic acid

(3) Both are triprotic acids

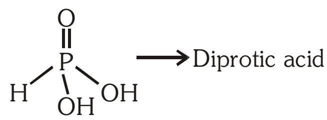
(4) Both are diprotic acids

Ans. (2)

Sol. Phosphinic acid (H_3PO_2)



Phosphonic acid (H_3PO_3)



79. Fog is colloidal solution of :-

(1) Liquid in gas

(2) Gas in liquid

(3) Solid in gas

(4) Gas in gas

Ans. (1)

Sol. Fog is a colloidal solution of liquid in gas

80. Which of the following statement about the composition of the vapour over an ideal a 1 : 1 molar mixture of benzene and toluene is **correct**? Assume that the temperature is constant at 25°C. (Given : Vapour Pressure Data at 25°C, benzene = 12.8 kPa, Toluene = 3.85 kPa)

(1) The vapour will contain a higher percentage of benzene

(2) The vapour will contain a higher percentage of toluene

(3) The vapour will contain equal amounts of benezene and toluene

(4) Not enough information is given to make a predication

Ans. (1)

Sol. A→ benzene, B→ toluene

1 : 1 molar mixture of A and B

$$\therefore\ x_A = \frac{1}{2} \text{ and } x_B = \frac{1}{2}$$

$$P_s = P_A^0 X_A + P_B^0 X_B$$

$$P_s = 12.8 \times \frac{1}{2} + 3.85 \times \frac{1}{2} = 8.325\text{kPa}$$

$$Y_A = \frac{P_A^0 X_A}{P_s} = \frac{12.8 \times \frac{1}{2}}{8.325} = 0.768$$

$$\therefore Y_B = 1 - Y_A = 1 - 0.768 = 0.232$$

so, the vapour will contain higher percentage of benzene.

81. The **correct** statement regarding the comparison of staggered and eclipsed conformation of ethane, is :-

(1) The staggered conformation of ethane is less stable than eclipsed conformation, because staggered conformation has torsional strain

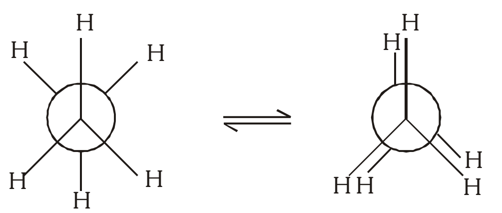
(2) The eclipsed conformation of ethane is more stable than staggered conformation, because eclipsed conformation has no torsional strain

(3) The eclipsed conformation of ethane is more stable than staggered conformation even through the eclipsed conformation has torsional strain

(4) The staggered conformation of ethane is more stable than eclipsed conformation, because staggered conformation has no torsional strain.

Ans. (4)

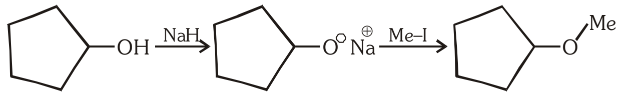
Sol.



Staggered form
* No torsional strain

Eclipsed form

82. The reaction



Can be classified as :-

(1) Williamson ether synthesis reaction

(2) Alcohol formation reaction

(3) Dehydration reaction

(4) Williamson alcohol synthesis reaction

Ans. (1)

Sol. This is an exmaple of Williamson ether syntehsis reaction in which sodium alkoxide reacts with alkyl halide and gives ether.

83. The product formed by the reaction of an aldehyde with a primary amine is :-

(1) Schiff base

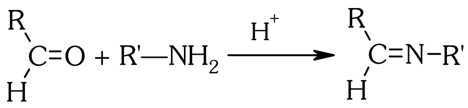
(2) Ketone

(3) Carboxylic acid

(4) Aromatic acid

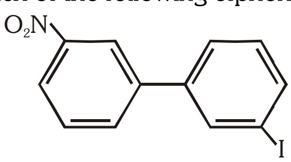
Ans. (1)

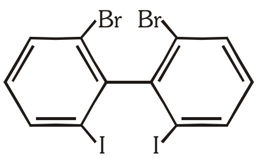
Sol.

