



Aakash

Medical | IIT-JEE | Foundations

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FINAL TEST SERIES for NEET-2025

MM : 720

Test - 3

Time : 180 Mins.

Answers

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

Hints and Solutions

PHYSICS

(1) Answer : (1)

Solution: $F = \frac{mv}{t} \Rightarrow m = \frac{Ft}{v} = \frac{Ft^2}{L} = [F][T]^2[L]^{-1}$

(2) Answer : (3)

Solution:

A zero between two non-zero digits is always considered significant so all four digits are significant.

(3) Answer : (3)

Solution:

$$3.20 + 1.21 + 4.5 = 8.91$$

Since 4.5 has 1 digit after decimal, therefore the result must have 1 digit after decimal place.

 \therefore The final answer would be 8.9

(4) Answer : (2)

Solution:

$$[\text{Angular momentum}] = \frac{n}{2\pi} \cdot [h]$$

$$\frac{n}{2\pi} = \text{dimensionless}$$

Then $[\text{Angular momentum}] = [\text{Planck's constant}]$

(5) Answer : (2)

Solution:

$$v = t^2 - 3t$$

$$a = 2t - 3$$

$$v = 0 \Rightarrow t(t - 3) = 0$$

$$\Rightarrow t = 3 \text{ s.}$$

$$\therefore a(t = 3) = 2 \times 3 - 3 = 3 \text{ m/s}^2.$$

(6) Answer : (4)

Solution:

Equation of trajectory

$$y = x \tan \theta - \frac{gx^2}{2u^2 \cos^2 \theta}$$

The trajectory of an object moving under acceleration is not always be straight line

(7) Answer : (4)

Solution:

$$\frac{r_1}{r_2} = \frac{2}{1}$$

$$\frac{a_1}{a_2} = \frac{v_1^2}{r_1} \cdot \frac{r_2}{v_2^2} = \frac{1}{2}$$

(8) Answer : (2)

Solution:

$$|\vec{v}_{\text{rel}}| = \sqrt{v^2 + v^2 - 2v^2 \cos 90^\circ}$$

$$= v\sqrt{2}$$

(9) Answer : (4)

Solution:

$$v_x = \frac{dx}{dt} = 5 - 6t \text{ and } v_y = \frac{dy}{dt} = 5$$

$$\text{at } t = 1 \text{ s, } v_x = -1, v_y = 5$$

$$v = \sqrt{(-1)^2 + 5^2} = \sqrt{26} \text{ m/s}$$

(10) Answer : (3)

Solution:

$$a = \frac{30-20}{5} = 2 \text{ ms}^{-2}$$

(11) Answer : (1)

Solution:

$$F = nmv$$

$$= 5 \times \frac{20}{1000} \times 100$$

$$= 10 \text{ N}$$

(12) Answer : (4)

Solution:

All the statements are true

$$\text{as } \vec{F} = \frac{d\vec{p}}{dt}$$

$$\vec{F} = m \vec{a}$$

(13) Answer : (4)

Solution:

Limitations of dimensional analysis.

(14) Answer : (1)

Solution:

$$t_1 = \sqrt{\frac{2h}{g}}$$

$$t_2 = \frac{2(3h)}{g} - \sqrt{\frac{2h}{g}}$$

$$= (\sqrt{3} - 1) t_1$$

$$= (\sqrt{3} - 1) \times 4 \approx 3 \text{ s}$$

(15) Answer : (2)

Solution:

$$\text{Coeff. of friction} = \frac{\text{Applied force}}{\text{Normal reaction}}$$

$$= \frac{[MLT^{-2}]}{[MLT^{-2}]} = \text{No dimensions}$$

(16) Answer : (2)

Solution:

$$\text{Energy density} = ML^{-1}T^{-2}$$

$$\text{Modulus of elasticity} = ML^{-1}T^{-2}$$

$$\text{Thrust} = MLT^{-2}$$

$$\text{Energy gradient} = MLT^{-2}$$

$$\text{Acceleration} = LT^{-2}$$

(17) Answer : (3)

Solution:

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

$$h_1 : h_2 : h_3 \Rightarrow u_1^2 : u_2^2 : u_3^2$$

(18) Answer : (4)

Solution:

$$\vec{a} = \frac{d\vec{v}}{dt}$$

$$\vec{a} = 0$$

$$\frac{d\vec{v}}{dt} = 0$$

$$\vec{v} = 0$$

or

$$\vec{v} = \text{constant}$$

(19) Answer : (2)

Solution:

$$\text{Average speed} = \frac{2v_1 v_2}{v_1 + v_2}$$

$$= \frac{2v \cdot \frac{v}{2}}{v + \frac{v}{2}} = \frac{2}{3}v$$

(20) Answer : (1)**Solution:**

Velocity of bolt relative to elevator

$$= 2.5 - 2.5 = 0$$

Acceleration of bolt relative to elevator

$$a = 10 - (-2) = 12 \text{ m/s}^2$$

$$s = ut + \frac{1}{2}at^2$$

$$3 = 0 + \frac{1}{2} \times 12 \times t^2$$

$$t = \frac{1}{\sqrt{2}} \text{ s}$$

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

$$R = 4\sqrt{h_1 h_2}$$

$$= 4\sqrt{16 \times 9}$$

$$= 4\sqrt{144}$$

$$R = 48 \text{ m}$$

(22) Answer : (4)**Solution:**

$$\text{Time} = \frac{\text{Distance}}{\text{Velocity}} = \frac{\text{Total distance travelled}}{\text{Relative velocity}}$$

