04/04/2025

Phase-II
CODE-D

Aakash
Medical | IIT-JEE | Foundations

Corporate Office: AESL, 3rd Floor, Incuspaze Campus-2, Plot no. 13, Sector-18, Udyog Vihar, Gurugram, Haryana-122015

FINAL TEST SERIES for NEET-2025

MM : 720 **Test – 3** **Time : 180 Mins.**

Answers

1. (3)	37. (4)	73. (3)	109. (1)	145. (1)
2. (1)	38. (3)	74. (3)	110. (3)	146. (3)
3. (4)	39. (3)	75. (1)	111. (3)	147. (3)
4. (3)	40. (2)	76. (2)	112. (4)	148. (1)
5. (4)	41. (2)	77. (2)	113. (1)	149. (3)
6. (4)	42. (3)	78. (1)	114. (4)	150. (2)
7. (1)	43. (2)	79. (3)	115. (1)	151. (2)
8. (1)	44. (4)	80. (3)	116. (2)	152. (2)
9. (4)	45. (2)	81. (3)	117. (2)	153. (3)
10. (2)	46. (3)	82. (2)	118. (4)	154. (2)
11. (1)	47. (3)	83. (3)	119. (2)	155. (1)
12. (4)	48. (2)	84. (3)	120. (1)	156. (4)
13. (3)	49. (1)	85. (1)	121. (2)	157. (2)
14. (1)	50. (4)	86. (3)	122. (1)	158. (2)
15. (1)	51. (4)	87. (1)	123. (3)	159. (4)
16. (3)	52. (3)	88. (2)	124. (2)	160. (2)
17. (3)	53. (2)	89. (4)	125. (3)	161. (1)
18. (1)	54. (2)	90. (3)	126. (4)	162. (2)
19. (4)	55. (3)	91. (4)	127. (1)	163. (3)
20. (1)	56. (1)	92. (2)	128. (4)	164. (1)
21. (1)	57. (1)	93. (4)	129. (3)	165. (2)
22. (3)	58. (1)	94. (3)	130. (1)	166. (1)
23. (3)	59. (4)	95. (1)	131. (4)	167. (4)
24. (2)	60. (4)	96. (1)	132. (3)	168. (3)
25. (3)	61. (4)	97. (3)	133. (4)	169. (3)
26. (2)	62. (3)	98. (4)	134. (2)	170. (4)
27. (3)	63. (4)	99. (3)	135. (1)	171. (4)
28. (1)	64. (1)	100. (2)	136. (4)	172. (4)
29. (3)	65. (1)	101. (2)	137. (4)	173. (2)
30. (3)	66. (4)	102. (3)	138. (3)	174. (4)
31. (2)	67. (1)	103. (3)	139. (3)	175. (2)
32. (3)	68. (3)	104. (1)	140. (2)	176. (3)
33. (4)	69. (1)	105. (4)	141. (4)	177. (3)
34. (1)	70. (2)	106. (3)	142. (1)	178. (1)
35. (2)	71. (4)	107. (3)	143. (3)	179. (3)
36. (3)	72. (3)	108. (3)	144. (3)	180. (4)

Hints and Solutions

PHYSICS

(1) **Answer :** (3)
Solution:
The trailing zeroes in a number having a decimal point are significant.

(2) **Answer :** (1)
Solution:
Two different physical quantities can't be added or subtracted.

(3) **Answer :** (4)
Solution:
Torque and angular momentum have dimensional formulae $[ML^2T^{-2}]$ and $[ML^2T^{-1}]$ respectively meaning they both involve mass raised to power of 1 and length raised to power of 2.

(4) **Answer :** (3)
Solution:
If distance is zero then object is not moving and its displacement is zero.
Distance is a scalar quantity.

(5) **Answer :** (4)
Solution:
In 4 minutes 10 seconds, boy will complete 5 revolutions. Therefore displacement will be zero.

(6) **Answer :** (4)
Solution:
$s = \frac{1}{2}\left(\frac{\alpha\beta}{\alpha+\beta}\right)\cdot T^2$
$= \frac{1}{2}\left(\frac{5.10}{5+10}\right)\cdot 30^2$
= 1500 m

(7) **Answer :** (1)
Solution:
$v = 10 + 2t^2$
$\therefore \quad a = 4t$

(8) **Answer :** (1)
Solution:
At t = 1 s, both balls are in air.
a_{rel} = zero
$v_{rel} = u_{rel} + a_{rel}t$ = 20 m/s
or
$v_1 = u - gt$
$= -gt$
v_1 = –10 m/s
$v_2 = u - gt$
$v_2 = 20 - 10(1) = 10$
$v_{rel} = v_{12} = v_1 - v_2$
$= |-10 - 10|$ = 20 m/s

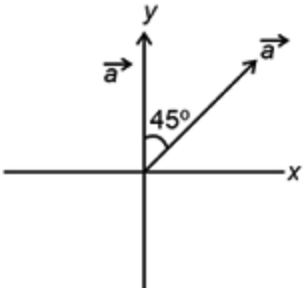
(9) **Answer :** (4)
Solution:
$\vec{F}_{av} = \frac{\Delta\vec{p}}{\Delta t}$
= 8 N

(10) **Answer :** (2)
Solution:
$f_k > f_r$ as $\mu_k >> \mu_r$

(11) Answer : (1)
Solution:
True value = Mean value $= \frac{10+11+10+10+9}{5}$ =10 cm

(12) Answer : (4)
Solution:
$T = \frac{2u\sin\theta}{g},\ R = \frac{u^2 \sin 2\theta}{g}$ and $H = \frac{u^2 \sin^2 \theta}{2g}$
$\Rightarrow T \propto u_y,\ H \propto {u_y}^2$

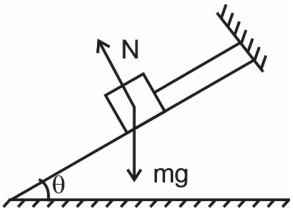
(13) Answer : (3)
Solution:



$\vec{a} = \hat{i}\cos 45^\circ + \hat{j}\cos 45^\circ$
= $\frac{\hat{i}}{\sqrt{2}} + \frac{\hat{j}}{\sqrt{2}}$

(14) Answer : (1)
Hint:
Use $v = \sqrt{v_x^2 + v_y^2}$ and $a = \sqrt{a_x^2 + a_y^2}$
Solution:
$x = 2t^2$, $y = 3t$
$v_X = 4t$, $v_Y = 3$
$a_X = 4$, $a_Y = 0$
At t = 1 s, v_X = 4 m/s and v_Y = 3 m/s
$\therefore \quad v = \sqrt{4^2 + 3^2} = 5$ m/s
a = 4 m/s^2