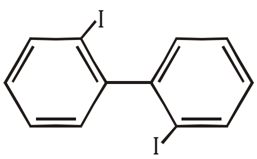


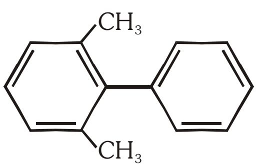
Aldehyde + primary amine Schiff base

84. Which of the following biphenyls is optically active?

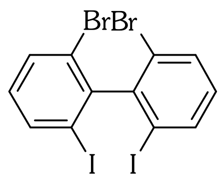
(1) 

(2) 

(3) 

(4) 

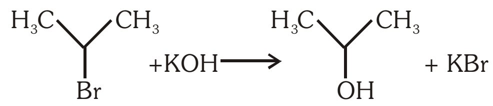
Ans. (2)

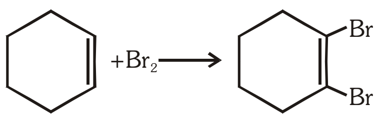
Sol. 

is optically active due to absence of plane of symmetry and center of symmetry

85. For the following reactions :-

(a) $CH_3CH_2CH_2Br + KOH \rightarrow CH_3CH{=}CH_2 + KBr + H_2O$

(b) 

(c) 

Which of the following statements is **correct** ?

(1) (a) and (b) are elimination reaction and (c) is addition reaction

(2) (a) is elimination, (b) is substitution and (c) is addition reaction

(3) (a) is elimination, (b) and (c) are substitution reactions

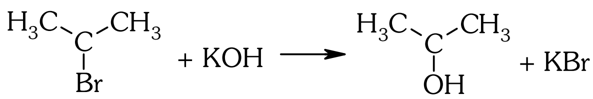
(4) (a) is substitution, (b) and (c) are addition reaction

Ans. (2)

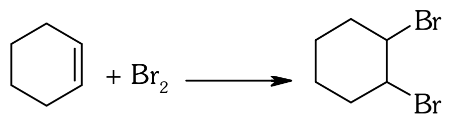
Sol.

(a) $CH_3CH_2CH_2{-}Br + KOH \rightarrow CH_3CH{=}CH_2 + KBr + H_2O$

breaking of 2σ bonds and formation of 1π bond so it is an example of elimination reaction.

(b) 

replacement of Br^- by OH^- is substitution reaction

(c) 

breaking of 1π bond and formation of 2σ bonds is addition reaction

86. At 100℃ the vapour pressure of a solution of 6.5g of a solute in 100 g water is 732 mm. If K_b = 0.52, the boiling point of this solution will be :-

(1) 101℃ (2) 100℃

(3) 102℃ (4) 103℃

Ans. (1)

Sol. $$\left(\frac{P^0 - P_s}{P^0}\right) = \frac{n}{N} = \frac{w_{solute}}{M_{solute}} \times \frac{M_{solvent}}{W_{solvent}}$$

at 100 ℃, P^0 = 760 mm

$$\frac{760-732}{760} = \frac{6.5 \times 18}{M_{solute} \times 100}$$

M_{solute} = 31.75 g mol^{-1}

$$\Delta T_b = m \times K_b = \frac{w_{solute} \times 1000}{M_{solute} \times w_{solvent}} \times K_b$$

$$\Delta T_b = \frac{0.52 \times 6.5 \times 1000}{31.75 \times 100} = 1.06°C$$

∴ boiling point of solution

= 100℃ + 1.06℃ ≃ 101℃

87. The **correct** statement regarding RNA and DNA, respectively is :

(1) The sugar component in RNA is arabinose and the sugar component in DNA is 2'-deoxyribose.

(2) The sugar component in RNA is ribose and the sugar component in DNA is 2'-deoxyribose.

(3) The sugar component in RNA is arabinose

(4) The sugar component in RNA is 2'-deoxyribose and the sugar component in DNA is arabinose.

