NEET PART TEST 6

JITYA
The Winners Platform

www.jitya.in

ONLINE TEST SERIES 2020

SUBJECT	PHYSICS	CHEMISTRY	BIOLOGY
SYLLABUS 12TH CLASS	• Dual nature of Radiation and Matter • Atoms	• Alcohols, Phenols and Ethers • Aldehydes, Ketones and Carboxylic Acids	Biotechnology • Principles and Processes • Biotechnology and its Applications

Download NEET App – **JITYA**   Download JEE MAINS APP – **JEE MAINS 2020**

JITYA
The Winners Platform

Online Test Series 2020 Syllabus

Description	Engineering & Medical Exams						
EXAMS	NEET		JEE MAINS		BITSAT	KCET	
	11TH	12TH	11TH	12th		11TH	12TH
CHAPTERWISE TEST	1500 Test (Each chapter contains Min 200mcqs ,All subjects PCMB)						
Part Syllabus Tests	8	8	8	8	0	0	0
Half Syllabus Tests	2	2	2	2	0	6	6
Subject Level Tests	3	3	3	3	0	3	3
Full Length Tests	8		8		4	3	
TOTAL	34		34		4	21	

Contact for Sales & More Info - 9900082194   www.jitya.in

PHYSICS

Que-1) When proton of energy 3.8 eV falls on metallic surface of wok function 2.8 eV, then the kinetic energy of emitted electrons are

(a) 1 eV

(b) 6.6 eV

(c) 0 to 10 eV

(d) 2.8 eV

options :4

level :2

Ans : C

Solution : h$\nu = w_0 + KE_{max}$

$3.8 - 2.8 = KE_{max}$

$\therefore KE_{max}$ = 1eV

Que-2) The photoelectric work function

(a) Is different for different materials

(b) Is same for all materials

(c) Depends upon frequency of the incident light

(d) Depends upon intensity of the incident light

options :4

level :2

Ans : A

Solution : Work function is the property of material.

Que-3) The phenomenon of photoelectric effect was first explained by

(a) Hallwach

(b) Einstein

(c) Planck

(d) Bohr

options :4

level :2

Ans : B

Solution : Einstein won the Nobel Prize for predicting photoelectric effect by proposing the dual nature of light.

Que-4) The energy of the most energetic photoelectrons emitted from a metal target depends upon

(a) Threshold frequency of the metal

(b) Photoelectric work function of the metal

(c) Wavelength of the incident radiation

(d) All of these

options :4

level :2

Ans : D

Solution : $h\nu = w_0 + KE_{max}$

Hence, all options are correct.

Que-5) Threshold wavelength for sodium is 6×10^{-7}m. Then photoemission occurs for light of wavelength λ if

(a) $\lambda > 6 \times 10^{-7}$m

(b) $\lambda < 6 \times 10^{-7}$m

(c) $\lambda = 6 \times 10^{-7}$m

(d) Frequency $\leq 5 \times 10^{14}$hertz

options :4

level :2

Ans : B

Solution : $\lambda \leq \lambda_{threshold}$

Que-6) Given that a photon of light of wavelength 10000 Å has energy 1.23 eV. Now when light of intensity I_0 and wavelength 5000 Å falls on a photo cell the saturation current and stopping potential are 0.40 μA and 1.36 V respectively. The work function is

(a) 0.43 eV

(b) 1.10 eV

(c) 1.36 eV

(d) 2.47 V

options :4

level :2

Ans : B

Solution : λ = 10000Å has E = 1.23 eV

∵ Energy of 5000 Å photon = 2.46 eV

2.46 = Ø + 1.36

Ø = 1.1 eV

Que-7) If the frequency of light incident on a metallic plate be doubled, how will be maximum kinetic energy of the photoelectrons change?

(a) It becomes more than double

(b) It becomes less than double

(c) It becomes exactly double

(d) It does not change

options :4

level :2

Ans : A

Solution : hf = $w_0 + KE_{max}$

KE_{max} = hf - w_0

Since w_0 is constant.

KE_{max} will become more than double

Que-8) The photoelectric threshold for a certain metal surface is 330 Å. What is the maximum kinetic energy of the photoelectrons emitted, if radiations of wavelength 1100 Å are used ?

(a) 1 eV

(b) 2 eV

(c) 7.5 eV

(d) No electron is emitted

options :4

level :2

Ans : D

Solution : Since λ incident is greater than threshold wavelength. No electron will be ejected.

Que-9) When a point source of light is at a distance of 50 cm from a photoelectric cell, the cut – off voltage is found to be V_0. If the same source is placed at a distance of 1 m from the cell, then the cut – off voltage will be

(a) V_0/4

(b) V_0/2

(c) V_0

(d) 2 V_0

options :4

level :2

Ans : C

Solution : Stopping potential depends on incident light and will not change.

Que-10) Radiation from the Sun reaches Earth at rate of 1350 $Js^{-1}m^{-2}$. The magnitudes of electric and magnetic fields are

(a) 1.01 x 10^6V/m, 3.37 x 10^{-3} T

(b) 3.37 x 10^3V/m, 1.01 x 10^{-6} T

(c) 1.01 x 10^3V/m, 3.37 x 10^{-6} T

(d) 3.37 x 10^6V/m, 1.01 x 10^{-3} T

options :4

level :2

Ans : C

Solution : Average power transferred per unit area = magnitude of poyting vector = S

$$= \frac{E_{rms}\, B_{rms}}{\mu_0} \cdot \frac{E}{B} = c$$

And $\quad E_{rms} = \frac{E_{max}}{\sqrt{2}} = \frac{E_0}{\sqrt{2}}$

So, E_0 = maximum value of electric field

$$= \sqrt{\frac{2S}{\varepsilon_0 C}} = \sqrt{\frac{2\ X\ 1350}{8.85\ X10^{-12}\ X\ 3\ X\ 10^8}}$$

$$= 1.01 \text{ x } 10^3 \text{V/m}$$

And $\qquad B_0 = \frac{E_0}{C} = \frac{1.01\ X\ 10^3}{3\ X\ 10^8} = 3.37$ x 10^{-6} T

Que-11) Assume light as particles, then force required to bring a light's particle to rest will be

(a) $\frac{\Delta P}{U}$

(b) $\frac{\Delta U}{P}$

(c) $\frac{\Delta U}{c}$

(d) $\frac{\Delta P}{c}$

options :4

level :2

Ans : C

Solution : To bright light's particle at rest means to get it absorb it by an atom

Now, initial momentum of a photon just striking the surface,

$P_i = \frac{h}{\lambda} \rightarrow$ de – Brogle's hypothesis

When it is completely absorbed , $P_f = 0$

So, change in momentum (Opposite to direction of initial velocity)

$\Delta P = \frac{h}{\lambda}$

Energy incident per unit time = IA

∴ Number of photons incident per unit time

$$= n = \frac{IA}{hf} = \frac{IA\lambda}{hc}$$

So, total change in momentum per unit time

$$= n\Delta p = \frac{IA\lambda}{hc} X \frac{h}{\lambda} = \frac{IA}{c}$$

So, force on the surface

= Total change of momentum per unit time

$$F = \frac{IA}{c}$$

$$= \frac{Energy\ falling\ per\ unit\ time}{Speed\ of\ light}$$

$$= \frac{\Delta U}{c}$$

Que-12) For a parallel plate capacitor with square plates of side 5.8 cm, the electric field is changing at a rest of 2 x 10^6 V/m/s. The value of conduction (charging) current at that instant is

(a) 1.2 x 10^{15} A

(b) 6 x 10^{-8} A

(c) 1.1×10^{-5} A

(d) 1.2×10^{-8}A

options :4

level :2

Ans : B

Solution : I_D = displacement current at that instant = $\varepsilon_0 A \frac{dE}{dt}$

$$= 8.85 \times 10^{-12} \times (0.058)^2 \times (2 \times 10^6)$$

$$= 6 \times 10^{-8} \text{ A}$$

Or $\qquad I_D = I_C$

$\qquad I_C = 6 \times 10^{-8}$ A

Que-13) Potential difference across plates of a capacitor 6µF is charging at the rate of 12 V/s. Displacement current at that instant will be

(a) 1.2 A

(b) 12×10^{-6} A

(c) 7.2×10^{-6} A

(d) 72×10^{-6}A

options :4

level :2

Ans : D

Solution : Charge on plates of capacitor at any instant is Q = CV

∴ Current that flows instantly is $I_C = \frac{dQ}{dt}$

$\Rightarrow \qquad\qquad I_C = \frac{d}{dt}$ CV = C$\left(\frac{d}{dt} V\right)$

$$= 6 \times 10^{-6} \times 12$$

$$= 72 \times 10^{-6} \text{ A}$$

$$I_D = I_C = 72 \times 10^{-6} \text{ A}$$

Que-14) What minimum potential must be applied on an electron microscope to view two point distinctively , which are about 1.22 Å apart?

(a) 1000 V

(b) 100 V

(c) 150 V

(d) 10^4 V

options :4

level :2

Ans : C

Solution : For an electron microscope, wavelength associated with electrons must be less than 1.22 Å = 1 Å.

Now, using $\lambda = \sqrt{\dfrac{150}{V}}$ we have , V = 150 V

When λ = 1 Å.

Que-15) The de-Broglie wavelength associated with a particle moving with speed of light will be

(a) 0

(b) Infinity

(c) $\dfrac{hv}{mc}$

(d) $\dfrac{mc}{h}$

options :4

level :2

Ans : A

Solution : For a particle of rest mass m_0

$$\lambda = \frac{h}{m_0 v} \sqrt{\left(1 - \frac{v^2}{c^2}\right)}$$

When v = C, $\lambda = 0$

Que-16) The de-Broglie wavelength for electron in an orbit of hydrogen atom is 10^{-9} m. Principal quantum number for this electron is

(a) 1

(b) 2

(c) 3

(d) 4

options :4

level :2

Ans : C

Solution : $2\pi f_1 n = \lambda$

$\Rightarrow$ $n = \frac{\lambda}{2\pi f_1}$

$\Rightarrow$ $n = \frac{10^{-9}}{2 \, X \, 3.14 \, X \, 5.13 \, X \, 10^{-11}}$

$\Rightarrow$ n = 3

Que-17) The de-Broglie wavelength associated with electron of hydrogen atom in its ground state is

(a) 0.3 Å

(b) 3.3 Å

(c) 6.26 Å

(d) 10 Å

options :4

level :2

Ans : B

Solution : $\lambda = \frac{h}{\sqrt{2mE}}$

E = - 13.6 eV ⇒ KE = 1.36 eV

∴ $\lambda = \frac{6.63 \times 10^{-34}}{\sqrt{2 \times 9.1 \times 10^{-31} \times 13.6 \times 1.6 \times 10^{-19}}}$ = 3.3 X 10^{-10}m = 3.3 Å

Que-18) Dual nature of radiation shown by

(a) diffraction and reflection

(b) Refraction and diffraction

(c) Photoelectric effect alone

(d) Photoelectric effect and diffraction

options :4

level :2

Ans : D

Solution : $\begin{pmatrix} Photoelectric\ effect \to Particle\ nature \\ Diffraction \to Wave\ nature \end{pmatrix}$ Dual nature

Que-19) If particles are moving with same velocity, then maximum de - Broglie wavelength will be for

(a) Neutron

(b) Proton

(c) β - particle

(d) ∝ - particle

options :4

level :2

Ans : C

Solution : $\lambda = \frac{h}{mv} \Rightarrow \lambda \propto \frac{1}{m}$

Que-20) If an electron and a photon propagate in the form of waves having the same wavelength, it implies that they have the Same