(15) Answer : (1)
Solution:



N = Mg cosθ
= $100 \times \frac{1}{2} = 50$ N

(16) Answer : (3)
Solution:
Sol.: Static friction is a self-adjusting force, it can be greater than, less than or equal to kinetic friction.
Limiting friction = $(F_S)_{max} = \mu_S N$
Kinetic friction = $\mu_k N$

(17) Answer : (3)
Solution:

$v_{avg.} = \frac{\text{Total distance}}{\text{Total time}}$

$v_{avg.} = \frac{(20+40)\text{m}}{\left(\frac{20}{5}+\frac{40}{10}\right)\text{s}}$

$= \frac{60}{(4+4)}\text{m s}^{-1}$

$= \frac{60}{8}\text{m s}^{-1}$

$= \frac{15}{2}\text{m s}^{-1}$

$= 7.5\text{ m s}^{-1}$

(18) Answer : (1)
Solution:

$v^2 = 25 - 8x$

$\frac{2Vdv}{dx} = -8 \quad \Rightarrow \frac{Vdv}{dx} = 4\text{ m/s}^2$

$a = -4\text{ m/s}^2$

(19) Answer : (4)
Solution:

$[T] = \left[\frac{F}{L}\right] = \left[\frac{E}{L^2}\right] = \bullet\frac{E}{(VT)^2}\bullet$

$\therefore \ [\text{T}] = [\text{EV}^{-2}\text{T}^{-2}]$

(20) Answer : (1)
Solution:

$h = \frac{u^2\sin^2\theta}{2g} = \frac{u_y^2}{2g} = \frac{4\times4}{2\times10} = 0.8\text{ m}$

(21) Answer : (1)
Solution:

$T = \frac{2u\sin\theta}{g} = 4\text{ s}$

$R = \frac{\text{u}^2\sin 2\theta}{\text{g}} = 60\text{ m}$

Time when it reaches wall (t) = $\frac{T}{4} = \frac{4}{4} = 1\text{ s}$

Horizontal position of wall

$x = u\cos\theta\times t$

$= 15\ m$

Vertical displacement after 1 s

$y = u\sin\theta - \frac{1}{2}gt^2$

=15 m

(22) Answer : (3)
Hint:

$R = u \times T$

Solution:

$T = \sqrt{\frac{2h}{g}}$

$T = \sqrt{\frac{2\times490}{9.8}}$

= 10 s

$u = 180 \times \frac{5}{18}$

= 50 m/s

$R = 50 \times 10$

= 500 m

(23) Answer : (3)
Solution:

$\Rightarrow$K.E. = ML^2T^{-2}

$\frac{\Delta K}{K} = \frac{\Delta M}{M}\times100 + 2\frac{\Delta L}{L}\times100 + 2\frac{\Delta T}{T}\times100$

= %M = 2%, %L = 1%, %T = 1%

= 2% + 2(1%) + 2(1%)

= 6%

(24) Answer : (2)

Solution:
$X = AB$

$\frac{\Delta X}{X} = \frac{\Delta A}{A} + \frac{\Delta B}{B}$

$\Delta X = \left[\frac{0.2}{2} + \frac{0.1}{1}\right] 2 = 0.4$

$X = (2 \pm 0.4)\text{m}$

(25) Answer : (3)
Solution:
20 VSD = 19 MSD
L.C. = MSD – VSD
= MSD – $\frac{19}{20}$ MSD
= MSD $\left[\frac{1}{20}\right]$
= $\left[\frac{2}{20}\right]$ = 0.1 mm

(26) Answer : (2)
Solution:

Time taken to cross river = $\frac{100\text{ m}}{5\text{ m/s}}$ = 20 s

Drift = V_R × time = 3 × 20 = 60 m

(27) Answer : (3)
Solution:
$a_c = \omega^2 r = \omega(\omega r) = \omega.v.$
= $\frac{2\pi}{10}$ (20) = 4π m/s^2

(28) Answer : (1)
Solution:
$\vec{F} = 3\hat{i} + 4\hat{j} - 5\hat{k}$

$F = \sqrt{3^2 + 4^2 + (-5)^2} = 5\sqrt{2}\ N$

$F = Ma$
$5\sqrt{2} = M\sqrt{2}$
M = 5 kg

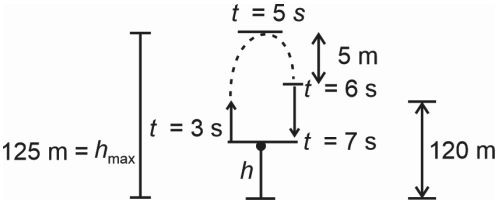
(29) Answer : (3)
Solution:
$V_{\text{optimum}} = \sqrt{rg\tan\theta}$
$= \sqrt{120 \times 10 \times \frac{3}{4}}$ = 30 m/s

(30) Answer : (3)
Solution:
$A = \frac{U}{t}$

$B = \frac{U}{t^2}$

$AB = U^2 t$
= $(ML^2T^{-2})^2T$
$AB = M^2L^4T^{-3}$

(31) Answer : (2)
Solution:



At t = 5 s, ball is at max height.

$t = \frac{u}{g}$

5 × 10 = u = 50 m/s

$h_{max} = \frac{u^2}{2g} = 125$ m

During downward journey

Distance travelled in 6th second = 5 m.

∴ Height at t = 6 s is (125 – 5) m

= 120 m

(32) Answer : (3)

Solution:

$x = 3t, \quad y = 2t + 2$

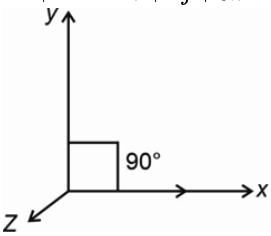
Put $t = \frac{x}{3} \quad y = 2\left(\frac{x}{3}\right) + 2$

$y = \frac{2}{3}x + 2$

(33) Answer : (4)

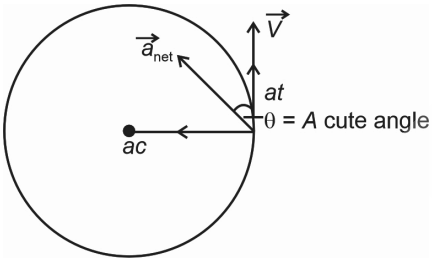
Solution:

$\vec{A} + \vec{B} = 4\hat{i} + 2\hat{j} + 5\hat{k} = 4\hat{i}$



(34) Answer : (1)

Solution:



Angle between $\vec{V}$ and $\vec{a}_{net}$ is acute. So may be 30°.