Ans. (2)

Sol. RNA ⟶ Ribose Nucleic Acid

DNA ⟶ 2'-Deoxyribose Nucleic Acid

88. The **correct** statement regarding the basicity of arylamines is :-

(1) Arylamines are generally less basic than alkylamines because the nitrogen lone-pair electrons are delocalized by interaction with the aromatic ring π electron system.

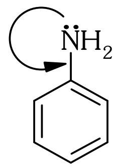
(2) Arylamines are generally more basic than alkylamines because the nitrogen lone-pair electrons are not delocalized by interaction with the aromatic ring π electron system.

(3) Arylamines are generally more basic than alkylamines because of aryl group.

(4) Arylamines are generally more basic than alkylamines, because the nitrongen atom in arylamines is sp-hybridized.

Ans. (1)

Sol.



Aryl amine

$R-\ddot{N}H_2$

alkyl amine

* Delocalized lone pair of nitrogen
* less basic

89. Which one given below is a non-reducing sugar ?

(1) Maltose

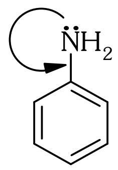
(2) Lactose

(3) Glucose

(4) Sucrose

Ans. (4)

Sol.



Aryl amine

$R-\ddot{N}H_2$

alkyl amine

* Delocalized lone pair of nitrogen
* less basic

90. The pair of electron in the given carbanion, $CH_3C \equiv C^{\ominus}$, is present in which of the following orbitals ?

(1) 2p (2) sp^3

(3) sp^2 (4) sp

Ans. (4)

Sol. $CH_3-C \equiv C^{\ominus}$

No. of σ $\left.\begin{matrix} bp-1 \\ \ell p-1 \end{matrix}\right]$ 2 & hybridisation is sp

AIPMT / NEET–2016 TEST PAPER WITH ANSWER & SOLUTIONS (HELD ON SUNDAY 01st MAY, 2016)

91. Gause's principle of competitive exclusion states that :

(1) More abundant species will exclude the less abundant species through competition.

(2) Competition for the same resources excludes species having different food preferences.

(3) No two species can occupy the same niche indefinitely for the same limiting resources.

(4) Larger organisms exclude smaller ones through competition.

Ans. (3)

92. The two polypeptides of human insulin are linked together by :-

(1) Hydrogen bonds

(2) Phosphodiester bond

(3) Covalent bond

(4) Disulphide bridges

Ans. (4)

93. The coconut water from tender coconut represents:-

(1) Endocarp

(2) Fleshy mesocarp

(3) Free nuclear proembryo

(4) Free nuclear endosperm

Ans. (4)

94. Which of the following statements is **wrong** for viroids?

(1) They lack a protein coat

(2) They are smaller than viruses

(3) They cause infections

(4) Their RNA is of high molecular weight

Ans. (4)

95. Which of the following featrues is **not** present in the Phylum - Arthropoda ?

(1) Chitinous exoskeleton

(2) Metameric segmentation

(3) Parapodia

(4) Jointed appendages

Ans. (3)

96. Which of the following most appropriately describes haemophilia ?

(1) Recessive gene disorder

(2) X - linked recessive gene disorder

(3) Chromosomal disorder

(4) Dominant gene disorder

Ans. (2)

97. Emerson's enhancement effect and Red drop have been instrumental in the discovery of :-

(1) Photophosphorylation and non-cyclic electron transport

(2) Two photosystems operating simultaneously

(3) Photophosphorylation and cyclic electron transport

(4) Oxidative phosphorylation

Ans. (2)

98. In which of the following, all three are macronutrients?

(1) Boron, zinc, manganese

(2) Iron, copper, molybdenum

(3) Molybdenum, magnesium, manganese

(4) Nitrogen, nickel, phosphorus

Ans. (Bonus)

99. Name the chronic respiratory disorder caused mainly by cigarette smoking :-

(1) Emphysema

(2) Asthma

(3) Respiratory acidosis

(4) Respiratory alkalosis

Ans. (1)

100. A system of rotating crops with legume or grass pasture to improve soil structure and fertility is called:-

(1) Ley farming

(2) Contour farming

(3) Strip farming

(4) Shifting agriculture

Ans. (1)

101. Mitochondria and chloroplast are :-

(a) semi-autonomous organelles

(b) formed by division of pre-existing organelles and they contain DNA but lack protein synthesizing machinery

Which one of the following options is **correct** ?