$$= \frac{80+120}{(10+15)} \text{ m/s}$$

$$= \frac{200}{25} = 8 \text{ s}$$

(23) Answer : (2)**Solution:**

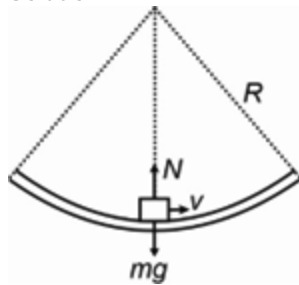
$$a = \frac{F_{\text{net}}}{M_{\text{Total}}} = \frac{20-5}{5} = 3 \text{ m/s}^2$$



$$20 - T = 3a$$

$$20 - 3(3) = T$$

$$11 \text{ N} = T$$

(24) Answer : (2)**Solution:**

$$N - mg = \frac{mv^2}{R}$$

$$N = mg + \frac{mv^2}{R}$$

(25) Answer : (1)**Solution:**

$$v = \sqrt{\mu_s R g} = \sqrt{0.5 \times 13 \times 10}$$

$$= \sqrt{65} = 8.06 \approx 8 \text{ m/s}$$

(26) Answer : (2)**Solution:**

$$L.C = \frac{\text{Pitch}}{\text{Number of divisions in circular scale}}$$

$$\text{Pitch} = 0.01 \times 100 = 1 \text{ mm}$$

(27) Answer : (2)**Solution:**

An object can be increasing in speed when its acceleration is decreasing in case of raindrop, Uniform circular motion is accelerated motion due to change in direction of velocity.

(28) Answer : (1)**Solution:**

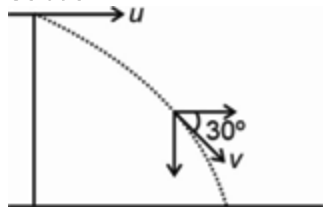
$$V = \frac{\pi d^2}{4} L$$

$$\frac{\Delta V}{V} \times 100 = 2 \left(\frac{\Delta d \times 100}{d} \right) + \left(\frac{\Delta L \times 100}{L} \right)$$

$$= 2 \left(\frac{0.01 \times 100}{0.5} \right) + \left(\frac{0.02 \times 100}{2.5} \right)$$

$$= 4 + 0.8$$

$$= 4.8\%$$

(29) Answer : (4)**Solution:**

$$\tan 30^\circ = \frac{v_y}{v_x} = \frac{gt}{u}$$

$$t = \frac{u}{\sqrt{3}g}$$

(30) Answer : (2)**Solution:**

Pseudo force is opposite to acceleration of frame and its magnitude is product of mass of body and acceleration of frame.

(31) Answer : (2)**Solution:**

$$|\vec{R}| = |\vec{A} + \vec{B}| = 2a \cos \frac{\theta}{2}$$

$$\text{If } \theta = 120^\circ, \text{ then } R = 2a \cos \frac{120}{2} = a$$

$$\text{If } |\vec{A}| = |\vec{B}| = a$$

(32) Answer : (3)**Solution:**

$$\vec{u}_A = \hat{i} + \hat{j} \quad \vec{u}_B = \hat{i} \quad \vec{u}_C = \hat{i} - \hat{j}$$

$$u_A = \sqrt{2}, \quad u_B = 1, \quad u_C = \sqrt{2}$$

$$\frac{u_B}{u_C} = \frac{1}{\sqrt{2}}$$

(33) Answer : (2)**Solution:**

$$\frac{R}{PQ} = \frac{1}{[MLT^{-2}]^2 \cdot T}$$

$$= [M^{-2}L^{-2}T^3]$$

(34) Answer : (4)**Solution:**

Comparing $y = x \tan \theta - \frac{1}{2} \frac{gx^2}{u^2 \cos^2 \theta}$

$$\tan \theta = \frac{1}{\sqrt{3}} \Rightarrow \theta = 30^\circ$$

(35) Answer : (1)

Solution:

$$\theta_1 = \theta, \theta_2 = 90 - \theta$$

$$\frac{T_A}{T_B} = \tan \theta = \frac{1}{\sqrt{3}} \Rightarrow T_B = \sqrt{3} T_A$$

$$\frac{R_A}{R_B} = 1 \Rightarrow R_A = R_B$$

$$\frac{H_A}{H_B} = \frac{1}{3} \Rightarrow H_B = 3H_A$$

(36) Answer : (2)

Solution:

If the net external force on a body is zero, its acceleration is zero.

Acceleration can be non-zero only if there is a net external force on the body.

