31/03/2026

Code A Phase 1

Aakash
Medical | IIT-JEE | Foundations

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Udyog Vihar, Gurugram, Haryana - 122015, ***Ph.***+91-1244168300

MM : 720 Final Test Series(P1)_NEET2026_Test-05A **Time : 180 Min.**

PHYSICS

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CHEMISTRY

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158. (4)

180. (2)

Hints and Solutions

PHYSICS

(1) **Answer :** (1)
Solution:
Negative charge will be induced on the surface of sphere which is near to the plate. Positive charge is induced on the surface of sphere that is away from the metal plate.
∴ Attractive force between the plate and the induced negative charges is greater than the repulsive force between the plate and induced positive charges.

(2) **Answer :** (4)
Solution:
Total flux passing through the cube $\phi = \frac{q}{\varepsilon_0}$
As the charge is placed symmetrically to each face of the cube, thus electric flux passing through each face is equal to the (1/6)th of the total flux.
∴ Electric flux passing through each face $\phi' = \frac{\phi}{6} = \frac{q}{6\varepsilon_0}$

(3) **Answer :** (1)
Solution:
The dielectric constant of metal is ∞.

(4) **Answer :** (4)
Solution:
Value of charge is independent of its speed.

(5) **Answer :** (4)
Solution:
For uniformly charged solid sphere, electric field is given as

$$E \propto \begin{cases} r & \text{for} \quad r \le R \\ \frac{1}{r^2} & \quad\quad r \ge R \end{cases}$$

(6) **Answer :** (3)
Solution:
$U = \frac{q_1 q_2}{4\pi\varepsilon_0 r}$, where q_1 and q_2 taken with their sign.

(7) **Answer :** (1)
Hint:
In the direction of electric field, potential decreases.
Solution:
B and *C* lies on same level so potential will be equal while potential will be less at point *A*.

(8) **Answer :** (2)
Solution:
In direction of electric field lines, the potential decreases.

(9) **Answer :** (4)
Solution:
$U = -PE\cos\theta$, $U_{max} = PE(-\cos\theta)_{max}$
$=PE$, at $\theta = 180°$, $\cos\theta = -1$, $(-\cos\theta)_{max}=1$

(10) **Answer :** (3)
Hint:
$\Delta U = \frac{1}{2}\left(\frac{C_1C_2}{C_1+C_2}\right)(V_2-V_1)^2$
Solution:
$\Delta U = \frac{1}{2}\left(\frac{2\times10^{-3}\times2\times10^{-3}}{2\times10^{-3}+2\times10^{-3}}\right)(20-10)^2$
$\Delta U = \frac{1}{2}(10)^2 \times \left(10^{-3}\right) = 0.05$ J

(11) **Answer :** (3)
Solution:
Force between plates of capacitor is independent of distance between them.

(12) **Answer :** (2)
Solution:
$\Delta K = e(\Delta V)$
$K - 0 = e\ (1\ kV) = 1\ keV$

(13) **Answer :** (2)
Hint:
In series combination, charge on each capacitor is same.
Solution:
$C_{net} = \frac{3}{2}\ \mu F$
$Q = C_{net}V = 30\ \mu C$

(14) **Answer :** (2)
Solution:
Electric field at any distance r from sheet, $E = \frac{\sigma}{2\varepsilon_0}$

(15) **Answer :** (4)
Solution:
$\Delta U = q(\Delta V)$
$U_{initial} = e(7V) = 7\ eV$
$U_{final} = e(10V) = 10\ eV$
$\therefore\ \Delta U = 10\ eV - 7\ eV = 3\ eV$

(16) **Answer :** (1)
Solution:
Electric field due to long line charge is
$E = \frac{2K\lambda}{r}$

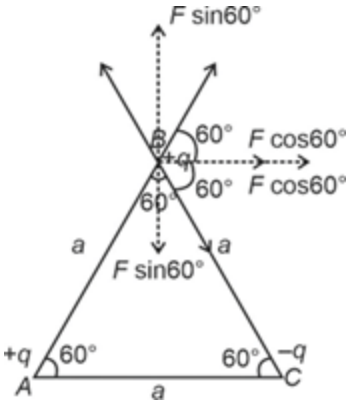
(17) **Answer :** (1)
Solution:
Electric potential due to an electric dipole at position (r, θ) is $\frac{kp\cos\theta}{r^2}$

(18) **Answer :** (1)
Solution:
Electric field at the point having position vector $\vec{r}$, will be $\vec{E} = \frac{1}{4\pi\varepsilon_0}\frac{q}{r^2}\hat{r}$

(19) **Answer :** (1)
Solution:
$V_f = n^{2/3}V$
$=(27)^{2/3}V = 9V = 9 \times 10 = 90\ V$

(20) **Answer :** (2)
Solution:
The electric potential (V) is related to electric field $(\vec{E})$ by
$\vec{E} = -\left(\hat{i}\frac{\partial V}{\partial x} + \hat{j}\frac{\partial V}{\partial y} + \hat{k}\frac{\partial V}{\partial z}\right)$

(21) **Answer :** (4)
Solution:



Here $F = \frac{1}{4\pi\varepsilon_0}\frac{q^2}{a^2}$

From figure net force on charge +*q at B*

$= 2F\ \cos 60^\circ = 2 \times \frac{1}{4\pi\varepsilon_o} \times \frac{q^2}{a^2} \times \frac{1}{2}$

$= \frac{1}{4\pi\varepsilon_o}\frac{q^2}{a^2}$

(22) Answer : (4)
Solution:

$\Phi_{\text{closed surface}} = \frac{q_{en}}{\varepsilon_0}$

here $q_{en} = 0 \therefore \Phi_{\text{closed}} = 0$

(23) Answer : (1)
Solution:
For charging of a body only electrons are responsible, when body gains electrons it becomes negatively charged and when it loses electrons it becomes positively charged.

(24) Answer : (3)
Solution:

$V_{\text{centre}} = K\frac{3Q}{2R}$

$V_{\text{at } r} = \frac{KQ}{r}$

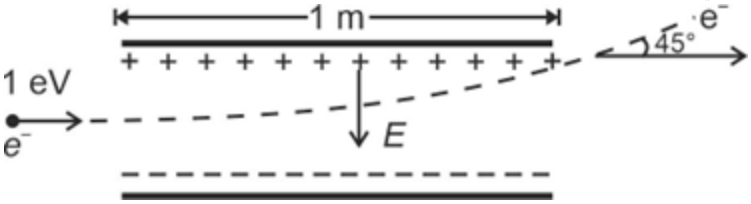
As $\frac{V_{\text{centre}}}{2} = V_{\text{at } r}$

$\therefore r = \frac{4R}{3}$

Distance from surface $\frac{4}{3}R - R = \frac{R}{3}$

(25) Answer : (2)
Solution:

Using equation of kinematics time taken in crossing the field $t = \frac{1}{v_x}$; $v_X \rightarrow$ remain constant



$v_y = a_y t = \frac{eE}{m} \times \frac{1}{v_x}$

$\Rightarrow \tan\theta = \frac{v_y}{v_x} = \frac{eE \times 1}{mv_x \cdot v_x} = \frac{eE}{mv_x^2}$

$\Rightarrow \tan\theta = \frac{eE}{2 \times \frac{1}{2}mv_x^2} = \frac{eE}{2 \cdot K_I}$

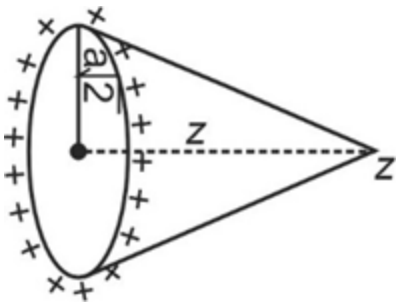
$\Rightarrow \tan 45^\circ = \frac{eE}{2 \times 1\,\text{e}} = \frac{eE}{2 \times e} = \frac{E}{2}$

