03/09/2025

Code-A

Aakash
Medical | IIT-JEE | Foundations

Corporate Office : AESL, 3rd Floor, Incuspaze Campus-2, Plot No. 13, Sector-18, Udyog Vihar, Gurugram, Haryana - 122015, ***Ph.***+91-1244168300

MM : 720 Term Exam for NEET-2026_CF+OYM(P1)-TE03A (Class-XI & XII) **Time : 180 Min.**

PHYSICS

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CHEMISTRY

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ZOOLOGY

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158. (2)

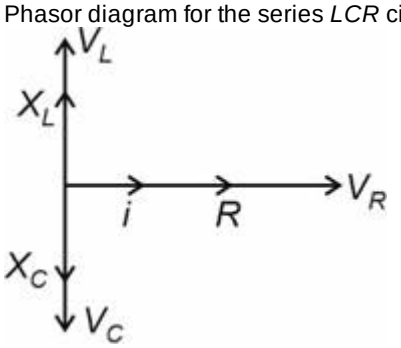
180. (1)

Hints and Solutions

PHYSICS

(1) **Answer :** (3)
Solution:
In purely inductive AC circuit, the power consumption by the inductor is zero.

(2) **Answer :** (4)
Hint:
Draw appropriate phasor diagram.
Solution:
Phasor diagram for the series *LCR* circuit is



All statements are true.
Current through *C* and *R* are in same phase because current is same through each elements.

(3) **Answer :** (3)
Hint:
$c = \frac{\omega}{k}$
Solution:
Velocity or speed of EM wave through vacuum = $\frac{\omega}{k} = \frac{2\pi f}{\frac{2\pi}{\lambda}} = f\lambda = c$

(4) **Answer :** (3)
Hint:
Impedance $= \frac{V_{max}}{I_{max}}$
Solution:
Impedance $= \frac{5\sqrt{2}}{\frac{1}{\sqrt{2}}}$ = 10 ohm

(5) **Answer :** (4)
Solution:
An electromagnetic wave cannot be deflected by magnetic or electric fields fields since it is not consist of charge particles.

(6) **Answer :** (1)
Solution:
Average energy density
$U_E = \frac{1}{2}\varepsilon_0 E^2_{rms} = \frac{1}{2}\varepsilon_0\left(\frac{E_0}{\sqrt{2}}\right)^2$
$U_E = \frac{1}{4}\varepsilon_0 E^2_0$

(7) **Answer :** (3)
Solution:
In series LCR circuit, current is maximum at resonance.
Resonance frequency $\omega = \frac{1}{\sqrt{LC}}$
$\omega^2 = \frac{1}{LC}$, $L = \frac{1}{\omega^2 C}$
$\frac{1}{10^6 \times 10 \times 10^{-6}}$ = 0.1 H

= 100 mH

(8) **Answer :** (2)
Solution:
Input power = Output power
$I_P E_P = I_S E_S$
200 × I_P = 44, $I_P = \frac{44}{220} = 0.2$

(9) **Answer :** (2)
Solution:
$V_O - V_Q = \frac{1}{2} B\omega (3L)^2$ ...(i)
$V_O - V_P = \frac{1}{2} B\omega L^2$ ...(ii)
Subtracting equation (i) – (ii)
$V_P - V_Q = 4B\omega L^2$

(10) **Answer :** (4)
Solution:
$\cos\phi = \frac{40}{\left\{\left(60-30\right)^2 + (40)^2\right\}^{½}} = \frac{4}{5}$

(11) **Answer :** (3)
Solution:
$V_{rms} = I_{rms} X_L$
$X_L = \frac{V_{rms}}{I_{rms}} = \frac{V_0}{\sqrt{2} I_{rms}} = \frac{50\sqrt{2}}{\sqrt{2}\times 2} = 25\ \Omega$
$\Rightarrow L = \frac{X_L}{\omega} = \frac{1}{4\pi}\ \text{H}$

(12) **Answer :** (1)
Solution:
$\phi = Li, \varepsilon = -L\frac{di}{dt}$
$\varepsilon \rightarrow$ +ve $\rightarrow \frac{di}{dt} \rightarrow$ –ve $\rightarrow$ for $t = 5$ to $t = 11$
$\varepsilon \rightarrow$ –ve $\rightarrow \frac{di}{dt} \rightarrow$ +ve $\rightarrow$ for $t = 0$ to $t = 2$ & $t = 4$ to $t = 5$
$\varepsilon = 0 \rightarrow \frac{di}{dt} = 0 \rightarrow$ for $t = 2$ to $t = 4$
$\varepsilon_{max} \rightarrow \left(\frac{di}{dt}\right)_{max} \rightarrow$ for $t = 4$ to $t = 5$ and $t = 5$ to $t = 11$

(13) **Answer :** (1)
Solution:
$X_C = \frac{1}{\omega C} = \frac{1}{2\pi f C}$
$X_C \propto \frac{1}{f}$

(14) **Answer :** (4)
Solution:
$P = V_{rms}\ I_{rms} \cos\phi$
$P = \frac{50}{\sqrt{2}} \times \frac{100}{\sqrt{2}} \cos 30 \times 10^{-3}$
$P = \frac{5}{4}\text{watt} = 1.25\ \text{watt}$

(15) **Answer :** (3)
Solution:
$|\varepsilon| = L\frac{dI}{dt}$
$\varepsilon = L\frac{d}{dt}(2t + 3t^2)$
= L (2 + 6t)
= 4(2 + 6 × 2) × 10^{-3}
= 56 mV

(16) **Answer :** (3)
Solution:

$\varepsilon = -\frac{d\phi}{dt}$

(17) Answer : (2)
Solution:
Given $V = V_0 \sin\omega t$ ...(1)
Now displacement current I_d is given by
$I_d = C\frac{dV}{dt}$
$= C\frac{d}{dt}\left(V_0 \sin \omega t\right)$ (using equation 1)
$= C(V_0\omega)\cos\omega t$
$I_d = V_0\omega C\cos\omega t$

(18) Answer : (2)
Solution:
$L = \mu_0 \pi r^2 n^2 l$
$L' = \mu_0 \pi 4r^2 n^2 2l = 8L$