(37) Answer : (3)

Solution:

$$t = \frac{d}{\sqrt{V_b^2 - V_R^2}} = \frac{200}{\sqrt{5^2 - 3^2}} = 50 \text{ s}$$

(38) Answer : (2)

Hint:

$$a_{\text{net}} = \sqrt{a_c^2 + a_t^2}$$

Solution:

$$a_c = \omega^2 r = \frac{v^2}{R} = \frac{3600}{1200} = 3 \text{ m/s}^2$$

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

$$\text{hence } a_{\text{net}} = \sqrt{3^2 + 4^2} = 5 \text{ m/s}^2$$

(39) Answer : (3)

Hint:

Area under $F - t$ curve equals change in momentum

Solution:

Area under curve = Zero

Change in momentum = Zero

Final velocity = Zero

(40) Answer : (2)

Solution:

$$T = \frac{2m_1 m_2}{(m_1 + m_2)} (g + a_0) = \frac{2 \times 5 \times 12}{6} = 20 \text{ N}$$

(41) Answer : (3)

Solution:

$$h_{\text{max}} = \frac{u^2}{2g} = \frac{50 \times 50}{2 \times 10} = 125 \text{ m}$$

$$t_{\text{up}} = \frac{u}{g} = 5 \text{ sec}$$

Distance travelled in 4 sec of its downward journey

$$S = \frac{1}{2} \times g \times t^2 = \frac{1}{2} \times 10 \times 16 = 80 \text{ m}$$

$$\text{Distance travelled in last second} = 125 - 80 = 45 \text{ m}$$

(42) Answer : (3)

Solution:

As speed is constant

\therefore There is no change in magnitude of velocity irrespective of path it travels.

(43) Answer : (1)

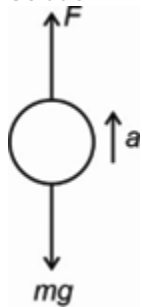
Solution:

$$f = mg \sin \theta$$

$$= 10 \times 10 \times \frac{1}{2} = 50 \text{ N}$$

(44) Answer : (2)

Solution:



$$F - mg = ma$$

$$F = m(g + a) = 5(10 + 2) = 60 \text{ N}$$

$$= 6 \text{ kgf}$$

(45) Answer : (1)

Solution:

$$\text{Using } T = \frac{2u \sin \theta}{g},$$

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

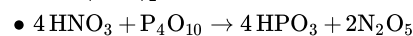
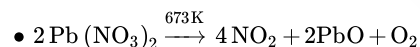
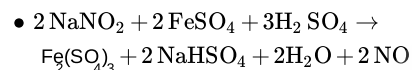
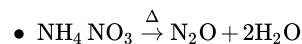
$$\text{Speed at max height} = u \cos \theta$$

$$\text{Speed at point of landing} = \text{Speed at point of projection}$$

CHEMISTRY

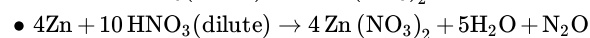
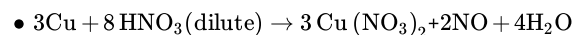
(46) Answer : (3)

Solution:



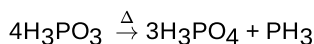
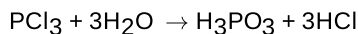
(47) Answer : (1)

Solution:



(48) Answer : (1)

Solution:



(49) Answer : (3)

Hint:

Higher the negative charge on metal carbonyl, stronger is the back donation of electron from metal to ligand.

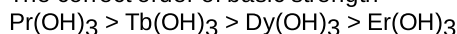
Solution:

Back donation of electron from metal to the vacant π^* orbital of CO takes place hence bond order of CO decreases and bond length increases. More electron density on metal increases back donation.

(50) Answer : (4)

Solution:

The correct order of basic strength



(51) Answer : (3)

Hint:

The transition metal ions which do not contain d -electrons do not undergo crystal field splitting.

Solution:

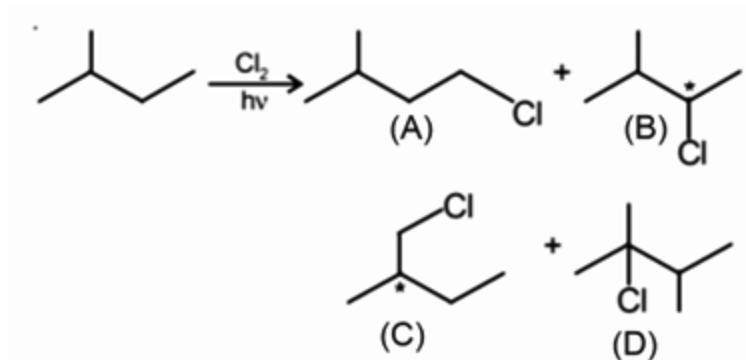
Sc^{3+} and Ti^{4+} do not have d -electrons hence do not show colour due to $d-d$ transition.

(52) Answer : (2)

Solution:

Mole of AgCl precipitated = $200 \times 0.4 \times 2 \times 10^{-3}$
= 0.16

(53) Answer : (2)

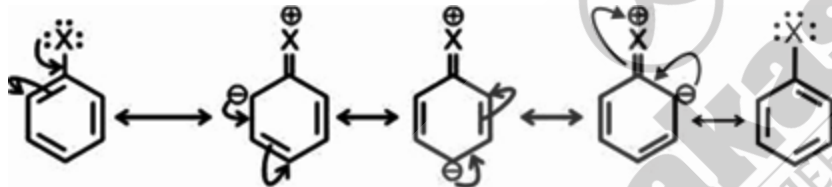
Solution:

(B) and (C) contains chiral center so each will exist as a pair of enantiomers.

(54) Answer : (3)

Hint:

In haloarenes, C-X bond acquires a partial double bond character due to resonance.