(a) Energy

(b) Momentum

(c) Velocity

(d) Angular momentum

options :4

level :2

Ans : B

Solution : If an elecfron and a photon propagates in the from of waves having the same wavelength, it implies that they have same momentum. This is according to deBroglie equation

$\Rightarrow \quad p \propto \frac{1}{\lambda}$

Que-21) The de-Broglie wavelength associated with the particle of mass m moving with velocity is

(a) h/m

(b) mv/h

(c) h/2v

(d) m/hv

options :4

level :2

Ans : A

Solution : $\lambda = \frac{h}{p} = \frac{h}{mv}$

Que-22) If the de-Broglie wavelength for a proton and for a ∝ - particle are equal, then the ratio of their velocities will be

(a) 4 : 1

(b) 2 : 1

(c) 1 : 2

(d) 1 : 4

options :4

level :2

Ans : A

Solution : $\lambda = \dfrac{h}{mv} \quad \Rightarrow \lambda \propto \dfrac{1}{m}$

Hence, $\dfrac{\lambda p}{\lambda \propto} = \dfrac{m_\propto v_\propto}{m_p v_p} \Rightarrow \dfrac{1}{1} = \dfrac{m_\propto v_\propto}{m_p v_p} \Rightarrow \dfrac{v_p}{v_\propto} = \dfrac{m_\propto}{m_p} = \dfrac{4}{1}$

Que-23) A photon, an electron and a uranium nucleus all have the same wavelength. The one with the most energy

(a) is the photon

(b) is the electron

(c) is the uranium nucleus

(d) depends upon the wavelength and the properties of the particle

options :4

level :2

Ans : A

Solution : $\lambda = \dfrac{h}{mv} = \dfrac{h}{\sqrt{2mE}} \quad \therefore E = \dfrac{h^2}{2m\lambda^2}$

λ is same for all, so $E \propto \dfrac{1}{m}$. Hence energy will be maximum for particle with lesser mass.

Que-24) For the Bohr's first orbit of circumference $2\pi r$, the de – Broglie wavelength of revolving electron will be

(a) $2\pi r$

(b) πr

(c) $\dfrac{1}{2\pi r}$

(d) $\dfrac{1}{4\pi r}$

options :4

level :2

Ans : A

Solution : mvr = $\frac{nh}{2\pi}$ According to Bohr's theory

$\Rightarrow 2\pi r = n\left(\frac{h}{mv}\right) = n\lambda$ for n = 1, $\lambda = 2\pi r$

Que-25) The de-Broglie wavelength associated with a hydrogen molecule moving with a thermal velocity of 3 km/s will be

(a) 0.25 Å

(b) 0.5 Å

(c) 1.5 Å

(d) 2 Å

options :4

level :2

Ans : B

Solution : By using $\lambda = \frac{1}{\sqrt{V}} \Rightarrow \frac{\lambda_1}{\lambda_2} = \sqrt{\frac{V_2}{V_1}}$

$\Rightarrow \frac{10^{-10}}{\lambda_2} = \sqrt{\frac{600}{150}} = 2 \Rightarrow \lambda_2 = 0.5$ Å

Que-26) An alpha particle colliding with one of the electrons in a gold atom loses

(a) Most of its momentum

(b) About 1/3rd of its momentum

(c) Little of its energy

(d) Most of its energy

options :4

level :2

Ans : C

Solution : The mass of an electron is hundred of times lesser than the mass of an alpha particle. Hence the alpha particles does not transfer much of its energy on collision with the electron.

Que-27) According to classical theory, Rutherford atom was

(a) Electro statically stable

(b) Electrodynamially unstable

(c) Semi stable

(d) Stable

options :4

level :2

Ans : A

Solution : Rutherford designed his theory to be electro statically stable.

Que-28) When a hydrogen atom is raised from the ground state to third state

(a) Both kinetic energy and potential energy increase

(b) Both kinetic energy and potential energy decrease

(c) Potential energy increases and kinetic energy decreases

(d) Potential energy decreases and kinetic energy increases

options :4

level :2

Ans : C

Solution : When hydrogen atom is raised from the ground state to third state

$$E = \frac{E_0}{3^2} \qquad \text{or} \qquad E = \frac{E_0}{9}$$

or PE is $\frac{-2E_0}{9}$ and KE is $\frac{E_0}{9}$ while initially, PE was $-2E_0$ and KE was E_0 .

Hence, Potential energy increases and kinetic energy decreases

Que-29) What is the angular momentum of an electron in Bohr's hydrogen atom whose energy is – 3.4 ev?

(a) $\frac{h}{\pi}$

(b) $\frac{2h}{\pi}$

(c) $\frac{h}{2\pi}$

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

options :4

level :2

Ans : A

Solution : E = $-\frac{E_0}{n^2}$

$3.4 = \frac{13.6\ eV}{n^2}$

$n^2 = \frac{13.6}{3.4}$

$n^2 = \frac{68}{17} = 4$

or   n = 2

Hence mvr = $\frac{nh}{2\pi}$ or $\frac{h}{\pi}$

Que-30) The energy levels of a certain atom for first , second and third levels are E, $4\frac{E}{3}$ and 2E respectively. A photon of wavelength λ is emitted for a transition 3 → 1. What will be the wavelength of emission for a transition 2 → 1 ?

(a) $\frac{\lambda}{3}$

(b) 3λ

(c) $\frac{3\lambda}{4}$

(d) $\frac{4\lambda}{3}$

options :4

level :2

Ans : B

Solution : $\Delta E = 2E - E = \frac{hc}{\lambda_1}$

$\therefore E = \frac{hc}{\lambda_1}$

Similarly $\frac{4E}{3} - E = \frac{hc}{\lambda_2}$

$\therefore \frac{E}{3} = \frac{hc}{\lambda_2}$

$\therefore \lambda_2 = 3\lambda_1$

Que-31) The ground state energy of H – atom is – 13.6 eV. The energy needed to ionise H – atom from its second excited state is

(a) 1.51 eV

(b) 3.4 eV

(c) 13.6 eV

(d) 12.1eV

options :4

level :2

Ans : A

Solution : Energy for nth excited state = $\frac{E_0}{(n+1)^2}$

$\therefore$ To ionise H – atom from its second excited state = $\frac{13.6}{9}$ = 1.51 eV

Que-32) If element with principle quantum number n > 4 were not allowed in nature , then the number of possible elements would be

(a) 60

(b) 32

(c) 4

(d) 64

options :4

level :2

Ans : A

Solution : Number of electron possible in a solid shell is given by

$N = 2n^2$

where n is number of the shell

$N_1 = 2$ $N_2 = 8$ $N_3 = 18$ $N_4 = 32$

Total = N = 2 + 8 + 18 + 32 = 60 atoms

Que-33) The angular speed of electron in the nth orbit of hydrogen atom is

(a) Directly proportional to n^2

(b) Directly proportional to n

(c) Inversely proportional to n^2

(d) Inversely proportional to n

options :4

level :2

Ans : C

Solution : mvr = $\frac{nh}{2\pi}$

$\Rightarrow$ mωr^2 = $\frac{nh}{2\pi}$

$\Rightarrow$ $\omega \propto \frac{n}{r^2}$

As,   r $\propto n^2$

$\therefore$ $\omega \propto \frac{1}{n^3}$

Que-34) Daltons atomic theory describes an atom as

(a) a sphere with only electrons and protons

(b) a sphere which is divisible in chemical reactions only

(c) a sphere with electrons, protons and neutrons

(d) an individual particle

options :4

level :2

Ans : B

Solution : Dalton assumed atom to be smallest particle of matter, which is individuals further.

Que-35) What would be the trajectory of an electron in JJ Thomoson's experiment without any magnetic field?

(a)

(b)

(c)

(d)
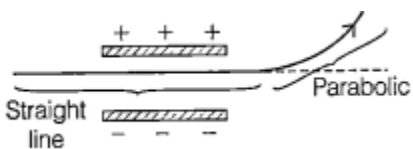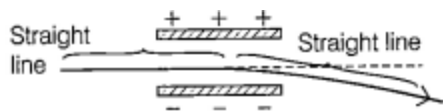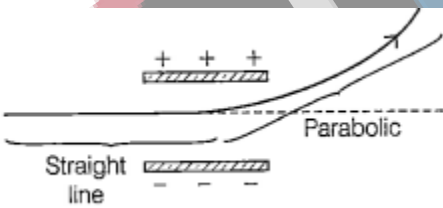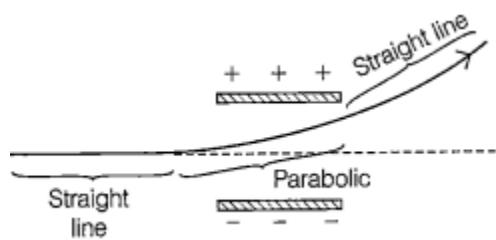
options :4

level :2

Ans : D

Solution : When particle passes through the region of electric field, it has two velocities.

∴   Path is parabolic,

But path of particle becomes again straight line when it is free of electric field's influence

Que-36) An ∝- particle is scattered by a nucleus as shown in the figure.
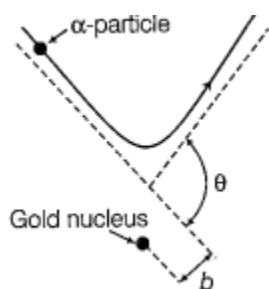
Let mass of ∝- particle is m and its speed is v. Assuming nucleus remains stationary, change in momentum of ∝- particle is

(a) 2 mv sinθ

(b) 2 mv cosθ

(c) 2 mv $\cos\frac{\theta}{2}$

(d) 2 mv $\sin\frac{\theta}{2}$

options :4

level :2

Ans : D

Solution : By law of sines, $\frac{\Delta p}{sin\theta}$ $= \frac{mv}{sin\left(\frac{\pi-\theta}{2}\right)}$

As, $\sin\left(\frac{\pi-\theta}{2}\right) = \cos\frac{\theta}{2}$

and $\sin\theta = 2\sin\frac{\theta}{2}\cos\frac{\theta}{2}$

We have $\dfrac{\Delta p}{2\sin\frac{\theta}{2}\cos\frac{\theta}{2}} = \dfrac{mv}{\cos\frac{\theta}{2}}$

$\Rightarrow \qquad \Delta p = 2\,mv\,\sin\dfrac{\theta}{2}$

Que-37) In Geiger – Marsden experiment, relation between impact parameter b and scattering angle θ is

(a) $b \propto \sin\dfrac{\theta}{2}$

(b) $b \propto \cos\dfrac{\theta}{2}$

(c) $b \propto \tan\dfrac{\theta}{2}$

(d) $b \propto \cot\dfrac{\theta}{2}$

options :4

level :2

Ans : D

Solution : Relation between scattering angle and impact parameter is

$\cot\dfrac{\theta}{2} = \dfrac{2\pi\varepsilon_0 mV^2}{Ze^2}\,.\,b$

or $\qquad b \propto \cot\dfrac{\theta}{2}$

Que-38) In ∝ - particle scattering experiment for a given angle θ, fraction of ∝ - particles scattered by angle θ or more by a foil of thickness t and containing n atoms per volume will be

(a) $nt\pi b^2$

(b) $nt^2\pi b$

(c) $n^2 t^3 b^3$

(d) nπ

options :4

level :2

Ans : C

Solution :
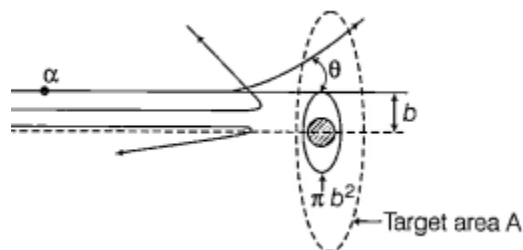
∝-particle is scattered before it reaches near to nucleus and hence, it does not pass with in a distance b of it.