(19) Answer : (1)
Solution:
$\because \phi = 5t^2$
$\therefore \frac{d\phi}{dt} = 10t$
induced emf at $t = 1$ s will be
$E_{in} = 10 \times 1 = 10$ V
$\therefore$ induced current $i = \frac{E_{in}}{R}$
$= \frac{10}{20}$
= 0.5 A

(20) Answer : (3)
Solution:
Current $I_{rms} = \frac{V_{rms}}{Z}$
$= \frac{100}{\left\{40^2 + (60-30)^2\right\}^{1/2}} = \frac{100}{50} = 2$ A
Amplitude of current $I_0 = I_{rms}\sqrt{2}$
$= 2\sqrt{2}$ A

(21) Answer : (2)
Solution:
$E = -\frac{d\phi}{dt}$
or $\frac{1}{R}\frac{d\phi}{dt} = \frac{E}{R} = i$ or $d\Phi = (idt)R$ or
$\phi = R\int idt = 10 \times \frac{1}{2} \times 5 \times 0.1$
= 2.5 weber

(22) Answer : (4)
Hint:
$\vec{v} = \vec{E} \times \vec{B}$
Solution:
$E \to +\hat{i}; \quad v \to \hat{j}$
So, by right hand thumb rule
B is along $\left(-\hat{k}\right)$
i.e., –*z* axis

(23) Answer : (2)
Solution:
$q = CV$
$\frac{dq}{dt} = C\frac{dV}{dt}$

$i = C\frac{dV}{dt}$

$\frac{dV}{dt} = \frac{i}{C} = \frac{1}{10^{-6}} = 10^6 \text{ V s}^{-1}$

(24) Answer : (4)
Solution:
Power factor and quality factor are dimensionless quantities.

(25) Answer : (2)
Solution: Answer (2)
$x_C = \frac{1}{2\pi f_C}$, on decreasing frequency reactance of capacitor increase therefore current in the circuit decrease and brightness of bulb decrease.

(26) Answer : (3)
Solution:

$$e_{\text{rms}} = \sqrt{\frac{\int_0^T e^2 dt}{\int_0^T dt}} = \sqrt{\frac{\int e_1^2 \sin^2 \omega t dt + \int 2e_1 e_2 \sin \omega t \cos \omega t dt + \int e_2^2 \cos^2 \omega t dt}{\int_0^T dt}}$$

$$= \sqrt{e_1^2 \times \left(\frac{1}{2}\right) + 0 + e_2^2 \left(\frac{1}{2}\right)}$$

$$\boxed{e_{\text{rms}} = \sqrt{\frac{e_1^2 + e_2^2}{2}}}$$

(27) Answer : (1)
Solution:
Among the given options radio wave have minimum frequency.

(28) Answer : (3)
Solution:
$V_{\text{rms}} = \frac{50\sqrt{2}}{\sqrt{2}} = \sqrt{V_2^2 + V_1^2} \Rightarrow V_1 = 30 \text{ V}$

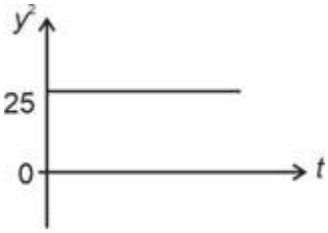
(29) Answer : (2)
Solution:
Moving along *X*-direction with frequency 10^6 Hz and wavelength 200 m

(30) Answer : (4)
Solution:
$P_{\text{av}} = V_{\text{rms}}\, i_{\text{rms}} \cos\varphi$
for capacitor
$\varphi = 90° \Rightarrow P_{\text{av}} = 0$

(31) Answer : (3)
Solution:
$I = 4 + 3\cos\omega t$
$\Rightarrow I^2 = 16 + 9\cos^2\omega t + 24\cos\omega t$
$[I^2]_{\text{rms}} = 16 + 9 \times \frac{1}{2} + 24 \times 0$
and $I_{\text{rms}} = \sqrt{20.5} = 4.53$ A

(32) Answer : (3)
Solution:
Use $\Delta V = \int \left(\vec{V} \times \vec{B}\right).\vec{dl}$

(33) Answer : (1)
Hint:
$y_{\text{rms}} = \sqrt{<y^2>}$
Solution:

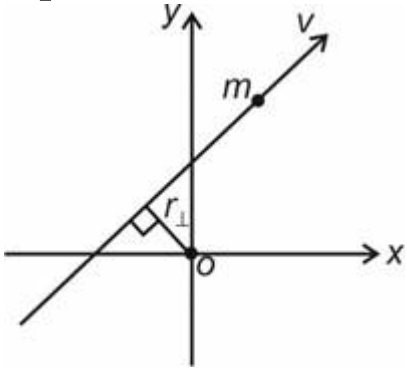


$y_{rms} = \sqrt{<y^2>} = \sqrt{25}$ = 5

(34) Answer : (4)
Hint:
$I_{\text{ind}} = \frac{\varepsilon_{ind}}{R} = \frac{1}{R}\left|\frac{d\phi}{dt}\right|$
Solution:
$\phi = \vec{B} \cdot \vec{A}$
$\frac{d\phi}{dt} = \frac{dB}{dt} \cdot A = K \cdot \frac{1}{2} \cdot \frac{l\sqrt{3}l}{2}$
$= \frac{K\sqrt{3}l^2}{4}$
$I_{ind} = \frac{1}{3\rho l} \cdot \frac{K\sqrt{3}l^2}{4} = \frac{Kl}{4\sqrt{3}\rho}$

(35) Answer : (3)
Solution:
$T = mg\sin\theta + \mu mg\cos\theta$
$2T = BiI$
$\therefore\ i = \frac{2mg\ \sin\theta + 2\mu mg\ \cos\theta}{Bl}$

(36) Answer : (1)
Hint:
Use, $\vec{L} = \vec{r} \times \left(\vec{P}\right)$
Solution:
$\left|\vec{L}\right| = rmv\sin\theta$.
$= r\sin\theta\, mv$
$= r_{\perp} mv =$ constant



(37) Answer : (3)
Hint:
$I = mx^2$, where x is perpendicular distance from axis.
Solution:
$I = ml^2 + m\left(\sqrt{2}l\right)^2 + ml^2$
$I = ml^2 + 2ml^2 + ml^2$
$I = 4ml^2$

(38) Answer : (1)
Hint:
Use parallel axis theorem

Solution:

$MK^2 = \frac{MR^2}{2} + M\left(R^2\right)$

$MK^2 = \frac{MR^2}{2} + MR^2$

$MK^2 = \frac{3}{2}MR^2$

$K = \sqrt{\frac{3}{2}}\ R$

(39) Answer : (1)

Solution:

Centre of mass = centroid

$= \left(\frac{6}{3}, \frac{9}{3}\right)$

= (2, 3)

(40) Answer : (2)

Hint:

$\overrightarrow{v}_{\text{com}} = \frac{m_1\overrightarrow{v}_1 + m_2\overrightarrow{v}_2}{m_1+m_2}$

Solution:

$\overrightarrow{v}_{\text{com}} = \left(\frac{1}{2}\right)\left[v\hat{i} + \sqrt{3}\,v\hat{j}\right]$

$\left|\overrightarrow{v}_{\text{com}}\right| = \frac{1}{2}(2v) = v$

(41) Answer : (4)

Solution:

Work done by friction on a body may be positive, negative or zero, depending on the direction of friction and displacement of the body.

(42) Answer : (4)

Hint:

Power = force × velocity

Solution:

Rate of doing work = Power

= force × velocity

= (200 × 5 + 60) 30

= 1060 × 30

= 31800 W

(43) Answer : (2)

Hint:

Use conservation of energy

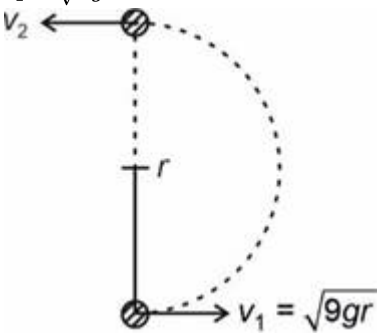
Solution:

$\frac{1}{2}mv_1^2 = \frac{1}{2}mv_2^2 + 2mgr$

$v_2^2 = v_1^2 - 4gr$

$= 9gr - 4gr$

$v_2 = \sqrt{5gr}$



Now, at highest point

$T + mg = \frac{mv_2^2}{r}$

$T = \frac{m}{r} \times 5gr - mg$

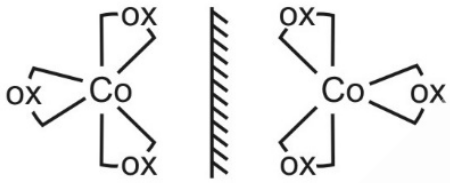
$= 4mg$

(44) Answer : (4)
Solution:
$w = \Delta k + \Delta U$,
$1600 = \left(\frac{1}{2}(10)v^2\right) + (10 \times 10 \times 10) \Rightarrow 5v^2 = 600$,
$v^2 = 120 \Rightarrow v = 2\sqrt{30}$ m/s

(45) Answer : (3)
Solution:
p : Linear momentum
$E = \frac{p^2}{2m}$ and $E' = \frac{(p')^2}{2m} = \frac{(1.3p)^2}{2m}$
$E' = 1.69E$
$\therefore \frac{\Delta E}{E} \times 100 = \frac{1.69E - E}{E} \times 100 = 69\%$

CHEMISTRY

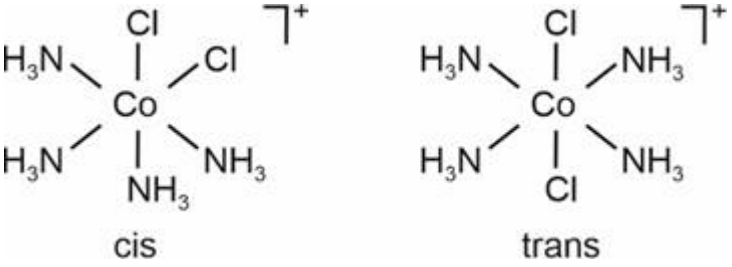
(46) Answer : (2)
Hint:
$[PtCl_2(NH_3)_2]$ shows geometrical isomerism.
Solution:
Coordination isomerism :
$[Co(en)_3]\,[Cr(ox)_3]$ and $[Cr(en)_3]\,[Co(ox)_3]$
Optical isomerism :
$[Co(C_2O_4)_3]^{3-}$ or $[Co(ox)_3]^{3-}$



Ionisation isomerism
$[Cr(NH_3)_5Cl]Br$ and $[Cr(NH_3)_5Br]Cl$

(47) Answer : (3)
Solution:
Complexes in which a metal is bound to more than one kind of donor groups.
$[Pt(NH_3)_2Cl(NO_2)]$ is known as hetroleptic complex.

(48) Answer : (1)
Hint:
Octahedral complex of type $[MX_2L_4]$ shows geometrical isomerism.
Solution:



• Trans isomers contains plane of symmetry hence they are optically inactive species.

(49) Answer : (4)
Solution:
IUPAC name of $K_3\,[Al(C_2O_4)_3]$:
Potassium trioxalatoaluminate (III)

(50) Answer : (3)
Hint:

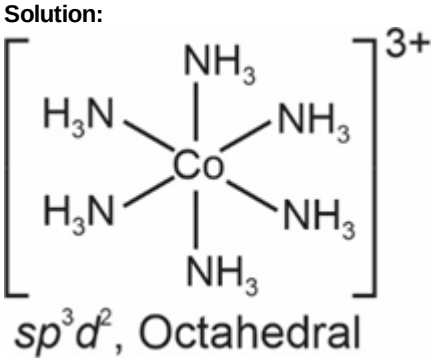
Ambidentate ligands are monodentate ligands with two different donor sites.

(51) **Answer :** (2)
Solution:
Tetrahedral complexes do not show geometrical isomerism because the relative positions of the ligands attached to the central metal atom are the same with respect to each other.

(52) **Answer :** (3)
Solution:
Octahedral complex of cobalt will contain six ligands in the complex.
Octahedral complex of $CoCl_3 \cdot 5NH_3$ will be $[Co(NH_3)_5Cl]Cl_2$ which has two ionizable chloride ions.

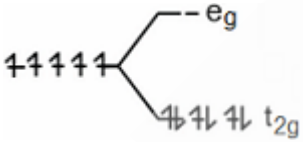
(53) **Answer :** (3)
Solution:
Metal carbonyl possesses both σ and π character in the bonds.