Solution:

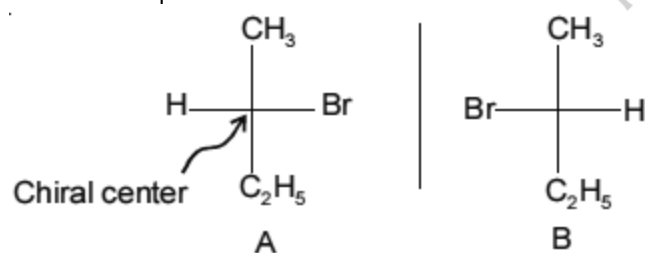
(where X = halogen atom)

A bond cleavage in haloarenes is difficult than haloalkane and therefore, they are less reactive towards nucleophilic substitution reactive.

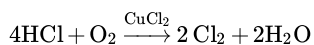
(55) Answer : (4)

Solution:

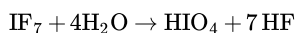
Enantiomeric pair



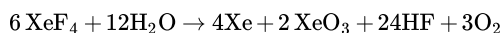
(56) Answer : (1)

Solution:

(57) Answer : (4)

Solution:

(58) Answer : (1)

Solution:

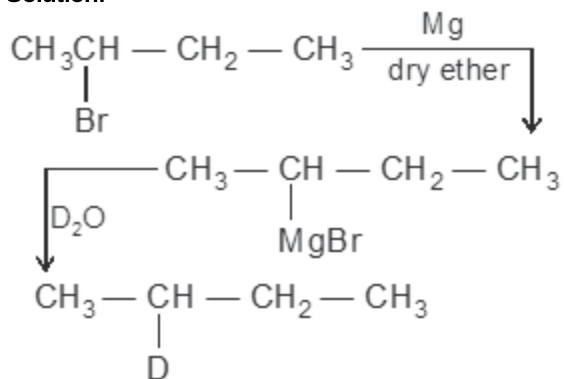
(59) Answer : (4)

Solution:

Compounds	Boling point (k)
H ₂ O	373
H ₂ S	213
H ₂ Se	232
H ₂ Te	269

(60) Answer : (4)

Solution:



(61) Answer : (3)

Solution:



(62) Answer : (1)

Solution:

Element	$\Delta_f H^\circ$ (kJ mol ⁻¹)
Fe	762
Co	758
Ni	736
Mn	717

(63) Answer : (1)

Hint:

$$\text{Spin only magnetic moment } (\mu) = \sqrt{n(n+2)} \text{ BM}$$

n = number of unpaired electrons

Solution:

For Ti²⁺, number of unpaired electrons = 2

$$n = 2, \mu = \sqrt{2(2+2)} = \sqrt{8} \text{ BM}$$

$$\mu = 2.83 \text{ BM}$$

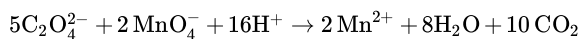
(64) Answer : (1)

Solution:

Manganate ion is paramagnetic because of one unpaired electron.

(65) Answer : (3)

Solution:



(66) Answer : (2)

Solution:

Usually weak field ligands form outer orbital complex with 3d metal ions.

[CoF₆]³⁻ and [MnCl₆]³⁻ are outer orbital complex.

(67) Answer : (2)

Solution:

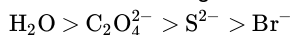
Complex ions	Hybridisation	Shape
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$[\text{Ni}(\text{CN})_4]^{2-}$	dsp^2	Square planar
$[\text{MnBr}_4]^{2-}$	sp^3	Tetrahedral

(68) Answer : (4)

Solution:

Correct order of ligand field strength of the species based on spectrochemical series is



(69) Answer : (3)

Solution:Cis – $[\text{CrCl}_2(\text{ox})_2]^{3-}$ does not contain plane of symmetry or center of symmetry hence it is optically active species.

(70) Answer : (4)

Solution:

Ions	Radii (pm)
$\text{Er}^{3+} \rightarrow$	88
$\text{Dy}^{3+} \rightarrow$	91
$\text{Sm}^{3+} \rightarrow$	96
$\text{Nd}^{3+} \rightarrow$	99

(71) Answer : (2)

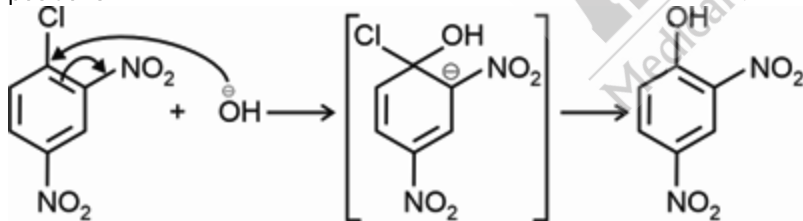
Solution:

	Coordination compounds		Metal present
a.	Chlorophyll	(i)	Magnesium
b.	Vitamin B ₁₂	(ii)	Cobalt
c.	Wilkinson catalyst	(iii)	Rhodium
d.	Haemoglobin	(iv)	Iron

(72) Answer : (4)

Solution:

In nucleophilic substitution reaction negative charge is more stabilised if electron withdrawing group is present at ortho/para positions.



(73) Answer : (1)

Solution:

Enantiomers possess identical physical properties namely, melting point, boiling point, refraction index etc.

(74) Answer : (2)

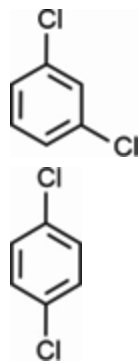
Solution:

The groups which possess two nucleophilic center are called as ambident nucleophiles

(75) Answer : (4)

Solution:

Compounds		Boiling point (K)
	\rightarrow	453
	\rightarrow	446

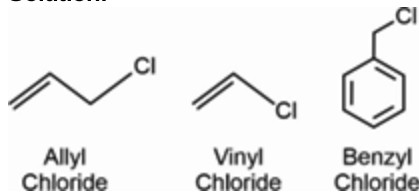


→

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(76) Answer : (2)

Solution:



(77) Answer : (2)

Hint:

Halous acid of only chlorine exist.