$\Rightarrow E$ = 2 volt/meter

(26) Answer : (4)

Solution:
Electric potential at any point on axis of circular loop

$V = \frac{kq}{\sqrt{z^2+(a\sqrt{2})^2}}$



For V to be maximum, z^2 should be minimum i.e., $z = 0$

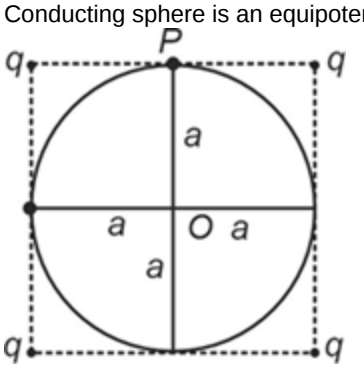
(27) Answer : (4)
Solution:

$\vec{\tau} = \vec{P} \times \vec{E}$

$\vec{P} \| \vec{E}$

$\tau = 0$

(28) Answer : (3)
Solution:
Conducting sphere is an equipotential volume and potential at its any point is equal to potential at its centre.



Total potential at point O, $V_0 = 4 \times \frac{kq}{a\sqrt{2}} + V_{\text{at O, due to induced charge on sphere}}$

$V_0 = \frac{4kq}{a\sqrt{2}}$

$\therefore \quad V_P = V_0$

Now using superposition principle
$V_P = V$ due to all charges q (at P) + V due to induced charges (at P)

$V_P = \frac{kq}{a} + \frac{kq}{a} + \frac{kq}{\sqrt{5}a} + \frac{kq}{\sqrt{5}a} + V_{\text{induced charge}}$

$\Rightarrow \frac{4kq}{a\sqrt{2}} = \frac{2kq}{a} + \frac{2kq}{\sqrt{5}a} + \mathrm{V}_{\text{induced charge}}$

(V at P)$_{\text{induced charge}}$

$= \frac{4kq}{a\sqrt{2}} - \frac{2kq}{a} - \frac{2kq}{\sqrt{5}a} = \frac{kq}{a}\left[2\sqrt{2} - 2 - \frac{2}{\sqrt{5}}\right]$

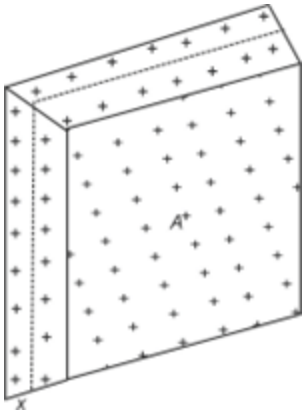
(29) Answer : (4)
Solution:
In the direction of electric field, potential always decreases $\Rightarrow v_A > v_B$

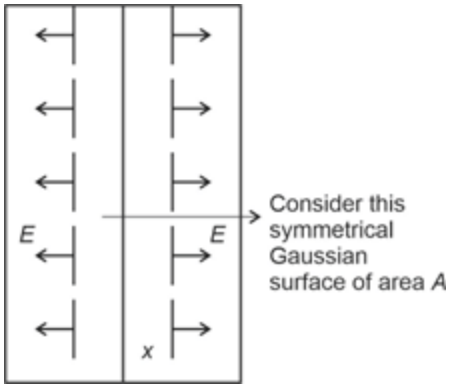
Electric field due to point charge, $E = \frac{kQ}{r^2}$

$\therefore E_A > E_B$

$W_{\text{ext}} = q(V_B - V_A)$

(30) Answer : (1)
Solution:





Using gauss theorem

$\phi = \frac{q}{\varepsilon_0}$

$2EA = \frac{q}{\varepsilon_0}$

$E = \frac{q}{2A\varepsilon_0} = \frac{\rho Ax \times 2}{2A\varepsilon_0} = \frac{\rho x}{\varepsilon_0}$

$E = \frac{\rho x}{\varepsilon_0} = \frac{1\times10^{-3}}{\varepsilon_0}$ N/C

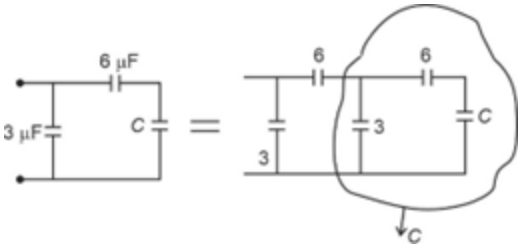
(31) Answer : (2)
Solution:
When *S* is open, charge on system

$= \left(\frac{2C\times C}{2C+C}\right)V = \frac{2}{3}CV = \frac{2}{3}\times 4\times 30 = 80$ μC

After switch *S* is closed,
Charge on system = 2*CV* = 2 × 4 × 30 = 240 μC
Charge passed through *AB* = 240 – 80 = 160 μC

(32) Answer : (4)
Solution:
Coulomb force is a central force and is conservative. It is also medium dependent because it depends on the permittivity (ε) of the surrounding medium.

(33) Answer : (3)
Solution:



$\frac{6C}{6+C} + 3 = C$

$6C + 18 + 3C = 6C + C^2$

$C^2 - 3C - 18 = 0$

$\Rightarrow (C - 6)(C + 3) = 0$

C = 6 μF or C = –3 μF
∴ C = 6 μF (as C cannot be negative)

(34) Answer : (2)
Solution:
Surface is parallel to *y-z* plane. Therefore for electric flux, only x-component of electric field will be responsible
Hence $2 \times 10^3 \times A = 6$
$A = \frac{6}{2} \times 10^{-3} = 3 \times 10^{-3} \text{m}^2$
$= 30\ \text{cm}^2$

(35) Answer : (2)
Solution:
Electric flux, $\Phi = EA \Rightarrow \text{NC}^{-1}\text{m}^2$
Electric field intensity, $V = Ed \Rightarrow \text{Vm}^{-1}$
Linear charge density, $\lambda = \frac{Q}{l} \Rightarrow \frac{\text{C}}{\text{m}}$
Dipole moment, $p = ql \Rightarrow$ C m

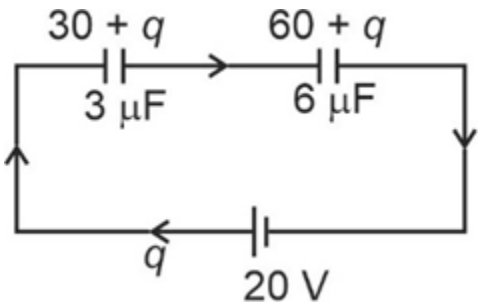
(36) Answer : (1)
Solution:
$W_{\text{ext.}} = U_2 - U_1$
$U_1 = \frac{kq_1q_2}{r},\ U_2 = \frac{kq_1q_2}{2r}$
$W = U_2 - U_1$
$= \frac{kq_1q_2}{r}\left(\frac{1}{2} - 1\right) = -\frac{kq_1q_2}{2r}$

(37) Answer : (1)
Solution:
Due to electrostatic shielding, charges will be distributed only on the outer metallic surface, ensuring the electric field inside the cabin to be zero.

