ANSWER KEY
NEET
PART TEST-05 (XII)
PHYSICS

Q.1 (4)	Q.2 (2)	Q.3 **(3)**	Q.4 (3)	Q.5 (3)	Q.6 (4)	Q.7 (1)	Q.8 (1)	Q.9 (2)	Q.10 (1)
Q.11 (3)	Q.12 (1)	Q.13 (2)	Q.14 (4)	Q.15 **(3)**	Q.16 (3)	Q.17 (1)	Q.18 (3)	Q.19 (3)	Q.20 (3)
Q.21 (3)	Q.22 (3)	Q.23 (2)	Q.24 **(1)**	Q.25 (1)	Q.26 (4)	Q.27 (2)	Q.28 (2)	Q.29 (3)	Q.30 (2)
Q.31 (2)	Q.32 (2)	Q.33 (3)	Q.34 (2)	Q.35 (3)	Q.36 (3)	Q.37 (1)	Q.38 (2)	Q.39 (3)	Q.40 **(3)**
Q.41 (3)	Q.42 **(1)**	Q.43 (4)	Q.44 (1)	Q.45 (4)	Q.46 (2)	Q.47 (2)	Q.48 (4)	Q.49 (3)	Q.50 (1)

CHEMISTRY

Q.51 (2)	Q.52 (3)	Q.53 (1)	Q.54 (2)	Q.55 (2)	Q.56 (4)	Q.57 (3)	Q.58 (4)	Q.59 (3)	Q.60 (1)
Q.61 (2)	Q.62 (2)	Q.63 (1)	Q.64 (2)	Q.65 (1)	Q.66 (4)	Q.67 (3)	Q.68 (1)	Q.69 (1)	Q.70 (1)
Q.71 (2)	Q.72 (3)	Q.73 (3)	Q.74 (4)	Q.75 (2)	Q.76 (2)	Q.77 (3)	Q.78 (1)	Q.79 (2)	Q.80 **(2)**
Q.81 (2)	Q.82 (4)	Q.83 (2)	Q.84 (4)	Q.85 (2)	Q.86 (4)	Q.87 (4)	Q.88 (1)	Q.89 (2)	Q.90 (3)
Q.91 (3)	Q.92 (2)	Q.93 (4)	Q.94 (2)	Q.95 (2)	Q.96 (1)	Q.97 (1)	Q.98 (2)	Q.99 (4)	Q.100 (1)

BIOLOGY

Q.101 (4)	Q.102 (1)	Q.103 (1)	Q.104 (3)	Q.105 (3)	Q.106 (3)	Q.107 (4)	Q.108 (3)	Q.109 (1)	Q.110 (3)
Q.111 (2)	Q.112 (4)	Q.113 (1)	Q.114 (1)	Q.115 (1)	Q.116 (4)	Q.117 (4)	Q.118 (1)	Q.119 (2)	Q.120 (4)
Q.121 (3)	Q.122 (4)	Q.123 (4)	Q.124 (3)	Q.125 (2)	Q.126 (4)	Q.127 (3)	Q.128 (1)	Q.129 (4)	Q.130 (1)
Q.131 (1)	Q.132 (4)	Q.133 (4)	Q.134 (4)	Q.135 (1)	Q.136 (4)	Q.137 (4)	Q.138 (1)	Q.139 (1)	Q.140 (3)
Q.141 (1)	Q.142 (2)	Q.143 (2)	Q.144 (3)	Q.145 (1)	Q.146 (1)	Q.147 (4)	Q.148 (2)	Q.149 (4)	Q.150 (2)
Q.151 (3)	Q.152 (1)	Q.153 (4)	Q.154 (3)	Q.155 (4)	Q.156 (1)	Q.157 (2)	Q.158 (2)	Q.159 (3)	Q.160 (3)
Q.161 (2)	Q.162 (1)	Q.163 (3)	Q.164 (1)	Q.165 (4)	Q.166 (3)	Q.167 **(4)**	Q.168 (3)	Q.169 (4)	Q.170 (4)
Q.171 (3)	Q.172 (2)	Q.173 (4)	Q.174 (2)	Q.175 (3)	Q.176 (2)	Q.177 (3)	Q.178 (1)	Q.179 (4)	Q.180 (2)
Q.181 (2)	Q.182 (4)	Q.183 (2)	Q.184 (3)	Q.185 (2)	Q.186 (3)	Q.187 (4)	Q.188 (2)	Q.189 (4)	Q.190 (4)
Q.191 (4)	Q.192 (3)	Q.193 (3)	Q.194 (4)	Q.195 (1)	Q.196 (4)	Q.197 (4)	Q.198 (4)	Q.199 (1)	Q.200 (1)

SOLUTIONS

PHYSICS

Q.1 (4)
From momentum conservation,
$m_1 v_1 = m_2 v_2$
Also, de-broglie wavelength,

$\lambda = \dfrac{h}{mv} \Rightarrow \lambda_1 = \dfrac{h}{m_1 v_1}$ and $\lambda_2 = \dfrac{h}{m_2 v_2} \Rightarrow \lambda_1 = \lambda_2$

Q.2 (2)
From Einstein photoelectric equation

$\dfrac{hc}{\lambda} = \phi + KE_{max} \Rightarrow \dfrac{12400}{2000}$

$= 5 + KE_{max}$
$\Rightarrow 6.2 = 5 + KE_{max} \Rightarrow KE_{max} = 1.2 \text{ eV}$

Q.3 **(3)**
For emitting photoelectrons
$\phi_0 < E$
For Mo and Ca work function
is less than 4.20 eV.

Q.4 (3)
$KE_{max} = hf - \phi$.
hence KE_{max} varies linearly with frequency. Alos, intensity of
radiation doesn't affect the KE of photoelectrons.

Q.5 (3)
$l \propto \dfrac{1}{P}$ (So, graph will be straight line)

Q.6 (4)
$\lambda = \dfrac{h}{p}$
$\lambda \to$ same
$p \to$ same
$p_e = p_p$

$KE = \dfrac{p^2}{2m}$; K.E. $\propto \dfrac{1}{m}$

$m_e < m_p$ so $KE_e > KE_p$

Q.7 (1)
Saturation current is different so intensity is different but stopping potential is same and frequency is same so cathode material also same.

Q.8 (1)
From photoelectric equation :

$$h\nu = \phi + KE_{max} \text{ or } h\nu = \phi + eV_0$$

$$\Rightarrow KE_{max} = h\nu - \phi \text{ or } V_0 = \frac{h\nu}{e} - \frac{\phi}{e}$$

$$\Rightarrow \text{slope} = h \qquad \text{or slope} = \frac{h}{e}$$

$$\text{intercept} = -\phi \qquad \text{intercept} = \frac{-\phi}{e}$$

Q.9 (2)
From photoelectric equation
$h\nu = f + KE_{max}$ and $KE_{max} = eV_s$
where V_s = slopping potential
$\Rightarrow KE_{max}$ depends on incident frequency

Q.10 (1)
Relation between energies are
Total energy = −(kinetic energy)

$$= \frac{\text{potential energy}}{2}$$

Q.11 (3)

$$E_n = -13.6 \frac{z^2}{n^2} eV$$

$$\Rightarrow \text{for } n = 1, E_1 = -13.6 \frac{(4)^2}{(1)^2} eV$$

$$\Rightarrow E_1 = -217.6 \, eV$$
$$E_\infty = 0 \, eV$$
$$\Rightarrow \Delta E_{1 \to \infty} = 217.6 \, eV$$

Q.12 (1)
From energy equation,
$$\Delta E_{total} = \Delta E_1 + \Delta E_2$$

$$\Rightarrow \frac{hc}{\lambda} = \frac{hc}{\lambda_1} + \frac{hc}{\lambda_2} \Rightarrow \frac{1}{\lambda} = \frac{1}{\lambda_1} + \frac{1}{\lambda_2}$$

$$\Rightarrow \lambda = 800 \, \text{Å}$$

Q.13 (2)

From relation, $mvr = \frac{nh}{2\pi}$ and

$$\lambda = \frac{h}{mv} \qquad \Rightarrow \left(\frac{h}{\lambda}\right)r = \frac{4h}{2\pi} \Rightarrow \lambda = \frac{\pi r}{2}$$

Q.14 (4)
Jump to first orbit leads to Lyman series. When an electron jumps from 3rd orbit to 1sl orbit, it will give rise to second line of Lyman series.