Solution:

HOBrO is least likely to exist

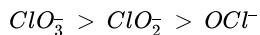
(78) Answer : (3)

Hint:

More stable is the conjugate base, stronger is the acid.

Solution:

• Correct order of stability of ions:

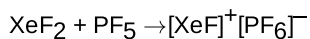


• Correct order of acidic strength



(79) Answer : (2)

Solution:



(80) Answer : (2)

Solution:

Element $\Delta_{\text{eg}}H(\text{kJ mol}^{-1})$

F	-333
Cl	-349
Br	-325
I	-296

(81) Answer : (2)

Solution:

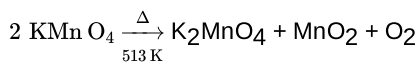
Element	$\Delta_{\text{a}}H^\circ (\text{kJ/mol})$
Ti	473
V	515
Cr	397
Mn	281

(82) Answer : (3)

Solution:

Interstitial compounds are very hard, same borides approach diamond in hardness.

(83) Answer : (3)

Solution:**(84) Answer :** (1)**Solution:**

Ammonia molecules are associated by intermolecular hydrogen bond, hence its boiling point is higher than phosphine.

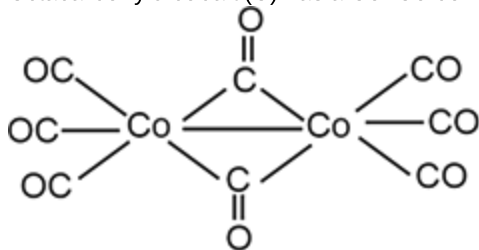
(85) Answer : (3)**Solution:**

Δ_0 increases with the increase in ligand field strength.

Ligand field strength: $\text{H}_2\text{O} < \text{NH}_3 < \text{CN}^-$

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

Octacarbonyldicobalt (O) has a Co–Co bond bridged by two CO groups

**(87) Answer :** (1)**Hint:**

The cation is named first in both positively and negatively charged coordination entities.

Solution:

O.S. of Cr in $\text{K}_3[\text{Cr}(\text{C}_2\text{O}_4)_3]$ is +3.

IUPAC name: Potassium trioxalatochromate (III).

(88) Answer : (3)**Solution:**

More is the stability of carbocation formed more is the tendency to undergo $\text{S}_\text{N}1$ reaction.

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

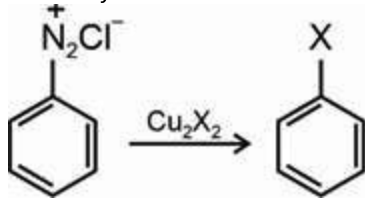
CCl_4 is non-polar solvent.

(90) Answer : (3)**Hint:**

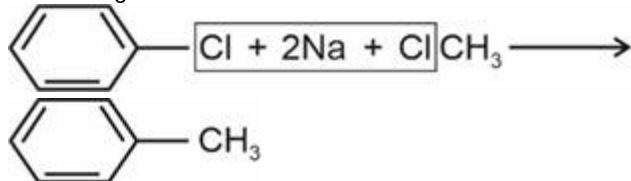
Swarts and Finkelstein reactions are halogen exchange reactions.

Solution:

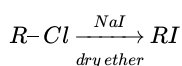
Sandmeyer reaction



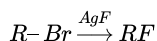
Wurtz Fittig reaction



Finkelstein reaction



Swarts reaction.



BOTANY

(91) Answer : (2)

Solution:

1. Selected strains of *Saccharomyces cerevisiae* or Baker's yeast are used for this purpose.
2. The kneaded flour is kept at a warm temperature for a few hours.
3. It swells up, the phenomenon called leavening is caused by secretion of enzymes by yeast.

(92) Answer : (3)

Solution:

Toddy palm, *Caryota urens* is a source of Toddy.

(93) Answer : (4)

Solution:

Baculoviruses attack insects and other arthropods hence are pathogens.
Trichoderma are very common in root ecosystems.

(94) Answer : (3)

Solution:

Floating debris is removed by sequential filtration.
 In aeration tanks, aerobic microbes grow.
 Some part of activated sludge is pumped back into aeration tank.

(95) Answer : (4)

Solution:

A-Bacteriophage, B-Adenovirus, C-TMV

(96) Answer : (2)

Solution:

The first antibiotic penicillin was discovered by A. Fleming.

(97) Answer : (4)

Solution:

Aspergillus niger produces citric acid.
Clostridium butylicum produces butyric acid.
Acetobacter aceti produces acetic acid
Lactobacillus produces lactic acid.

(98) Answer : (2)

Solution:

Given genotype : AaBBccDdEe

Number of type of gametes = 2^n [Since, n = number of heterozygous locus]
 $= 2^3 = 8$

(99) Answer : (2)

Solution:

The tightly linked genes show 100% parental types and 0% recombinants.