(35) Answer : (2)

Solution:

$\vec{A} + \vec{B} = \hat{i} + \hat{j} + \hat{k} + 2\hat{i} - \hat{k} = 3\hat{i} + \hat{j}$

$2\vec{A} - \vec{B} = 2\hat{i} + 2\hat{j} + 2\hat{k} - 2\hat{i} + \hat{k} = 2\hat{j} + 3\hat{k}$

$\vec{A} + 2\vec{B} = \hat{i} + \hat{j} + \hat{k} + 4\hat{i} - 2\hat{k} = 5\hat{i} + \hat{j} - \hat{k}$

(36) Answer : (3)

Solution:

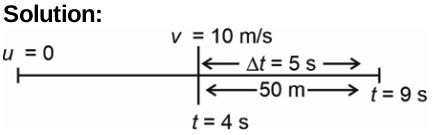
N = 40 N normal force

F = 30 N Frictional force

$F_{Total} = \sqrt{F^2 + N^2} = 50$ N

(37) Answer : (4)

Solution:



After force stops, body covers 50 m with uniform velocity in 5 s.

$v = \frac{50}{5}$ = 10 m/s

$v = u + at$
$10 = 0 + a\,(4)$
$a = 2.5\ \text{m/s}^2$
$F = \text{ma} = 12.5\ \text{N}$

(38) Answer : (3)
Solution:
μ is dimensionless
$\therefore B = \lambda^2$
$B = L^2 = (\text{Area})$

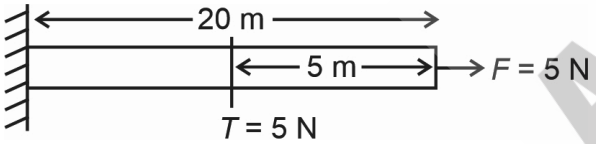
(39) Answer : (3)
Solution:
Time taken $t = \sqrt{\frac{2h}{g}}$
$\frac{t_a}{t_b} = \sqrt{\frac{h_a}{h_b}} = \sqrt{\frac{2}{1}} = \frac{\sqrt{2}}{1}$

(40) Answer : (2)
Solution:
As speed of raindrop is constant, its acceleration is zero
$\therefore$ Net force is zero
$\Rightarrow F\text{-ing} = \text{ma}$
$F = 3 \times 10^5\ \text{N}$
The internal action and reaction forces between different parts of a body do, sum to zero.

(41) Answer : (2)
Solution:
A unit vector associated with vector $\vec{A}$ has magnitude one unit and is along $\vec{A}$.

(42) Answer : (3)
Solution:
Decimal resolution is high in 0.001 m. So it is most precise.

(43) Answer : (2)
Solution:



Tension is equal to applied force (within elastic limit) and same throughout in case of massless string.

(44) Answer : (4)
Solution:
$\mu = \tan\theta$
$\mu' = 2\mu$
$\tan\theta' = 2\tan\theta$
$= 2\tan 30^\circ$
$\tan\theta' = \frac{2}{\sqrt{3}}$
$\theta' = \tan^{-1}\left(\frac{2}{\sqrt{3}}\right)$

(45) Answer : (2)
Solution:
$F = ma$
$\frac{v-u}{t} = a$
$\frac{0-8}{\frac{1}{5}} = a$
$a = -40\ \text{m/s}^2$
$F = ma = 4000\ \text{N}$

CHEMISTRY

(46) **Answer :** (3)

Hint:

Ozone is thermodynamically unstable with respect to oxygen since its decomposition into oxygen results in the liberation of heat (ΔH is negative).

Solution:

• Due to the ease with which it liberates atoms of nascent oxygen ($O_3 \rightarrow O_2 + O$), it acts as a powerful oxidising agent.

• Ozone is used as a germicide, disinfectant and for sterilising water.

(47) **Answer :** (3)

Hint:

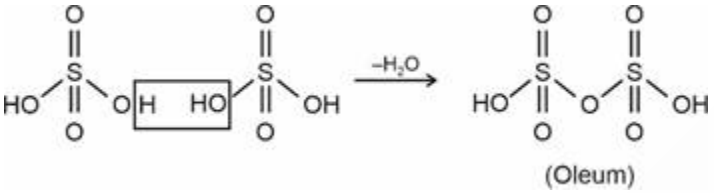
Phosphinic acid (H_3PO_2) is a reducing agent.

Solution:

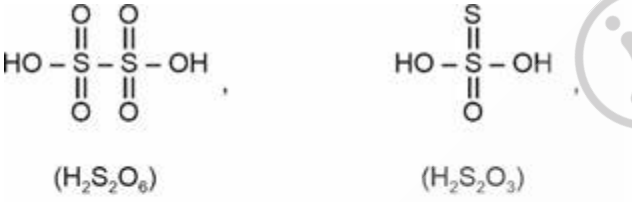
$4AgNO_3 + 2H_2O + H_3PO_2 \rightarrow 4Ag + 4HNO_3 + H_3PO_4$

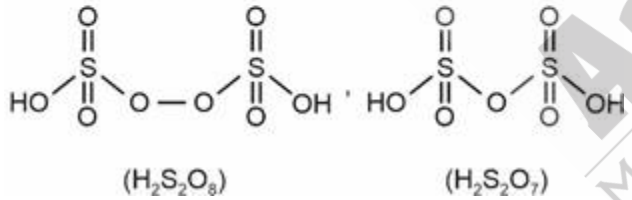
(48) **Answer :** (2)

Hint:



Solution:





(49) **Answer :** (1)

Solution:

White phosphorus is soluble in CS_2 but red phosphorus is not.

White phosphorus shows chemiluminescence but red phosphorus does not.