Now, fraction of a-particles, which are scattered by angle θ or more is

$$f = \frac{\propto -particles\ scattered\ by\ angle\ \theta\ or\ more}{Total\ member\ of\ incident \propto -particles}$$

$$= \frac{Aggregate\ cross -section}{Target\ area}$$

Now, when ∝-particle beam is targetted over area A, it encounters ntA nuclei. But an ∝-particle which is initially directed anywhere in area πb^2 is scattered, through θ or more.

where. $\cot\frac{\theta}{2} = \frac{2\pi\varepsilon_0 mV^2}{Ze^2}$. b

So, $f = \frac{Aggregate\ cross -section}{Area} = \frac{ntA\ X\pi b^2}{A}$

$= nt\pi b^2$

Que-39) Two H – atoms in the ground state colloids inelestically and are excited to reach first excited state, the maximum amount by which their combined KE is reduced is

(a) 10.20 eV

(b) 20.40 eV

(c) 13.6 eV

(d) 27.20 eV

options :4

level :2

Ans : B

Solution : When two atoms collide inelastically, energy lost due to collision excites the colliding atoms.

Hence, there is energy lost (maximum)

= 2 X energy of excitation of atoms to their first excitation position

= 2 X 10.2

= 20.40 eV

Que-40) Simple Bohr model cannot be applied to calculate the energy levels of a multi – electron atom because

(a) electron collide with each other

(b) screening effect of other eectrons

(c) non – validity of the Coulomb's law

(d) electrons not being subjected to a central force

options :4

level :2

Ans : D

Solution : In a multi-electron atom, electrons are not subjected to a central force as it is assumed in Bohr's atomic model

Que-41) Equivalent electric current created by electron of a H – atom in its ground state using Bohrs model is nearly

(a) 2.14×10^{-35} A

(b) 4.48×10^{-30} A

(c) 24×10^{-30} A

(d) 70×10^{-35} A

options :4

level :2

Ans : A

Solution : Let the speed of electron = v

And Bohr's radius $= a_0$

Then, number of rounds made by electron in 1s $= \frac{2\pi a_0}{V}$

So, current constituted electron $= \frac{2\pi a_0}{V} \cdot e$

$$= \frac{2\pi \times 0.53 \times 10^{-10} \times 1.6 \times 10^{-19}}{2.2 \times 10^6}$$

$$= 2.14 \times 10^{-35} \text{ A}$$

Que-42) In Hydrogen- like atoms, ratio of $E_{4n} - E_{2n}$ and $E_{2n} - E_n$ is proportional to

(a) $\frac{Z^2}{n^2}$

(b) $\frac{Z^4}{n^4}$

(c) $\frac{Z}{n}$

(d) $\frac{Z^0}{n^0}$

options :4

level :2

Ans : D

Solution : For a H – like atom,

$$E_n = \frac{Z^2}{n^2} \cdot E_1, \qquad \text{(where } E_1 = -13.6 \text{ eV)}$$

$$\Rightarrow \qquad E_{4n} - E_{2n} = \frac{Z^2 E_1}{16n^2} - \frac{Z^2 E_1}{4n^2}$$

$$= \frac{Z^2 E_1}{n^2}\left(\frac{1}{16} - \frac{1}{4}\right)$$

$$= \frac{Z^2 E_1}{n^2}\left(\frac{-3}{16}\right)$$

and $\qquad E_{2n} - E_n = \frac{Z^2 E_1}{n^2}\left(\frac{1}{4} - \frac{1}{1}\right)$

$$= \frac{Z^2 E_1}{n^2}\left(\frac{-3}{4}\right)$$

Ratio $\frac{E_{4n} - E_{2n}}{E_{2n} - E_n} = \frac{4}{16}$

$= \frac{1}{4} = $ a constant.

Que-43) A hydrogen atom in n = 5 state, makes a transition to its ground state. Assuming hydrogen atom initially at rest, the recoil speed of hydrogen atom nearly is

(a) 10^{-4} m/s

(b) 2 X 10^{-2} m/s

(c) 4.2 m/s

(d) 3.8 X 10^{-2} m/s

options :4

level :2

Ans : C

Solution :

Que-44) In Thomson's experiment of finding specific charge of electrons, are replaced by muons (m = 208 X mass of an electron , q = same as electron), then the no deflection is observed when

(a) B is increased 208 times

(b) B is increased 14.4 times

(c) E is increased 208 times

(d) E is increased 14.4 times

options :4

level :2

Ans : B

Solution : For no deflection, $\frac{e}{m} = \frac{E^2}{2VB^2}$

When m is increases by 208 times, then keeping other things constant, B^2 must be increased 208 times, or B is increased

$\sqrt{208}$ = 14.4 times.

Que-45) In case of line absorption spectrum of hydrogen gas, colour of absorption line is

Photon of wavelength λ

Spectrum

Bright back ground   Absorption line
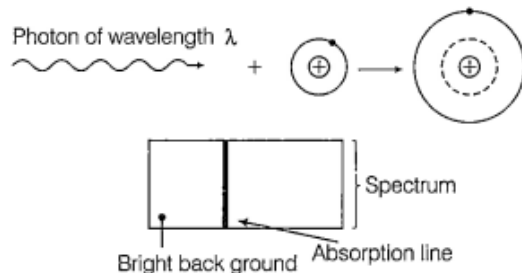
(a) block – totally dark

(b) bright but of complementary colour to that of emission line

(c) dull complementary colour to that of emission line

(d) dull and same colour as that of emission line

options :4

level :2

Ans : D

Solution : When white light is passed through hydrogen gas, photons of those wavelengths that corresponds to transitions between energy levels are absorbed. The resulting excited H-atoms re-radiate their excitation energy almost at once.

But the radiated photons come off in all random directions with only few in same direction as the original white beam.

Absorbed wavelengths

Transmitted wavelengths

Absorbed light is re-radiated in all directions
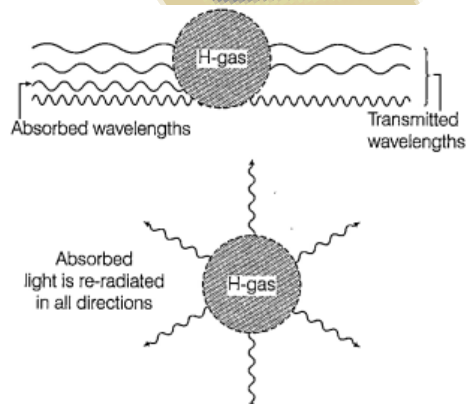
The dark lines in emission spectrum are not completely black but appears, so by contrast with the bright background. Lines in the absorption spectrum of any element, coincide with those in emission spectrum that represent transition to the ground state.

CHEMISTRY

Que-1) IUPAC name of $HOCH_2CH_2OH$ is :

(a) Ethylene glycol

(b) Ethane – 1,2-diol

(c) Ethyl – 1,2-diol

(d) Ethylene diol

options :4

level :2

Ans : B
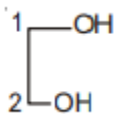
Solution :

Etane - 1,2 - diol

Que-2) IUPAC name of is

(a) Ethyl propyl ether

(b) Propyl ethoxide

(c) Ethoxy propane

(d) Propoxy ethane

options :4

level :2

Ans : C

Solution :

 Ethoxy propane

Que-3) Which among the following show tautomerism ?

(a) Alcohols

(b) Phenols

(c) Ethers

(d) Anisole

options :4

level :2
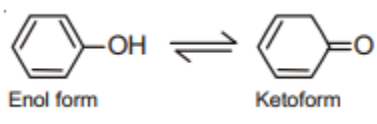
Ans : B

Solution :

Que-4) Which one will be optically active?

(a)

(b)

(c)

(d)
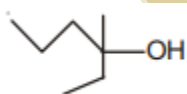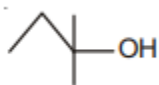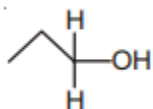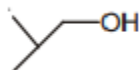
options :4

level :2

Ans : A

Solution :

This molecule has a chiral centre.

$\because$ Optically active.

Que-5) 3° alkyl halides form alcohols preferably via

(a) S_N2

(b) S_N1

(c) Transition state

(d) S_Ni

options :4

level :2

Ans : B

Solution : 3° alkyl halides

(Carbocation)
Stable
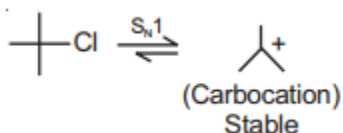
Que-6) Which one is preferable reagent for given reaction?

R $CH_2 - X \rightarrow HO - CH_2$ R
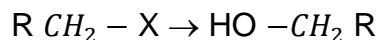
(a) $(H_2O + KOH)$

(b) (ROH + KOH)

(c) (ROH + KOH) / Δ

(d) $(H_2O + KOH)$ / Δ

options :4

level :2

Ans : A

Solution : R $- CH_2 - X \rightarrow HO - CH_2 - R$
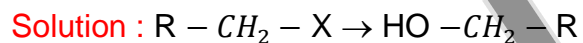
The reagent used must be $(H_2O + KOH)$

Que-7) ROH + $SOCl_2 \rightarrow$?

The final product is

(a) Alkyl chloride

(b) Alkyl sulphate

(c) Alkene

(d) Ether

options :4

level :2

Ans : A

Solution : ROH + $SOCl_2$ $\rightarrow$ R -- Cl
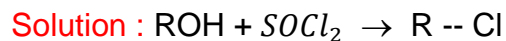
Alkyl chloride

Que-8)
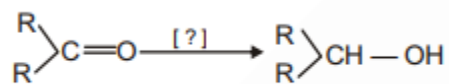
Here reagent is

(a) $LiAlH_4$

(b) $NaBH_4$

(c) Ni/H_2

(d) all of these

options :4

level :2

Ans : D
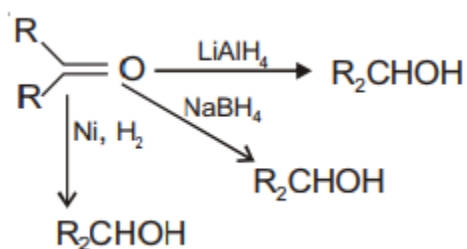
Solution :

Que-9) Boiling point will be least for

(a)

(b)

(c)

(d)
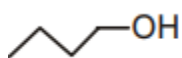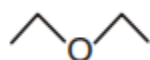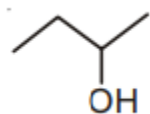
options :4

level :2

Ans : B

Solution :

    This is having least boiling point.

Que-10) Which one is most viscous

(a)

(b)

(c)

(d)
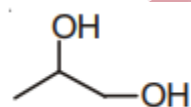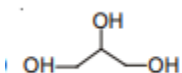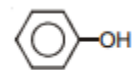
options :4

level :2
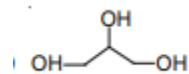
Ans : C

Solution :

 This is viscous because of maximum hydrogen bonding.

Que-11) Lowest boiling point is for

(a) Butanol

(b) Pentanol

(c) 2-methyl propane-2-ol

(d) 2-methyl butane-2-ol

options :4

level :2

Ans : C
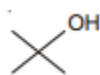
Solution :

 has lowest B.P.

Que-12) Which one is inter – molecular dehydration?