(38) Answer : (4)
Solution:
$\left|q_{\text{ind}}\right| = q\left[1 - \frac{1}{k}\right]$
$1.6 \times 10^{-6} = 2 \times 10^{-6}\left[1 - \frac{1}{k}\right]$
$\Rightarrow \frac{1.6}{2} = 1 - \frac{1}{k}$
$\Rightarrow \frac{4}{5} = 1 - \frac{1}{k}$
$\frac{1}{k} = 1 - \frac{4}{5} = \frac{1}{5}$
k = 5

(39) Answer : (4)
Solution:
Electrostatic field due to line charge
$E = \frac{\lambda}{2\pi\varepsilon_0 x}$
Force on small electric dipole
$F = P \cdot \frac{dE}{dx} = aq\frac{d}{dx}\left(\frac{\lambda}{2\pi\varepsilon_0 x}\right)$
$= aq\frac{\lambda}{2\pi\varepsilon_0} \times \frac{-1}{x^2}$
$= \left(-\right)\frac{\lambda aq}{2\pi\varepsilon_0 x^2}$ (Attractive)

(40) Answer : (2)
Solution:



Let charge q is supplied by battery, using KVL

$\frac{30+q}{3}+\frac{60+q}{6}=20$

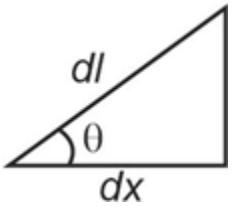
$10+\frac{q}{3}+10+\frac{q}{6}=20$

$q = 0$

So no charge distribution after battery connection i.e., charges remain unchanged.

(41) **Answer :** (1)

Solution:



Electric force on elementary wire (AB) having linear charge density λ at angle (θ) is

$dF=\frac{\lambda}{2\pi\varepsilon_0 x}\lambda\cdot dl=\frac{\lambda\cdot\lambda\, dx}{2\pi\varepsilon_0 x\cos\theta}\ \Rightarrow F=\int dF$

$\Rightarrow\ F=\frac{\lambda^2}{2\pi\varepsilon_0\cos\theta}[\log_e x]_a^b$

$=\frac{\lambda^2}{2\pi\varepsilon_0\cos\theta}\log_e\left(\frac{b}{a}\right)$

(42) **Answer :** (1)

Solution:

$W = \Delta KE$

$\Rightarrow\ \Delta KE=\int qE\, dl=qE\cdot\pi r$

$= 10^{-3} \times \pi \times \pi \times 10 \times 10^{-2} = 10^{-3}$ J

(43) **Answer :** (4)

Solution:

Here $\oint \vec{E}\cdot\vec{dl}\neq 0$, in each field pattern.

For any closed loop in an electrostatic field, the line integral $\oint \vec{E}\cdot\vec{dl}=0$

(44) **Answer :** (3)

Solution:

$\sigma\propto\frac{1}{r}$ here radii of curvature, $r_1 = r_3$ and $r_2 = r_4$

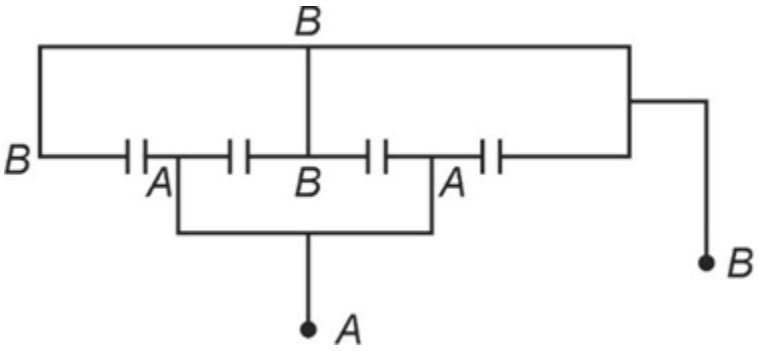
$\therefore\ \sigma_1 = \sigma_3$ and $\sigma_2 = \sigma_4$

But $r_1 = r_3 > r_2 = r_4$

$\therefore\quad \sigma_1 = \sigma_3 < \sigma_2 = \sigma_4$

(45) **Answer :** (3)

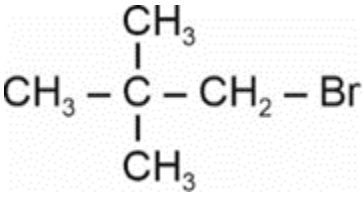
Solution:



All capacitors are in parallel connection across *A* and *B*
$\therefore\ C_{AB} = 4C = 4 \times 4 = 16\ \mu F$

CHEMISTRY

(46) **Answer :** (1)
Solution:

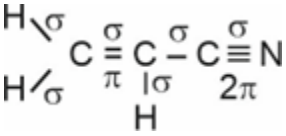


(47) **Answer :** (2)
Solution:
Compounds having same molecular formula but different functional groups in the molecules are called functional isomers.
$\underset{\text{Alcohol}}{CH_3CH_2OH}$ and $\underset{\text{Ether}}{CH_3OCH_3}$

(48) **Answer :** (3)
Hint:
Distillation under reduced pressure is used to purify liquids which decompose at or below their boiling points.
Solution:
Fractional distillation is used to separate liquids if difference in boiling points of liquids is not much. Crude oil is purified by this method.

(49) **Answer :** (2)
Solution:
$\overset{\oplus}{C}H_3$ is planar in shape while $\overset{\ominus}{C}H_3$ is pyramidal in shape.

(50) **Answer :** (1)
Solution:



6σ and 3π bonds

(51) **Answer :** (1)
Hint:
AgCl forms a complex compound with NH_4OH solution.
Solution:
• $AgCl(s) + 2NH_3(aq) \rightarrow [Ag(NH_3)_2]Cl\ (aq)$
AgCl forms complex with ammonium hydroxide hence it is soluble in NH_4OH.
• AgI is insoluble in NH_4OH.
• Nitrogen, sulphur, halogens (Cl, Br, I) and phosphorus present in an organic compound are detected by “Lassaigne's test".
• On treating sodium fusion extract with sodium nitroprusside, appearance of a violet colour indicates the presence of sulphur.

$$S^{2-} + [Fe(CN)_5NO]^{2-} \rightarrow [Fe(CN)_5NOS]^{4-}$$

Violet

(52) **Answer :** (4)
Solution:
There is no such equilibrium between the resonating structures.

(53) **Answer :** (4)
Hint:
In Heterocylic compound, atoms other than carbon are also present in the ring.
Solution:
Tetrahydrofuran(THF) is heterocyclic since it contains oxygen atom in the ring other than carbon atoms.

THF : 

(54) **Answer :** (4)
Hint:
Actual pressure due to N_2 gas = (Total pressure – Aqueous tension)
Solution:
Actual pressure of N_2 gas(P_2) = (715–15)
= 700 mm of Hg

$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

$V_2 = \frac{P_1V_1T_2}{P_2T_1}$

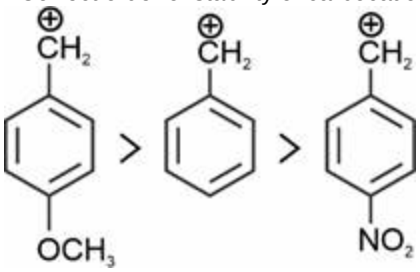
$V_2 = \frac{700\times152\times273}{760\times300}$

22400 mL N_2 at STP weighs 28 g

$\frac{700\times152\times273}{760\times300}$ mL N_2 at STP weighs = $\frac{28}{22400}\times\frac{700\times152\times273}{760\times300}$

% of nitrogen = $\frac{28\times700\times152\times273}{22400\times760\times300\times0.7}\times100 = 22.75\%$

(55) **Answer :** (4)
Hint:
Electron donating group present at para position, in the benzene moiety, stabilises the carbocation
Solution:
• $-OCH_3$ is electron donating group while $-NO_2$ is electron withdrawing group.
• Correct order of stability of carbocations:



(56) **Answer :** (4)
Solution:

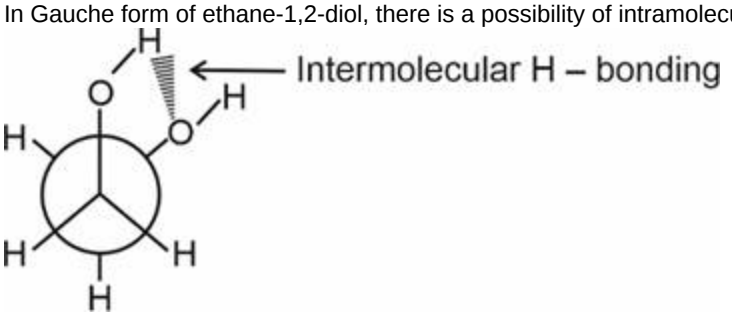
Alkanes	Boiling point/(K)
2-Methylpropane	261.0
2-Methylbutane	300.9
2,2-Dimethylpropane	282.5
Hexane	341.9

(57) **Answer :** (1)
Solution:
$-CH_3$ group increases electron density at ortho and para position and also activate benzene ring towards electrophilic substitution reaction.