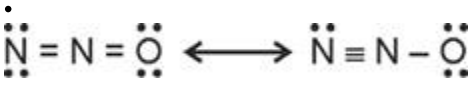
(50) **Answer :** (4)

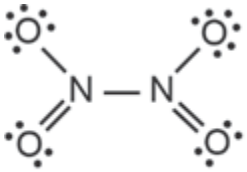
Hint:

N–N bond is present in N_2O_4

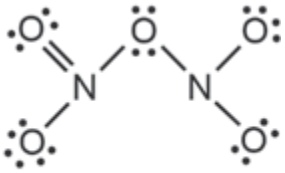
Solution:

• N_2O is a colourless, neutral gas





N_2O_4



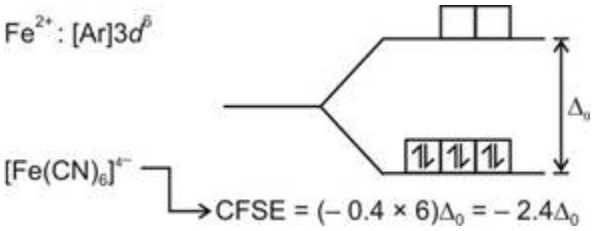
N_2O_5

(51) Answer : (4)

Hint:

Order of field strength of ligand : $Cl^- < H_2O < NH_3 < CN^-$

Solution:



(52) Answer : (3)

Solution:

Vitamin B_{12}, cyanocobalamine is a coordination compound of cobalt.

(53) Answer : (2)

Solution:

Higher is the effective nuclear charge greater is hydration enthalpy.

(54) Answer : (2)

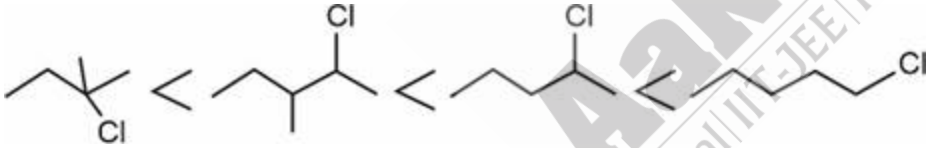
Hint:

More the steric hindrance around the carbon atom attached with halogen, lesser would be the S_N2 reaction rate.

Solution:

Maximum crowding is in 2-chloro-2-methylbutane.

Order of rate of S_N2 reaction will be



(55) Answer : (3)

Hint:

F^- and Cl^- are weak field ligands.

Solution:

Oxalate ion and CN^- are strong field ligands.

Complex	Number of unpaired electron(s)
$[CoF_6]^{3-}$	4
$[Co(C_2O_4)_3]^{3-}$	0
$[Fe(CN)_6]^{3-}$	1
$[MnCl_6]^{3-}$	4

$[Fe(CN)_3]^{3-}$ has one unpaired electron.

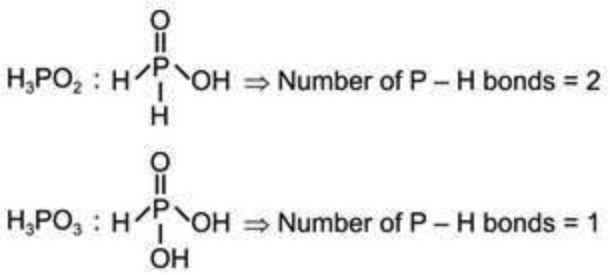
(56) Answer : (1)

Hint:

Phosphinic acid : H_3PO_2

Phosphonic acid : H_3PO_3

Solution:



(57) Answer : (1)
Solution:
The complex is $[Cr(NH_3)_4Cl_2]Cl$. Hence two chlorides are coordinated.

(58) Answer : (1)
Solution:

$$CH_3Br + AgNO_3 \rightarrow \underset{\text{Nitro methane}}{CH_3 - NO_2}$$

$$CH_3Br + KNO_2 \rightarrow \underset{\text{Methyl nitrite}}{CH_3ONO}$$

(59) Answer : (4)
Solution:
(a) Sodium azide or Barium azide : Pure nitrogen
(b) Haber process : Ammonia
(c) Contact process : Sulphuric acid
(d) Deacon's process : Chlorine

(60) Answer : (4)
Hint:
Answer (4)
Solution:
Ac, Cf and No only show +3 Oxidation state Th shows only +4 and Np shows +3,+4,+5,+6 and +7 Oxidation states

(61) Answer : (4)
Hint:
Due to partial double bond character of 'C – Cl' bond in haloarenes, it shows slowest rate towards nucleophilic substitution reaction.

(62) Answer : (3)
Solution:

- H_2O molecule with Co^{3+} ion act as strong field ligand. So $[Co(H_2O)_6]^{3+}$ is diamagnetic but F^- is a weak field ligand so $[CoF_6]^{3-}$ is paramagnetic with 4 unpaired electrons.
- $[Co(H_2O)_6]^{3+}$ is spin paired complex and $[CoF_6]^{3-}$ is spin free complex.

(63) Answer : (4)
Hint:
More is the electron density on metal, more will be the back donation from metal to π* orbital of CO
Solution:
More is the back donation from metal to the π* orbital of CO, stronger is M–C bond and weaker is C–O bond strength.
Correct order of C–O bond strength:
$[Mn(CO)_6]^+ > [Cr(CO)_6] > [V(CO)_6]^-$

(64) Answer : (1)
Hint:
Primary valency is equal to the oxidation number of the metal in complex.
Solution:
In $[Ni(CO)_4]$ oxidation number of Ni is zero.

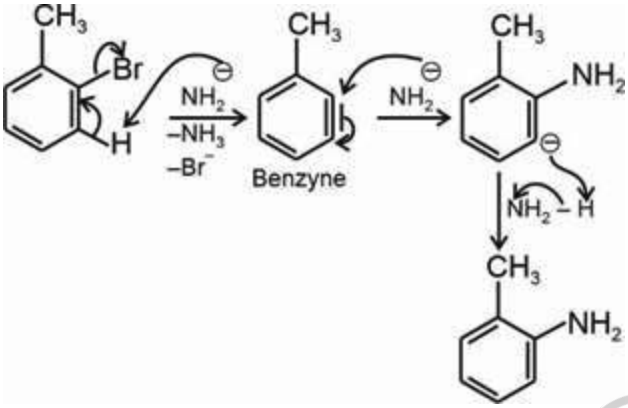
(65) Answer : (1)
Hint:
Element of atomic numbers 58 to 71 are lanthanoids for which general outer electronic configuration is $4f^{1-14}\ 5d^{0-1}\ 6s^2$.
Solution:

Nd(60): $[Xe]4f^4 6s^2$

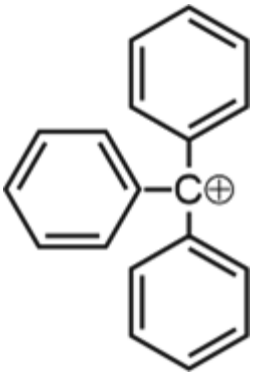
(66) **Answer :** (4)
Solution:
Para-isomers has higher melting point than the other isomers due to more symmetrical structure that fits in crystal lattice more efficiently than o– and m-isomers.