(1) Both (a) and (b) are correct

(2) (b) is true but (a) is false

(3) (a) is true but (b) is false

(4) Both (a) and (b) are false

Ans. (3)

102. In context of Amniocentesis, which of the following statement is **incorrect** ?

(1) It is usually done when a woman is between 14-16 weeks pregnant.

(2) It is used for prenatal sex determination

(3) It can be used for detection of Down syndrome

(4) It can be used for detection of Cleft palate

Ans. (4)

103. In a chloroplast the highest number of protons are found in :-

(1) Stroma

(2) Lumen of thylakoids

(3) Inter membrane space

(4) Antennae complex

Ans. (2)

104. Photosensitive compound in human eye is made up of :-

(1) Guanosine and Retinol

(2) Opsin and Retinal

(3) Opsin and Retinol

(4) Transducin and Retinene

Ans. (2)

105. Spindle fibres attach on to :-

(1) Telomere of the chromosome

(2) Kinetochore of the chromosome

(3) Centromere of the chromosome

(4) Kinetosome of the chromosome

Ans. (2)

106. Which is the National Aquatic Animal of India ?

(1) Gangetic shark

(2) River dolphin

(3) Blue whale

(4) Sea-horse

Ans. (2)

107. Which of the following is required as inducer(s) for the expression of Lac operon ?

(1) Glucose

(2) Galactose

(3) Lactose

(4) Lactose and galactose

Ans. (3)

108. Which of the following pairs of hormones are **not** antagonistic (having opposite effects) to each other?

(1) Parathormone – Calcitonin

(2) Insulin – Glucagon

(3) Aldosterone – Atrial Natriuretic Factor

(4) Relaxin – Inhibin

Ans. (4)

109. Microtubules are the constituents of :-

(1) Cilia, Flagella and Peroxisomes

(2) Spindle fibres, Centrioles and Cilia

(3) Centrioles, Spindle fibres and Chromatin

(4) Centrosome, Nucleosome and Centrioles

Ans. (2)

110. A complex of ribosomes attached to a single strand of RNA is known as :-

(1) Polysome (2) Polymer

(3) Polypeptide (4) Okazaki fragment

Ans. (1)

111. Fertilization in humans is practically feasible only if:-

(1) the sperms are transported into vagina just after the release of ovum in fallopian tube

(2) the ovum and sperms are transported simultaneously to ampullary isthmic junction of the fallopian tube

(3) the ovum and sperms are transported simultaneously to ampullary - isthmic junction of the cervix

(4) the sperms are transported into cervix within 48 hrs of release of ovum in uterus

Ans. (2)

112. Asthma may be attributed to :

(1) bacterial infection of the lungs

(2) allergic reaction of the mast cells in the lungs

(3) inflammation of the trachea

(4) accumulation of fluid in the lungs

Ans. (2)

113. The *Avena* curvature is used for bioassay of :

(1) ABA (2) GA_3

(3) IAA (4) Ethylene

Ans. (3)

114. The standard petal of a papilionaceous corolla is also called :

(1) Carina (2) Pappus
(3) Vexillum (4) Corona

Ans. (3)

115. Tricarpellary syncarpous gynoecium is found in flowers of :

(1) Liliaceae (2) Solanaceae
(3) Fabaceae (4) Poaceae

Ans. (1)

116. One of the major components of cell wall of most fungi is :-

(1) Chitin (2) Peptidoglycan
(3) Cellulose (4) Hemicellulose

Ans. (1)

117. Select the incorrect statement :

(1) FSH stimulates the sertoli cells which help in spermiogenesis
(2) LH triggers ovulation in ovary
(3) LH and FSH decrease gradually during the follicular phase
(4) LH triggers secretion of androgens from the Leydig cells

Ans. (3)