(54) **Answer :** (1)
Solution:

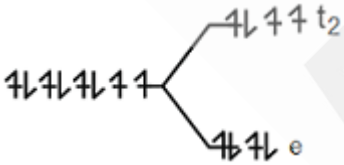


(55) **Answer :** (2)
Solution:

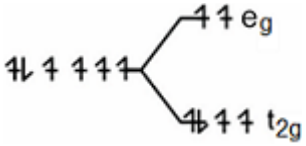
In $[Co(NH_3)_6]^{3+}$:



In $[NiCl_4]^{2-}$:

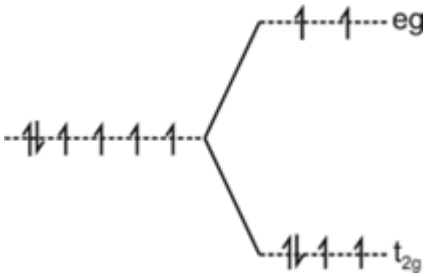


In $[CoF_6]^{3-}$:



(56) **Answer :** (4)
Solution:
Correct order of field strength of ligands is
$edta^{4-} < NH_3 < en < CN^{\ominus}$

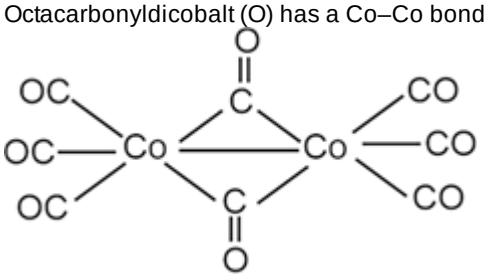
(57) **Answer :** (4)
Hint:
For octahedral complexes
$CFSE = -0.4\ \Delta_0 \times n_e t_{2g} + 0.6\Delta_0 \times n_e\ e_g$
($n_e \Rightarrow$ number of electrons)
Solution:
For d^6 high spin → d



CFSE = $-0.4\Delta_0 \times 4 + 0.6\Delta_0 \times 2 = -0.4\ \Delta_0$

(58) **Answer :** (2)
Solution:
Stronger is ligand, field strength, more in Δ_0 value and shorter is the wavelength of light absorbed.

(59) **Answer :** (1)
Solution:
Octacarbonyldicobalt (O) has a Co–Co bond bridged by two CO groups

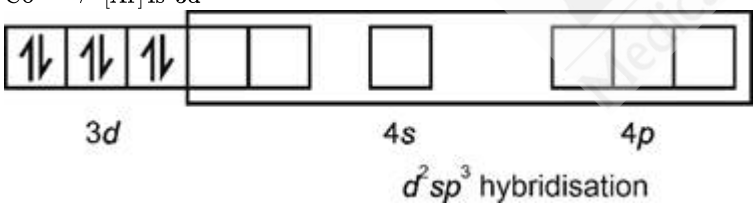


(60) **Answer :** (1)
Hint:
Wilkinson catalyst is $[(Ph_3P)_3RhCl]$.

(61) **Answer :** (1)
Solution:
$\Delta_t = \frac{4}{9}\Delta_o$

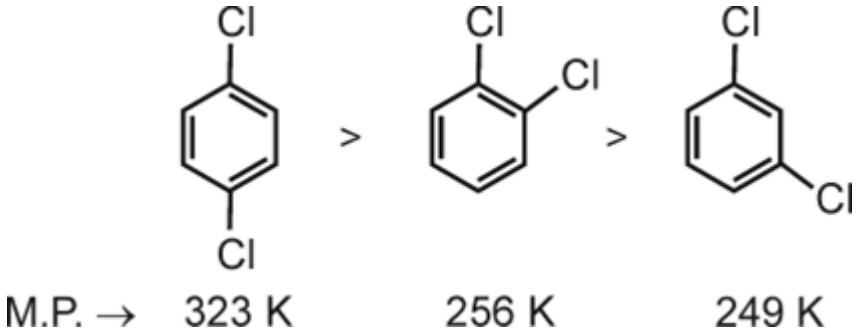
(62) **Answer :** (4)
Hint:
Primary valences are normally ionisable and secondary valences are non-ionisable.
Solution:
$[Co(en)_3]Cl_3$

$Co^{3+} \rightarrow [Ar]4s^0 3d^6$



- It is diamagnetic in nature
- It has $t_{2g}^6 e_g^0$ configuration because (en) is strong field ligand.

(63) **Answer :** (3)
Solution:

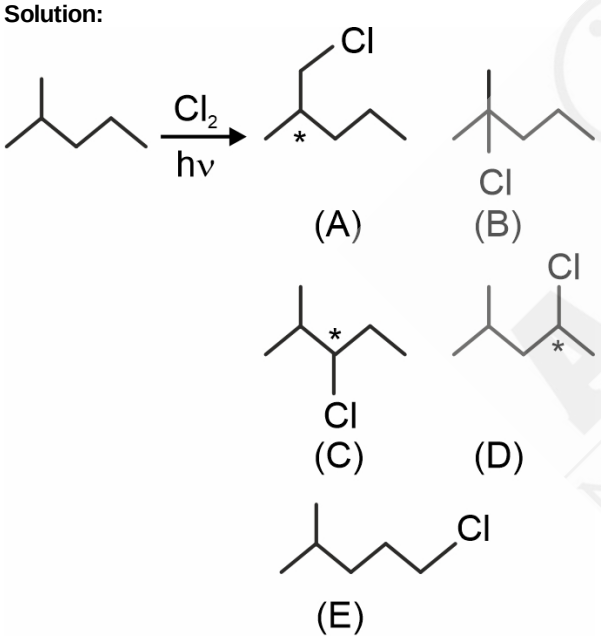


(64) **Answer :** (2)
Solution:

Haloalkane	Dipole moment/Debye
$CH_3 - F$	1.847
$CH_3 - Cl$	1.860
$CH_3 - Br$	1.830
$CH_3 - I$	1.636

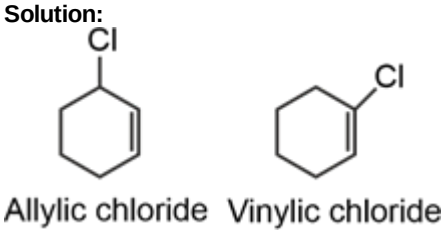
(65) **Answer :** (4)
Solution:
CCl_4 is non-polar solvent.