Q.15 (3)
K.E. = − (Total energy)
= 1.51 eV
P.E. = 2 (Total energy)
= 2 (−1.51 eV) = −3.02 eV

Q.16 (3)

$$r = r_0 \frac{n^2}{z}$$

$$r = 53 \frac{(2)^2}{3} = 70.7 \, \text{pm}$$

Q.17 (1)

Velocity, $V_n \propto \dfrac{z}{n}$

where n = orbit
z = atomic number

$$\Rightarrow v \propto \frac{1}{n} \quad \Rightarrow \frac{V_4}{V_9} = \frac{9}{4}$$

Q.18 (3)
Theoretical mass of nucleus
$= Zmp + (A - Z) m_n$
Practicle mass, m < theoretical mass
This mass difference is called mass defect.

Q.19 (3)

$$_8O^{16} + {}_1H^2 \longrightarrow {}_7X^{14} + {}_2\alpha^4$$
$$\text{(deutoron)} \qquad \text{(unknown nuclei)} \quad (\alpha-\text{particle})$$

Q.20 (3)
Energy related in nuclear reaction
= (Binding energy of product)
− (Binding energy of reactant)
$\Rightarrow \Delta E = B_3 + B_4 - B_1 - B_2$

Q.21 (3)

80 g of ^{240}X will have $\dfrac{1}{3}$ mole of X

Number of atom $= \dfrac{1}{3} \times N_A = \dfrac{1}{3} \times 6 \times 10^{23}$

$= 2 \times 10^{23}$
Energy released $= 2 \times 10^{23} \times 200 \, \text{MeV}$
$= 4 \times 10^{25} \, \text{MeV}$

Q.22 (3)

B.E. of A $= 240 \times 7.6 = 1824$ MeV

B.E. of B $= 100 \times 8.1 = 810$ MeV

B.E. of C $= 140 \times 8.1 = 1134$ MeV

So $Q = (810 + 1134)$ MeV $- 1824$ MeV $= 120$ MeV

Q.23 (2)

From real time variation of input signals, we can from truth table for A and B and conclude output form NAND gate.

Inputs		Output
A	**B**	**Y**
0	0	1
1	0	1
0	0	1
1	1	0
0	0	1

From output, we can show real time variation of output signal as below :

Q.24 **(1)**

LED work always on the forward biasing condition & it emits light when energised

So increase the frequency of light emitted from LED, the potential barried of Diode is increased.

So for the same value of current, a higher value of voltage is required for higher frequency.
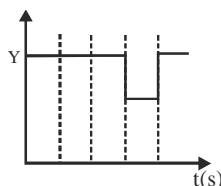
Q.25 (1)

(1) At $V = -8$ V

$$R = \frac{-8}{-1\mu}$$

(2) At $I_d = 10$ mA

$$R = \frac{\Delta V}{\Delta I} = \frac{0.8 - 0.6}{(15 - 5) \times 10^{-3}} = 20\Omega$$

Q.26 (4)

$\because V_{supply} < V_{zener}$

So, Zener diode will not work so, it will behave as open circuit so, I = 0.

Q.27 (2)

$\Delta KE = w$

$KE_f - KE_i = eV_0$

$KE_f = KE_i + eV_0 = 0.7$ eV $+ 0.5$ eV

$= 1.2$ eV

Q.28 (2)

$\sigma = n_i e(\mu_e + \mu_n)$

$= (1.6 \times 10^{10}) \times (1.6 \times 10^{-19})$

$[1500 + 500]$

$= 5.12 \times 10^{-6}$ $(\Omega cm)^{-1}$

Q.29 (3)

Refer the theory

Q.30 (2)

The p-type and n-type semiconductors are formed when the impurity atoms, which themselves are electrically neutral, are added to pure semiconductor which is also electrically neutral. Hence the p or n-type semiconductor formed is electrically neutral.

Q.31 (2)

As both diodes are forward biased, so equivalent circuit diagram is

$R_{eq} = 5$ Ω
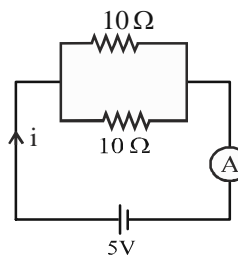
$\Rightarrow i = \frac{5}{5} = 1$ A

Q.32 (2)

$$V_{max} = \frac{V_0}{2} = \frac{10}{2} = 5 \text{ V}$$

Q.33 **(3)**

Because specific heat of copper is small

Q.34 (2)

$$f_{closed} = \frac{v}{4\ell} \; ; f_{open} = \frac{v}{2\ell}$$

$\Rightarrow f_{open} > f_{closed}$

Also, $v = \sqrt{\frac{\gamma RT}{M}}$ and $M_{H_2} < M_{air} \Rightarrow V_{H_2} > V_{air}$

$\Rightarrow f_{H_2} > f_{air}$.   Also, $f \propto \frac{1}{\ell}$

$\Rightarrow \ell$ increases , f decreases

Q.35 (3)
Slope of V – I graph is resistance
Slope of A > slope of B
$\Rightarrow R_A > R_B$

$\Rightarrow \dfrac{\rho\ell}{(\text{Area})_A} > \dfrac{\rho\ell}{(\text{Area})_B} \Rightarrow \pi r_A^2 < \pi r_B^2$

$\Rightarrow r_A < r_B \Rightarrow 1 < \dfrac{r_B}{r_A}$

Q.36 (3)
$E = \phi_0 + 0.6$ ..... (i)
$1.3\,E = \phi_0 + 0.9$ .....
(ii) – (i)
$0.3\,E = 0.3$
$E = 1\,eV$
$\phi_0 = 1 - 0.6 = 0.4\,eV$

Q.37 (1)
Work function is the property of material only. How strongly electron is bounded to nucleus, depends on material only.

Q.38 (2)
De- broglie wavelength,

$\lambda = \dfrac{h}{mv} = \dfrac{h}{\sqrt{2mk}}$

When k = kinetic energy

$\Rightarrow \lambda \propto \dfrac{1}{\sqrt{M}}$

As $m_e << m_p \approx m_n < m_a \Rightarrow \lambda_e >> \lambda_p = \lambda_n > \lambda_\alpha$

Q.39 (3)
From Bohr's postulate :

Angular momentum , $L = mvr = \dfrac{nh}{2\pi}$

Q.40 (3)

Total energy, $TE = -13.6\,\dfrac{z^2}{n^2}\,eV$

And total energy = – (Kinetic energy)
$\Rightarrow$ TE for n = 1 is E

$\Rightarrow$ TE for n = 3 is $\dfrac{E}{9} \Rightarrow KE = -TE = \dfrac{-E}{9}$

Q.41 (3)

Velocity, $v \propto \dfrac{z}{n}$

Radius, $r \propto \dfrac{n^2}{z}$

Ratio $= \dfrac{\omega}{V} = \dfrac{\omega}{\omega r} = \dfrac{1}{r} = \dfrac{z}{n^2}$

ratio $\propto \dfrac{1}{n^2}$

Q.42 (1)
Given nuclear reaction can be written as :

$_z X^A \longrightarrow _{z-1} X^{A-12} + 3\,_2\alpha^4 + 5\,_{-1}e^0 + 2\gamma$
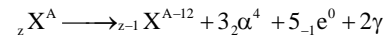
Q.43 (4)

$R = R_0 (A)^{\frac{1}{3}}$

$\dfrac{R_1}{R_2} = \dfrac{R_0 (27)^{\frac{1}{3}}}{R_0 (8)^{\frac{1}{3}}} = \dfrac{3}{2}$

Q.44 (1)
(1) Density of nucleus is common for all nucleus irrespective of mass number

(2) Radius of nuclei $\propto (\text{mass no.})^{\frac{1}{3}}$

(3) Binding energy $\propto$ mass defect
(4) When heavy nuclei breaks into lighter nuclei, energy is released.