(a) ROH $\rightarrow$ R -- OR

(b) ROH $\rightarrow$ R --X

(c) ROH $\rightarrow$ alkene

(d) R –X $\rightarrow$ R OH

options :4

level :2

Ans : A

Solution : R – OH + HO –R $\xrightarrow{\Delta/-H_2O}$ R – O –R

Que-13) In Lucus test Immediate turbidity is caused by

(a) 3° alcohols

(b) 2° alcohols

(c) 1° alcohols

(d) Phenols

options :4

level :2

Ans : A

Solution : 3° alcohols gives sudden turbidity.

Que-14) Phenols can be distinguished from alcohols by

(a) $FeCl_3$(neutral)

(b) Fehling solution

(c) Tollen's reagent

(d) 2, 4- DNP

options :4

level :2

Ans : A

Solution :

$$6 \langle O \rangle{-}OH + FeCl_3 \longrightarrow [Fe\,(OPh)_6]^{3-} + 3HCl + 3H^+$$
(Violet)
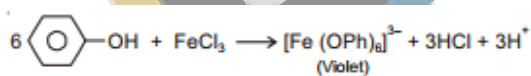
Que-15) Most acidic among the following is

(a)

(b)

(c)

(d)

options :4

level :2

Ans : D

Solution :

(Stabilished anion because of –M and –I effect of –NO₂)
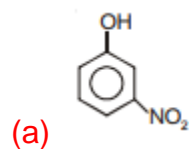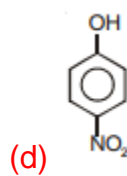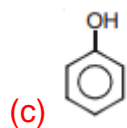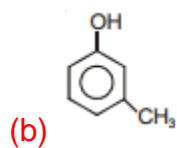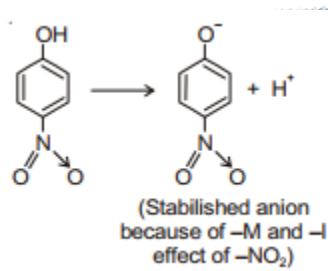
Que-16)
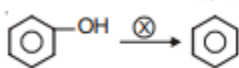
The reagent ⊗ required for above conversion is

(a) $LiAH_4$

(b) Zn

(c)
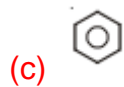
(d) $NaBH_4$

options :4

level :2

Ans : B
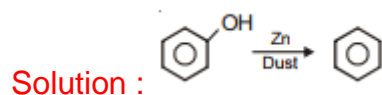
Solution :

Que-17) Electrophile in Reimer – Tiemann reaction

(a) $CHCl_3$

(b) $: CH_2$

(c) $: CCl_2$

(d) CO_4

options :4

level :2

Ans : C

Solution : In Reimer – Tiemann reaction.

The major product is ortho isomer intermediate ($: CCl_2$)

Que-18) Molecule which does not oxidize using PCC

(a)

(b)

(c)

(d)
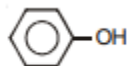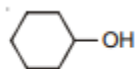
options :4

level :2

Ans : A
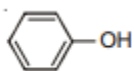
Solution :

Phenol cannot oxidized by PCC.

Que-19) Which one of the following is best Lewis base?

(a)

(b)

(c)

(d)
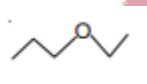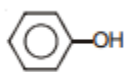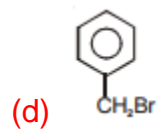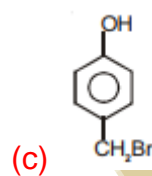

options :4

level :2
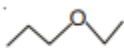
Ans : B

Solution :

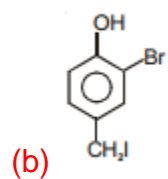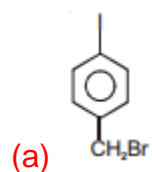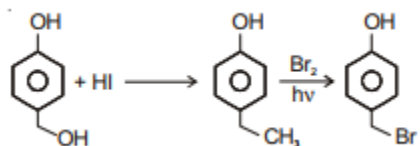This is best Lewis base among the given options.
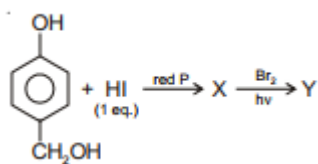
Que-20)

What is Y?

(a)

(b)

(c)

(d)

options :4

level :2

Ans : B

Solution :

Que-21) An alkene of molecular formula C_9H_{18} on ozonolysis gives 2,2 – dimethylpropanal and butan -2 – one then the alkene is
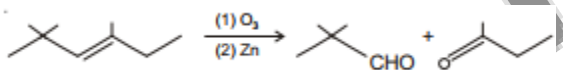
(a) 2,2,4-trimethylhex-3-ene

(b) 2,2,6- trimethylhex-3-ene

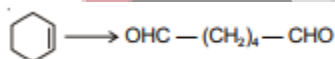(c) 2,3,4- trimethylhex-2-ene

(d) 2,2,4- trimethylhex-2-ene

options :4

level :2

Ans : A

Solution :
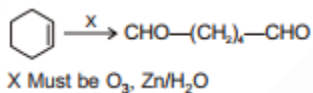

Que-22) Select the reagent for the following reaction.

(a) SeO_2

(b) O_3, Zn/H_2O

(c) $O_3,H_2O_2 - CH_3COOH$

(d) PCC

options :4

level :2

Ans : B

Solution :

X Must be O_3, Zn/H_2O

Que-23) Correct order of reactivity of CH_3CHO, $C_2H_5COCH_3$ and CH_3COCH_3 with HCN

(a) $CH_3CHO > CH_3COCH_3 > C_2H_5COCH_3$

(b) $C_2H_5COCH_3 > CH_3COCH_3 > CH_3CHO$

(c) $CH_3COCH_3 > CH_3CHO > C_2H_5COCH_3$

(d) $CH_3COCH_3 > C_2H_5COCH_3 > CH_3CHO$

options :4

level :2

Ans : A

Solution : Nucleophilic addition on carbonyl compound follows as
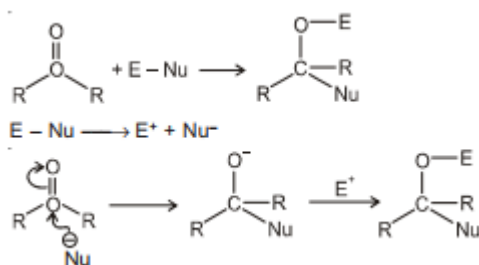
Since, the first step is attack of Nu on carbonyl carbon, so more is the positive charge on carboxyl 'C' more the probability of attack on it. Because of this, the reactivity order follows as
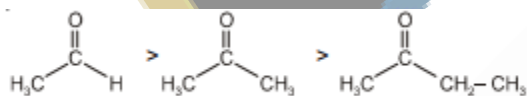
Que-24) Predict the product

(a)

(b)

(c)

(d)
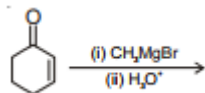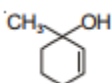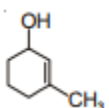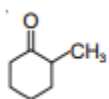
options :4

level :2

Ans : B

Solution :

Que-25) Reaction

$R_2CO + HCN \longrightarrow R{-}C(R)(OH)(CN)$ is
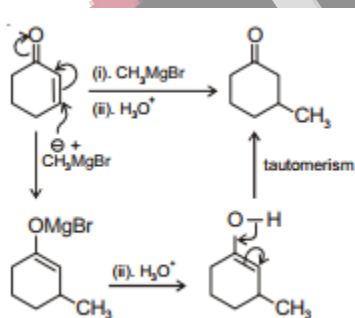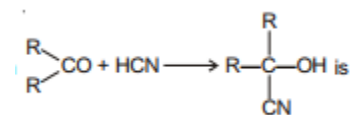
(a) Electrophilic substitution

(b) Nucleophilic addition

(c) Nucliophilic substitution

(d) Elecrophilic addition

options :4

level :2

Ans : B

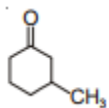Solution : This is nucleophilic addition.
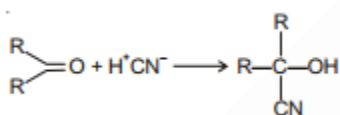
Que-26) Aldol condensation will not be observed in

(a) Chloral

(b) Phenyl acetaldehyde

(c) Hexanal

(d) Ethanal

options :4

level :2

Ans : A

Solution : Chloral ($CCl_3 - CHO$) will not give Aldol reaction.

Que-27) Which of the following compound will exhibits positive Fehling test as iodoform test?

(a) Methanal

(b) Ethanol

(c) Propanone

(d) Ethanal

options :4

level :2

Ans : D

Solution :

Que-28) Dimethyl ketones are usually charecterised through

(a) Tollens reagent

(b) Iodoform test

(c) Schiff's test

(d) Benedicts reagent

options :4

level :2

Ans : B

Solution :
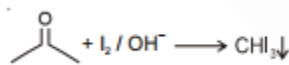
Que-29) An aromatic compound 'X' with molecular formula $C_9H_{10}O$ gives the following chemical tests

(i) Forms 2,4 – DNP derivative

(ii) Reduce Tollens reagent

(iii) Undergoes Cannizzaro reaction and

(iv) On vigorous oxidation, 1,2-benzenedicarboxylix acid is obtained

The Compound

(a)

(b)

(c)

(d)
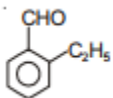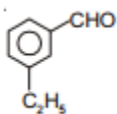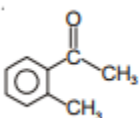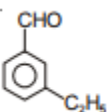
options :4

level :2
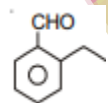
Ans : A

Solution :

 ⇒ + 2,4 DNP Test

+ Tollen's Test

+ Cannizzaro reaction

Que-30) The IUPAC name of phthalic acid

(a) Benzene- 1,2-dicarboxylic acid

(b) Benzene -1,4-dioic acid

(c) Cyclo-1,3,5-triene-1,2-dioic acid

(d) Benzene-1,3-dicarboxylic acid

options :4

level :2

Ans : A

Solution : Benzene- 1,2-dicarboxylic acid
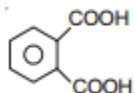
Que-31) Which of the following is optically active?

(a) Ethylene glycol

(b) Oxalic acid

(c) Glycerol

(d) Tartaic acid

options :4

level :2

Ans : D

Solution : Tartaic acid has chiral centre.

Que-32) Saponicatinof ethyl benzoate with caustic soda as alkali gives

(a) Benzyl alcohol and ethanoic acid

(b) Sodium benzoate and ethanol

(c) Benzoic acid and sodium ethoxide

(d) Phenol and ethanoic acid

options :4

level :2

Ans : B

Solution :
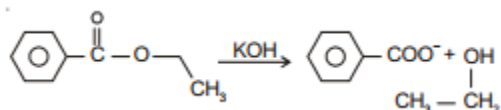
Que-33) Acetic acid is obtained when

(a) Methyl alcohol is oxidised with potassium permanganate

(b) Calcium acetate is distilled in the presence of calcium formate

(c) Acetaldehyde is oxidized with potassium dichromate and sulphuric acid

(d) Glycerol is heated with sulphuric acid

options :4

level :2

Ans : C

Solution :

$$CH_3CHO \xrightarrow{K_2Cr_2O_7, H^+} CH_3COOH$$
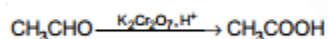
Que-34) A liquid was mixed with ethanol and a drop of concentrated H_2SO_4 was added. A compound with a fruity smell was formed. The liquid was

(a) CH_3OH

(b) HCHO

(c) CH_3COCH_3

(d) CH_3COOH

options :4

level :2

Ans : D
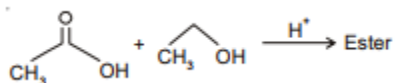
Solution :

Que-35) Which one of the following orders of acid strength is correct?