(67) **Answer :** (1)
Solution:
Linkage isomerism arises in coordination compound containing ambidentate ligand.

(68) **Answer :** (3)
Hint:
Benzyne intermediate is aromatic in nature.
Solution:



(69) **Answer :** (1)
Solution:



is stable by resonance. So $(C_6H_5)_3CCl$ is rapidly hydrolysed by S_N1 mechanism

(70) **Answer :** (2)
Solution:
For racemisation molecules should have chiral centre

(71) **Answer :** (4)
Solution:

$$2Pb(NO_3)_2 \xrightarrow{673K} 4NO_2 + 2PbO + O_2$$

(72) **Answer :** (3)
Hint:
IUPAC name of $[Co(NH_3)_6]Cl_3$ is hexaamminecobalt(III) chloride.

(73) **Answer :** (3)
Solution:

Element		$\Delta_{eg}H(kJmol^{-1})$
O	$\rightarrow$	–141

S	→	–200
Se	→	–195
Te	→	–190

(74) **Answer :** (3)
Solution:
Because of association by intermolecular hydrogen bond, boiling point of H_2O is higher than H_2S.

(75) **Answer :** (1)
Solution:
$$3\,Cl_2 + \underset{\left(\text{hot and conc.}\right)}{6\,NaOH} \rightarrow 5NaCl + NaClO_3 + 3H_2O$$

(76) **Answer :** (2)
Solution:
CCl_3NO_2 is called tear gas while and $ClCH_2CH_2SCH_2CH_2Cl$ is called mustard gas.

(77) **Answer :** (2)
Solution:
Helium is a non-inflammable and light gas.

(78) **Answer :** (1)
Solution:

Element		Density (g cm^{-3})
V	→	6.27
Cr	→	7.19
Fe	→	7.8
Ni	→	8.9

(79) **Answer :** (3)
Solution:

Metal		Most common oxidation states
Ni	→	+2
V	→	+5

(80) **Answer :** (3)
Solution:
CO has vacant low energy π* orbital, hence it accepts electron from metal and is called as π-acceptor ligand.

(81) **Answer :** (3)
Solution:
Correct order of oxidising power : $MnO_4^- > Cr_2O_7^{2-} > VO_2^+$

(82) **Answer :** (2)
Solution:
$$8\,MnO_4^- + 3S_2O_3^{2-} + H_2O \rightarrow 8\,MnO_2 + 6\,SO_4^{2-} + 2\,OH^-$$

(83) **Answer :** (3)
Solution:
La^{3+} (Z = 57) : $[Xe]4f^0$
Lu^{3+} (Z = 71) : $[Xe]4f^{14}$

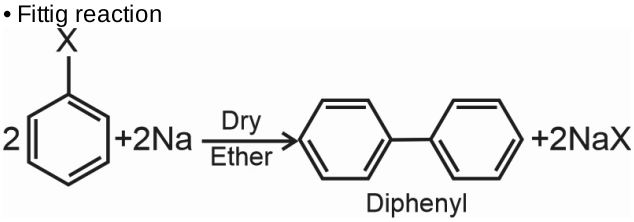
(84) **Answer :** (3)
Hint:
Aqua regia on reaction with Pt gives $[PtCl_6]^{2-}$ species
Solution:

$3Pt + 16H^+ + 4NO_3^- + 18Cl^- \rightarrow \quad 3PtCl_6^{2-} + 4NO + 8H_2O$

(85) **Answer :** (1)
Solution:
$C_2O_4^{2-}$ is chelate ligand while CN^- is ambidentate ligand.

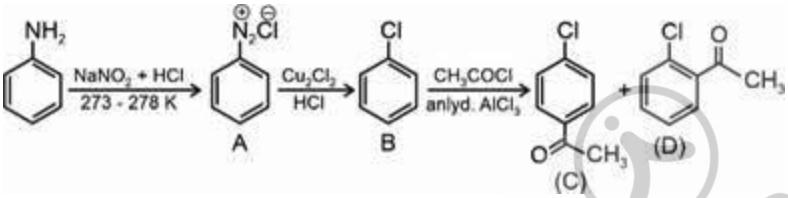
(86) **Answer :** (3)
Solution:
trans-$[CrCl_2(ox)_2]^{3-}$ contains plane of symmetry hence it is optically inactive species.

(87) **Answer :** (1)
Solution:
• Fittig reaction

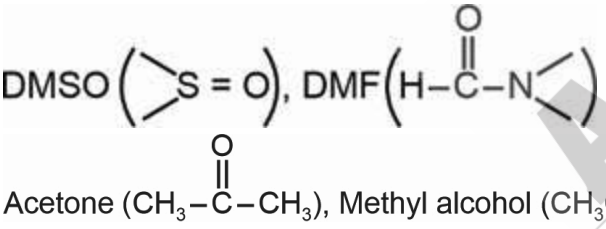


• Wurtz reaction
$2RX + 2Na \rightarrow R-R+2NaX$

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



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



(90) **Answer :** (3)
Solution:

Compound		Density (g mL^{-1})
CH_2Cl_2	$\rightarrow$	1.336
$CHCl_3$	$\rightarrow$	1.489
CCl_4	$\rightarrow$	1.595

BOTANY

(91) **Answer :** (4)
Solution:
Lactobacillus is used to produce lactic acid.

(92) **Answer :** (2)
Solution:

During growth, LAB produce acids that coagulate and partially digest the milk proteins, thus, converting milk into curd. They also improve its nutritional quality by increasing vitamin B_{12}. In our stomach, LAB play very beneficial role in checking disease causing microbes.

(93) **Answer :** (4)
Solution:
Baculoviruses are pathogens that attack insects and other arthropods. They have narrow spectrum insecticidal applications.

(94) **Answer :** (3)
Solution:
Whisky and brandy have concentration of alcohol more than 13%.
The fermenting yeast cannot survive when the alcohol concentration in the medium reaches about 13%. To increase the alcohol concentration more than 13%, the fermented broth is distilled.

(95) **Answer :** (1)
Solution:
Full potential of penicillin as an effective antibiotic was established by Ernest Chain and Howard Florey.

(96) **Answer :** (1)
Solution:
The ministry of Environment and Forest initiated Ganga Action Plan and Yamuna Action Plan.