(66) **Answer :** (2)
Solution:

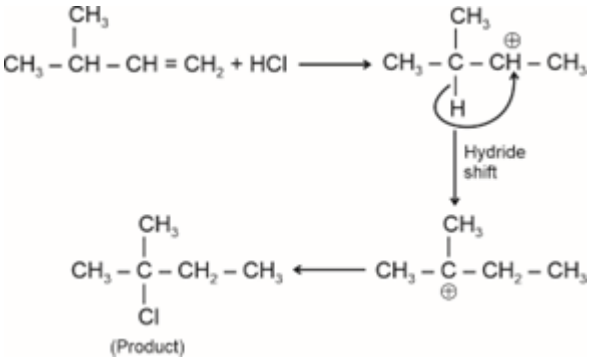


• (A), (B) and (D) will exist as a pair of enantiomers.
• Total number of compounds (including stereoisomers) obtained = 8

(67) **Answer :** (2)
Solution:



(68) **Answer :** (3)
Solution:



(69) **Answer :** (1)
Solution:
Alkyl iodides are often prepared by the reaction of alkyl chlorides/bromides with NaI in dry acetone. This reaction is known as Finkelstein reaction.
R – X + NaI → R – I + NaX.

(70) **Answer :** (1)
Solution:
In geminal dihalide two halogens are present on same carbon atom.

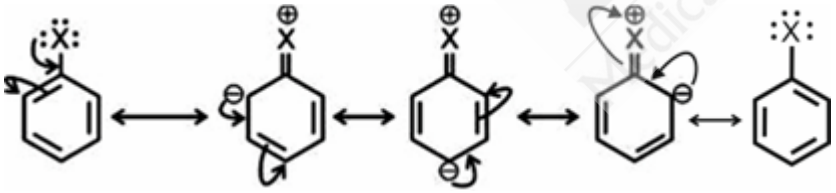
(71) **Answer :** (4)
Hint:
Oxidation of chloroform forms carbonyl chloride.
Solution:

$$2\,CHCl_3 + O_2 \xrightarrow{light} \underset{\text{Phosgene}}{2\,COCl_2} + 2\,HCl$$

(72) **Answer :** (2)
Solution:
KCN being ionic, attack mainly takes place through carbon atom since C–C bond is more stable than C–N bond.
While AgCN is covalent.

(73) **Answer :** (3)
Solution:
Compound of most stable intermediate carbocation formed gives fastest rate of S_N1.

(74) **Answer :** (3)
Hint:
In haloarenes, C–X bond acquires a partial double bond character due to resonance.
Solution:



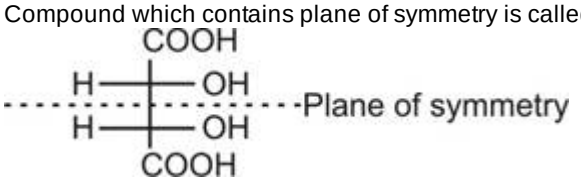
(where X = halogen atom)
A bond cleavage in haloarenes is difficult than haloalkane and therefore, they are less reactive towards nucleophilic substitution reactive.

(75) **Answer :** (2)
Solution:
A mixture containing two enantiomers in equal proportions will have zero optical rotation, as the rotation due to one isomer will be cancelled by the rotation due to other isomer.

(76) **Answer :** (4)
Solution:
Order of S_N2 is $CH_3Cl > CH_3CH_2Cl > (CH_3)_2CHCl > (CH_3)_3CCl$

(77) **Answer :** (4)
Solution:
Greater the stability of carbocation, greater will be its ease of formation from alkyl halide and faster will be the rate of reaction.

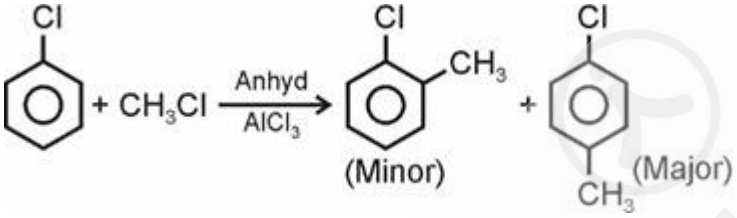
(78) **Answer :** (1)
Solution:
Compound which contains plane of symmetry is called meso compounds



(79) **Answer :** (4)
Hint:
The compound which contains plane of symmetry or centre of symmetry is not a chiral molecule.
Solution:
sec-butyl alcohol $CH_3 - \underset{\underset{OH}{|}}{CH} - CH_2 - CH_3$ (Chiral)

isobutyl alcohol $CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH_2 - OH$ (achiral)

(80) **Answer :** (3)
Solution:

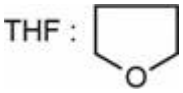


(81) **Answer :** (3)
Solution:
Order → –COOR > COCl > – $CONH_2$ > –CN

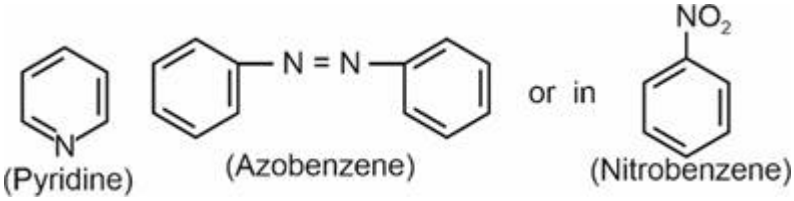
(82) **Answer :** (1)
Solution:
IUPAC name:-
3-keto-2-methylhex-4-enal

(83) **Answer :** (4)
Solution:
(i) Resonating structures are hypothetical and do not represent any real molecule.
(ii) The energy of actual structure of the molecule (resonance hybrid) is lower than that of any canonical structures.
(iii) The resonance structures have the same position of nuclei and the same number of unpaired electrons.

(84) **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.



(85) **Answer :** (1)
Solution:
Nitrogen in a ring / nitro group / azo group cannot be estimated by Kjeldahl method.



Nitrogen cannot be estimated by Kjeldahl method

(86) **Answer :** (1)
Solution:
% of Br = $\frac{80}{188} \times \frac{0.09}{0.18} \times 100 = 21.27\%$

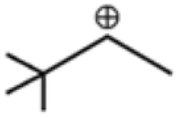
(87) **Answer :** (1)
Solution:

Speceis	Colour
$[Fe(SCN)]^{2+}$	Blood red
PbS	Black
$[Fe(CN)_5NOS]^{4-}$	Violet

(88) **Answer :** (4)
Solution:
Electron donating group present at para-position, stabilises the carbocation by +R effect.