Q.45 (4)

$Y = \overline{\overline{(A+B)} \cdot B}$

$= (A + B) \cdot B = A \cdot B + B = B(A+1)$
$= B$

Q.46 (2)
For reverse biasing of an ideal diode, the potential of n-side should be higher than potential of p-side. Only option (2) is satisfying the criterion for reverse biasing.

Q.47 (2)
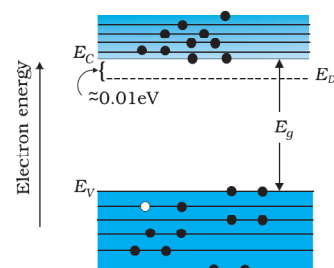
(a) $T > 0K$
one thermally generated electron-hole pair + 9 electrons from donor atoms
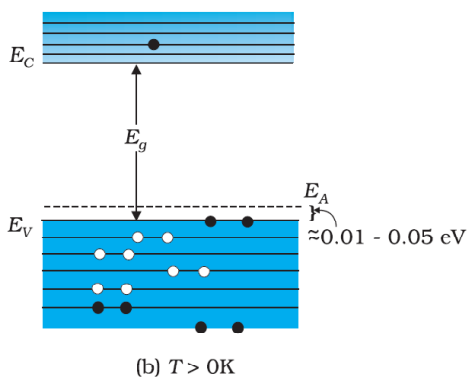
(b) $T > 0K$

Energy bands of (a) n-type semiconductor at T > OK, (b) p-type semiconductor at T > OK.

Q.48 (4)
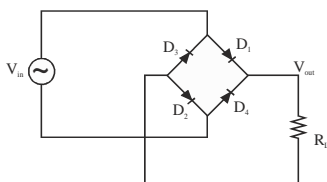
Q.49 (3)

$$\text{Pitch} = \frac{4}{8} = 0.5\text{mm}$$

Now, least count $= \dfrac{\text{Pitch}}{\text{CSD}} = \dfrac{0.5}{50}$

$$= \frac{1}{100}\text{mm} = 0.01\text{mm} = 0.001\text{ cm}$$

Q.50 (1)

Initially, microscope is focussed on ink dot without glass slab.
Later on, microscope is focussed with glass slab on ink dot.
$\Rightarrow$ Microscope is above the slab and normal to the slab.

CHEMISTRY

Q.51 (2)

$XeF_4 + 12H_2O \rightarrow 4Xe + 2XeO_3$
$+ 24HF + 3O_2$
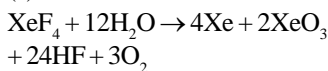
Q.52 (3)

The thermal stability decreases from H_2O to H_2Po.

Q.53 (1)

NH_3 has –46.1 kJ/mol enthalpy of formation.

Q.54 (2)

Bond angle $\rightarrow H_2O > H_2S > H_2Se$
$> H_2Te$

Q.55 (2)

Chlorine has more negative electron gain enthalpy than fluorine.

Q.56 (4)

Nitrogen does not show allotropy.

Q.57 (3)

Oxygen exist as diatomic molecule (O_2) and sulphur exist as polyatomic (S_8) molecule.

Q.58 (4)

The tendency to show –3 oxidation state decreases down the group in group-15 due to increase in atomic size.

Q.59 (3)

$Cs \rightarrow$ Alkali metal $\rightarrow$ Only $\oplus$ive O.S.
$Ne \rightarrow$ Noble gas $\rightarrow$ Nor $\oplus$ive nor $\ominus$ive O.S.
$I \rightarrow$ Halogen $\rightarrow \oplus$ and $\ominus$ both O.S.
$F \rightarrow$ Highly EN atom $\rightarrow$ Only $\ominus$ive O.S.

Q.60 (1)

$_{29}Cu = 1s^2\, 2s^2\, 2p^6\, 3s^2\, 3p^6\, 4s^1\, 3d^{10}$
$_{24}Cr = 1s^2\, 2s^2\, 2p^6\, 3s^2\, 3p^6\, 4s^1\, 3d^5$

Q.61 (2)

$Cu + H_2SO_4 \text{ (dil.)} \rightarrow$ liberate H_2 gas
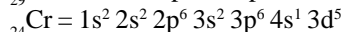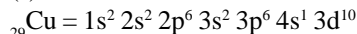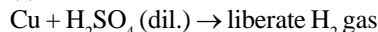
Q.62 (2)

Enthalpy of atomisation
$\rightarrow Ni > Co > Fe > Cu$

Q.63 (1)

$2MnO_4^- + I^- + H_2O \rightarrow IO_3^- + 2OH^- + 2MnO_2$
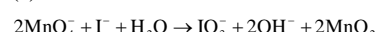
Q.64 (2)

$CrO \rightarrow$ Basic
$Cr_2O_3 \rightarrow$ Amphoteric
$V_2O_5 \rightarrow$ Acidic
$CrO_3 \rightarrow$ Acidic oxide

Q.65 (1)
Ac shows only +3 oxidation state.
$Th \rightarrow +4$
$Pa \rightarrow +3, +4, +5$
$U \rightarrow +3 \text{ to } +6$

Q.66 (4)
When we moves left to right in lanthanoid series, basic strength decreases.

Q.67 (3)
The green manganate ion is paramagnetic but the permanganate ion is diamagnetic.

Q.68 (1)
Zr and Hf have nearly same atomic radii due to lanthanoid contraction.

Q.69 (1)
V^{+3} exhibit colour in aqueous solutions.

Q.70 (1)
$NH_2 - NH_2$ = monodentate ligand

Q.71 (2)
Strength of ligand $\rightarrow Cl^- < H_2O$
$< en < CO$

Q.72 (3)
The metal-carbon bond in metal carbonyl possess both σ and π character.

Q.73 (3)
$Mn^{+3} \rightarrow 3d^4$
$Cl^- \rightarrow$ W.F.L.
$Mn^{+3} \rightarrow t_{2g}^3 e_g^1$

Q.74 (4)
$[Co(en)_2ClBr]$ is heteroleptic complex. Here en is didentate ligand.

Q.75 (2)
CO shows synergic bonding.

Q.76 (2)
$[Cr(NH_3)_6][Co(CN)_6]$ both are coordination isomerism.

Q.77 (3)
$Co^{+3} \rightarrow 3d^6, \; t_{2g}^6$
$NH_3 \rightarrow$ S.F.L.
So, hybridisation d^2sp^3.

Q.78 (1)
$[Fe(CN)_6]^{3-}, Fe^{+3} \rightarrow t_{2g}^5$
M.M. = 1.73 B.M.
$[NiCl_4]^{2-}, Ni^{+2} \rightarrow 3d^8$
M.M. = 2.83 B.M.
$[Co(NH_3)_6]^{+3}, Co^{+3} \rightarrow t_{2g}^6$
M.M. = 0 B.M.
$[FeF_6]^{3-}, Fe^{+3} \rightarrow t_{2g}^3 e_g^2$
M.M. = 5.92 B.M.

Q.79 (2)
$[Fe(CN)_6]^{4-}, Fe^{+2} = 3d^6$
$CN^- \rightarrow$ S.F.L.
$Fe^{+2} \rightarrow t_{2g}^6 e_g^0$

Q.80 **(2)**
$[Cu(NH_3)_4]^{2+}$ is blue in colour.

Q.81 (2)
PbS formed which is a black ppt.

Q.82 (4)
None

Q.83 (2)

Acetanilide

Q.84 (4)
All of these affects the rate of reaction.

Q.85 (2)
Iodine with starch form blue colour complex which indicate the presence of iodine.

Q.86 (4)
$XeF_4 + SbF_5 \rightarrow [XeF_3]^+[SbF_6]^-$

Q.87 (4)
Boiling point $\propto$ molecular weight
$HF > HI > HBr > HCl$
(due to strong H-bonding)

Q.88 (1)
F_2 is a strong oxidising agent than chlorine because F_2 has a low B.D.E. and $F^\oplus$ ion has high hydration enthalpy.

Q.89 (2)
$Cr^{2+} \rightarrow 3d^4 \rightarrow 4$ unpaired e^-
$V^{2+} \rightarrow 3d^3 \rightarrow 3$ unpaired e^-
$Mn^{2+} \rightarrow 3d^5 \rightarrow 5$ unpaired e^-
$Ni^{2+} \rightarrow 3d^8 \rightarrow 2$ unpaired e^-

Q.90 (3)
Density of Ni is more than Fe.
$Ni \rightarrow 8.9$ g/cm^3
$Fe \rightarrow 7.8$ g/cm^3

Q.91 (3)
The first I.E. of the lanthanoids is around 600 kJ/mol.