(58) **Answer :** (1)
Solution:
α-H present at Bridged position does not participate in tautomerism.

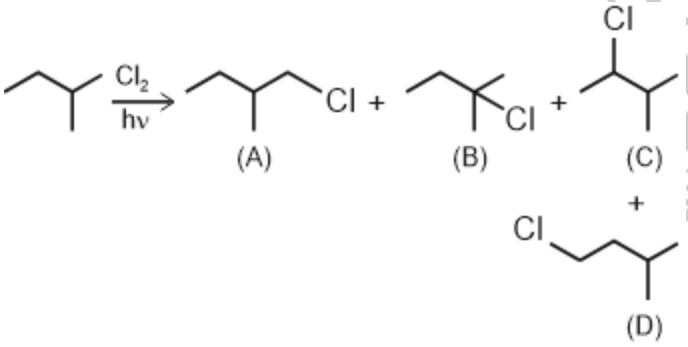
(59) **Answer :** (3)
Solution:
More substituted alkene is preferred as major product on β-elimination of alkyl halide.

(60) **Answer :** (4)
Hint:
A conformer will be more stable if it has a possibility of intramolecular hydrogen bonding.
Solution:
In Gauche form of ethane-1,2-diol, there is a possibility of intramolecular hydrogen bonding



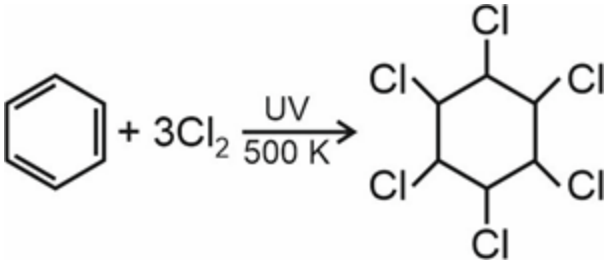
(61) **Answer :** (2)
Solution:
Molar mass of AgBr = 188
Mass of Br in $0.47\ \text{g AgBr} = \frac{80}{188} \times 0.47$ = 0.2 g
$\therefore \quad \%\ \text{of Br} = \frac{0.2}{0.5} \times 100 = 40\%$

(62) **Answer :** (2)
Solution:



(63) **Answer :** (3)
Hint:
Wurtz reaction produces higher alkanes from two alkyl halide units in presence of Na and dry ether.
Solution:
Minimum two carbon chains should be present to form alkane by Wurtz reaction. So, methane can't be formed from Wurtz reaction.

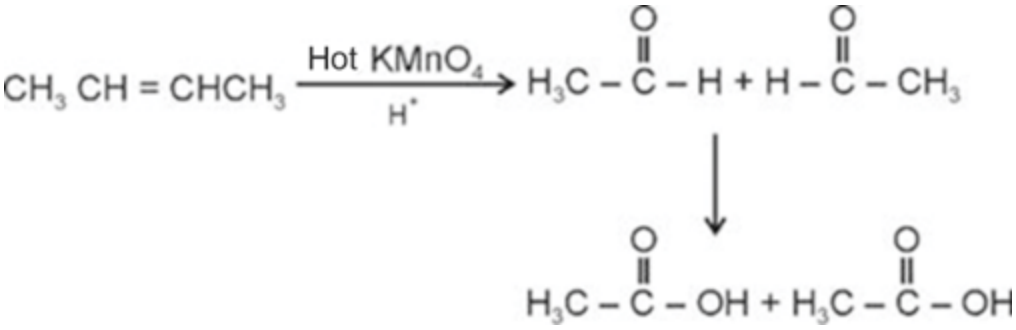
(64) **Answer :** (4)
Solution:



(65) **Answer :** (2)
Hint:

Aldehydes are further oxidised to acids in presence of acidified $KMnO_4$.

Solution:



(66) **Answer :** (3)

Solution:

(67) **Answer :** (1)

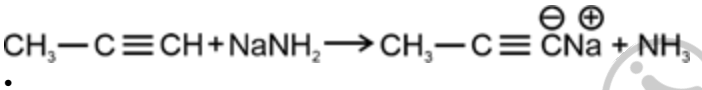
Hint:

Propyne contains acidic hydrogen.

Solution:

• Because of + I effect of CH_3 group, propyne is less acidic in nature than acetylene.

•



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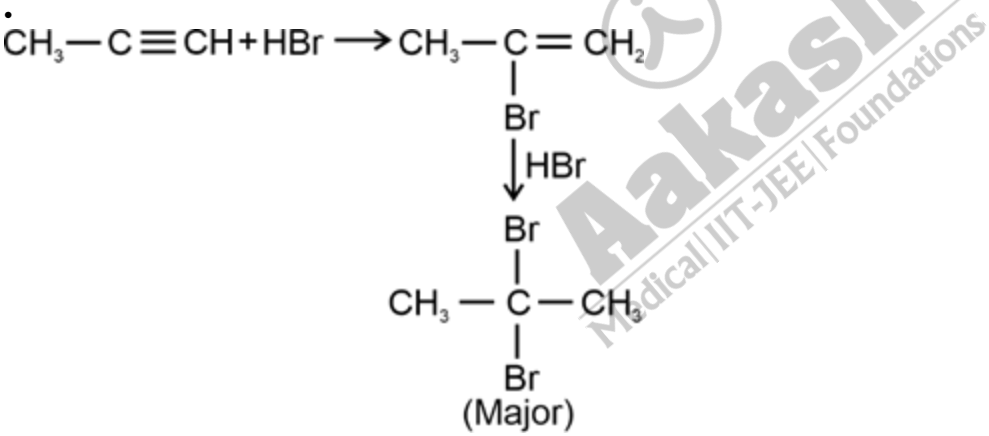


(68) **Answer :** (1)

Hint:

In cis-But-2-ene two methyl groups are in same direction.

Solution:

In cis-But-2-ene due to net dipole moment it has boiling point greater than trans-But-2-ene.

(69) **Answer :** (3)

Hint:

Alkanes on heating with a regulated supply of O_2 at high pressure and in the presence of suitable catalysts give a variety of oxidation products.

Solution:

$$2CH_4 + O_2 \xrightarrow{Cu/523\ K/100\ atm} 2CH_3OH$$

$$CH_4 + O_2 \xrightarrow[\Delta]{Mo_2O_3} HCHO + H_2O$$

(70) **Answer :** (4)

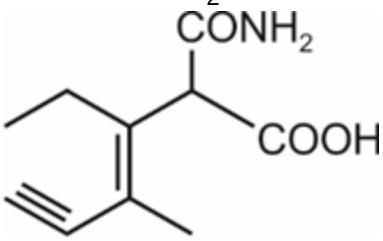
Solution:

Alkane	Melting point/K

2-Methylpropane	114.7
Pentane	143.3
2-Methylbutane	113.1
2, 2-Dimethylpropane	256.4

(71) Answer : (2)
Solution:
Nitro, azo and compounds with nitrogen present in the ring are not estimated by Kjeldahl's method.