(97) **Answer :** (3)
Hint:
Biogas is produced by the action of anaerobic methanogenic bacteria.
Solution:
The methanogenic bacteria digest the aerobic bacteria and fungi present in sludge obtained from aeration tanks. During this digestion, mixture of gases that form biogas are produced. This process occurs in the anaerobic sludge digester.

(98) **Answer :** (4)
Solution:
Φ × 174 bacteriophage has circular ssDNA.

(99) **Answer :** (3)
Solution:
There are about 1.4 million locations where SNPs are present and an average gene consists of 3000 bases.

(100) **Answer :** (2)
Solution:
In the given experiment, it was observed that 50% of heavy DNA is obtained in 1st generation and 25 % of light DNA is obtained in second generation. Heavy DNA was not found in second generation. Proportion of hybrid DNA in second generation is much higher than first generation.

(101) **Answer :** (2)
Solution:
An organism with AaBbccDd has 3 heterozygous loci, i.e., n = 3. Therefore, total number of different genotypes = $2^n = 2^3 = 8$

(102) **Answer :** (3)
Solution:
Loss or gain of a segment of DNA results in alteration in chromosomes. This results in chromosomal aberration.

(103) **Answer :** (3)
Hint:
More parental type offsprings show less recombination frequency.
Solution:
In the second experiment, the recombinant types are more as compared to the first experiment. It means, cross over value (recombination frequency) for eye colour and wing type is more than that of body colour and eye colour.

(104) **Answer :** (1)
Solution:
Chronic myelogenous leukemia is one of the examples of cancer, caused by chromosomal aberrations.

(105) **Answer :** (4)
Solution:
Change in a subset of chromosome number is called aneuploidy. Down's syndrome is an example of aneuploidy (2 n + 1).

(106) **Answer :** (3)
Solution:
Affected individuals are represented by shaded symbols in pedigree analysis.

(107) Answer : (3)

Hint:

Deoxyribonucleoside triphosphates are high energy phosphates same as ATP. Four types of deoxyribonucleotides, dAMP, dGMP dTMP and dCMP are activated by them.

Solution:

The process of copying genetic information from one strand of the DNA into RNA is known as transcription. It is catalysed by DNA-dependent RNA polymerase enzyme. Deoxyribonucleoside triphosphates act as substrate for polymerisation of DNA and also provide energy. RNA polymerase without sigma factor is core enzyme.

(108) Answer : (3)

Solution:

Heterochromatin is transcriptionally inactive.

(109) Answer : (1)

Solution:

Since DNA from every tissue, from an individual show the same degree of polymorphism, they become very useful identification tool in forensic applications.

(110) Answer : (3)

Solution:

SNPs (single nucleotide polymorphisms) are the locations where single base DNA differences occur.

(111) Answer : (3)

Solution:

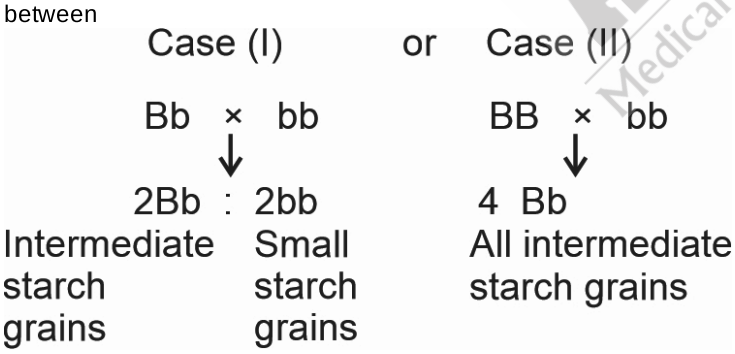
Homozygous tall pea plant × Homozygous dwarf pea plant	-	3 : 1
Heterozygous round and heterozygous yellow seed pea plant self pollination	-	9 : 3 : 3 : 1
Self pollination of pink flowers in *Antirrhinum*	-	1 : 2 : 1
Heterozygous violet flower of pea plant × white flower of pea plant	-	1 : 1

(112) Answer : (4)

Solution:

Starch synthesis in pea seeds is controlled by one gene. As the seed shape is round, the gene that controls starch grain synthesis can be heterozygous or homozygous i.e. Bb or BB.

While the plant with wrinkled seeds will have homozygous recessive starch synthesising gene bb so, if we make a cross between



(113) Answer : (1)

Solution:

Sickle-cell anaemia is caused by the substitution of glutamic acid by valine at the sixth position of the beta globin chain of the Hb molecule. In normal beta globin, the 6^{th} and the 7^{th} amino acid is glutamic acid.

(114) Answer : (4)

Solution:

Genetic disorders can be grouped into two categories, Mendelian disorder and chromosomal disorders. Mendelian disorders can be determined by alteration or mutation in the single gene.

(115) Answer : (1)

Solution:

Because humans are diploid organisms, each person possesses any two of the three *I* gene alleles.

(116) Answer : (2)
Solution:
The frequency of recombination between gene pairs on the same chromosome as a measure of the distance between genes was explained by Alfred Sturtevant. Today, genetic maps are extensively used as a starting point in the sequencing of whole genomes as was done in the case of HGP.

(117) Answer : (2)
Solution:
In birds, the total number of chromosomes is same in both males and females. But two different types of gametes in terms of the sex chromosome, are produced by females *i.e.* female heterogamety.

(118) Answer : (4)
Solution:
Dominant genetic disorders like myotonic dystrophy are expressed in each and every generation.

(119) Answer : (2)
Solution:
Color-blind male Female (carrier)

$X^CY \times X^CX$

$\downarrow$

$X^CX : X^CX^C : X^CY : XY$

50% of the sons are color-blind

(120) Answer : (1)
Solution:
Translocation is shifting of a part of chromosome to another non homologous chromosomes.

(121) Answer : (2)
Solution:
Avery, MacLeod and McCarty, worked to determine the biochemical nature of 'transforming principle' in Griffith's experiment.

(122) Answer : (1)
Solution:
The anticodon on tRNA for codon 5 'AGU3 ' is 5 'ACU3 '

(123) Answer : (3)
Solution:
When the small subunit of ribosome encounters an mRNA, the process of translation of the mRNA to protein begins.

(124) Answer : (2)
Solution:
AUG is a start codon and translation begins from this codon.