(89) **Answer :** (2)
Solution:
Adsorption chromatography is based on the fact that different compounds are adsorbed on an adsorbent to different degrees.
• Paper chromatography is a type of partition chromatography.
• TLC is another type of adsorption chromatography.

(90) **Answer :** (4)
Hint:
α-Hydrogen with respect to +ve charge should be present.
Solution:



Ph α-hydrogen with respect to +ve charge is absent. So, no hyperconjugation.

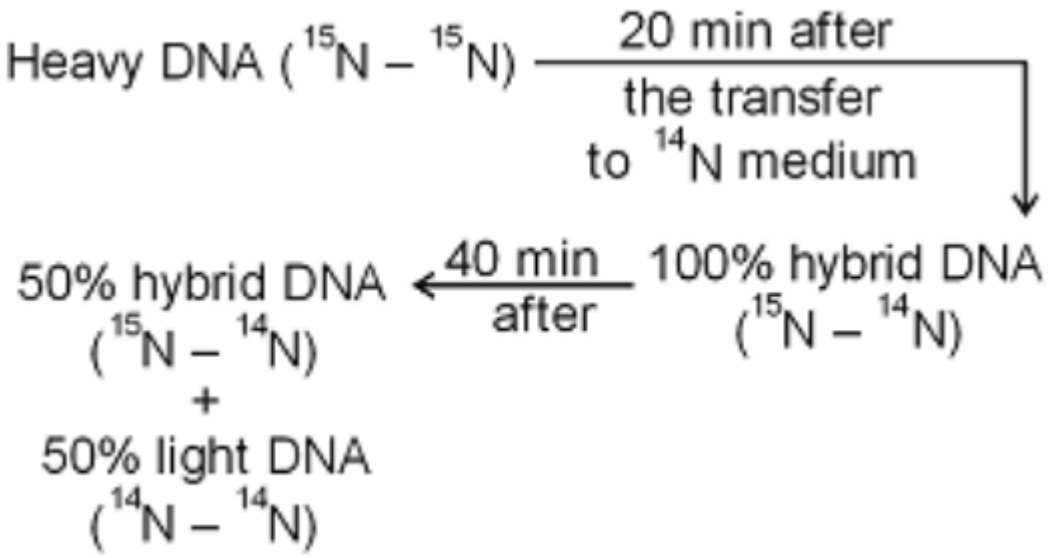
BOTANY

(91) **Answer :** (2)
Solution:
Double stranded RNA would be formed if both strands of DNA act as template.

(92) **Answer :** (1)
Solution:
Biochemical characterisation of 'Transforming Principle' was determined by Oswald Avery, Colin MacLeod and Maclyn McCarty (1933-44).

(93) **Answer :** (1)
Solution:
The sequence of mRNA strand will be 5' U A C G U A G C 3'.

(94) **Answer :** (2)
Solution:



(95) **Answer :** (3)
Solution:
In Griffith's experiment, mice died when injected with heat–killed S-strain combined with live R-strain bacteria.

(96) **Answer :** (2)
Solution:
Chromosome 1 has most gene (2968), and the Y has the fewest (231).

(97) **Answer :** (4)
Solution:
lac i gene encodes for repressor protein in *lac* operon.

(98) **Answer :** (3)
Solution:
Severo Ochoa enzyme is polynucleotide phosphorylase and it is template independent.

(99) **Answer :** (4)
Solution:
Both the statements are correct –
The nascent RNA synthesised by RNA polymerase II is called hnRNA.
Splicing is the process of removal of introns and joining of exons in a defined order.

(100) **Answer :** (2)
Solution:
SSB proteins or 'Single Strand Binding' proteins bind and stabilise the single stranded DNA during DNA replication.

(101) **Answer :** (2)
Solution:
The correct sequence of steps used in DNA fingerprinting are
Isolation of DNA
↓
Digestion of DNA
↓
Electrophoresis
↓
Blotting of separated DNA
↓
Hybridisation
↓
Autoradiography

(102) **Answer :** (2)
Solution:
In a double stranded DNA, Thymine =35% hence, Adenine=35%, So Cytosine and Guanine will be 15% each.

(103) **Answer :** (1)
Hint:
UAG is a stop codon.

Solution:

After mutation, the 25th codon will be a stop codon. Thus, a polypeptide containing only 24 amino acids will be formed.

(104) Answer : (4)

Solution:

A – Replication
B – Transcription
C – Translation
D – F. Crick

(105) Answer : (3)

Solution:

One nucleosome has 200 bp = (2 × 10^2 bp)

Hence, $\frac{6.6\times10^6\text{bp}}{2\times10^2\text{bp}} = 3.3\times10^4$

(106) Answer : (3)

Solution:

RNA polymerase III transcribes t-RNA.

(107) Answer : (3)

Solution:

200 bp are wrapped around the histone octamer to form a nucleosome.

(108) Answer : (2)

Solution:

Use of radioactive thymidine to detect distribution of newly synthesised DNA in the chromosomes was performed on *Vicia faba* by Taylor and colleagues in 1958.

(109) Answer : (4)

Solution:

The i gene of lac operon is a continuously expressed gene.
The i gene codes for the repressor protein, whose synthesis is always required by the cell.

(110) Answer : (4)

Solution:

Genetic code is degenerate, it means one amino acid can be coded by more than one codon.

(111) Answer : (1)

Solution:

AUG has dual functions, it codes for methionine, and it also acts as initiator codon.

(112) Answer : (2)

Solution:

RNA polymerase helps in opening of DNA helix during transcription.

(113) Answer : (1)

Solution:

Two copies of each H_2A, H_2B, H_3 and H_4 histone proteins form a histone octamer.

(114) Answer : (4)

Hint:

Euchromatin is lightly stained region of chromatin.

Solution:

Features of heterochromatin are as follows:
• It is darkly stained region.
• Chromatin is densely packed.
• It is transcriptionally inactive.

(115) Answer : (3)

Solution:

VNTR is the basis of DNA fingerprinting. Regulator gene in *lac* operon codes for repressor protein.
ESTs (Expressed Sequence Tags) are used to identify all genes that are expressed as RNA.
Promotor provides binding site for RNA polymerase.