(72) Answer : (3)
Solution:
Priority of functional group
–COOH > – $CONH_2$ > – C = C > C ≡ C



2-Carbarmoyl-3-Ethyl- -4-methylhex-3-en-5-ynoic acid

(73) Answer : (3)
Solution:
More is the number of α-Hydrogen, more will be the hyperconjugative structure.

(74) Answer : (1)
Solution:
• Partition and adsorption chromatography are types of chromatography.
• Paper chromatography is partition chromate-graphy.
• TLC is adsorption chromatography.

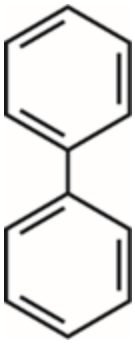
(75) Answer : (1)
Solution:
SO_3, BF_3, $AlCl_3$ = Electrophiles

H_2O, NH_3, CN^- = Nucleophiles

(76) Answer : (1)
Solution:

Compound	**Colour**
$Fe_4[Fe(CN)_6]_3 \cdot xH_2O$	Prussian blue
PbS	Black
$[Fe(CN)_5NOS]^{4-}$	Violet
$[Fe(SCN)]^{2+}$	Blood red

(77) Answer : (1)
Solution:



All atoms are planar and sp^2 hybridized.

(78) **Answer :** (2)
Solution:
The correct order of stability is (b) > (c) > (a)

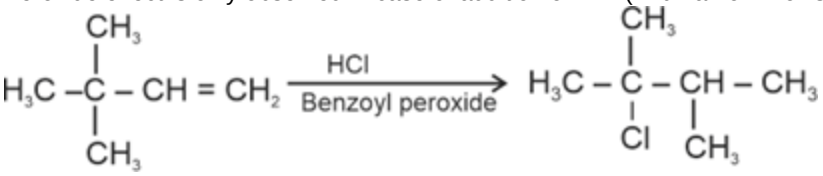
(79) **Answer :** (2)
Solution:

Methyl free radical, $\dot{C}H_3$ is paramagnetic, sp^2 hybridised and has one unpaired electron.

(80) **Answer :** (2)
Solution:
1 M, 20 mL H_2SO_4 = 1 M, 40 mL NH_3
1000 mL 1 M NH_3 → 14 g N

40 mL → $\frac{14 \times 100 \times 40}{1000 \times 0.8}$

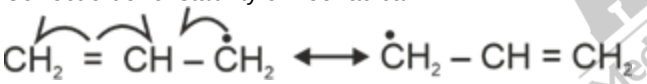
(81) **Answer :** (4)
Solution:
Peroxide effect is only observed in case of addition of HBr (Antimarkovnikov's addition)



(82) **Answer :** (3)
Hint:
Lesser the torsional strain, higher is the stability of conformer.
Solution:
Stability of conformers of ethane:
Staggered > Skew > Eclipsed

(83) **Answer :** (1)
Solution:
In benzene, the 6p electrons are delocalised and can move freely about 6 carbon nuclei.

(84) **Answer :** (4)
Solution:
Correct order of stability of free radical II > III > I



[two equivalent resonating structure]
Therefore, allylic radical is more stable than benzylic radical.

(85) **Answer :** (1)
Solution:
Since both substituents on (I) are same i.e., ($–CH_3$)
Hence, geometrical isomerism is not possible.

(86) **Answer :** (1)
Solution:

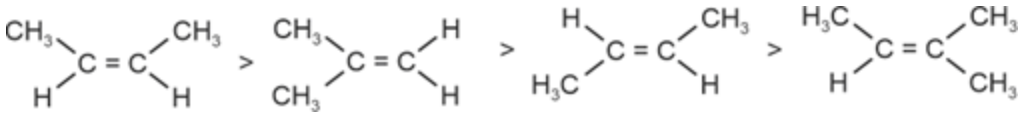
$2\,CH_3\,COONa + 2H_2O \xrightarrow{\text{Kolbe 's electrolysis}}$
$CH_3 – CH_3 + 2CO_2 + H_2 + NaOH$

Anode : $CH_3 – CH_3\uparrow + 2CO_2\uparrow$
Cathode : $H_2\uparrow$ and NaOH

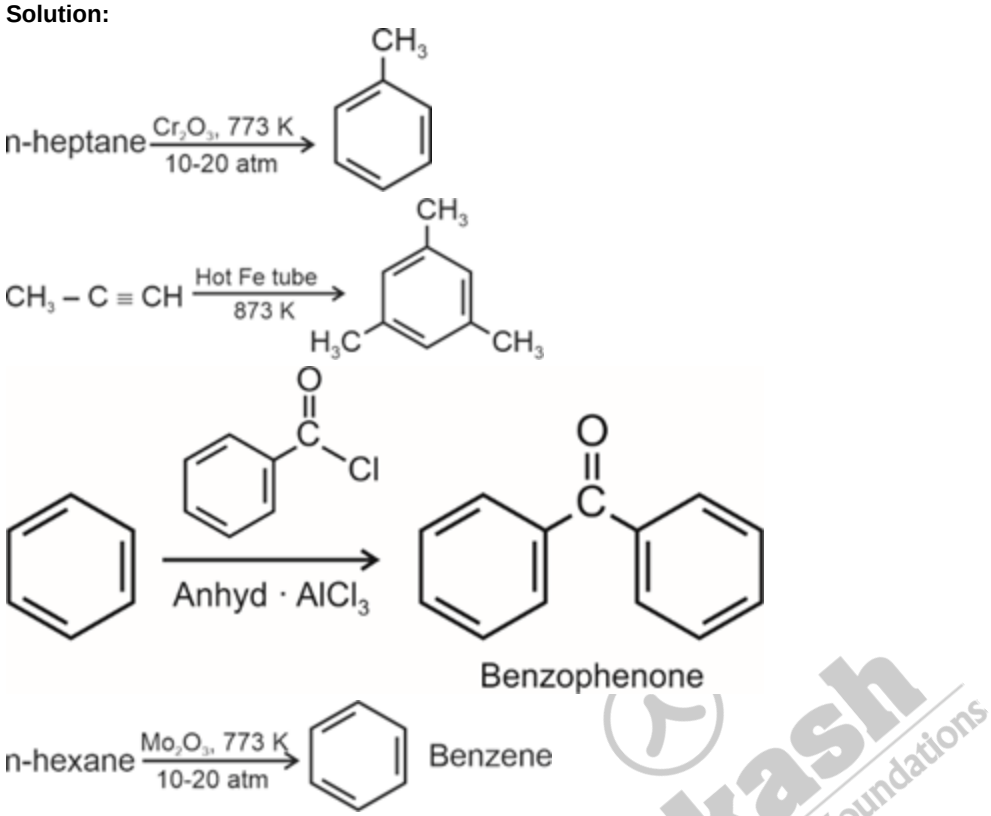
(87) **Answer :** (2)
Solution:

Rate of Hydrogenation $\propto \frac{1}{\text{Stability of alkene}}$

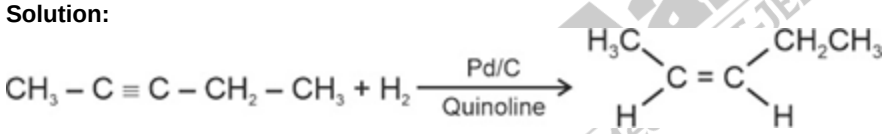
Rate of hydrogenation



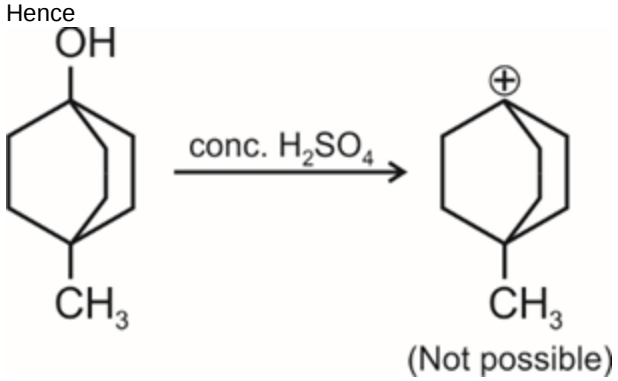
(88) **Answer :** (2)
Solution:



(89) **Answer :** (4)
Solution:



(90) **Answer :** (2)
Solution:
Carbocation on bridge head carbon is highly unstable.
Hence



BOTANY

(91) **Answer :** (3)
Solution:

Glycerol is converted into dihydroxy acetone phosphate which is an intermediate product of glycolysis also. Pyruvic acid is common respiratory intermediate of glycerol, glucose and amino acids. Acetyl CoA is common respiratory intermediate of fatty acids, glycerol, glucose and amino acids. DHAP is common respiratory intermediate of glycerol and glucose.