(125) Answer : (3)
Solution:
In Eukaryotes, the RNA polymerase III is responsible for transcription of tRNA, 5S rRNA and snRNAs

(126) Answer : (4)
Solution:
Severo Ochoa enzyme (Polynucleotide phosphorylase) was helpful in polymerizing RNA with defined sequence in a template independent manner (enzymatic synthesis of RNA).

(127) Answer : (1)
Solution:
The development and differentiation of embryo in adult organisms are a result of the coordinated regulation of expression of several sets of genes.

(128) Answer : (4)
Solution:
The secondary structure of tRNA looks like a clover-leaf.

(129) Answer : (3)

Solution:
The backbone of a polynucleotide chain is formed due to sugar and phosphates.

(130) Answer : (1)
Solution:
Lactose acts as a substrate for the enzyme, beta-galactosidase and it regulates switching on and off of the operon.

(131) Answer : (4)
Solution:
Methanobacterium are commonly found in the anaerobic sludge during sewage treatment. These bacteria are also present in the rumen of cattle.

(132) Answer : (3)
Solution:
Saccharomyces cerevisiae is used for making bread and beverages.

(133) Answer : (4)
Solution:
Primary treatment $\rightarrow$ Secondary treatment $\rightarrow$ Anaerobic sludge digestion.

(134) Answer : (2)
Solution:
Ladybirds are useful to get rid of aphids.

(135) Answer : (1)
Solution:
Plants having mycorrhizal associations show benefits such as resistance to root-borne pathogens, tolerance to salinity and drought and an overall increase in plant growth and development.

ZOOLOGY

(136) Answer : (4)
Hint:
Identify a bony fish.
Solution:
Mouth is mostly terminal in bony fishes like fighting fish. Rest all are cartilaginous fishes in the given options.

(137) Answer : (4)
Solution:
Clarias (Magur) is a fresh water bony fish while, *Scoliodon*, *Trygon* and *Torpedo* are marine cartilaginous fishes.

(138) Answer : (3)
Solution:
Sponges undergo internal fertilisation. The development in sponges is mediated by an intermediate free-swimming flagellated larval stage for dispersal of species. Thus, the development in sponges is indirect. Their larvae are morphologically distinct from adults. Both asexual and sexual reproduction occur in sponges.

(139) Answer : (3)
Hint:
Basic chordate feature
Solution:
Calotes (garden lizard) is a reptile. *Columba* (pigeon) is a bird. *Clarias* (magur) is a bony fish and *Carcharodon* (great white shark) is a cartilaginous fish.
All chordates possess dorsal, hollow and single central nervous system, ventral heart and pharynx perforated by gill slits.

(140) Answer : (2)
Solution:
In amphibians, fertilization is external.

(141) Answer : (4)
Hint:
Economically important arthropod
Solution:
Ascaris – Pseudocoelomate, dioecious
Hirudinaria – Coelomate, monoecious
Apis – Coelomate, dioecious
Taenia – Acoelomate, monoecious

(142) Answer : (1)

Hint:
True segmentation

Solution:
Annelids possess metameres and nephridia. Presence of dorsal, hollow and single nerve cord is a characteristic feature of chordates.

(143) Answer : (3)

Solution:
Amphioxus belongs to the sub-phylum Cephalochordata. Notochord is persistent throughout the life of cephalochordates.

(144) Answer : (3)

Solution:
Equus is a member of the class Mammalia.
• The most unique mammalian characteristic is the presence of milk producing glands (mammary glands) by which they nourish their young ones.
• Presence of ventral heart is a chrodate feature.
• Tympanum is present in both reptiles and amphibians.

(145) Answer : (1)

Solution:
Sexual dimorphism means distinct differences in the appearance of male and female individuals of a species. One pair anal style is present in the 9^{th} abdominal segment of the male cockroach.

(146) Answer : (3)

Hint:
This is a product of ornithine cycle.

Solution:
Chief excretory product is uric acid in reptiles.

(147) Answer : (3)

Solution:
With the help of several ommatidia, a cockroach can receive several images of an object. This kind of vision is known as mosaic vision with more sensitivity but less resolution, being common during night (hence called nocturnal vision).

(148) Answer : (1)

Hint:
Frogs eat insects.

Solution:
Frogs are beneficial for mankind because they eat insects and protect the crop. Frogs maintain ecological balance, because these serve as an important link of food chain and food web in the ecosystem.
In some countries, the muscular legs of frogs are used as food by man.

(149) Answer : (3)

Hint:
Ophiura belongs to the same phylum

Solution:
Obelia is a cnidarian which exhibits alternation of generation (metagenesis).
Saccoglossus is a hemichordate having proboscis gland as an excretory organ.
Asterias (Star fish) is an echinoderm having indirect development with free-swimming larva.
Hydra exhibits polyp form.

(150) Answer : (2)

Hint:
Male has common duct for passage of urine and semen.

Solution:
One pair of ureters emerge from kidneys of both male and female frogs and open into cloaca, but ureters are called urinogenital ducts only in male frogs as they carry both urine and sperms.

(151) Answer : (2)

Hint:
Flatworms are acoelomate organisms.

Solution:
Ophiura and *Petromyzon* are found in marine habitat. Liver fluke is an endoparasite while lamprey is an ectoparasite on fishes. Both *Ophiura* and *Ascidia* have larval stages in their life cycle.

(152) Answer : (2)

Solution:
Three types of junctions are found in the epithelium and other tissues–

(i) Tight junctions, which help to stop substances from leaking across a tissue.
(ii) Adhering junctions, which perform cementing to keep neighbouring cells together.
(iii) Gap junctions/communication junctions, which facilitate the cells to communicate with each other by connecting the cytoplasm of adjoining cells.

(153) Answer : (3)
Hint:
They are present on free surface
Solution:
The presence of microvilli increases the surface area of reabsorption and gives brush-bordered appearance.
Cilia are present in ciliated epithelium. Stratification is seen in multi-layered epithelium or compound epithelium.

(154) Answer : (2)
Hint:
Excitability is a property of this tissue.
Solution:
Wall of blood vessels contain a layer of smooth muscle fibres which exhibit excitability and contractility.

(155) Answer : (1)
Solution:
Nereis possess setae and parapodia for locomotion.

(156) Answer : (4)
Solution:
Chondrocytes are characteristic cells of cartilage. Fibroblasts, mast cells and macrophages are found in areolar tissue.

(157) Answer : (2)
Solution:
Intercellular material of cartilage is solid and pliable and resists compression. It is present in the tip of nose, outer ear joints, between adjacent bones of the vertebral column, limbs and hands in adults.
Blood is the fluid connective tissue.
Lamellae are present in bones.