Q.92 (2)
Cu^{+2}, Ti^{+3} both have one unpaired e^-, so spin only magnetic moment is 1.73 B.M.

Q.93 (4)
Brass is an alloy of copper and tin.

Q.94 (2)

[Facial isomer]　　　　[meridional isomer]

Q.95 (2)
$C_2O_4^{-2}$ bidentate ligand

Q.96 (1)
$[Co(NH_3)_6]Cl_3 \rightarrow$ Hexaamminecobalt (III) chloride

Q.97 (1)
Facts

Q.98 (2)

Q.99 (4)
All of these used as acid-base indicator.

Q.100 (1)
Ba $\longrightarrow$ Apple green colour
Ca $\longrightarrow$ Brick red colour
Sr $\longrightarrow$ Crimson red colour

BIOLOGY

Q.101 (4)
New NCERT Pg. No. 201
Commensalism is a type of relationship between two living organisms where one benefits and the other is neither harmed nor helped. Examples of commensalism include:
1. An orchid growing on a mango branch: The orchid benefits by getting a place to live, while the mango tree is not affected.
2. Barnacles growing on the back of a whale: Barnacles get a place to live and access to nutrient-rich waters, while the whale is not harmed.
3. The cattle egret and grazing cattle: The egret benefits by eating insects stirred up by the cattle, while the cattle are not affected.
4. The sea anemone and the hermit crab is an example of proto-cooperation, not commensalism. The anemone gets a place to live and food scraps, while the crab gets protection from predators.

Q.102 (1)
New NCERT Pg. No. 199
The principle of competitive exclusion, also known as Gause's Law, states that two species competing for the same limiting resources cannot coexist at constant population values if other ecological factors remain constant. One species will outcompete the other, leading to the latter's local extinction.

Q.103 (1)
New NCERT Pg. No. 202
Both assertion and reason are true. The reason explains why the assertion is true: the specificity of the relationship between fig trees and their wasp pollinators is an example of mutualism where both species benefit and are dependent on each other. Therefore, both the assertion and the reason are true, and the reason correctly explains the assertion.

Q.104 (3)
New NCERT Pg. No. 200
Brood parasitism is a form of parasitism where one species (the parasite) relies on another species (the host) to raise its offspring. The cuckoo is a well-known brood parasite that lays its eggs in the nests of other bird species, such as crows. The host bird then raises the cuckoo chick, often at the expense of its own chicks.
Lice on humans and ticks on dogs are examples of ectoparasitism, not brood parasitism. Cuscuta growing on hedge plants is an example of plant parasitism.

Q.105 (3)
New NCERT Pg. No. 193
Population attributes are characteristics that describe the population structure and dynamics.
These include:
1. Natality (birth rate): The rate at which new individuals are added to the population through reproduction.
2. Mortality (death rate): The rate at which individuals are lost from the population through death.
3. Sex ratio: The proportion of males to females in a population.
"Birth" is not a population attribute itself but contributes to natality, which is a population attribute.

Q.106 (3)
New NCERT Pg. No. 192
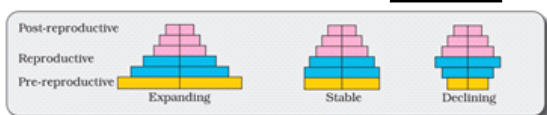
• Q represents a stable population (bell-shaped).
• R represents a declining population (urn-shaped).
• P represents an expanding population (pyramid-shaped).

Q.107 (4)
New NCERT Pg. No. 195
The Verhulst-Pearl logistic growth equation describes how populations grow in a limited environment with carrying capacity (K). The equation is:

$$\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$$

where:
• dN/dt is the rate of change of the population size.
• r is the intrinsic rate of natural increase.
• N is the population size.
• K is the carrying capacity of the environment.
This equation shows that the population growth rate decreases as the population size approaches the carrying capacity.

Q.108 (3)
New NCERT Pg. No. 198, 199
• Statement I: It is generally believed that competition occurs when closely related species compete for the same resources that are limiting, but this is not entirely true. Totally unrelated species could also compete for the same resource.
• Statement II: Herbivores and plants appear to be more adversely affected by competition than carnivores. This is correct.
• Therefore, Statement I is incorrect, and Statement II is correct.

Q.109 (1)
New NCERT Pg. No. 200
Parasites typically have high reproductive capacities to ensure their survival and transmission to new hosts. The adaptations that are true for parasites include:
• Loss of digestive system: Many parasites absorb nutrients directly from their host.
• Presence of adhesive organs: Parasites often have structures like hooks or suckers to attach to their host.
• Loss of unnecessary sense organs: Parasites living inside hosts lose the need for certain sense organs.
Low reproductive capacity is not an adaptation of parasites; instead, they tend to have high reproductive rates to increase the chances of transmission and survival.

Q.110 (3)
New NCERT Pg. No. 198
Calotropis is avoided by browsers because it produces highly poisonous cardiac glycosides, which are toxic compounds that can affect the heart. These toxins serve as a chemical defense mechanism against herbivory.
Long spines and thorns are physical defenses found in other plants. Sweet taste would attract browsers, and opium and caffeine are not produced by Calotropis.

Q.111 (2)

New NCERT Pg. No. 197

The correct match for species interactions with respect to population interactions is:

• + + Mutualism: Both species benefit from the interaction.

• + – Predation: One species (the predator) benefits, while the other species (the prey) is harmed.

• + 0 Commensalism: One species benefits, and the other is neither helped nor harmed.

• – 0 Amensalism: One species is harmed, and the other is unaffected.

Therefore, the correct match for + - interaction is predation.

Q.112 (4)

New NCERT Pg. No. 192

A population is considered to be declining when the number of individuals in the pre-reproductive group is fewer than those in the reproductive group. This indicates that fewer young individuals are being produced to replace the aging reproductive population, leading to a decline in population size over time.

Q.113 (1)

New NCERT Pg. No. 212, 213

• The pyramid of energy is always upright, regardless of the ecosystem, because energy flow is unidirectional and decreases at each trophic level.

• The pyramid of number in a tree ecosystem is inverted as it consists of tree, birds and parasites.

• The pyramid of biomass in a sea ecosystem is often inverted because the biomass of phytoplankton (producers) is lower than the biomass of zooplankton (primary consumers).

• The pyramid of number in a grassland is typically upright. Therefore, the correct answer is the pyramid of energy in a grassland (always upright) and the pyramid of number in a tree ecosystem (can be inverted).

Q.114 (1)

New NCERT Pg. No. 208

Factors that promote faster decomposition include:

• Warm and moist environment: These conditions favor microbial activity and decomposition.

• Presence of oxygen-rich environment: Aerobic conditions enhance decomposition.

• Presence of nitrogen and water-soluble substances like sugars in detritus: These substances provide readily available nutrients for decomposers.

Detritus rich in lignin and chitin decomposes more slowly because these substances are complex and resistant to breakdown by decomposers.

Q.115 (1)

New NCERT Pg. No. 208

Temperature and soil moisture are the most important climatic factors regulating the rate of decomposition.

Warm temperatures and adequate moisture levels enhance microbial activity and accelerate decomposition, while extreme temperatures and dry conditions slow down the process.

Q.116 (4)

New NCERT Pg. No. 205

A man-made ecosystem is one that has been created and maintained by human activities.

Crop fields are an example of a man-made ecosystem because they are artificially established and managed for agricultural production.

Natural ecosystems include forests, grasslands, and deserts, which exist without direct human intervention.

Q.117 (4)

New NCERT Pg. No. 213

• Assertion (A): Pyramid of energy can be inverted in most of the ecosystems.

This is false. The pyramid of energy is always upright because energy flow is unidirectional and decreases at each trophic level.

• Reason (R): The flow of energy is unidirectional from producer to consumer level, and vice versa. This is true. Energy flows in one direction from producers to various levels of consumers, but it does not flow back from consumers to producers.

Since the assertion is false and the reason is true, the correct answer is (4).