(a) $RCOOH > HC \equiv CH > HOH > ROH$

(b) $RCOOH > ROH > HOH > HC \equiv CH$

(c) $RCOOH > HOH > ROH > HC > \equiv CH$

(d) $RCOOH > HOH > HC \equiv CH > ROH$

options :4

level :2

Ans : C

Solution : Stability order of CB's $R - CO_2^- > OH^- > R - O^- > C^- \equiv CH$

∴ Acidic strength order $R - CO_2H > H_2O > R- OH > HC \equiv CH$

Que-36) The product A in the following reaction sequence is
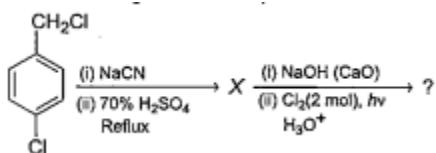
(a)
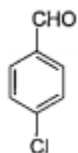
(b)
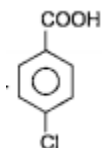
(c)
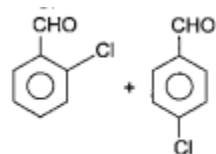
(d) X gives no reaction

options :4

level :2
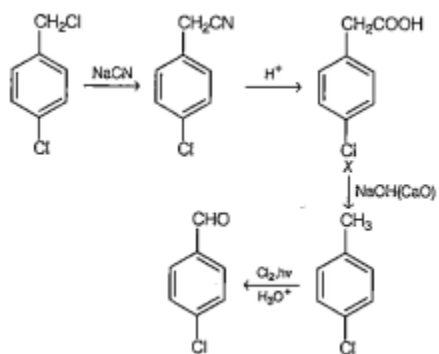
Ans : A

Solution :

Que-37) Product obtained when benzoyl acetic acid is heated, is

(a)

(b)

(c)

(d)

options :4

level :2

Ans : A

Solution :

β-keto acid → (Δ, decarboxylation, $-CO_2$) → acetophenone
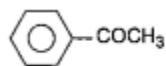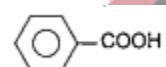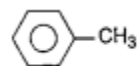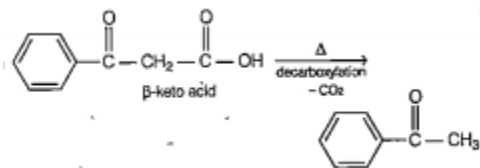
Que-38) What two different combination of starting materials and reagents can be used to prepare benzaldehyde?

i. Benzyl alcohol	A. LiAlH $[OC(CH_3)_3]_3$
ii . Benzoyl chloride	B. PCC in CH_2Cl_2
iii. Stryrene	C. B_2H_2 then H_2O_2 and NaOH
iv. Phenyl acetylene	D. $HgSO_4$

(a) I , A and ii, B

(b) iii, C and iv, D

(c) I, B andb ii,A

(d) iv, C and ii, A

options :4

level :2

Ans : A

Solution :

Benzyl alcohol + PCC (Controlled oxidation) → CHO

O=C—Cl Benzoyl chloride + LIAlH [OC(CH₃)₃]₃ (Controlled reduction) → CHO
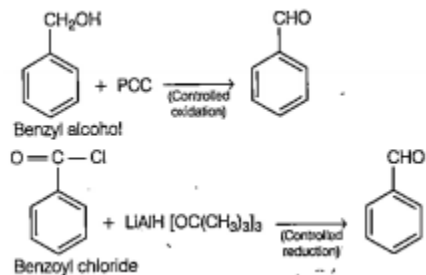
Que-39) What is the major product of the reaction?
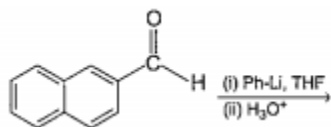
(a)
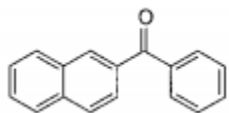
(b)
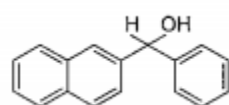
(c)
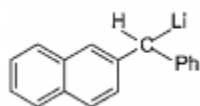
(d) None of these

options :4

level :2

Ans : A
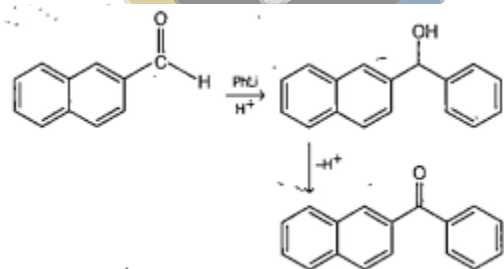
Solution :

Que-40) Which of the following reagents can be used to carry out of the following transformation?
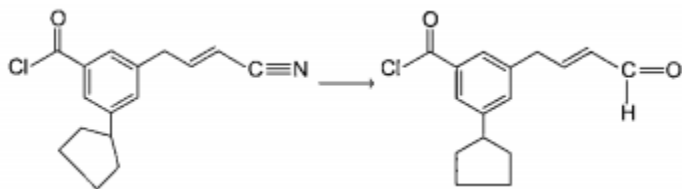
(a) DIBAL-HH

(b) LBAH (Lithium tri-t-butoxy aluminum hydride)

(c) $SnCl_2$/ HCl

(d) All of the above

options :4

level :2

Ans : C

Solution : Among the given only $SnCl_2$/ HCl selectivity reduced – CN group, to – CHO. DIBAL-H (disobutyl aluminium hydride) and LBAH, also reduce – C= O – Cl group into – CHO.

Que-41) In the reaction given below, the product would be
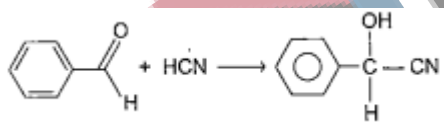
(a) a racemate

(b) optically active

(c) a meso compound

(d) a mixture of the diastereomers

options :4

level :2

Ans : A

Solution : Since, CN^- attacks at planar sp^2- hybridized carbon, the attack is possible from both sides and hence, a recimic mixture is obtained.
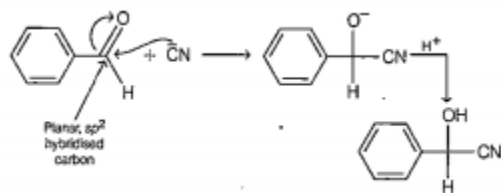
Que-42) When m-bromobenzaldehyde is treated with 50% alkali, the products obtained is

(a)

(b)

(c)

(d)
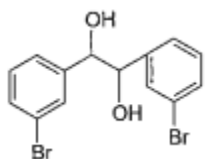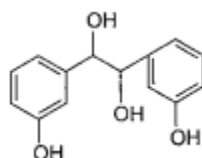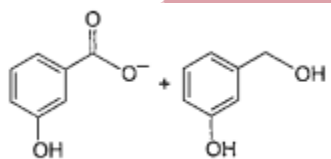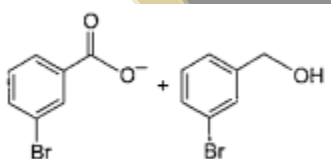
options :4

level :2

Ans : D

Solution : When treated with concentrated alali solution, − CHO group is oxidised to acid as well as reduced to alcohol (i.e. disproportionate) as
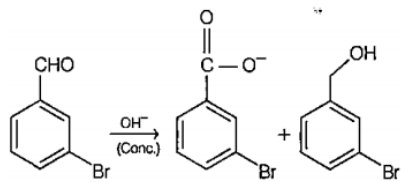
Que-43) The product expected from the following reactions is/are

(a)

(b)

(c)

(d)
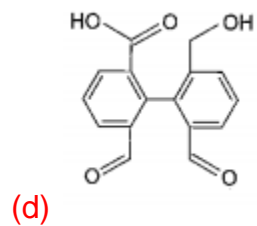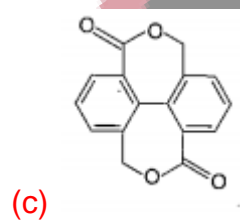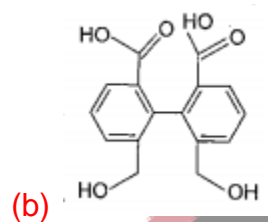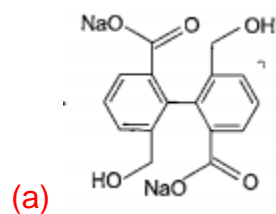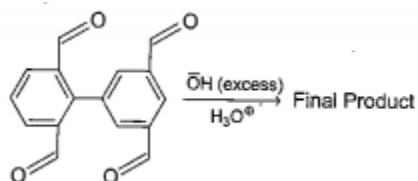
options :4

level :2
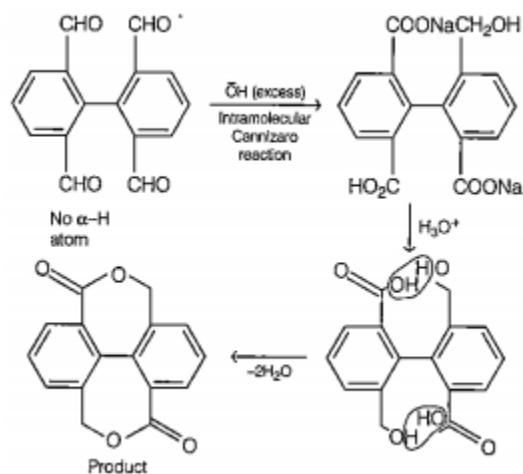
Ans : C

Solution :

Que-44) Which of these would be the most reactive in nucleophilic acyl substitution reaction?

(a)

(b)

(c)
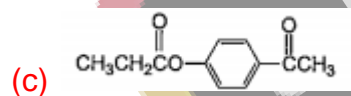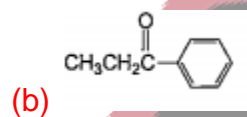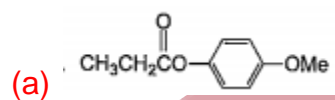
(d) All these are equally reactive

options :4

level :2

Ans : C

Solution : Electron withdrawing group increases the electrophilicity of carboxyl group.

Que-45) In presence of NaOH, a charges to

$\xrightarrow{\text{NaOH}}$

(a)

(b)

(c)

(d)
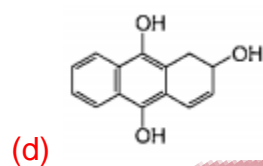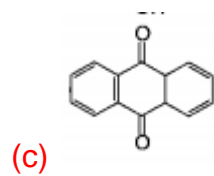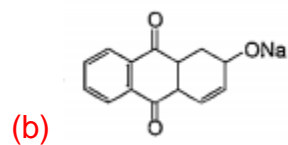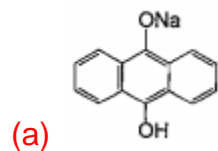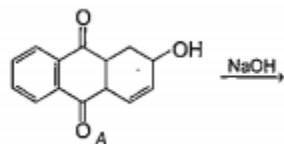
options :4

level :2

Ans : A

Solution : First $\bar{O}H$ attacks at $\propto$ - carbon forming a carbonion, which rearranges to give
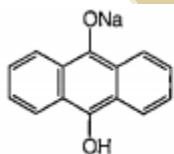
BIOLOGY

Que-1) Select the option that is incorrect w.r.t. traditional hybridisation

(a) Procedure extensively used in plant breeding

(b) Often leads to inclusion of undesirable genes

(c) Involves selective inclusion and multiplication of desired genes only

(d) Enabled qualitative and quantitative improvement in food production

options :4

level :2

Ans : C

Solution : Involves inclusion and multiplication of undesirable genes along with desired genes.