(158) Answer : (2)
Solution:
In frogs, the fore brain includes olfactory lobes, paired cerebral hemispheres and unpaired diencephalon. The midbrain is characterised by a pair of optic lobes.

(159) Answer : (4)
Solution:
On land, buccal cavity, skin and lungs act as the respiratory organs for frogs. Air enters through nostrils into the buccal cavity and then to lungs. They exhibit only cutaneous respiration during aestivation and hibernation.

(160) Answer : (2)
Solution:
Mesothoracic wings (forewings) are called elytra or tegmina. Metathoracic wings (hind wings) are used in flight.

(161) Answer : (1)
Solution:
Mushroom-shaped gland functions as an accessory reproductive gland. It is present in 6^{th} -7^{th} abdominal segments of male cockroaches.

(162) Answer : (2)
Solution:
Sea pen is a coelenterate and it exhibits tissue level of organisation. Diploblasty (presence of mesoglea) is seen in coelenterates and ctenophores. *Echinus* is an echinoderm. Incomplete digestive system is seen in platyhelminths *i.e.*, they have only a single opening for both mouth and anus.

(163) Answer : (3)
Solution:
Salamandra (amphibian) has 3-chambered heart. It lacks scales and possesses a tail. *Calotes* (reptile) has 3-chambered heart and possesses a tail. It also possesses scales on its body.

(164) Answer : (1)
Solution:
In molluscs, such as *Sepia*, external calcareous shell is absent. In molluscs, a soft and spongy layer of skin forms a mantle over the visceral hump. The space between the hump and the mantle is called the mantle cavity in which feather-like gills are present. They have respiratory and excretory functions. The anterior head region of molluscs has sensory tentacles. Their mouth contains a file-like rasping organ for feeding, called radula.

(165) Answer : (2)

Solution:

The fish described in the question is an Osteichthyes, which belongs to the super class Pisces, division Gnathostomata and the sub-phylum Vertebrata. Cyclostomes are not true fishes. Operculum is present in the members belonging to the class Osteichthyes.

(166) Answer : (1)

Solution:

Endoskeleton is fully ossified (bony) and the long bones are hollow with air cavities (pneumatic) in members of the class Aves.

Corvus – Class Aves

Petromyzon – Class Cyclostomata

Macropus and *Pteropus* – Class Mammalia

(167) Answer : (4)

Solution:

Macaca, *Trygon* $\rightarrow$ Viviparous, bilaterally symmetrical animals

Ornithorhynchus, Struthio, Clarias $\rightarrow$Oviparous, bilaterally symmetrical animals

(168) Answer : (3)

Solution:

In cockroaches, at the junction of midgut and hindgut, a ring of 100-150 yellow coloured thin filamentous Malpighian tubules is present. They help in removal of excretory products from haemolymph. The hindgut is broader than midgut and is differentiated into ileum, colon and rectum. Gastric caeca is present at the junction of foregut and midgut.

(169) Answer : (3)

Solution:

Frogs exhibit sexual dimorphism. Male frogs can be distinguished by the presence of sound producing vocal sacs and also copulatory pads on the first digits of the fore limbs which are absent in female frogs.

(170) Answer : (4)

Solution:

The thin-walled urinary bladder is present ventral to the rectum which also opens in the cloaca. The frog excretes urea and thus is a ureotelic animal.

(171) Answer : (4)

Solution:

Special venous connection between liver and intestine as well as the kidney and lower parts of the body are present in frogs. The former is called the hepatic portal system and the latter is called the renal portal system. In frogs, RBCs are nucleated and contain red coloured pigment namely haemoglobin.

(172) Answer : (4)

Solution:

The system for control and coordination is highly evolved in the frogs. It includes both neural system and endocrine glands. The chemical coordination of various organs of the body is achieved by hormones which are secreted by the endocrine glands. The prominent endocrine glands found in frogs are pituitary, thyroid, parathyroid, thymus, pineal body, pancreatic islets, adrenals and gonads.

(173) Answer : (2)

Solution:

Communication junctions (intercalated discs) at some fusion points allow the myocytes to contract as a unit, *i.e.*, when one cell receives a signal to contract, its neighbours are also stimulated to contract. Cardiac muscle fibres are branched, uninucleated and involuntary in nature.

(174) Answer : (4)

Solution:

Compound epithelium is made of more than one layer (multi-layered) of cells and thus has a limited role in secretion and absorption. Their main function is to provide protection against chemical and mechanical stresses. They cover the dry surface of the skin, the moist surface of the buccal cavity, pharynx, inner lining of ducts of salivary glands and of pancreatic ducts.

(175) Answer : (2)

Solution:

Balanoglossus is a hemichordate. The phylum Hemichordata consists of a small group of worm-like marine animals with organ-system level of organisation. They are bilaterally symmetrical, triploblastic and coelomate animals. Their body is cylindrical and is composed of an anterior proboscis, a collar and a long trunk. Circulatory system is of open type. Respiration takes place through gills. Excretory organ is proboscis gland. Sexes are separate. Fertilisation is external. Development is indirect.

(176) Answer : (3)

Solution:

Adamsia	Sessile, diploblastic
Aurelia	Freely moving, radially symmetrical
Fasciola	Endoparasite, acoelomate
Hirudinaria	Ectoparasite, coelomate

(177) Answer : (3)

Solution:

In the members of the phylum Aschelminthes, sexes are separate (dioecious) *i.e.*, males and females are distinct. For example, in *Ancylostoma,* often females are longer than the males. Earthworms are monoecious.

(178) Answer : (1)

Solution:

Sycon – Sponge

Antedon – Echinoderm

The most distinctive feature of echinoderms is the presence of water vascular system which helps in locomotion, capture and transport of food and respiration. Sponges have a water transport or canal system. In porifers, water enters through minute pores (ostia) in the body wall into a central cavity, spongocoel, from where it goes out through the osculum. This pathway of water transport is helpful in food gathering, respiratory exchange and removal of waste.

(179) Answer : (3)

Solution:

Cyclostomes such as lamprey have an elongated body bearing 6-15 pairs of gill slits for respiration. They have a sucking and circular mouth without jaws. Their body is devoid of scales and paired fins. Cranium and vertebral column are cartilaginous. Circulation is of closed type. Cyclostomes are marine but migrate to fresh water for spawning. They have a tail fin.

(180) Answer : (4)

Solution:

Catla – Osteichthyes

Chelone, *Chameleon* – Reptilia