(116) Answer : (1)

Solution:

DNA consists of two polynucleotide chains. The backbone is constituted by sugar-phosphate and bases projects inside.

(117) Answer : (2)
Solution:
On discontinuous strand, Okazaki fragments are joined by the action of DNA ligase.

(118) Answer : (2)
Solution:
Unequivocal proof that DNA is the genetic material came from the experiments of Alfred Hershey and Martha Chase (1952).

(119) Answer : (3)
Solution:
Uridine, guanosine and deoxycytidine are nucleosides thus lack phosphate group and phosphoester bond.

(120) Answer : (2)
Solution:
Each turn of DNA double helix or the pitch of the DNA helix is 3.4 nm.

(121) Answer : (3)
Hint:
Aminoacylation of tRNA requires energy.
Solution:
Aminoacylation of tRNA is the first phase of translation.

(122) Answer : (2)
Solution:
Anticodons are present on tRNA and codons on mRNA. Complementary of 3′UUC 5′ is 5′AAG 3′

(123) Answer : (3)
Solution:
The size of VNTR varies from 0.1 to 20 kb.

(124) Answer : (4)
Solution:
For evolution and speciation polymorphism plays very important role.
If an inheritable mutation is observed in a population at high frequency, it is referred to as DNA polymorphism

(125) Answer : (1)
Solution:
RNA polymerase I transcribes 5.8S, 18S and 28S rRNA.

(126) Answer : (1)
Hint:
Zygotene is marked by the pairing of homologous chromosomes.
Solution:
Diplotene is recognised by the dissolution of the synaptonemal complex. In oocytes of some vertebrates, diplotene can last for months or years.

(127) Answer : (1)
Solution:
M phase represents the phase with actual cell division, which starts with nuclear division and ends with the division of the cytoplasm.

(128) Answer : (2)
Solution:
Two metaphasic plates are formed in Metaphase I.

(129) Answer : (4)
Solution:
In S-phase, amount of DNA doubles but the number of chromosomes remains the same.

(130) Answer : (2)
Hint:
In S phase of cell cycle, amount of DNA doubles.
Solution:
In S-phase, the cell doubles its DNA. The amount of nucleic acid, i.e., DNA (genetic material) doubles but the number of chromosomes remains the same.

(131) Answer : (3)
Solution:
In metaphase, morphology of chromosomes is most easily studied.

(132) Answer : (1)

Hint:
Quiescent stage is G_0 phase.
Solution:
Cell is metabolically active in G_0 phase. DNA replication occurs in S phase. In G_0 phase cell does not divide.

(133) Answer : (1)
Solution:
Condensation of chromosomal material occurs in prophase.

(134) Answer : (4)
Solution:
In metaphase, chromosomes align themselves at equator. Homologous chromosomes separate from each other during anaphase I. Recombinase is involved in the crossing over of genetic material during pachytene.

(135) Answer : (2)
Solution:
Tetrad consists of a pair of homologous chromosomes or four chromatids. It is clearly visible in the pachytene stage.

ZOOLOGY

(136) Answer : (1)
Solution:
Branching descent and natural selection are the two key concepts of `Darwinian theory of evolution'.

(137) Answer : (1)
Solution:
S.L. Miller, an American scientist, created similar conditions in a laboratory scale. He created electric discharge in a closed flask containing CH_4, H_2, NH_3 and water vapour at 800°C. He observed the formation of amino acids.

(138) Answer : (2)
Solution:
Pre-historic cave art developed about 18,000 years ago. One such cave paintings by Pre-historic humans can be seen at Bhimbetka rock shelter in Raisen district of Madhya Pradesh.

(139) Answer : (2)
Solution:
From the original seed eating feature, many other forms with altered beaks arose.

(140) Answer : (1)
Solution:
The skull of baby chimpanzee is more like adult human skull than adult chimpanzee skull.

(141) Answer : (3)
Solution:
A study of fossils in different sedimentary layers indicates the geological period in which they existed.

(142) Answer : (3)
Solution:
The first mammals were like shrews. Their fossils are small sized.

(143) Answer : (3)
Solution:
During the industrial evolution, dark-winged moths became more in number; this indicates that nature was favouring one of the traits only. Thus, it represents directional selection.
In a mixed population, having different variants of moths, those that can adapt better will survive more and will produce more offsprings. It is important to remember that no variant was completely wiped out.

(144) Answer : (3)
Solution:
In the electric discharge experiment conducted by S.L. Miller, the closed flask contained CH_4, H_2, NH_3 and water vapours at 800°C.

(145) Answer : (3)
Solution:
Homologous structures in different organisms show similarity in their anatomy. Sweet potato and potato are examples of analogy.

(146) Answer : (3)
Solution:
Karl Ernst von Baer disapproved the proposal of Ernst Haekel.

(147) Answer : (1)
Solution:
The atmosphere of primitive Earth was reducing in nature and oxygen was absent.

(148) Answer : (1)
Solution:
Natural selection can lead to disruptive selection in which more individuals acquire peripheral character value at both ends of the distribution curve.

(149) Answer : (4)
Solution:
In 1938, a fish caught in South Africa was Coelacanth which was called lobefin and evolved into first amphibian.

(150) Answer : (1)
Solution:
Ichthyosaurs were fish-like reptiles probably 200 mya.

(151) Answer : (3)
Solution:
When more than one adaptive radiations appeared to have occurred in an isolated geographical area (representing different habitats), one can call this convergent evolution.