(92) Answer : (1)
Solution:
Bell pepper is a C_3 plant. Temperature optimum for these plants is 20-25°C.

(93) Answer : (4)
Solution:
Cyclic flow of electrons is seen in cyclic photophosphorylation. PS II involves splitting of H_2O.

(94) Answer : (2)
Hint:
Maize is a C_4 plant.
Solution:
In C_4 plants, Calvin cycle occurs in chloroplasts of bundle sheath cells.
In C_4 plants, mesophyll cells are the site of primary CO_2 fixation. This process is facilitated by PEPcase enzyme.

(95) Answer : (4)
Hint:
Plastocyanin is placed after cytochrome B_6f in Z-scheme.
Solution:
During chemiosmosis, plastocyanin transfers electrons from cyt B_6f to PS I.

(96) Answer : (1)
Solution:
Synthesis of glucose and its storage in the form of starch in green parts of plants was explained by Julius von Sachs.

(97) Answer : (4)
Solution:
Non-cyclic photophosphorylation takes place in the granal thylakoid region of chloroplast.

(98) Answer : (1)
Solution:
PEP is the primary CO_2 acceptor in C_4-cycle.

(99) Answer : (4)
Solution:
According to chemiosmotic hypothesis, ATP synthesis is linked to the generation of proton gradient across the thylakoid membrane.

(100) Answer : (3)
Solution:
TCA is an amphibolic pathway.

(101) Answer : (1)
Hint:
Glycolysis is also known as EMP pathway (Embden-Meyerhof Parnas pathway)
Solution:
Phosphofructokinase is known as pacemaker enzyme of glycolysis.

(102) Answer : (3)
Solution:
$NADH + H^+$ is consumed during the conversion of pyruvic acid into lactic acid, during fermentation.

(103) Answer : (4)
Solution:
Both respiration and photosynthesis require cytochromes in order to perform transfer of electrons through ETS.

(104) Answer : (1)
Solution:
$NADH_2$ donates its electrons to complex I.

(105) Answer : (3)
Solution:
The mobile electron carrier towards the inter-membrane space of mitochondria is cytochrome *c*.

(106) Answer : (3)
Solution:
In glycolysis, ATP is utilised at two steps : First in conversion of glucose into glucose-6-phosphate and second in the conversion of fructose-6-phosphate to fructose 1,6-bisphosphate.

(107) Answer : (4)
Solution:
Majority of the enzymes required in TCA cycle are found in matrix except succinic acid dehydrogenase, which is found attached to inner membrane of mitochondria.

(108) Answer : (2)
Solution:

Glucose + ATP $\overset{\text{Hexokinase}}{\rightleftarrows}$ Glucose-6-phosphate + ADP.

(109) Answer : (1)
Solution:
The step of respiration, common to all living beings, is glycolysis that occurs in the cytoplasm.

(110) Answer : (2)
Solution:
CO_2 concentration is very low in environment and hence, it is a major limiting factor for photosynthesis.

(111) Answer : (4)
Solution:
Carboxylation is the most crucial step of the Calvin cycle.

(112) Answer : (4)
Solution:
In photosynthesis, antenna molecules enable different range of wavelength of light to be utilised for photosynthesis.

(113) Answer : (3)
Solution:

As the thylakoids, previously kept at pH8, equilibrated at pH 4, the concentration of H^+ increased in the lumen. When this thylakoid was again moved to pH 8, the proton concentration of lumen was much higher than the surrounding liquid and thus, ATP synthesised due to the breakdown of proton gradient.

(114) Answer : (4)
Solution:
At low light intensity, no plant (C_3 or C_4) respond to high CO_2 concentration.

(115) Answer : (3)
Solution:
Pyruvic acid is reduced to lactic acid by lactate dehydrogenase.

(116) Answer : (1)
Solution:

All plants show Calvin cycle. Plants forming C_3 acid as 1^{st} stable product are C_3 plants where as those forming C_4 acid are called C_4 plants.

(117) Answer : (2)
Solution:
Yeasts poison themselves as the alcohol concentration reaches about 13%.

(118) Answer : (2)
Solution:
Breakdown of C–C bonds –Helps in obtaining both respiratory intermediates and chemical energy.
Triose phosphates – Withdrawn from EMP pathway for biosynthesis of glycerol.

Molecular oxygen – Receives redox equivalents from NADH + H^+ and electrons to form metabolic water.
Pyruvate – Receives redox equivalents during anaerobic respiration in muscle cells.

(119) Answer : (4)
Solution:
Plants lack the enzymatic machinery to synthesise lactose.

(120) Answer : (1)
Solution:
Melvin Calvin along with J.A.Bassham studied sugar forming reactions in green plants by labelling raw materials with radioisotope.

(121) Answer : (2)
Solution:
$NADH + H^+$ is not involved in C_3 cycle.

(122) Answer : (1)
Solution:
Complex III provides electrons to cytochrome c and hence, acts as cytochrome c reductase.

(123) Answer : (1)
Solution:
Radioisotopes were used by Ruben and Kamen.
Glucose is the product of reduction in photosynthesis. Carbon source for glucose synthesis is always CO_2.

(124) Answer : (1)
Solution:
Glycerol would enter the respiratory pathway after being converted to PGAL.
The proteins would be degraded by proteases and the individual amino acid (after deamination), depending on their structure they would enter the pathway at some stage within the Krebs' cycle or even as pyruvate or acetyl CoA.
Fatty acid will convert into acetyl CoA before entering the respiratory pathway. Carbohydrates are usually first converted into glucose before they are used for respiration.

(125) Answer : (1)
Solution:
Since light saturation occurs at 10% of full sunlight, regions A and B will be achieved before the plant reaches light saturation, shown by D.

(126) Answer : (3)
Solution:
All non green plant parts even in green plants head food for oxidation because they lack the ability to photosynthesise and hence can not synthesise food on their own.

(127) Answer : (1)
Solution:
Pyruvate dehydrogenase requires NAD^+ and CoA. During link reaction, no oxidative phosphorylation occurs.

(128) Answer : (4)
Solution:
C_4 plants are cold sensitive due to the presence of orthophosphate dikinase enzyme.

(129) Answer : (4)
Solution:
Woody stem have lenticels instead of stomata and would not be affected by an antitranspirant. Roots lack stomata so they will naturally respire.

(130) Answer : (4)
Solution:
The scheme of glycolysis was given by Gustav Embden, Otto Meyerhof and J.Parnas.

(131) Answer : (3)
Solution:
Conversion of fumaric acid to malic acid does not yield $NADH + H^+$.

(132) Answer : (2)
Solution:
CO_2 fixation in C_4 pathway of photosynthesis occurs in mesophyll cells.