118. In meiosis crossing over is initiated at :

(1) Pachytene (2) Leptotene
(3) Zygotene (4) Diplotene

Ans. (1)

119. A tall true breeding garden pea plant is crossed with a dwarf true breeding garden pea plant. When the F_1 plants were selfed the resulting genotypes were in the ratio of :

(1) 1 : 2 : 1 :: Tall homozygous : Tall heterozygous : Dwarf
(2) 1 : 2 : 1 :: Tall heterozygous : Tall homozygous : Dwarf
(3) 3 : 1 :: Tall : Dwarf
(4) 3 : 1 :: Dwarf : Tall

Ans. (1)

120. Which of the following is the most important cause of animals and plants being driven to extinction ?

(1) Over - exploitation
(2) Alien species invasion
(3) Habitat loss and fragmentation
(4) Co-extinctions

Ans. (3)

121. Which of the following is a characteristic feature of cropland ecosystem ?

(1) Absence of soil organisms
(2) Least genetic diversity
(3) Absence of weeds
(4) Ecological succession

Ans. (2)

122. Changes in GnRH pulse frequency in females is controlled by circulating levels of :-

(1) estrogen and progesterone
(2) estrogen and inhibin
(3) progesterone only
(4) progesterone and inhibin

Ans. (1)

123. Which of the following is not a feature of the plasmids?

(1) Independent replication
(2) Circular structure
(3) Transferable
(4) Single - stranded

Ans. (4)

124. Which of the following features is not present in *Periplaneta americana* ?

(1) Schizocoelom as body cavity
(2) Indeterminate and radial cleavage during embryonic development
(3) Exoskeleton composed of N-acetylglucosamine
(4) Metamerically segmented body

Ans. (2)

125. In higher vertebrates, the immune system can distinguish self-cells and non-self. If this property is lost due to genetic abnormality and it attacks self-cells, then it leads to :-

(1) Allergic response
(2) Graft rejection
(3) Auto-immune disease
(4) Active immunity

Ans. (3)

126. Match the terms in Column-I with their description in Column-II and choose the correct option :

Column-I		Column-II	
(a)	Dominance	(i)	Many genes govern a single character
(b)	Codominance	(ii)	In a heterozygous organism only one allele expresses itself
(c)	Pleiotropy	(iii)	In a heterozygous organism both alleles express themselves fully
(d)	Polygenic inheritance	(iv)	A single gene influences many characters

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

Ans. (2)

127. Joint Forest Management Concept was introduced in India during :
(1) 1960 s (2) 1970 s (3) 1980 s (4) 1990 s

Ans. (3)

128. Pick out the correct statements :
(a) Haemophilia is a sex-linked recessive disease
(b) Down's syndrome is due to aneuploidy
(c) Phenylketonuria is an autosomal recessive gene disorder.
(d) Sickle cell anaemia is a X-linked recessive gene disorder
(1) (a) and (d) are correct
(2) (b) and (d) are correct
(3) (a), (c) and (d) are correct
(4) (a), (b) and (c) are correct

Ans. (4)

129. Which one of the following statements is wrong ?
(1) Cyanobacteria are also called blue-green algae
(2) Golden algae are also called desmids
(3) Eubacteria are also called false bacteria
(4) Phycomycetes are also called algal fungi

Ans. (3)

130. Proximal end of the filament of stamen is attached to the
(1) Anther (2) Connective
(3) Placenta (4) Thalamus or petal

Ans. (4)

131. Which of the following approaches does **not** give the defined action of contraceptive ?

(1)	Barrier methods	prevent fertilization
(2)	Intra uterine devices	Increase phagocytosis of sperms, suppress sperm motility and fertilizing capacity of sperms
(3)	Hormonal contraceptives	Prevent/retard entry of sperms, prevent ovulation and fertilization
(4)	Vasectomy	Prevents spermatogenesis

Ans. (4)

132. The taq polymerase enzyme is obtained from :
(1) *Thermus aquaticus*
(2) *Thiobacillus ferroxidans*
(3) *Bacillus subtilis*
(4) *Pseudomonas putida*

Ans. (1)

133. Identify the **correct** statement on 'inhibin' :-
(1) Inhibits the secretion of LH, FSH and Prolactin.
(2) Is produced by granulose cells in ovary and inhibits the secretion of FSH.
(3) Is produced by granulose cells in ovary and inhibits the secretion of LH.
(4) Is produced by nurse cells in testes and inhibits the secretion of LH.