Que-2) Credit for construction of first recombinant DNA may be given to

(a) Charles Darwin and Alfred Wallace

(b) Stanley Cohen and Herbert Boyer

(c) Meselson and Stahl

(d) Esther and Joshua Lederberg

options :4

level :2

Ans : B

Solution : Stanley Cohen and Herbert Boyer (Fact/Data)

In 1972 they constructed 1st recombinant DNA

Que-3) Which of the following enzymes has been incorrectly matched with their function?

(a) Ligase   - Molecular glue

(b) Endonuclease   - Chemical scalpel

(c) DNA polymerase   - Joins nucleosides

(d) RNA polymerase   - Joins nucleotides

options :4

level :2

Ans : C

Solution : DNA polymerase– Joins nucleosides (Incorrect match)

DNA polymerase– Joins nucleotides (Synthesize a new strand of DNA complementary to an existing DNA template)

Que-4) Restriction in Restriction endonuclease enzyme refers to

(a) Cleavage of phosphodiester bond in DNA by the enzyme

(b) Cutting of DNA at specific position only

(c) Prevention of bacteriophage multiplication in bacteria

(d) Cutting each of the two strands of DNA at specific points in sugar phosphate backbone

options :4

level :2

Ans : C

Solution : The term 'restriction' refers to the function of these enzymes in restricting the propogation of foreign DNA of bacteriophage in the host bacterium.

Que-5) In agarose gel electrophoresis, DNA molecules of different lengths are separated on the basis of their

(a) Charge only

(b) Size only

(c) Charge to size ratio

(d) Both (a) and (c)

options :4

level :2

Ans : B

Solution : The DNA will not migrate at the same rate, larger piece of DNA collide with the gel matrix more often and are slowed down, while smaller pieces of DNA move through more quickly.

Que-6) Which of the following steps is/are catalyzed by Taq polymerase in a PCR?

(a) Danaturation of template DNA

(b) Annealing of primers to template

(c) Extension of primer end on template DNA

(d) All of these

options :4

level :2

Ans : C

Solution : Extension of primer is done by adding nucleotides to the primer which is done by DNA polymerase here taq polymerase.

Que-7) Who among the following was awarded Nobel Prize for development of PCR technique?

(a) Herbert Boyer

(b) Kary Mullis

(c) Rene Descartes

(d) Andrew Fire

options :4

level :2

Ans : B

Solution : Kary Mullis : American biochemist – Noble prize in 1993

Que-8) Which of the following statements does not hold true for restriction enzyme?

(a) It recognizes a palindromic nucleotide sequence

(b) It is an endronuclease

(c) It is isolated from bacteriophages

(d) It produces the same kind of sticky ends in different DNA molecules

options :4

level :2

Ans : C

Solution : Restriction endonucleases are isolated form bacteria.

Que-9) Pure DNA precipitated by addition of chilled ethanol can be removed from solution by

(a) Elution

(b) Gel electrophoresis

(c) Spooling

(d) PCR

options :4

level :2

Ans : C

Solution : Spooling is a method of obtaining DNA in a form of spool over a glass rod at the last step of DNA extraction.
Elution is extraction of separated bands of DNA from agarose gel.
Gel electrophoresis is a method for separation and analysis of macromolecules and their fragments based on their size using gel medium.
PCR polymerase chain reaction ensures amplification of gene of interest.

Que-10) Cells in continuous culture system are maintained in

(a) Stationary phase

(b) Lag phase

(c) Log phase

(d) Either (a) or (c)

options :4

level :2

Ans : C

Solution : Because in continuous culture system product is forming continuously and cells will grow exponentially in log phase.

Que-11) Stirrer in stirred tank type bioreactor facilitates

(a) Oxygen delivery from outside to inside

(b) Mixing and aeration

(c) Temperature control

(d) Foam control

options :4

level :2

Ans : B

Solution : Bioreactor has different system for oxygen, temperature and foam control.

Que-12) Function of 'ori' site in a vector is to

(a) Initiate insertional inactivation

(b) Initiate replication

(c) Codes for the proteins involved in replication of the plasmid

(d) Initiate antibiotic resistance

options :4

level :2

Ans : B

Solution : 'ori' site is the site of origin of replication.

Que-13) Normal *E. coli* cells carry resistance against which of the following antibiotics?

(a) Chloramphenicol

(b) Ampicillin

(c) Tetracyclin

(d) None of these

options :4

level :2

Ans : D

Solution : *E. coli* cells usually does not carry resistance against any antibiotics.

Que-14) Separation and purification by filtration, centrifugation of desired compound produced in bioreactor is a part of

(a) Downstream processing only

(b) Scaling up and downstream processing

(c) Upstream processing

(d) Screening for recombinants and downstream processing

options :4

level :2

Ans : A

Solution : Downstreaming processing is the name given to the stage after fermentation when the desired product is recovered and purified.

Que-15) A chimaeric DNA is formed by

(a) Deleting selectable markers

(b) Joining c – DNA with plasmid

(c) EcoRIE

(d) Enzyme β- galactosidase

options :4

level :2

Ans : B

Solution : Chimaeric DNA is recombinant DNA.

Que-16) A plasmid

(a) Shows dependent assortment

(b) Has ability to replicate within bacterial cells independent of the control chromosomal DNA

(c) Cannot replicate

(d) Contains genes for vital activities

options :4

level :2

Ans : B

Solution : Plasmid can replicate.

Que-17) Which of the following is not a method of introducing alien DNA into host cells?

(a) Micro injection

(b) Heat shock method

(c) Being placed along with the cell into a gene gun

(d) Gel electrophoresis

options :4

level :2

Ans : D

Solution : Gel electrophoresis : Method for separation and analysis of macromolecules and their fragments based on their size using gel medium.

Que-18) Each restriction endonuclease functions by inspecting the length of a DNA sequence. It cleaves _____

(a) Only the master strand to produce sticky end

(b) Each strand of DNA to produce stick ends

(c) Each of the two strands of the double helix at specific points in their sugar phosphate backbones

(d) Messenger RNA to remove exons

options :4

level :2

Ans : C

Solution :

Que-19) Which enzyme is required to prevent unwanted self-ligation of vector DNA molecules in recombinant DNA technology?

(a) DNA polymerase

(b) DNA ligase

(c) Alkaline phosphatase

(d) Reverse transcriptase

options :4

level :2

Ans : C

Solution : Alkaline phosphatase removes phosphate groups from the 5' ends of DNA molecules.

Que-20) A set of bacterial clones, each containing a plasmid or phase, is called

(a) Gene library

(b) Gene pool

(c) Genephore

(d) Genome

options :4

level :2

Ans : A

Solution :

Que-21) Which of these are most widely used in genetic engineering?

(a) Plastid

(b) Plasmid

(c) Mitochondria

(d) Ribosome

options :4

level :2

Ans : B

Solution : Plasmids are much used because can replicate independently of the chromosomal DNA.

Que-22) A tumor inducing plasmid widely used in the production of transgenic plants is that of

(a) *Escherichia coli*

(b) *Bacillus thuringiensis*

(c) *Staphylococcus aureus*

(d) *Agrobacterium tumefaciens*

options :4

level :2

Ans : D

Solution : *Agrobacterium tumefaciens*: It can cause tumor by transferring a defined segment of DNA (T-DNA) from its tumor inducing plasmid into the nuclear genome of plant cells.

Que-23) Agarose extracted from sea weeds finds use in

(a) Gel electrophoresis

(b) Spectrophotometry

(c) Tissue culture

(d) PCR

options :4

level :2

Ans : A

Solution : Agarose gels have very large pore size and are used primarily to separate very large molecules with a molecular mass greater than 200 K Da.

Spectrophotometry is a method to measure how much a chemical substance absorbs light by measuring the intensity of light as a beam of light passes through sample solution

Tissue culture involves the growth in an artificial medium of cells derived from living tissue.
PCR is a technique used to make multiple copies of a segment of DNA.

Que-24) Which of the following is not a basis of difference between chromosomal DNA and plasmids?

i. Presence of histones   ii. Nature of histones

iii. Nature of nucleotide   iv. Linear form of genetic material

(a) ii & iii only

(b) i & iv only

(c) i, ii, & iv only

(d) I, ii, iii, & iv

options :4

level :2

Ans : A

Solution :

Que-25) An antibiotic resistance gene in a vector helps in selection of

(a) Competent

(b) Transformed cells

(c) Recombinant cells

(d) Both (b) and (c)

options :4

level :2

Ans : D

Solution :

Que-26) PCR is used for

(a) Reverse transcribing RNA into DNA

(b) Digesting DNA

(c) Amplifying DNA

(d) Amplifying proteins and separating DNA

options :4

level :2

Ans : C

Solution : PCR is polymerase chain reaction (*in vitro* replication of DNA)

Que-27) Strirred – tank bioreactors have been designed for

(a) Purification of product

(b) addition of preservatives to the product

(c) Availability of oxygen throughout the process

(d) ensuring anaerobic conditions in the culture vessel

options :4

level :2

Ans : C

Solution : Strirred – tank bioreactor is provided with stirrer for availability of oxygen throughout the process.

Que-28) A foreign DNA and plasmid cut by the same restriction endonuclease can be joined to form a recombinant plasmid using

(a) Eco RI

(b) Taq polymerase

(c) Polymerase III

(d) Ligase

options :4

level :2

Ans :D

Solution : In DNA recombinant technology, linking of foreign DNA and plasmid is made possible by DNA ligase which is also called "molecular glue"

Que-29) Which of the following is not a component of downstream processing?

(a) Separation

(b) Purification

(c) Preservation

(d) Expression

options :4

level :2

Ans :D

Solution : After the completion of biosynthetic pathway, downstreaming processing includes all the steps involved in isolation, purification and preservation of products. All the steps before the completion of pathway are included in upstreaming processing i.e., expression of genetic material.

Que-30) Which of the following is **not** a feature of the plasmid?

(a) Single - stranded

(b) Independent replication

(c) Circular structure

(d) Transferable

options :4

level :2

Ans : A

Solution : Plasmid is extra chromosomal, double stranded circular DNA.

Que-31) The taq polymerase enzyme is obtained from

(a) Pseudomonas putida

(b) Thermus aquaticus

(c) Thiobacillus ferroxidans

(d) Bacillus subtilis

options :4

level :2

Ans : B

Solution : Taq polymerase is thermostable DNA polymerase obtained from Thermus aquaticus

Que-32) Which of the following is a restriction endonuclease?

(a) RNase

(b) Hind II

(c) Protease

(d) DNase I

options :4

level :2

Ans : B

Solution : Hid II is a restriction endonuclease.

Que-33) The DNA molecule to which the gene of interest is integrated for cloning is called

(a) Carrier

(b) Transformer

(c) Vector

(d) Template

options :4

level :2

Ans : C

Solution : The DNA molecule to which the gene of interest is integrated for cloning is called vector.

Que-34) The cutting of DNA at specific locations became possible with the discovery of

(a) Ligase

(b) Restriction enzymes

(c) Probes

(d) Selectable markers

options :4

level :2

Ans : B

Solution : The cutting of DNA at specific locations became possible with the discovery of restriction enzymes called molecular scissors or knife.