(133) Answer : (3)
Solution:
C → Fixation by PEPcase
B → Formation of OAA
D → C_4 acid (Malate/Aspartate) sent to bundle sheath cell
E → C_3 acid (pyruvate is formed)
A → Ketose sugar is carboxylated

(134) Answer : (1)
Solution:
Mitochondria also show substrate level phosphorylation. Water splitting complex is located towards thylakoid lumen. NADP reductase is absent in stroma lamellae.

Facilitated diffusion of protons through CF_0 is essential for ATP synthesis.

(135) Answer : (4)
Solution:
Stroma lamellae lack NADP reductase enzyme, due to which the electron is cycled back to P700.

ZOOLOGY

(136) Answer : (3)
Solution:
The male accessary glands include paired seminal vesicles, a prostate and paired bulbourethral glands. Secretions of these glands constitute the seminal plasma which is rich in fructose, calcium and certain enzymes. The secretions of bulbourethral glands also help in the lubrication of penis.

(137) Answer : (1)
Solution:
The order of structures present in mammary glands in human females from inside to outside is

$$\text{Alveoli} \longrightarrow \begin{matrix}\text{Mammary}\\ \text{Tubule}\end{matrix} \longrightarrow \begin{matrix}\text{Mammary}\\ \text{Duct}\end{matrix} \longrightarrow \begin{matrix}\text{Mammary}\\ \text{Ampulla}\end{matrix} \longrightarrow \begin{matrix}\text{Lactiferous}\\ \text{Duct}\end{matrix}$$

(138) Answer : (4)
Solution:
During the proliferative phase of the menstrual cycle, high amount of estrogen gives positive feedback to FSH and LH just before ovulation.

(139) Answer : (1)
Solution:
ADH/vasopressin regulates water reabsorption in the kidneys, reducing urine output and raising blood pressure.

(140) Answer : (2)
Solution:
In humans, by the end of the 2^{nd} month of pregnancy, the foetus develops limbs and digits. By the end of 12 weeks most of the major organ systems are formed. By the end of second trimester, the body is covered with fine hair and eye lids seperate

(141) Answer : (2)
Solution:
The cleavage (mitosis without growth phase) division starts as the zygote moves through the isthmus of the oviduct towards the uterus and forms 2, 4, 8, 16 daughter cells called blastomeres. As the size of blastomeres decreases during cleavage, the nuclear to cytoplasmic ratio increases.

(142) Answer : (4)
Solution:
The functions of male sex accessory ducts (epididymis, vas deferens) and male sex accessory glands (seminal vesicles and prostate gland) are maintained by androgens (testosterone).

(143) Answer : (4)
Solution:
hCG prevents involution of corpus luteum and stimulates it to secrete sufficient progesterone that maintain pregnancy until placenta take over this function . Decreased levels of hCG will lead to a drop in the levels of progesterone and spontaneous abortion will occur.

(144) Answer : (4)
Solution:
Each testis has about 250 compartments called testicular lobules. Each lobule contains one to three highly coiled seminiferous tubules in which sperms are produced.
Thus, the total number of testicular lobules in human testes is 500 and the total number of seminiferous tubules varies from 500-1500.

(145) Answer : (3)
Solution:
Zona pellucida is mainly made up of glycoproteins, an acellular primary egg membrane.

(146) Answer : (2)
Solution:

Hypothyroidism during pregnancy causes defective development and maturation of the growing baby leading to stunted growth (cretinism), mental retardation, low intelligence quotient, abnormal skin, deaf-mutism, *etc*.

(147) Answer : (2)
Solution:
Cortisol stimulates formation of RBCs and thereby increases RBC count. It retards the activity of basophils eosinophils and lymphocytes thus suppresses the inflammatory reactions.

(148) Answer : (1)
Solution:
Hyposecretion of ADH causes diabetes insipidus and glycosuria is a characteristic of diabetes mellitus.

(149) Answer : (1)
Solution:
Hypothalamus releases gonadotrophin releasing hormone/GnRH (X) which stimulates the pituitary to synthesise (Y) (LH and FSH).
• LH induces ovulation and also maintains the corpus luteum.
• Androgens are responsible for the development of secondary sexual characters in males.
• Progesterone acts on the mammary glands and stimulates the formation of alveoli.

(150) Answer : (1)
Solution:
The adrenal cortex can be divided into three layers called zona reticularis (inner layer), zona fasciculata (middle layer) and zona glomerulosa (outer layer).

(151) Answer : (3)
Solution:
During ovulation, the ovum is released into the abdominal/peritoneal cavity close to the funnel of the fallopian tube (infundibulum) from where it is picked up by the beating of cilia on fimbriae of either fallopian tube along with peritoneal fluid currents.

(152) Answer : (4)
Solution:
All cellular functions need to be continuously regularized, a special kind of coordination and integration has to be provided. Since the nerve fibres do not innervate all cells of the body, this function is carried out by hormones. So the neural system and the endocrine system jointly coordinate and regulate the physiological functions in the body.

(153) Answer : (4)
Solution:
GHIH/Somatostatin is a peptide hormone. Somatocrinin is also known as growth hormone releasing hormone.

(154) Answer : (1)
Solution:
MSH affects pigmentation of skin. Parathyroid hormone increases the Ca^{2+} levels in the blood. PTH acts on bones and stimulates the process of bone resorption. Thyrocalcitonin stimulates Ca^{2+} deposition in bones. Hence, to treat the fracture thyrocalcitonin should be injected to the patient.
Vitamin-D is crucial for bone mineralization.

(155) Answer : (1)
Solution:
Hypoglycaemia stimulates the release of glucagon from α-cells of pancreas to increase blood glucose levels.

(156) Answer : (3)
Solution:
The uterus lies between the urinary bladder interiorly and the rectum posteriorly.
The urethral opening is anterior to the vaginal orifice.
The cervix opens into vagina. The clitoris is anterior to the urethral and vaginal opening.

(157) Answer : (4)
Solution:
LH stimulates Leydig cells to produce testosterone which is essential for sperm production. FSH acts on the Sertoli cells to support and nourish the developing sperms and promote the maturation phase of spermatogenesis, also known as spermiogenesis.

(158) Answer : (4)
Solution:
Primary follicle: Single layer of granulosa cells around the primary oocyte
Mature follicle : Oocyte starts secreting the zona pellucida.
Secondary follicle: Multiple granulosa layers present; theca is also formed

Tertiary follicle : Antrum present and theca is differentiated into theca externa and theca interna

(159) Answer : (3)

Solution:

Leydig cells are located between the seminiferous tubules.

Mature spermatozoa are released into the lumen of the seminiferous tubule during the process called spermiation.

(160) Answer : (2)

Solution:

The foetal-ejection reflex is a neuroendocrine mechanism that plays a critical role in parturition (childbirth).

The process begins when the fully developed foetus and the placenta send signals that induce mild uterine contractions. As the foetus moves down the birth canal, its head exerts pressure, causing the cervix to stretch.

In response to the hypothalamic stimulation, the maternal posterior pituitary gland releases the hormone oxytocin into the bloodstream.

Oxytocin acts on the uterine smooth muscles (myometrium) and causes stronger, more frequent contractions. This increased contraction creates more pressure on the cervix, leading to further stretching and the release of even more oxytocin (a positive feedback loop), ultimately leading to the expulsion of the baby.

(161) Answer : (2)

Solution:

Acrosome of sperm releases sperm lysins which facilitates its entry into cytoplasm of ovum.