Ans. (2)

134. Which part of the tobacco plant is infected by *Meloidogyne incognita* ?
(1) Flower (2) Leaf (3) Stem (4) Root

Ans. (4)

135. Antivenom injection contains preformed antibodies while polio drops that are administered into the body contain :-
(1) Activated pathogens
(2) Harvested antibodies
(3) Gamma globulin
(4) Attenuated pathogens

Ans. (4)

136. Which one of the following cell organelles is enclosed by a single membrane ?

(1) Mitochondria (2) Chloroplasts
(3) Lysosomes (4) Nuclei

Ans. (3)

137. Lack of relaxation between successive stimuli in sustained muscle contraction is known as :-

(1) Spasm (2) Fatigue
(3) Tetanus (4) Tonus

Ans. (3)

138. Which of the following is **not** a stem modification?

(1) Pitcher of *Nepenthes*
(2) Thorns of citrus
(3) Tendrils of cucumber
(4) Flattened structures of *Opuntia*

Ans. (1)

139. Water soluble pigments found in plant cell vacuoles are :-

(1) Xanthophylls (2) Chlorophylls
(3) Carotenoids (4) Anthocyanins

Ans. (4)

140. Select the **correct** statement :-

(1) Gymnosperms are both homosporous and heterosporous
(2) *Salvinia*, *Ginkgo* and *Pinus* all are gymnosperms
(3) *Sequoia* is one of the tallest trees
(4) The leaves of gymnosperms are not well adapted to extremes of climate

Ans. (3)

141. Which of the following is **not** required for any of the techniques of DNA fingerprinting available at present ?

(1) Polymerase chain reaction
(2) Zinc finger analysis
(3) Restriction enzymes
(4) DNA–DNA hybridization

Ans. (2)

142. Which type of tissue correctly matches with its location ?

	Tissue	Location
(1)	Smooth muscle	Wall of intestine
(2)	Areolar tissue	Tendons
(3)	Transitional epithelium	Tip nose
(4)	Cuboidal epithelium	Lining of stomach

Ans. (1)

143. A plant in your garden avoids photorespiratory losses, has improved water use efficiency shows high rates of photosynthesis at high temperatures and has improved efficiency of nitrogen utilisation. In which of the following physiological groups would you assign this plant ?

(1) C_3 (2) C_4
(3) CAM (4) Nitrogen fixer

Ans. (2)

144. Which of the following structures is homologus to the wing of a bird ?

(1) Dorsal fin of a Shark
(2) Wing of a Moth
(3) Hind limb of Rabbit
(4) Flipper of Whale

Ans. (4)

145. Which of the following characteristic features always holds true for the corresponding group of animals?

(1)	Cartilaginous endoskeleton	Chondrichthyes
(2)	Viviparous	Mammalia
(3)	Possess a mouth with an upper and a lower jaw	Chordata
(4)	3 - chambered heart with one incompletely divided ventricle	Reptilia

Ans. (1)

146. Which of the following statements is **not true** for cancer cells in relation to mutations ?

(1) Mutations in proto-oncogenes accelerate the cell cycle.
(2) Mutations destroy telomerase inhibitor.
(3) Mutations inactive the cell control.
(4) Mutations inhibit production of telomerase.

Ans. (4)

147. The amino acid Tryptophan is the precursor for the synthesis of :-

(1) Melatonin and Serotonin
(2) Thyroxine and Triiodothyronine
(3) Estrogen and Progesterone
(4) Cortisol and Cortisone

Ans. (1)

148. Following are the two statements regarding the origin of life :-

(a) The earliest organisms that appeared on the earth were non-green and presumably anaerobes.

(b) The first autotrophic organisms were the chemoautotrophs that never released oxygen.