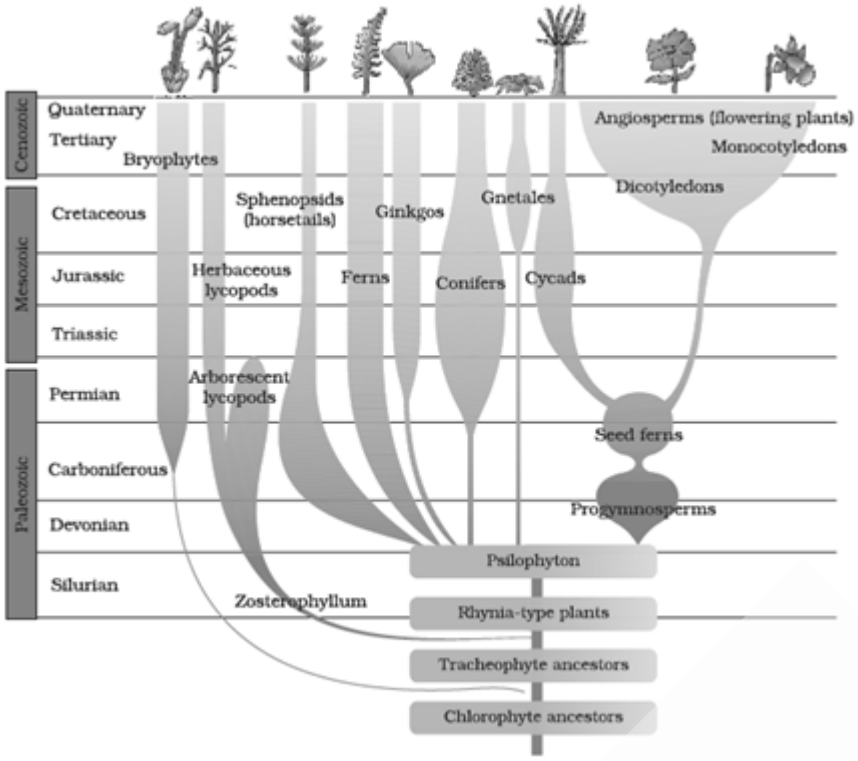
(152) Answer : (3)
Solution:
Around 200 mya, some of the land reptiles went back into water and evolved into fish-like reptiles (*Ichthyosaurs*).

(153) Answer : (1)
Solution:
Evening primrose is *Oenothera lamarckiana.* Hugo deVries believed mutation caused speciation and hence called it saltation.

(154) Answer : (1)
Solution:
Ramapithecus was more man-like while *Dryopithecus* was more ape-like. Correct chronological sequence is
Ramapithecus → Australopithecus → Homo habilis → Homo erectus → Homo sapiens

(155) Answer : (3)
Solution:
About 15 mya, primates called *Dryopithecus* were existing. They were hairy and walked like gorilla and chimpanzees.

(156) Answer : (1)
Solution:



(157) Answer : (1)

Solution:

Forelimbs of mammals are example of homologous organs. Homologous organs are result of divergent evolution.

(158) Answer : (2)

Solution:

The process of evolution of different species in a given geographical area starting from a point and literally radiating to other areas of geography is called adaptive radiation.

(159) Answer : (3)

Solution:

Molecular homology implies common ancestry. Similarities in proteins and genes performing a given function among diverse organisms give clues to the common ancestry. These biochemical similarities point to the same shared ancestry as structural similarities among the diverse organisms.

(160) Answer : (1)

Solution:

About 15 mya, primates called *Dryopithecus* and *Ramapithecus* were existing. They were hairy and walked like gorillas and chimpanzees.

(161) Answer : (2)

Solution:

Carboniferous and devonian periods are included under Paleozoic era. Jurassic and triassic periods are included under mesozoic era.

(162) Answer : (3)

Solution:

New genes/alleles are added to the new population and these are lost from the old population.
There would be a gene flow if this gene migration, happens multiple times.

(163) Answer : (4)

Solution:

Flying squirrel is a placental mammal.

(164) Answer : (3)

Solution:

According to Hardy-Weinberg equilibrium:

$p^2 + q^2 + 2pq = 1$

$p = 0.6$

$q = 0.4$

$\therefore 2pq = 0.6 \times 0.4 \times 2$
$= 0.48.$

(165) Answer : (1)
Solution:
According to Darwin, those who are better fit in an environment, leave more progeny than others.

(166) Answer : (2)
Solution:
Analogous organs have common function but different origin.

(167) Answer : (1)
Solution:
Homo sapiens arose during ice age between 75,000 – 10,000 years back.

(168) Answer : (2)
Hint:
According to Darwin, evolution is gradual
Solution:
Mutations are random and directionless while Darwinian variations are small and directional. According to Darwin, evolution was gradual while deVries believed mutation caused speciation and hence called it saltation.

(169) Answer : (3)
Solution:
Tyrannosaurus was the largest carnivorous dinosaur.

(170) Answer : (1)
Solution:
The same structure developed along different directions due to adaptations to different needs. This is divergent evolution and these structures are homologous. Homology indicates common ancestry.

(171) Answer : (2)
Solution:
Muscle fibre is the anatomical unit of muscle. Each muscle fibre has many parallelly arranged myofibrils. Each myofibril contains many serially arranged unit called sarcomere which are the functional unit of muscle.
Each organised skeletal muscle in our body is made of a number of muscle bundle or fascicles.

(172) Answer : (3)
Solution:
PCT is lined by simple cuboidal brush border epithelium which increases the surface area for reabsorption.

(173) Answer : (1)
Solution:
Ammonia is the most toxic and uric acid is the least toxic nitrogenous wastes in animals.

(174) Answer : (2)
Solution:
Smooth muscle fibres do not show any light and dark bands, that is why, they are called unstriped or non-striated muscle fibres.

(175) Answer : (4)
Solution:
The 8^{th}, 9^{th} and 10^{th} pairs of ribs do not articulate directly with the sternum but join the seventh rib with the help of hyaline cartilage. 11^{th} and 12^{th} pairs of ribs are not joined with sternum hence called floating ribs. The two halves of the pelvic girdle meet ventrally to form the pubic symphysis containing fibrous cartilage.

(176) Answer : (3)
Solution:
Red muscle fibres contain high amount of myoglobin and mitochondria.
White muscle fibres have high amount of sarcoplasmic reticulum and depend on anaerobic process for energy.

(177) Answer : (3)
Solution:
* Reptiles, land snails, birds and insects are uricotelic animals.
* Bony fishes and aquatic amphibians are ammonotelic animals.
* Terrestrial amphibians and marine fishes are ureotelic animals.

(178) Answer : (3)
Hint:
Properties of skeletal muscle fibres

Solution:
Muscle fibres possess properties like excitability, contractility, extensibility, elasticity and contractility.

(179) Answer : (2)
Solution:
In humans, osmolarity gradient in the medullary interstitium is maintained by NaCl and urea.

(180) Answer : (1)
Solution:
Protonephridia or flame cells – Platyhelminths, rotifers, some annelids and cephalochordate – *Amphioxus*
Antennal glands – Prawn
Malpighian tubules – Terrestrial insects (cockroach)