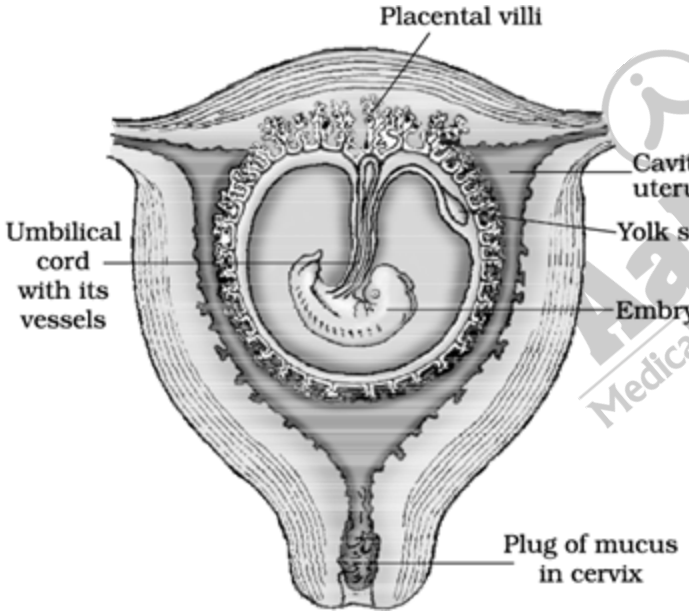
(162) Answer : (4)

Solution:

A fully mature Graafian follicle is most likely to be present around day 14 of a typical 28-day menstrual cycle, just before ovulation. This is the final stage of the follicular phase, during which one follicle matures to release an egg.

(163) Answer : (2)

Solution:



The umbilical cord connects the embryo to the placenta and it contains foetal blood vessels that carry substances to/from the embryo.

(164) Answer : (2)

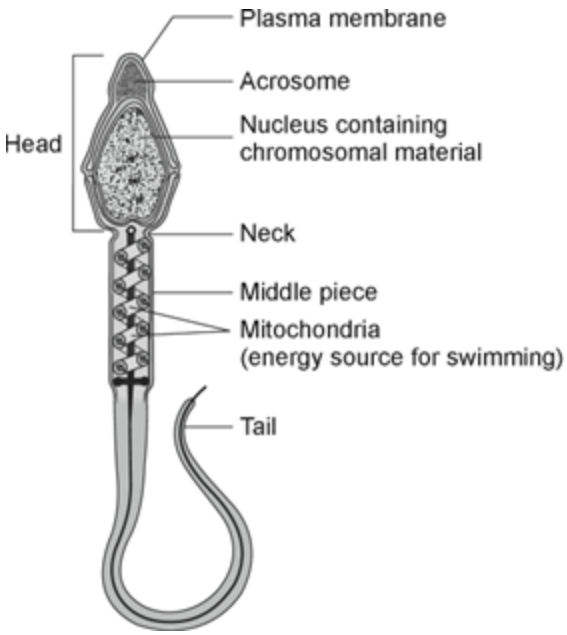
Solution:

The LH surge around 13–14th day of the menstrual cycle causes ovulation and luteinisation of the ruptured Graafian follicle, forming the corpus luteum, which is responsible for the high progesterone levels during the luteal phase.

(165) Answer : (3)

Solution:

Large amount of cytoplasm is found in ovum but as the sperm mature its cytoplasm gradually decrease.



(166) Answer : (1)

Solution:

The pre-ovulatory phase is the time between the end of menstruation and ovulation. The pre-ovulatory phase of the cycle is more variable in length than the other phases and accounts for most of the differences in length of the cycle. It lasts from days 6 to 13 in a 28-day cycle. Cyclic menstruation is an indicator of normal reproductive phase.

(167) Answer : (2)

Solution:

Monozygotic twins have the same sex and nearly identical features. They are formed from a single fertilized egg.
The division of a single zygote at the early blastocyst stage results in monozygotic twins.
Fraternal or dizygotic twins are formed as a result of fertilization of two separate eggs with two different sperms.

(168) Answer : (1)

Solution:

Immediately after implantation, the inner cell mass differentiates into an outer layer called ectoderm and an inner layer called endoderm.
The inner cell mass of a blastocyst has pluripotent cells.
Increased production of hPL, hCG, estrogen and progesterone is essential for supporting fetal growth, metabolic changes in the mother and maintenance of pregnancy.

(169) Answer : (3)

Solution:

A continuously estrogen-secreting adrenal tumor, producing high amount of estrogen, will disrupt multiple components of the reproductive–endocrine axis.
Sustained high estrogen exerts strong negative feedback on the hypothalamus and pituitary. This results in:
↓ GnRH pulsatility
↓ LH release (from pituitary)
Hence, LH secretion falls significantly, suppress, ovulation so menstrual cycle becomes irregular.
Even though the source is abnormal, high estrogen prevents:
(1) Osteoclast hyperactivity
(2) Bone demineralization
Progesterone is a steroid hormone.

(170) Answer : (4)

Solution:

A person suffering from Graves' disease will typically have suppressed TSH and high free T_4/T_3 in the plasma. The levels of TRH produced by the hypothalamus are also expected to be low due to the strong negative feedback from the excess thyroid hormones.

(171) Answer : (2)

Solution:

Cortisol is a steroid hormone synthesized from cholesterol. Glucagon is a peptide hormone. Epinephrine is a catecholamine synthesized from the amino acid tyrosine.

The adrenal glands, which produce cortisol and epinephrine, are located superior to the kidneys. The pancreas, which produces glucagon, is located posterior to the stomach, (not posterior to the kidneys).
Cortisol acts *via* intracellular receptors. Glucagon and epinephrine bind to cell surface receptors and typically act *via* second messengers.

(172) Answer : (2)
Solution:
The hormone released from the β-cells of pancreas is insulin. It inhibits fat breakdown (lipolysis). It also inhibits glycogen breakdown and promotes glycogen synthesis.

(173) Answer : (1)
Solution:
Both steroidal hormones and thyroxine hormone are effective when taken by mouth. They are not split apart during digestion and easily cross the intestinal lining because they are lipid-soluble. By contrast, peptide and protein hormones, such as insulin, are not effective oral medications because digestive enzymes destroy them by breaking their peptide bonds.

(174) Answer : (3)
Solution:
Norepinephrine acts *via* cell-surface receptors.
Norepinephrine increases the rate of breathing.
Under the influence of the sympathetic nervous system, epinephrine increases cardiac performance during stress.
Norepinephrine is released from adrenal medulla whose secretion is mainly regulated *via* sympathetic pre-ganglionic stimulation using acetylcholine, not primarily by ACTH.

(175) Answer : (3)
Solution:
MSH is a protein hormone secreted from adenohypophysis. It stimulates melanocytes to produce and disperse melanin, leading to darkening of the skin.

(176) Answer : (2)
Solution:
Thyroxine is produced by the thyroid gland, located in the neck on the ventral side of the body. Aldosterone is produced by the adrenal glands, which are located superior to the kidneys.
Aldosterone is a steroid hormone that is synthesized from cholesterol.

(177) Answer : (4)
Solution:
Melatonin is a hormone that regulates the sleep-wake cycle, but it is **not** an iodinated hormone. It is derived from the amino acid tryptophan. Melatonin interacts with receptors in the body, primarily in the brain's suprachiasmatic nucleus, to signal darkness and promote sleepiness.

(178) Answer : (3)
Solution:
Growth hormone is a protein hormone. It has a diabetogenic effect.

(179) Answer : (1)
Solution:
GIP (Gastric Inhibitory Polypeptide or Glucose-Dependent Insulintropic Polypeptide) primarily opposes the actions of gastrin, inhibiting gastric acid secretion.

(180) Answer : (2)
Solution:
Ovarian hormones like estrogen and progesterone are steroidal (derived from cholesterol) whereas, relaxin and inhibin are protein hormones. Steroid hormones typically act *via* intracellular receptors.
While the ovaries are the primary source of estrogen and progesterone in women, these hormones can also be secreted by other structures. For instance, during pregnancy, the placenta becomes a major source of both estrogen and progesterone. Relaxin is secreted by the corpus luteum as well as placenta.