Of the above statements which one of the following options is **correct** ?

(1) (a) is correct but (b) is false.
(2) (b) is correct but (a) is false.
(3) Both (a) and (b) are correct.
(4) Both (a) and (b) are false.

Ans. (3)

149. Reduction in pH of blood will :-

(1) reduce the rate of heart beat.
(2) reduce the blood supply to the brain.
(3) decrease the affinity of hemoglobin with oxygen.
(4) release bicarbonate ions by the liver.

Ans. (3)

150. Analogous structures are a result of :-

(1) Divergent evolution
(2) Convergent evolution
(3) Shared ancestry
(4) Stabilizing selection

Ans. (2)

151. Which of the following is a restriction endonuclease?

(1) Hind II (2) Protease
(3) DNase I (4) RNase

Ans. (1)

152. The term ecosystem was coined by :-

(1) E.P. Odum (2) A.G. Tansley
(3) E. Haeckel (4) E. Warming

Ans. (2)

153. Which one of the following statements is **wrong** ?

(1) Sucrose is a disaccharide.
(2) Cellulose is a polysaccharide.
(3) Uracil is a pyrimidine.
(4) Glycine is a sulphur containing amino acid.

Ans. (4)

154. In bryophytes and pteridophytes, transport of male gametes requires :-

(1) Wind (2) Insects
(3) Birds (4) Water

Ans. (4)

155. When does the growth rate of a population following the logistic model equal zero ? The logistic model is given as $dN/dt = rN(1-N/K)$:-

(1) when N/K is exactly one.
(2) when N nears the carrying capacity of the habitat.
(3) when N/K equals zero.
(4) when death rate is greater than birth rate.

Ans. (1)

156. Which one of the following statements is **not** true?

(1) Tapetum helps in the dehiscence of anther
(2) Exine of pollen grains is made up of sporopollenin
(3) Pollen grains of many species cause severe allergies
(4) Stored pollen in liquid nitrogen can be used in the crop breeding programmes

Ans. (1)

157. Which of the following would appear as the pioneer organisms on bare rocks?

(1) Lichens (2) Liverworts
(3) Mosses (4) Green algae

Ans. (1)

158. Which one of the following is the starter codon ?

(1) AUG (2) UGA
(3) UAA (4) UAG

Ans. (1)

159. Which one of the following characteristics is **not** shared by birds and mammals ?

(1) Ossified endoskeleton
(2) Breathing using lungs
(3) Viviparity
(4) Warm blooded nature

Ans. (3)

160. Nomenclature is governed by certain universal rules. Which one of the following is contrary to the rules of nomenclature?

(1) Biological names can be written in any language
(2) The first word in a biological name represents the genus name, and the second is a specific epithet
(3) The names are written in Latin and are italicised
(4) When written by hand, the names are to be underlined

Ans. (1)

161. Blood pressure in the pulmonary artery is :-
(1) same as that in the aorta.
(2) more than that in the carotid.
(3) more than that in the pulmonary vein.
(4) less than that in the venae cavae.

Ans. (3)

162. Cotyledon of maize grain is called :-
(1) plumule (2) coleorhiza
(3) coleoptile (4) scutellum

Ans. (4)

163. In the stomach, gastric acid is secreted by the :-
(1) gastrin secreting cells
(2) parietal cells
(3) peptic cells
(4) acidic cells

Ans. (2)

164. Depletion of which gas in the atmosphere can lead to an increased incidence of skin cancers :-
(1) Nitrous oxide (2) Ozone
(3) Ammonia (4) Methane

Ans. (2)

165. Chrysophytes, Euglenoids, Dinoflagellates and Slime moulds are included in the kingdom :-
(1) Monera (2) Protista
(3) Fungi (4) Animalia

Ans. (2)

166. Water vapour comes out from the plant leaf through the stomatal opening. Through the same stomatal opening carbon dioxide diffuses into the plant during photosynthesis. Reason out the above statements using one of following options :-
(1) Both processes cannot happen simultaneously.
(2) Both processes can happen together because the diffusion coefficient of water and CO_2 is different.
(3) The above processes happen only during night time.
(4) One process occurs during day time, and the other at night.