Que-35) Which vector can clone only a small fragment of DNA

(a) Bacterial artificial chromosome

(b) Yeast artificial chromosome

(c) Plasmid

(d) Cosmid

options :4

level :2

Ans : C

Solution : Plasmid can clone only a small fragment of DNA about 10 kbp size

Cosmid   - 45 kbp

YAC   - 1Mbp/1000 kbp – 2,500 kbp

BAC   - 300 to 350 kbp

Que-36) Which of the following is not correctly matched for the organism and its cell wall degraded enzyme?

(a) Plant cells - Cellulase

(b) Algae - Methylase

(c) Fungi - Chitinase

(d) Bacteria - Lysozyme

options :4

level :2

Ans : B

Solution :

Que-37) The colonies of recombinant bacteria appear white in contrast to blue colonies of non-recombinant bacteria because of

(a) Insertion inactivation of alpha – galactosidase in non – recombinant bacteria

(b) Insertion inactivation of alpha – galactosidase in recombinant bacteria

(c) Inactivation of glycosidase enzyme in recombinant bacteria

(d) Non – recombinant bacteria containing beta - galactosidase

options :4

level :2

Ans : B

Solution :

Que-38) Which one is a true statement regarding DNA polymerase used in PCR?

(a) It is isolated from a virus

(b) It remains active at high temperature

(c) It is used to ligate introduced DNA in recipient cells

(d) It serves as a selectable marker

options :4

level :2

Ans : B

Solution :

Que-39) For transformation, micro – particles coated with DNA to be bombarded with gene gun are made up of

(a) Silicon or Platinum

(b) Gold or Tungsten

(c) Silver or Platinum

(d) Platinum or Zinc

options :4

level :2

Ans : B

Solution :

Que-40) The figure below is the diagrammatic representation of the E.coli vector pBR 322. Which one of the given options correctly identifies its certain component(s)?
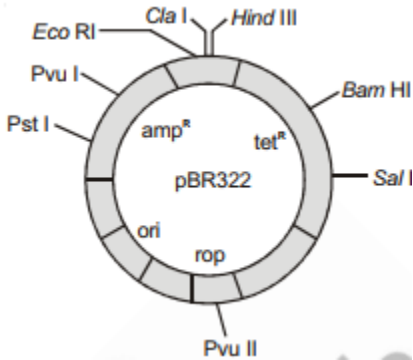
(a) amp^R, tet^R - antibiotic resistance genes

(b) ori – original restriction enzyme

(c) rop – reduced osmotic pressure

(d) Hind III, EcoRI-selectable markers

options :4

level :2

Ans : A

Solution : The corrected options

(b) ori– origin of replication

(c) rop– codes for the proteins involved in the replication of the plasmid.

(d) Hind III, EcoRI– Restriction sites

Que-41) Biolistics (gene gun) is suitable for

(a) DNA fingerprinting

(b) Disarming pathogen vectors

(c) Transformation of plant cells

(d) Constructing recombinant DNA by joining with vectors

options :4

level :2

Ans : C

Solution : As gene gun interests recombinant DNA into host cells which leads to transformation of plant cells.

Que-42) In genetic engineering, the antibiotics are used

(a) To keep the cultures free of infection

(b) As selectable markers

(c) To select healthy vectors

(d) As sequences from where replication starts

options :4

level :2

Ans : B

Solution : The host cells must naturally be sensitive to the antibiotic in questions so that any vector molecule which transforms a host cell can confer antibiotic resistance. By plating transformed cells on a medium containing the antibiotic, only those cells that have been transformed by vector molecules survive.

Que-43) The figure below shows three steps (A, B, C) of Polymerase Chain Reaction (PCR). Select the option giving correct identification together with what it represents ?
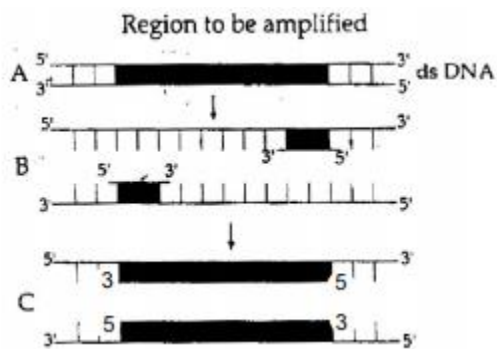
(a) A – Annealing with two sets of primers

(b) B – Denaturation at a temperature of about 98°C separating the two DNA strands

(c) A – Denaturation at a temperature of about 50°C

(d) C – Extension in the presence of heat stable DNA polymerase

options :4

level :2

Ans : D

Solution :

Que-44) There is a restriction endonuclease called EcoRI. What does "co" part in it stand for?

(a) coli

(b) colon

(c) coelom

(d) coenzyme

options :4

level :2

Ans : A

Solution :

E   co   R I → Order in which enzyme were isolated
Escherichia   coli   Rough strain (RY13 strain)
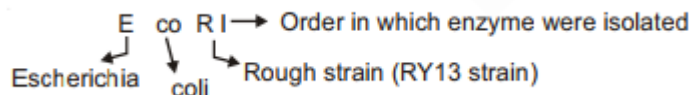
Que-45) Given below is a sample of a protein of DNA strand giving the base sequence on the opposite strands. What is so special shown in it?

    5'_____ GAATTC _____ 3'

    3'_____ CTTAAG_____ 5'

(a) Palindromic sequence of base pairs

(b) Replication completed

(c) Deletion mutation

(d) Start codon at the 5' end

options :4

level :2

Ans : A

Solution :

Que-46) Which one of the following techniques made it possible to genetically engineer living organisms?

(a) Heavier isotope labelling

(b) Hybridisation

(c) Recombinant DNA techniques

(d) X – ray diffraction

options :4

level :2

Ans : C

Solution :

Que-47) Select the incorrect statement w.r.t. Green Revolution.

(a) Succeeded in quadrupling the food supply

(b) Increase was insufficient to feed the growing human population

(c) Increased yields could be attributed to improved crop varieties

(d) Use of agrochemicals contributed to enhanced yields

options :4

level :2

Ans : A

Solution : Succeeded in tripling the food supply.

Que-48) Which of the following is not an advantage of GM crops?

(a) Increased crop tolerance to salt in soil

(b) Increased reliance on chemical pesticides

(c) Reduction in post harvest losses

(d) Increased efficiency of mineral usage

options :4

level :2

Ans : B

Solution : Reduced reliance on chemical pesticides is an advantage of GM crops.

Que-49) Production of pest resistant plants could

(a) Increase the amount of pesticide used

(b) Increase the amount of weedicide used

(c) Decrease the amount of pesticide used

(d) Both (b) and (c)

options :4

level :2

Ans : C

Solution : If plant resistant to pest then there will not be any need of using much pesticide

Que-50) Identify the gene and its protein that controls corn borer from the given options

(a) *cry I Ab and Cry I Ab*

(b) *cry I Ac and Cry I Ac*

(c) *cry II Ab and Cry II Ab*

(d) *cry I Ac and Cry I Ac*

options :4

level :2

Ans : A

Solution : Bt toxin is enclosed by a gene named *cry*.

There are a number of such genes for instance ,*cry I Ab* for corn borer.

Que-51) Human insulin is being commercially produced from a transgenic species of

(a) Saccharomyces

(b) *E. coli*

(c) Mycobacterium

(d) Agrobacterium

options :4

level :2

Ans : B

Solution :

Que-52) Bt toxin kills the insect by

(a) Blocking mitochondrial respiration

(b) Blocking transfer of nerve impulse

(c) Creating pores in body surface

(d) Creating pores in mid – gut epithelium cell

options :4

level :2

Ans : D

Solution : After ingestion by the insect, the protoxin is converted/cleaved into shorter versions of the protein that display the toxic activity. These bind to the mid gut epithelium and create pores that cause cell swelling and lysis. The insect is unable to feed and consequently starves to death.

Que-53) How many recombinant therapeutics have been approved for human use in world over?

(a) 12

(b) 30

(c) 42

(d) 27

options :4

level :2

Ans : B

Solution : At present about 30 recombinant therapeutics have been approved globally and 12 of these are presently being marketed in India.

Que-54) Removal of which chain results in maturation of proinsulin to insulin?

(a) D chain

(b) C chain

(c) B chain

(d) A chain

options :4

level :2

Ans : B

Solution : Insulin is synthesized as a pro – hormone and the gene for this protein synthesis is located on chromosome 11, and contains an extra stretch called the C – peptide.

This C – peptide is removed during maturation into insulin.

Que-55) Why would lac z gene be fused to coding sequence of chain A and B in plasmids of *E.coli*?

(a) Helps to form blue insulin which is more effective

(b) Helps in selection of recombinant

(c) Help in oral administration of insulin

(d) All of these

options :4

level :2

Ans : B

Solution : Sequences for A and B chains were linked with lac z gene and introduced into pBR322. The recombinant E.coli could be selected by blue-white screening. Recombinants do not produce colour.

Que-56) Animals that have had their DNA manipulated to possess and express an extra gene are known as

(a) Foreign animals

(b) Superior animals

(c) Transgenic animals

(d) Elevated animals

options :4

level :2

Ans : C

Solution : Transgenic animals are animals that have had their DNA manipulated to possess and express an extra gene.

Que-57) If a probe is made of radioactively labelled dsDNA and is allowed to hybridise to its complementary DNA in a cloned cell followed by detection using autoradiography. Which of the following is considered wrong for the given statements?

(a) It is double stranded DNA

(b) It is radioactively labelled

(c) This probe can be used in autoradiography

(d) It is hybridize to complementary DNA/RNA

options :4

level :2

Ans : A

Solution : A single stranded DNA or RNA tagged with a radioactive molecules called probe allowed to hybridize to its complementary DNA in a clone of cells.

Que-58) Which step of Government of India has taken to cater to the requirement of patent terms and other emergency provisions in this regard?

(a) RTI Act

(b) NGO Act

(c) Indian patents Bill

(d) Biopiracy Act

options :4

level :2

Ans : C

Solution : The Indian parliament has recently cleared the second amendment of the Indian Patents Bill, that takes such issues into consideration, including patent terms emergency provisions and research and development initiative

Que-59) ' Rosie' a transgenic cow is known to produce a type of milk which has all the following characteristics, except

(a) Protein content of 2,4 g/L

(b) Human ∝-lactalbumin

(c) More balanced diet than normal cow milk fo babies

(d) Was produced for first time in year 2001

options :4

level :2

Ans : D

Solution : Roise was produced for the first time in year 1997.

Que-60) Repeated transfusions of genetically modified cells are required in SCID patients and in enzyme replacement therapy because

(a) Transfused cells have a limited life span

(b) Introduced gene has been mutated

(c) The enzyme required is degraded after 20 days of transfusion

(d) Both (a) and (c)

options :4

level :2

Ans : D

Solution : SCID is caused due to defect in gene for adenosine deaminase.

Que-61) The bacterium Bacillus thuringiensis is widely used in contemporary biology as

(a) Bioweapon

(b) Bioinsecticide

(c) Bioweedicide

(d) Indicator of water pollution

options :4

level :2

Ans : B

Solution :

Que-62) Hirudin can be extracted from transgenic plant

(a) Brassica napus

(b) Bacillus napus

(c) Bt brinjol

(d) Bt Brassica napus

options :4

level :2

Ans : A

Solution : Synthesis hirudin gene $\rightarrow$ Intruduced into Brassica napus $\rightarrow$ seeds containg hirudin $\rightarrow$ Isolation and purification $\rightarrow$ Purified hirudin

Que-63) Select incorrect statements w.r.t. RNAi

(a) dsDNA binds target mRNA and initiate RNAi

(b) Agrobacterium vector is used to introduce nematode specific gene into host plant

(c) ssRNA binds target mRNA and initiate RNAi

(d) Both (b) and (c)

options :4

level :2

Ans : A

Solution : dsRNA binds target mRNA and initiates RNAi.