Q.118 (1)

New NCERT Pg. No. 210

	Examples	
Tertiary Consumer	Fourth Trophic level (Top Carnivore)	Man, lion
Secondary Consumer	Third trophic level (Carnivore)	Birds, fishes wolf
Primary Consumer	Second trophic level (Herbivore)	Zooplankton, grasshopper and cow
Primary Producer	First Trophic level (Plants)	Phytoplankton, grass, trees
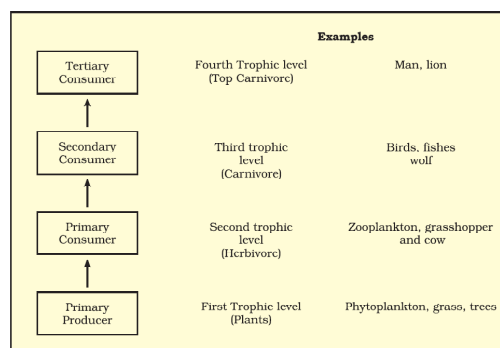
Q.119 (2)
New NCERT Pg. No. 210
The detritus food chain (DFC) begins with dead organic matter and involves decomposers such as fungi and bacteria. However, decomposers are not autotrophic; they are heterotrophic organisms that obtain energy by breaking down dead organic matter.
The other statements are correct. Decomposers secrete digestive enzymes that break down dead and waste materials into simple, inorganic materials, which they absorb. Decomposers are also known as saprotrophs.

Q.120 (4)
New NCERT Pg. No. 210
The third trophic level of a food chain is typically occupied by secondary consumers or carnivores that feed on primary consumers (herbivores). Herbivores occupy the second trophic level as primary consumers.
Therefore, herbivores do not occupy the third trophic level.

Q.121 (3)
New NCERT Pg. No. 210, 211
• Statement I: In an aquatic ecosystem, GFC is the major conduit for energy flow.
• Statement II: The biomass of a species is expressed in terms of fresh or dry weight. Measurement of biomass in terms of dry weight is more accurate.

Q.122 (4)
New NCERT Pg. No. 214
It does not take into account the same species belonging to two or more trophic levels.
It assumes a simple food chain, something that almost never exists in natur e; it does not accommodate a food web. Moreover, saprophytes are not given any place in ecological pyramids even though they play a vital role in the ecosystem.

Q.123 (4)
New NCERT Pg. No. 212
The ecological pyramid shown in the question is likely to be the pyramid of biomass in an aquatic ecosystem.
In aquatic ecosystems, the biomass of primary producers (phytoplankton) is typically lower than that of primary consumers (zooplankton), resulting in an inverted pyramid of biomass.

Q.124 (3)
New NCERT Pg. No. 207
Catabolism in the context of decomposition refers to the breakdown of detritus into simpler inorganic substances by decomposers such as bacteria and fungi. This process releases nutrients back into the environment, making them available for uptake by plants.

Q.125 (2)
New NCERT Pg. No. 222
The most dramatic examples of habitat loss come from tropical rainforests, not temperate rainforests.
Tropical rainforests are being rapidly cleared and degraded, leading to significant biodiversity loss.
The other statements are correct:
• Habitat loss and fragmentation are the most important causes driving animals and plants to extinction.
• The Amazon rainforest, which harbors millions of species, is being cut and cleared for agriculture and livestock raising.
• Tropical rainforests once covered more than 14% of the Earth's land surface.
Therefore, the incorrect statement is (2).

Q.126 (4)
New NCERT Pg. No. 217, 220, 221
The correct match is:
• Edward Wilson (a) popularized the term biodiversity (iv).
• Alexander von Humboldt (b) is associated with species-area relationship (iii).
• David Tilman (c) is known for long-term ecosystem experiments (ii).
• Paul Ehrlich (d) is associated with the rivet popper hypothesis (i).
Therefore, the correct answer is (4).

Q.127 (3)
New NCERT Pg. No. 221
According to the IUCN Red List (2004), the number of extinct species is 784 species which includes:
• 338 vertebrates,
• 359 invertebrates and
• 87 plants

Q.128 (1)
New NCERT Pg. No. 223
The passenger pigeon and Steller's sea cow are examples of species that became extinct due to overexploitation. Both species were heavily hunted by humans, leading to their extinction.
Cichlid fish species have faced threats from habitat changes and invasive species, while the African catfish is an invasive species itself.

Q.129 (4)
New NCERT Pg. No. 225
Sacred groves are protected areas of natural vegetation that hold cultural and religious significance. Examples of sacred groves include:
• Khasi and Jaintia hills in Meghalaya
• Aravalli hills of Rajasthan
• Western Ghat region of Karnataka
The Sarguja area is in MP, not Maharashtra, and is not known for sacred groves.
Therefore, the incorrect example is (4).

Q.130 (1)
New NCERT Pg. No. 221
The Red Data Book or Red List is maintained by the International Union for Conservation of Nature (IUCN). It provides comprehensive information on the global conservation status of plant and animal species.
UNEP (United Nations Environment Programme), WWF (World Wide Fund for Nature), and MAB (Man and the Biosphere Programme) are other organizations involved in conservation but do not maintain the Red List.

Q.131 (1)
New NCERT Pg. No. 217, 223
• Statement I: The Western Ghats have a greater amphibian species diversity than the Eastern Ghats.
This is correct. The Western Ghats are a biodiversity hotspot with high amphibian diversity.
• Statement II: Bioprospecting is exploring molecular, genetic, and species-level diversity for products of economic importance. This is also correct. Bioprospecting involves searching for valuable biological resources that can be used in medicine, agriculture, and other industries.
Therefore, both statements are correct.

Q.132 (4)
New NCERT Pg. No. 225
Cryopreservation of gametes of threatened species in viable and fertile condition is an advanced form of ex situ conservation. Ex situ conservation involves protecting an endangered species outside its natural habitat, such as in gene banks, seed banks, and cryopreservation facilities.
In situ conservation involves protecting species in their natural habitats, such as in protected areas and sacred groves.

Q.133 (4)
New NCERT Pg. No. 222
The "Evil Quartet" refers to the four major causes of biodiversity loss:
• Habitat loss and fragmentation
• Over-exploitation
• Alien species invasion
• Co-extinction
Co-evolution, the process where two or more species influence each other's evolution, is not a cause of biodiversity loss and is not part of the Evil Quartet.

Q.134 (4)
New NCERT Pg. No. 218
• Statement I: Globally among the animal groups, the most species-rich taxonomic group is of vertebrates.
This is incorrect. Among animal groups, insects are the most species-rich, not vertebrates.
• Statement II: Globally among plants, the diversity of mosses is more than angiosperms. This is also incorrect. Angiosperms (flowering plants) have greater species diversity than mosses.
Therefore, Statement I is incorrect, and Statement II is also incorrect.

Q.135 (1)
New NCERT Pg. No. 218
The number of fungi species in the world is more than the combined total of:
• Fishes
• Amphibians
• Reptiles
• Mammals
Fungi represent one of the largest groups of organisms, with a vast number of species.

Q.136 (4)
New NCERT Pg. No. 201, 202
Mutualism is a type of interaction where both species benefit. Examples of mutualism include:
• Lichens: A symbiotic relationship between a fungus and an alga or cyanobacterium.
• Mycorrhizae: A symbiotic association between fungi and plant roots.
• Fig and fig wasp: The fig tree provides a habitat and food for the wasp, while the wasp pollinates the fig tree.
The relationship between the cuckoo and crow is an example of brood parasitism, not mutualism. The cuckoo benefits by laying its eggs in the crow's nest, while the crow is harmed as it ends up raising the cuckoo chick at the expense of its own offspring.

Q.137 (4)
New NCERT Pg. No. 200
Ectoparasites live on the surface of their host and include:
• Cuscuta on hedge plant: Cuscuta (dodder) is a parasitic plant that wraps around and derives nutrients from its host plant.
• Lice on humans: Lice live on the skin and hair of humans and feed on blood.
• Ticks on dogs: Ticks attach to the skin of dogs and feed on their blood.
The relationship between the cuckoo and crow is an example of brood parasitism, where the cuckoo lays its eggs in the crow's nest, and the crow raises the cuckoo chick. It is not an example of ectoparasitism.