Ans. (2)

167. In mammals, which blood vessel would normally carry largest amount of urea ?
(1) Renal Vein (2) Dorsal Aorta
(3) Hepatic Vein (4) Hepatic Portal Vein

Ans. (3)

168. Seed formation without fertilization in flowering plants involves the process of :-
(1) Sporulation (2) Budding
(3) Somatic hybridization (4) Apomixis

Ans. (4)

169. Which of the following is wrongly matched in the given table ?

	Microbe	**Product**	**Application**
(1)	*Trichoderma polysporum*	Cyclosporin A	immunosuppressive drug
(2)	*Monascus purpureus*	Statins	lowering of blood cholesterol
(3)	*Streptococcus*	Streptokinase	removal of clot from blood vessel
(4)	*Clostridium butylicum*	Lipase	removal of oil stains

Ans. (4)

170. In a testcross involving F_1 dihybrid flies, more parental-type offspring were produced than the recombinant-type offspring. This indicates :-
(1) The two genes are located on two different chromosomes.
(2) Chromosomes failed to separate during meiosis.
(3) The two genes are linked and present on the same chromosome.
(4) Both of the characters are controlled by more than one gene.

Ans. (3)

171. It is much easier for a small animal to run uphill than for a large animal, because :-
(1) It is easier to carry a small body weight.
(2) Smaller animals have a higher metabolic rate.
(3) Small animals have a lower O_2 requirement.
(4) The efficiency of muscles in large animals is less than in the small animals.

Ans. (2)

172. Which of the following is **not** a characteristic feature during mitosis in somatic cells ?
(1) Spindle fibres
(2) Disappearance of nucleolus
(3) Chromosome movement
(4) Synapsis

Ans. (4)

173. Which of the following statements is **not** correct ?
(1) Pollen grains of many species can germinate on the stigma of a flower, but only one pollen tube of the same species grows into the style.
(2) Insects that consume pollen or nectar without bringing about pollination are called pollen/nectar robbers.
(3) Pollen germination and pollen tube growth are regulated by chemical components of pollen interacting with those of the pistil.
(4) Some reptiles have also been reported as pollinators in some plant species.

Ans. (1)

174. Specialised epidermal cells surrounding the guard cells are called :-
(1) Complementary cells
(2) Subsidiary cells
(3) Bulliform cells
(4) Lenticels

Ans. (2)

175. Which of the following guards the opening of hepatopancreatic duct into the duodenum ?
(1) Semilunar valve (2) Ileocaecal valve
(3) Pyloric sphincter (4) Sphincter of Oddi

Ans. (4)

176. Stems modified into flat green organs performing the functions of leaves are known as :-
(1) Cladodes (2) Phyllodes
(3) Phylloclades (4) Scales

Ans. (3)

177. The primitive prokaryotes responsible for the production of biogas from the dung of ruminant animals, include the :-
(1) Halophiles (2) Thermoacidiophiles
(3) Methanogens (4) Eubacteria

Ans. (3)

178. A river with an inflow of domestic sewage rich in organic waste may result in :-
(1) Drying of the river very soon due to algal bloom.
(2) Increased population of aquatic food web organisms.
(3) An increased production of fish due to biodegradable nutrients.
(4) Death of fish due to lack of oxygen.

Ans. (4)

179. A cell at telophase stage is observed by a student in a plant brought from the field. He tells his teacher that this cell is not like other cells at telophase stage. There is no formation of cell plate and thus the cell is containing more number of chromosomes as compared to other dividing cells. This would result in :-
(1) Aneuploidy (2) Polyploidy
(3) Somaclonal variation (4) Polyteny

Ans. (2)

180. A typical fat molecule is made up of :-
(1) Three glycerol molecules and one fatty acid molecule
(2) One glycerol and three fatty acid molecules
(3) One glycerol and one fatty acid molecule
(4) Three glycerol and three fatty acid molecules

Ans. (2)