(100) Answer : (3)

Solution:

$$TtYy \times ttYy$$

$$\downarrow$$

	TY	Ty	tY	ty
tY	TtYY	TtYy	ttYY	ttYy
ty	TtYy	Ttyy	ttYy	ttyy

Phenotypic ratio = $\frac{3}{8}, \frac{3}{8}, \frac{1}{8}, \frac{1}{8}$

(101) Answer : (1)

Solution:

In bacteria, since the mRNA does not require any processing to become active, and also since transcription and translation take place in the same compartment (there is no separation of cytosol and nucleus in bacteria), many times the translation can begin much before the mRNA is fully transcribed. Consequently, the transcription and translation can be coupled in bacteria

(102) Answer : (3)

Hint:

This enzyme hydrolyses the lactose into glucose and galactose.

Solution:

β -galactosidase is responsible for hydrolysis of lactose sugar.

(103) Answer : (2)

Solution:

On discontinuous strand, Okazaki fragments are joined by the action of DNA ligase.

(104) Answer : (2)

Solution:

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

(105) Answer : (1)

Solution:

Mendel proposed that something was being stably passed down, from parent to offspring through the gamete, over successive generation. He called these things as factors. Now we call them as genes.

(106) Answer : (3)

Solution:

Wrinkled seed shape and yellow pod colour are recessive traits and they are only able to express themselves under homozygous condition.

(107) Answer : (3)

Solution:

In human skin colour, the number of each type of alleles in the genotype would determine the darkness or lightness of the skin in an individual.

(108) Answer : (2)

Solution:

Law of segregation is based on the fact that the alleles do not show any blending and that both the characters are recovered as such in the F_2 generation, though one of these is not seen at the F_1 stage.

(109) Answer : (1)

Solution:

Starch synthesis gene in pea shows incomplete dominance.

(110) Answer : (3)

Solution:

ϕ	I^A	I^B
I^B	$I^A I^B$	$I^B I^B$
i	$I^A i$	$I^B i$

4 genotypes: 3 phenotypes.

(111) Answer : (2)

Solution:

In 1900, three scientists (deVries, Correns and von Tschermak) independently rediscovered Mendel's results on the inheritance of characters.

(112) Answer : (4)

Solution:

Chromosomal aberrations are commonly observed in cancer cells

(113) Answer : (3)

Solution:

Absence or excess or abnormal arrangements of one or more chromosome results in chromosomal disorders.

(114) Answer : (3)

Solution:

A nucleosome is composed of negatively charged DNA and positively charged histone octamer.

(115) Answer : (1)

Solution:

6.6×10^9 bp – Diploid content of human DNA

48502 bp – Lambda bacteriophage

5386 nucleotides – $\phi \times 174$ bacteriophage

4.6×10^6 bp – *Escherichia coli*

(116) Answer : (3)

Solution:

UTRs are seen in m-RNA at 5' end before start codon and at 3' end after stop codon.

(117) Answer : (2)

Solution:

Gene expression is regulated by metabolic, environmental and physiological conditions.

(118) Answer : (3)

Solution:

There is a single DNA-dependent RNA polymerase that catalyses the transcription of all types of RNA in bacteria.

(119) Answer : (3)

Solution:

AUG that codes for methionine is also a start codon.

(120) Answer : (4)

Solution:

Cistron is a segment of DNA coding for a polypeptide. Monocistronic gene synthesise only one type of polypeptide.

(121) Answer : (1)

Solution:

The chromatin that is more densely packed and stains dark are called heterochromatin and these are transcriptionally inactive.

(122) Answer : (4)

Solution:

Thymine have CH_3 at 5' position

(123) Answer : (1)

Solution:

Two nucleotides are linked through phosphodiester linkage to form a dinucleotide.

(124) Answer : (3)

Solution:

Myotonic dystrophy is an autosomal dominant disorder.

(125) Answer : (1)

Solution:

Grasshopper shows XO type of sex determination.

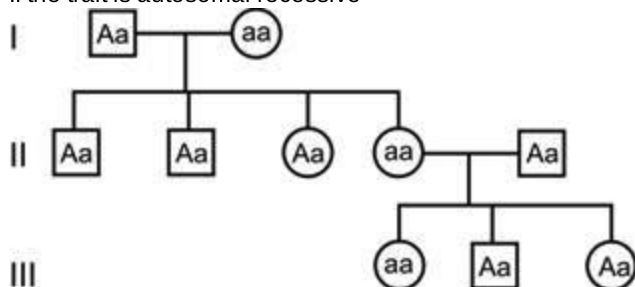
(126) Answer : (2)

Hint:

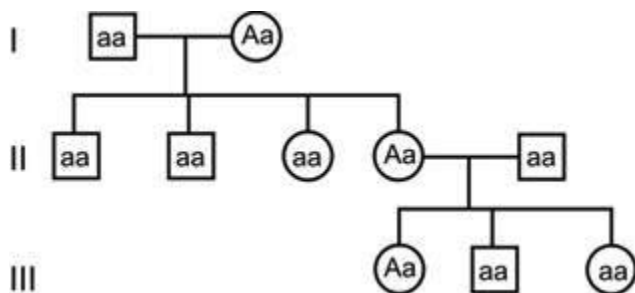
In the given pedigree, the trait under study can be autosomal recessive or dominant.

Solution:

If the trait is autosomal recessive



If the trait is autosomal dominant.



- Genotype of affected female of IInd generation can be aa or Aa.
 → Male of first generation can be a carrier if trait under study is autosomal recessive.

(127) Answer : (4)

Solution:

A gamete is always haploid.