Q.138 (1)

New NCERT Pg. No. 198

• Statement I: Mimicry refers to the resemblance of one organism to another or to the natural objects among which it lives. This is correct. Mimicry is a survival strategy used by various organisms to avoid predators by resembling other organisms or natural objects.

• Statement II: Monarch butterfly is avoided by its predators due to the presence of a special chemical in its body which makes it highly distasteful. This is also correct. Monarch butterflies contain toxic compounds called cardenolides, which they acquire from their host plants (milkweeds). These compounds make them distasteful to predators.

Q.139 (1)

New NCERT Pg. No. 193

Immigration refers to the number of individuals of the same species that have come into the habitat from elsewhere during the time period under consideration. It is one of the factors that can influence population size and dynamics. Emigration is the movement of individuals out of a population. Natality refers to the birth rate, and mortality refers to the death rate.

Q.140 (3)

New NCERT Pg. No. 198, 199

• Competition typically reduces the fitness of both competing species, not increases it. It is a process where individuals or species compete for limited resources, which can negatively impact their growth, survival, and reproduction.

• The other statements are correct. Competition can occur between closely related species and unrelated species. Parasitism is a common mode of life in many taxonomic groups. Plant-animal interactions often involve coevolution to maintain mutually beneficial relationships.

Therefore, the incorrect statement is that competition increases the fitness of one species in the presence of another.

Q.141 (1)

New NCERT Pg. No. 209

• Statement I: Of the incident solar radiation, less than 50 percent of it is photosynthetically active radiation (PAR). This is correct. Only a portion of the total solar radiation falls within the wavelength range that plants can use for photosynthesis.

• Statement II: Plants capture only 2-10 percent of the PAR. This is also correct. Despite the availability of PAR, plants can only capture a small fraction of it for photosynthesis.

Therefore, both statements are correct.

Q.142 (2)

New NCERT Pg. No. 207

The rate of production of organic matter by producers during photosynthesis is known as gross primary productivity (GPP). GPP represents the total amount of energy captured and converted into chemical energy by plants.

Net primary productivity (NPP) is the remaining energy after accounting for the energy used in respiration by plants. Primary production is a general term for the synthesis of organic compounds from carbon dioxide through photosynthesis. Secondary productivity refers to the production of biomass by heterotrophic organisms (consumers).

Q.143 (2)

New NCERT Pg. No. 206

Stratification refers to the vertical distribution of different species occupying different levels in an ecosystem. For example, in a forest ecosystem, different species of plants and animals occupy different vertical layers, such as the canopy, understory, shrub layer, and forest floor.

Species composition refers to the types and numbers of species present in an ecosystem. Standing crop refers to the biomass or number of organisms in a unit area at a given time. Species diversity refers to the variety and abundance of different species in an ecosystem.

Q.144 (3)

New NCERT Pg. No. 207

The important steps in the process of decomposition include:

• Catabolism: The breakdown of complex organic molecules into simpler substances.

• Fragmentation: The physical breakdown of detritus into smaller particles.

• Humification: The formation of humus, a stable form of organic matter.

Stratification refers to the vertical distribution of different species in an ecosystem and is not a step in the decomposition process.

Q.145 (1)

New NCERT Pg. No. 209

Except for the deep sea hydro-thermal ecosystem, sun is the only source of energy for all ecosystems on Earth. Of the incident solar radiation less than 50 per cent of it is photosynthetically active radiation (PAR). We know that plants and photosynthetic bacteria (autotrophs), fix Sun's radiant energy to make food from simple inorganic materials.

Q.146 (1)

New NCERT Pg. No. 219

The Amazonian rainforests have the greatest biodiversity on Earth. These tropical rainforests are home to an immense variety of plant, animal, and microbial species. Temperate forests, the Western Ghats of India, and polar regions have lower biodiversity compared to the Amazonian rainforests.

Q.147 (4)

New NCERT Pg. No. 223

Eichhornia, also known as water hyacinth, is an exotic species in India. It was introduced from South America and has become invasive in many water bodies. *Parthenium*, *Lantana* are also exotic species in India. Nile Perch was not exotic in India.

Q.148 (2)

New NCERT Pg. No. 225

The correct match is:
• Sacred Groves (a) - Aravalli Hills (iii)
• Ex situ conservation (b) - Wildlife safari parks (ii)
• Earth Summit (c) - Rio de Janeiro, 1992 (i)
• Hotspots (d) - High degree of endemism (iv)
Therefore, the correct answer is (2).

Q.149 (4)

New NCERT Pg. No. 218

The major taxa of invertebrates in ascending order with respect to the number of species present globally are:
• Crustaceans (c)
• Molluscs (a)
• Insects (b)
Therefore, the correct order is (c) < (a) < (b).

Q.150 (2)

New NCERT Pg. No. 224, 225

• Statement I: The Amazon rain forest is estimated to produce 20% of the total oxygen in the Earth's atmosphere. This is correct. The Amazon rainforest is often referred to as the "lungs of the Earth" due to its significant contribution to oxygen production through photosynthesis.
• Statement II: Wildlife safari parks are an example of in situ conservation. This is incorrect. Wildlife safari parks are examples of ex situ conservation, where species are conserved outside their natural habitats in controlled environments.
Therefore, Statement I is correct, and Statement II is incorrect.

Q.151 (3)

New NCERT Pg. No. 197

Predators play several important roles in nature, including:
• Transfer of energy across trophic levels: Predators consume prey and transfer energy up the food chain.
• Maintain species diversity in a community: Predators help control prey populations, preventing any one species from becoming too dominant.
• Reduce the intensity of competition among prey species: By controlling prey populations, predators help reduce competition for resources among prey species.
Complete eradication of prey populations is not a typical role of predators; in a balanced ecosystem, predators help keep prey populations in check rather than completely eliminating them.

Q.152 (1)

New NCERT Pg. No. 199

• Assertion: MacArthur showed that five closely related species of warblers living on the same tree were able to avoid competition and coexist. This is true.
• Reason: The five closely related species of warblers considered by MacArthur in his experiment had differences in their foraging activities. This is also true. The reason explains how the warblers were able to coexist: by partitioning their foraging niches, they reduced direct competition for resources. Therefore, both the assertion and the reason are true, and the reason correctly explains the assertion.

Q.153 (4)

New NCERT Pg. No. 220

In the species-area relationship equation,
$\log S = \log C + Z \log A$
• S represents species richness.
• C is a constant.
• A represents the area.
• Z is the slope of the line when $\log S$ is plotted against $\log A$.
Therefore, Z represents the slope of the line in the species-area relationship equation.

Q.154 (3)

New NCERT Pg. No. 201

The interaction between epiphytes such as orchids growing on other plants like mango is an example of commensalism. In this relationship, the orchid benefits by having a place to live and access to sunlight, while the mango tree is not affected.

Q.155 (4)
New NCERT Pg. No. 192
• An age pyramid is a graphic representation of the proportion of various age groups of a population. This is correct.
• The shape of the pyramid reflects the growth status of the population. This is correct.
• In a bell-shaped age-pyramid, the population is said to be stable. This is correct.
• Urn-shaped age-pyramid shows positive growth. This is incorrect. An urn-shaped age pyramid indicates a declining population.
Therefore, only statement (iv) is incorrect.

Q.156 (1)
New NCERT Pg. No. 194
The equation $N_t = N_0 e^{rt}$ describes exponential population growth, where:
• N_t (i) represents the population density after time t (b).
• N_0 (ii) represents the initial population density at time zero (d).
• r (iii) represents the intrinsic rate of natural increase (c).
• e (iv) is the base of natural logarithms (a).

Q.157 (2)
New NCERT Pg. No. 198
Camouflage is an important mechanism where prey species are cryptically coloured to avoid being easily detected by predator.

Q.158 (2)
New NCERT Pg. No. 202
The figure likely depicts the mutualistic relationship between orchid flowers and bees.

Q.159 (3)
New NCERT Pg. No. 192
Population density can be measured in various ways, including the biomass (total mass of individuals), or percent cover (area occupied by the population). In the case of plants like Parthenium and banyan trees, density can be expressed in terms of biomass, or percent cover depending on the context of the study.