Que-64) Nobel prize was given to Andrew Fire and Craig Mello for their work on RNAi on

(a) Meloidogyne incognita

(b) Caenorhabditis elegans

(c) Bacillus thuringiensis

(d) Brassica napus

options :4

level :2

Ans : B

Solution :

Que-65) The main challenge for population of insulin using rDNA techniques was getting insulin into matured from using _____ bond

(a) Hydrogen

(b) Peptide

(c) Ionic

(d) Disulphide

options :4

level :2

Ans : D

Solution : Two interchain disulphide bonds exist between chain A and chain B in mature insulin.

Que-66) Technique used to detect HIV in suspected AIDS patient in asymptomatic stage is

(a) PCR

(b) Serum analysis

(c) Both (a) and (b)

(d) Urine analysis

options :4

level :2

Ans : A

Solution : **PCR**: It helps to detect very low conc. of bacteria or virus at the time when the symptoms of the disease are not visible, by amplification of their nucleic acid.

Que-67) Which ingredient was present in higher concentrations in GM rice as compared to the usual rice?

(a) Protein

(b) Carbohydrate (starch)

(c) β-carotene

(d) Na^+

options :4

level :2

Ans : C

Solution : β-carotene makes golden rice a source of vitamin A.

Que-68) Disadvantage of using porcine insulin in diabetic patients is

(a) That it may lead to hypercalcemia

(b) It may cause allergic reactions

(c) It is expensive

(d) It can lead to mutations in adult

options :4

level :2

Ans : B

Solution : Porcine insulin is animal (pig) insulin.

Que-69) Enzyme used in ELISA test is

(a) Endonuclease

(b) Ligase

(c) Peroxidase

(d) Polymerase

options :4

level :2

Ans : C

Solution : **Peroxidase** : It converts colourless substrate into coloured product which indicates the presence of antigens.

Que-70) Which of the following is not an application of genetic engineering in plants?

(a) Nitrogen fixation

(b) DNA vaccines

(c) Resistance to glyphosate

(d) Production of insecticidal proteins in plants

options :4

level :2

Ans : B

Solution : DNA vaccines are genetic vaccines that use the genetic material of the pathogen itself to immunize the individual. DNA vaccines induce both humoral and cell-mediated immunity.

Que-71) What is the difference between the two mice as shown as in the figure?
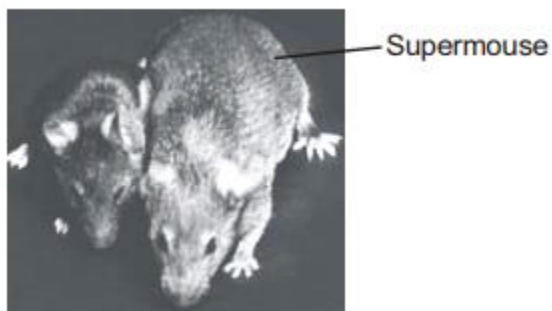
(a) One animal normal in size, the other is twice as big supermouse because of good diet

(b) The bigger 'Supermouse' is transgenic. It is larger because of expression of the gene for human growth hormone factor that has been introduced

(c) The smaller one is a dwarf

(d) Transgenic mice are an example of gene therapy

options :4

level :2

Ans : B

Solution :

Que-72) Which kind of therapy was given in 1990 to a four- year-old girl with adenosine deaminase (ADA) deficiency?

(a) Gene therapy

(b) Chemotherapy

(c) Immunotherapy

(d) Radiation therapy

options :4

level :2

Ans : A

Solution : Gene therapy was given in 1990 to a four year old girl child with ADA deficiency.

Que-73) Which part of the tobacco plant infected by *Meloidogyne incognita*?

(a) Root

(b) Flower

(c) Leaf

(d) Stem

options :4

level :2

Ans : A

Solution : *Meloidogyne incognita* cause root knot disease in tobacco plant.

Que-74) Golden rice is a genetically modified crop plant where the incorporated gene is meant for biosyntheses of

(a) Vitamin A

(b) Vitamin B

(c) Vitamin C

(d) Omega 3

options :4

level :2

Ans : A

Solution : Golden rice is nutritionally enriched rice and is meant for biosynthesis of vitamin A.

Que-75) In Bt cotton, the Bt toxin present in plant tissue as pro-toxin is converted into active toxin due to

(a) Presence of conversion factors in insect gut

(b) Alkaline pH of the insect gut

(c) Acidic pH of the insect gut

(d) Action of gut micro-organisms

options :4

level :2

Ans : B

Solution : Bt toxin crystals are solubilised in alkaline pH of the insect gut.

Que-76) In vitro clonal propagation in plants is characterized by

(a) PCR and RAPD

(b) Northerm blotting

(c) Electrophoresis and HPLC

(d) Microscopy

options :4

level :2

Ans : A

Solution : Now a days PCR & RAPD technique are used for the characterization of *in vitro* clonal propagation in plants.

 Que-77) The first human hormone produced by recombinant DNA technology is

(a) Insulin

(b) Estrogen

(c) Thyroxin

(d) Progesterone

options :4

level :2

Ans : A

Solution : The first human hormone produced by recombinant DNA technology is insulin.

Que-78) An analysis of chromosomal DNA using the Southern hybridization techinque does not use:

(a) Electrophoresis

(b) Blotting

(c) Autoradiography

(d) PCR

options :4

level :2

Ans : D

Solution : PCR is only for amplification of DNA.

Que-79) Which of the following Bt crops is being grown in India by the farmers?

(a) Cotton

(b) Brinjal

(c) Soyabean

(d) Maize

options :4

level :2

Ans : A

Solution :

Que-80) Consumption of which one of the following foods can prevent the kind of blindness associated with vitamin 'A' deficiency?

(a) Golden rice

(b) Bt-Brinjal

(c) 'Flaver Savr' tomato

(d) Canolla

options :4

level :2

Ans : A

Solution :

Que-81) The first clinical gene therapy was given for treating

(a) Adenosine deaminase deficiency

(b) Diabetes mellitus

(c) Chicken pox

(d) Rheumatoid arthritis

options :4

level :2

Ans : A

Solution :

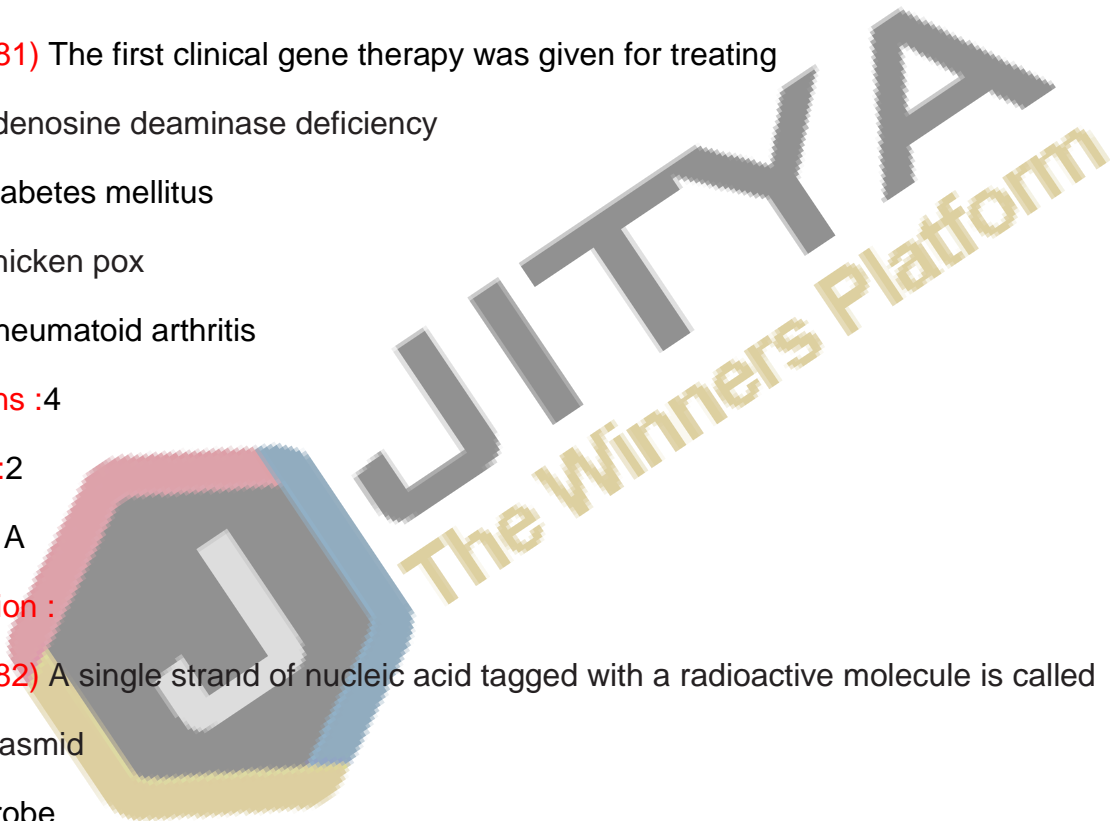Que-82) A single strand of nucleic acid tagged with a radioactive molecule is called

(a) Plasmid

(b) Probe

(c) Vector

(d) Selectable marker

options :4

level :2

Ans : B

Solution :

Que-83) Tobacco plants resistant to a nematode have been developed by the introduction of DNA that produced (in the host cells)

(a) Both sense and anti-sence RNA

(b) A particular hormone

(c) An antifeedant

(d) A toxic protein

options :4

level :2

Ans : A

Solution : Tobacco plant resistant to a nematode to prevent infestation is based on the process of RNA interference, which involves silencing of a specific mRNA by binding of dsRNA molecule.

Que-84) Silencing of mRNA has been used in producing transgenic plants resistant to

(a) White rusts

(b) Bacterial blights

(c) Bollworms'

(d) Nematodes

options :4

level :2

Ans : D

Solution :

Que-85) Maximum number of existing transgenic animals is of

(a) Pig

(b) Fish

(c) Mice

(d) Cow

options :4

level :2

Ans : C

Solution :

Que-86) The process of RNA interference has been used in the development of plants resistant to

(a) Insects

(b) Nematodes

(c) Fungi

(d) Viruses

options :4

level :2

Ans : B

Solution :

Que-87) The genetically-modified (GM) brinjal in India has been developed for

(a) Drought -resistance

(b) Insect - resiatance

(c) Enhancing shelf life

(d) Enhancing mineral content

options :4

level :2

Ans : B

Solution :

Que-88) Some of the characteristics of Bt cotton are

(a) High yield and resistance to bollworms

(b) Long fibre and resistance to aphids

(c) Medium yield, long fibre and resistance to beetle pests

(d) High yield and production of toxic protein crystals which kill dipteran pests

options :4

level :2

Ans : A

Solution : Bt cotton is a biopepsticide resistant to bollorm

Que-89) Which one of the following is now being commercially produced by biotechnological procedures?

(a) Nicotine

(b) Morphine

(c) Quinine

(d) Insulin

options :4

level :2

Ans : D

Solution :

Que-90) The bacterium Bacillus thuringiensis is widely used in contemporary biology as

(a) Insecticide

(b) Agent for production of dairy

(c) Source of industrial enzyme

(d) Indicator of water pollution

options :4

level :2

Ans : A

Solution :