(128) Answer : (2)

Solution:

The ratio of light, hybrid and heavy DNA respectively, at the end of third generation will be 0 : 1 : 3

(129) Answer : (1)

Hint:

Dystrophin has 2.4 million bases.

Solution:

Dystrophin is the largest human gene. TDF is smallest gene with 14 bases.

(130) Answer : (4)

Solution:

VNTRs are minisatellites surrounded by conserved restriction sites. The size of VNTR varies from 0.1 to 20 kb.

(131) Answer : (1)

Solution:

Adenine is a purine.

(132) Answer : (1)

Solution:

The bottled fruit juices bought from the market are clearer because of the use of pectinases and proteases.

(133) Answer : (2)

Solution:

Statins produced by the yeast *Monascus purpureus* have been commercialised as blood-cholesterol lowering agents.

(134) Answer : (3)

Solution:

During the primary treatment, all solids that settle, form the primary sludge and the supernatant forms the effluent.

(135) Answer : (2)

Solution:

In the rumen of cattle, methanogens help in the breakdown of cellulose and play an important role in the nutrition of cattle.

ZOOLOGY

(136) Answer : (1)

Solution:

Members of the class Reptilia lack pinnae whereas mammals possess external ears or pinnae.

(137) Answer : (3)

Hint:

Cyclostomes

Solution:

Besides the basic chordate characters, vertebrates have a ventral muscular heart with two, three or four chambers; kidneys for excretion and osmoregulation. Paired appendages (fins or limbs) may be present.

Cyclostomes lack paired fins.

(138) Answer : (3)

Solution:

Both reptiles (*Hemidactylus*) and birds (*Psittacula*) are oviparous and exhibit direct development.

(139) Answer : (2)

Hint:

Bilateral symmetry

Solution:

Echinoderms exhibit radial symmetry in their adult stage. Radial symmetry is seen in the members of the phylum Ctenophora and Cnidaria.

(140) Answer : (3)

Solution:

Spongilla belongs to the phylum Porifera. They are multicellular animals with cellular level of body organisation.

(141) Answer : (4)

Hint:

Glioma is seen in this tissue.

Solution:

Neural tissue comprises neurons whose cytons are rich in clusters of RER and RNA and act as a site of protein synthesis.

(142) Answer : (2)

Solution:

In frogs, forebrain includes olfactory lobes, paired cerebral hemispheres and unpaired diencephalon. The midbrain is characterised by a pair of optic lobes. Hindbrain consists of cerebellum and medulla oblongata. The medulla oblongata passes out through the foramen magnum and continues into spinal cord, which is enclosed in the vertebral column.

(143) Answer : (4)

Solution:

Frogs respire on land and in the water by two different methods. In water, skin act as the aquatic respiratory organ (cutaneous respiration). During aestivation and hibernation, gaseous exchange takes place *via* skin.

(144) Answer : (4)

Solution:

The heart of frog has 3-chambers; it is myogenic in nature and is located on the ventral side of the body.

(145) Answer : (2)

Solution:

The given statement talks about the features of molluscs. *e.g.*-*Pila* and *Dentalium*.

(146) Answer : (3)

Hint:

Feature of vertebrates

Solution:

The phylum Chordata is divided into three sub-phyla: Urochordata, Cephalochordata and Vertebrata. Sub-phyla Urochordata and Cephalochordata are often referred to as protochordates.

In vertebrates, the notochord is replaced by a cartilaginous or bony vertebral column in the adults.

(147) Answer : (4)

Solution:

Copulatory pad is present in male frogs. Muscular tongue is bilobed. Fertilization and development is external and indirect respectively.

(148) Answer : (3)

Hint:

Identify the excretory structure present in insects.

Solution:

Chaetopleura (Chiton) is a mollusc. Excretion takes place through Malpighian tubules in arthropods (*e.g.* cockroach).

(149) Answer : (4)

Solution:

Presence of pseudocoelom is the characteristic feature of aschelminths. Roundworms may be free-living, aquatic and terrestrial or parasitic in plants and animals.

(150) Answer : (3)

Solution:

Coelenterates and ctenophores are diploblastic acoelomate animals.

(151) Answer : (2)

Hint:

It is a reptile.

Solution:

Generally reptiles have a three-chambered heart and show incomplete double circulation.

Crocodilus is an exception. It has 4-chambered heart and shows double circulation.

(152) Answer : (3)

Hint:

Exclusively present in heart

Solution:

Intercalated discs are exclusively present in cardiac muscle fibres.

Cardiac muscle fibres are cylindrical in shape with uninucleate condition, where as the nucleus is located centrally. They are branched and show striations. Smooth muscle fibres have fusiform shape. Skeletal muscle fibres are unbranched.

(153) Answer : (3)

Solution:

Simple eye (*i.e.*, ocelli), dorsal sclerite of prothorax (*i.e.*, pronotum) and anal cerci are present in both male and female cockroaches. Anal style is present in male cockroaches only.

(154) Answer : (2)

Solution:

Dense irregular connective tissue has fibroblasts and many fibres (mostly collagen) that are oriented differently. This type of tissue is present in the skin.

(155) Answer : (4)

Solution:

Muscle fibres contract (shorten) in response to stimulus, then relax (lengthen) and return to their uncontracted state in a coordinated fashion. Their action moves the body to adjust to the changes in the environment and to maintain the positions of the various parts of the body.