Q.160 (3)
New NCERT Pg. No. 199
The introduction of goats led to the competitive exclusion of the Abingdon tortoise.
The goats outcompeted the tortoises for food and other resources, leading to the tortoises' extinction within a decade. This is an example of the competitive exclusion principle, where one species is driven to extinction by another that competes more effectively for limited resources.

Q.161 (2)
New NCERT Pg. No. 192, 196
• Statement I: The tiger census in our national parks and tiger reserves is often based on pug marks and faecal pellets. This is correct. These indirect methods are commonly used for tracking and estimating tiger populations.
• Statement II: The logistic growth model is not considered as a more realistic model. This is incorrect. The logistic growth model is considered more realistic than the exponential growth model because it accounts for the carrying capacity of the environment and the limiting factors that affect population growth.
Therefore, Statement I is correct, and Statement II is incorrect.

Q.162 (1)
New NCERT Pg. No. 199
Gause's experiment demonstrated that when resources are limited, the superior (more competitive) species survives while the less competitive species is driven to extinction. This supports the competitive exclusion principle, which states that two species competing for the same limiting resources cannot coexist.

Q.163 (3)
New NCERT Pg. No. 207
Primary productivity refers to the rate at which producers (plants) capture and convert solar energy into chemical energy through photosynthesis. It includes:
• Gross primary productivity (GPP): The total rate of photosynthesis, including the energy used for respiration.
• Net primary productivity (NPP): The rate at which biomass is produced after accounting for respiration losses. NPP is the energy available to herbivores and other consumers, not directly to carnivores.
Therefore, primary productivity does not refer to the biomass available for consumption by carnivores.

Q.164 (1)
New NCERT Pg. No. 210
• Statement I: Each trophic level has a certain mass of living material at a particular time called the standing crop. This is correct. The standing crop represents the total biomass of organisms at each trophic level.
• Statement II: The standing crop is measured as the mass of living organisms (biomass) or the number in a unit area. This is also correct. Standing crop can be expressed in terms of biomass or the number of individuals per unit area.
Therefore, both statements are correct.

Q.165 (4)
New NCERT Pg. No. 211
According to the 10 percent law of energy transfer in ecosystems, only about 10 percent of the energy at one trophic level is passed on to the next trophic level. In the given food chain
(Grass $\rightarrow$ Grasshopper $\rightarrow$ Frog $\rightarrow$ Snake):
• If 100 J of energy is converted into biomass by producers (grass), the energy available to the primary consumers (grasshoppers) is 10 percent of 100 J, which is 10 J.
• The energy available to the secondary consumers (frogs) is 10 percent of 10 J, which is 1 J.
• Therefore, the energy available to the frog in the form of food is 1 J.

Q.166 (3)
New NCERT Pg. No. 208
• Assertion (A): Humus undergoes decomposition at an extremely slow rate.
This is true. Humus is a stable form of organic matter that decomposes slowly.
• Reason (R): There is no need for oxygen in the process of decomposition that forms humus as it is controlled mainly by the chemical composition of detritus. This is false. Decomposition, including the formation of humus, typically requires oxygen as it involves aerobic microbial activity. The chemical composition of detritus does influence decomposition, but oxygen is still necessary.
Since the assertion is true but the reason is false, the correct answer is (3).

Q.167 (4)
New NCERT Pg. No. 206
The key functional aspects of an ecosystem include:
• Nutrient cycling: The movement and exchange of nutrients through the biotic and abiotic components of the ecosystem.
• Productivity: The rate at which biomass is produced by producers and consumers.
• Energy flow: The transfer of energy through different trophic levels in the ecosystem.
Stratification, on the other hand, refers to the vertical layering of different species in an ecosystem and is not considered a key functional aspect.

Q.168 (3)
New NCERT Pg. No. 221
According to Paul Ehrlich's rivet popper hypothesis, species in an ecosystem are likened to rivets in an airplane. Some rivets are more critical to the structure and function of the ecosystem, similar to rivets on the wings of an airplane. Removing these key species (rivets on the wings) poses a serious threat to the stability and functioning of the ecosystem.

Q.169 (4)
New NCERT Pg. No. 211
When any organism dies it is converted to detritus or dead biomass that serves as an energy source for decomposers.
Organisms at each trophic level depend on those at the lower trophic level for their energy demands.
Each trophic level has a certain mass of living material at a particular time called as the standing crop.
The standing crop is measured as the mass of living organisms (biomass) or the number in a unit area.

Q.170 (4)
New NCERT Pg. No. 206
To understand the ethos of an aquatic ecosystem let us take a small pond as an example.
This is fairly a self-sustainable unit and rather simple example that explain even the complex interactions that exist in an aquatic ecosystem. A pond is a shallow water body in which all the above mentioned four basic components of an ecosystem are well exhibited. The abiotic component is the water with all the dissolved inorganic and organic substances and the rich soil deposit at the bottom of the pond. The consumers are represented by the zooplankton, the free swimming and bottom dwelling forms. The decomposers are the fungi, bacteria and flagellates especially abundant in the bottom of the pond. This system performs all the functions of any ecosystem and of the biosphere as a whole, i.e., conversion of inorganic into organic material with the help of the radiant energy of the sun by the autotrophs; consumption of the autotrophs by heterotrophs; decomposition and mineralisation of the dead matter to release them back for reuse by the autotrophs, these event are repeated over and over again. There is unidirectional movement of energy towards the higher trophic levels and its dissipation and loss as heat to the environment.

Q.171 (3)
New NCERT Pg. No. 213
• Assertion (A): Pyramid of energy is always upright in an ecosystem.
This is true. The pyramid of energy is always upright because energy flow is unidirectional and decreases at each trophic level.
• Reason (R): When energy flows from a particular trophic level to the next trophic level, some energy is always added as heat at each step. This is false. Energy transfer between trophic levels is not 100% efficient, and some energy is lost as heat.

Q.172 (2)

New NCERT Pg. No. 213

• The base of each ecological pyramid represents the producers or the first trophic level, while the apex represents tertiary or top-level consumers. This is correct.

• A given organism can occupy more than one trophic level. For example, a bird that eats insects (primary consumers) and seeds (producers) occupies both primary and secondary consumer levels. Therefore, this statement is incorrect.

• The trophic level represents a functional level, not a species as such. This is correct.

• Energy at a lower trophic level is always more than at a higher level. This is correct.

Therefore, the incorrect statement is that a given organism can occupy only one trophic level.

Q.173 (4)

New NCERT Pg. No. 210

Sparrows can occupy multiple trophic levels depending on their diet:

• As primary consumers, sparrows feed on seeds and grains (producers).

• As secondary consumers, sparrows can feed on insects (primary consumers).

Therefore, sparrows occupy both primary and secondary consumer trophic levels.

Q.174 (2)

New NCERT Pg. No. 223

The introduction of the Nile perch in Lake Victoria led to the extinction of many cichlid fish species.

This is an example of alien species invasion, where a non-native species disrupts the native ecosystem and outcompetes or preys on native species.

Q.175 (3)

New NCERT Pg. No. 221

The recent extinction of the Thylacine, occurred in Australia.

The last known Thylacine died in captivity in the 20th century.

Q.176 (2)

New NCERT Pg. No. 223

The narrowly utilitarian arguments for conserving biodiversity are obvious; humans derive countless direct economic benefits from naturefood (cereals, pulses, fruits), firewood, fibre, construction material, industrial products (tannins, lubricants, dyes, resins, perfumes) and products of medicinal importance.

Q.177 (3)

New NCERT Pg. No. 222

Biodiversity losses may lead to:

• Decrease in plant productivity due to reduced species diversity and ecosystem resilience

• Lower resistance to environmental perturbations, making ecosystems more vulnerable to changes

• Decrease in species diversity, particularly in areas like rainforests that are rich in species

Biodiversity losses do not lead to an increase in species diversity or an increase in variability of ecosystem processes like pest and disease cycles. Instead, they reduce the variability and resilience of these processes.

Q.178 (1)

New NCERT Pg. No. 218

Angiosperms, or flowering plants, have the maximum global biodiversity among different plant groups.

They represent the largest group of plants in terms of the number of species.

Mosses, algae, and lichens have fewer species compared to angiosperms.

Q.179 (4)

New NCERT Pg. No. 224

Ethical arguments for conserving biodiversity emphasize that every species has intrinsic value and is a part of our biological legacy to future generations. This perspective values biodiversity for its own sake, beyond direct economic or utilitarian benefits.

The other statements relate to direct economic benefits (narrowly utilitarian) and ecosystem services (broadly utilitarian).

Q.180 (2)

New NCERT Pg. No. 219

Species diversity typically increases as we move from:

• High altitude to low altitude: Lower altitudes have more favorable climatic conditions and greater habitat diversity.

• High latitude to low latitude: Tropical regions near the equator have higher species diversity compared to temperate and polar regions.

Therefore, the correct pattern is high altitude to low altitude and high latitude to low latitude.

Q.181 (2)

New NCERT Pg. No. 220

One of the reasons temperate regions have less biodiversity than the tropics is that less solar energy is available in temperate regions. This results in lower primary productivity and fewer resources to support diverse species.

Tropical regions have more solar energy, stable climates, and diverse habitats, contributing to higher biodiversity.

Q.182 (4)
New NCERT Pg. No. 223
• Statement I: Alien species invasion is the most important cause driving animals and plants to extinction.
This is incorrect. Habitat loss and fragmentation are generally considered the most important causes of extinction.
• Statement II: Many species extinctions in the last 500 years (Steller's Sea cow, Passenger pigeon) were due to habitat loss and fragmentation. This is incorrect. This was due to over exploitation.
• Therefore, Statement I is incorrect, and Statement II is also incorrect.

Q.183 (2)
New NCERT Pg. No. 218
In the pie chart representing global species diversity of vertebrates:
• A represents Birds.
• B represents Reptiles.
Therefore, the correct labels for the taxa in the pie chart are A-Birds and B-Reptiles.

Q.184 (3)
New NCERT Pg. No. 217
The medicinal plant Rauwolfia vomitoria, known for its genetic variation, grows in the Himalayan ranges.

This region provides the specific climatic and environmental conditions suitable for the growth of this plant.

Q.185 (2)
New NCERT Pg. No. 220
The concept of species-area relationship is best explained by statement (B):
• Within a region, species richness increases with increasing explored area, but only up to a limit. This relationship is typically represented as a rectangular hyperbola, where the rate of increase in species richness slows down as more area is explored.
Statements (A), (C), and (D) do not accurately describe the species-area relationship.

Q.186 (3)
New NCERT Pg. No. 197, 198, 199
Unrelated species can compete for the same resources if they have similar ecological niches or requirements.

This phenomenon is known as interspecific competition.
The other statements are correct. Mutualism benefits both species involved. Biological control methods use predators to manage prey populations. The life cycles of endoparasites are more complex due to their specialization.

Q.187 (4)
New NCERT Pg. No. 193
The birth rate is calculated as the number of births per individual per unit time. In this case:
Birth rate=Number of new individuals
Therefore, the birth rate is 0.4 offspring per rabbit per year.

Q.188 (2)
New NCERT Pg. No. 199
Resource partitioning allows competing species to coexist by dividing resources spatially or temporally. This reduces direct competition and enables multiple species to inhabit the same area without outcompeting each other.
Competitive release occurs when a dominant competitor is removed, allowing other species to flourish. Competitive exclusion refers to the principle that two species competing for the same resources cannot coexist. Antibiosis is an interaction where one organism is harmed while the other is unaffected.

Q.189 (4)
New NCERT Pg. No. 199
The interaction between the larger barnacle *Balanus* and the smaller barnacle *Chthamalus* on the rocky sea coasts of Scotland is an example of competition. *Balanus* outcompetes *Chthamalus* for space in the intertidal zone, excluding it from that habitat.

Q.190 (4)
New NCERT Pg. No. 193
The population density at time t+1 is calculated as:
$$N_{t+1} = N_t + [(B + I) - (D + E)]$$
where:
• Nt is the population density at time t.
• B is the number of births.
• I is the number of immigrants.
• D is the number of deaths.
• E is the number of emigrants.
This equation accounts for the changes in population size due to births, immigration, deaths, and emigration.

Q.191 (4)
New NCERT Pg. No. 206
In an aquatic ecosystem, the primary producers include:
• Phytoplankton: Microscopic photosynthetic organisms.
• Algae: Various types of photosynthetic organisms found in water.
• Floating plants: Aquatic plants that float on the surface of the water.
Hydra and corals are not primary producers. Hydra are simple animals, and corals are marine invertebrates that often have symbiotic relationships with photosynthetic algae (zooxanthellae) but are not producers themselves.

Q.192 (3)
New NCERT Pg. No. 210
• Primary producer - Tree: Correct. Trees are primary producers that carry out photosynthesis.
• Herbivore - Cow: Correct. Cows are herbivores that feed on plants.
• Secondary consumer - Grasshopper: Incorrect. Grasshoppers are primary consumers (herbivores) that feed on plants.
• Saprotroph - Fungi: Correct. Fungi are saprotrophs that decompose dead organic matter.
Therefore, the incorrect match is "Secondary consumer - Grasshopper."

Q.193 (3)
New NCERT Pg. No. 209
While the sun is the primary source of energy for most ecosystems on Earth, there are exceptions.
For example, deep-sea hydrothermal vent ecosystems rely on chemosynthetic bacteria that derive energy from chemical reactions involving inorganic compounds rather than sunlight.
The other statements are correct. Ecosystems follow the second law of thermodynamics, which states that energy transformations are not 100% efficient. Herbaceous and woody plants are major producers in terrestrial ecosystems. Green plants are called producers because they produce organic matter through photosynthesis.

Q.194 (4)
New NCERT Pg. No. 206
• Statement I: The solar input and climatic conditions do not influence the functioning of a pond ecosystem.
This is incorrect. Solar input and climatic conditions significantly influence the functioning of pond ecosystems by affecting temperature, light availability, and nutrient cycling.

• Statement II: Zooplankton are considered autotrophic components of a pond ecosystem. This is incorrect. Zooplankton are heterotrophic organisms that feed on phytoplankton and other small particles in the water. Therefore, both statements are incorrect.

Q.195 (1)
New NCERT Pg. No. 206
The decomposers are the fungi, bacteria and flagellates especially abundant in the bottom of the pond.
The abiotic component is the water with all the dissolved inorganic and organic substances and the rich soil deposit at the bottom of the pond.
The solar input, the cycle of temperature, day-length and other climatic conditions regulate the rate of function of the entire pond. The autotrophic components include the phytoplankton, some algae and the floating, submerged and marginal plants found at the edges.

Q.196 (4)
New NCERT Pg. No. 225
The historic convention on Biological Diversity, known as the Earth Summit, was held in Rio de Janeiro, Brazil, in 1992. This summit led to significant international agreements on biodiversity conservation.

Q.197 (4)
New NCERT Pg. No. 225
As of the data provided, India has:
• 90 national parks
• 14 biosphere reserves
• 448 wildlife sanctuaries
Therefore, the correct numbers are 90 national parks, 14 biosphere reserves, and 448 wildlife sanctuaries.

Q.198 (4)
New NCERT Pg. No. 217
• IUCN stands for International Union for Conservation of Nature.
• According to IUCN (2004), the total number of plant and animal species described so far is more than 1.5 million.
• More than 70 percent of all the species recorded are animals, while plants comprise less than 22 percent of the total.
Robert May's estimate of global species diversity is about 7 million, considering both described and undescribed species.
Therefore, the correct statement is (4).

Q.199 (1)
New NCERT Pg. No. 219
• Assertion (A): India is one of the 12 megadiversity countries of the world.
This is true. India is recognized as one of the countries with the highest biodiversity.
• Reason (R): Although India has only 2.4 percent of the world's land area, its share of the global species diversity is an impressive 8.1 percent. This is also true. The reason explains why India is considered a megadiversity country, as it supports a significant proportion of the world's species diversity despite its relatively small land area.
Therefore, the correct answer is (1).

Q.200 (1)
New NCERT Pg. No. 220
The relationship between species richness and area for a wide variety of taxa is described by the equation:
$\log S = \log C + Z \log A$
where:
• S is the species richness.
• C is a constant.
• A is the area.
• Z is the slope of the line.
This equation represents a straight line on a logarithmic scale, indicating the species-area relationship.