(156) Answer : (3)

Solution:

Limulus, silkworm, *Locusta* and butterfly are arthropods. Thus, their body is covered by chitinous exoskeleton.

Statocysts are present in aquatic arthropods while locust is terrestrial.

Circulatory system is open type in silkworms whereas most annelids (earthworm) have a closed circulatory system.

(157) Answer : (2)

Solution:

Goblet cells are isolated glandular cells in the alimentary canal. They are formed by the modification of simple columnar epithelium.

(158) Answer : (3)

Solution:

Most of the cartilages in vertebrate embryos are replaced by bones in adults. Cartilage is present in the tip of nose, outer ear joints, between adjacent bones of the vertebral column, limbs and hands in adults. Bone marrow is the site of production of blood cells.

(159) Answer : (3)

Solution:

The abdomen in both male and female cockroaches consists of 10 segments. In females, the 7th sternum is boat-shaped and together with the 8th and 9th sterna forms a brood or genital pouch whose anterior part contains female gonopore, spermathecal pores and collateral glands. Antennae arise from membranous sockets lying in front of eyes.

(160) Answer : (3)

Solution:

The nervous system is organised into a central nervous system (brain and spinal cord), a peripheral nervous system (cranial and spinal nerves) and an autonomic nervous system (sympathetic and parasympathetic). There are ten pairs of cranial nerves arising from the brain of frog.

Hormones are secreted by endocrine glands.

(161) Answer : (4)

Solution:

Meandrina (Brain coral) is a coelenterate/cnidarian. It has a central gastrovascular cavity with a single opening, mouth on hypostome.

Cuttle fish (Mollusc) is dioecious.

The body of a scorpion (Arthropod) is divided into cephalothorax and abdomen.

Hooks are not present in liver fluke (Platyhelminth).

(162) Answer : (3)

Solution:

Bangarus (krait) is a limbless poisonous reptile that exhibits internal fertilisation and direct development. *Chelone* (Turtle) have limbs. *Bufo* (toad) and *Pterophyllum* (Angel fish) exhibit external fertilisation.

(163) Answer : (4)

Solution:

<i>Taenia</i>	<i>Ancylostoma</i>
<ul style="list-style-type: none"> • Endoparasite • Monoecious • Triploblastic • Complete digestive system is not present • Acoelomate 	<ul style="list-style-type: none"> • Endoparasite • Dioecious • Triploblastic • Complete digestive system present • Pseudocoelomate

(164) Answer : (2)

Solution:

Elephantiasis is caused by *Wuchereria* (Filarial worm). It shows internal fertilisation, exhibits organ-system level of body organisation and is circular in cross-section.

(165) Answer : (4)

Solution:

In male *Pristis* (Saw fish), pelvic fins bear claspers.

- They have two-chambered heart that pumps out deoxygenated blood.
- Their head has saw-like anterior part.

(166) Answer : (4)

Solution:

Male reproductive organs consist of a pair of yellowish ovoid testes which are found adhered to the upper parts of kidneys by mesorchium. In frogs, fertilization is external and takes place in water.

(167) Answer : (2)

Solution:

The name cnidaria is derived from the cnidoblasts or cnidocytes (which contain the stinging capsules or nematocysts) present on the tentacles and the body of cnidarians. Cnidoblasts are used for anchorage, defence and for the capture of prey.

(168) Answer : (3)

Solution:

- *Ornithorhynchus* is an oviparous mammal.
- Protochordates do not have a vertebral column.
- Amphibians have a closed circulatory system.

(169) Answer : (2)

Solution:

The bone marrow in some bones is the site of production of blood cells. Bone cells are present in fluid-filled spaces called lacunae.

(170) Answer : (1)

Solution:

The digestive tract of birds has additional chambers, the crop and gizzard.

Pteropus → Mammal

Panthera → Mammal

Pterophyllum → Bony fish

(171) Answer : (4)

Solution:

Bombyx, *Aedes* → Arthropods

Pheretima → Annelid

Dentalium, *Chaetopleura* → Molluscs

Ctenoplana → Ctenophore

Echinus, *Ophiura*, *Asterias* → Echinoderms

(172) Answer : (1)

Solution:

Sponges reproduce asexually by fragmentation and sexually by the formation of gametes. In them, fertilisation is internal and development is indirect having a larval stage which is morphologically distinct from the adult.

Spongilla → Sponge

Pleurobrachia → Ctenophore → External fertilization

Hirudinaria → Annelid → Internal fertilization but direct development.

Balanoglossus → Hemichordate → Indirect development but external fertilization.

(173) Answer : (3)

Solution:

Salamandra is a tailed amphibian and the amphibian skin is moist (without scales). Angel fish (*Pterophyllum*) has four pairs of gills.

Clarias (Magur) contains deoxygenated blood in its two-chambered heart.

(174) Answer : (4)

Solution:

Digestion of food takes place by the action of HCl and gastric juices secreted from the walls of the stomach. Partially digested food, called chyme, is passed from stomach to the first part of the small intestine, the duodenum. The duodenum receives bile from the gall bladder and pancreatic juices from the pancreas through a common bile duct. Bile emulsifies fat and pancreatic juices digest carbohydrates and proteins. Final digestion takes place in the intestine. Digested food is absorbed by the numerous finger-like folds in the inner wall of intestine called villi and microvilli. The undigested solid waste moves into the rectum and passes out through cloaca.

(175) Answer : (4)

Solution:

Compound epithelium provides protection from mechanical and chemical stresses.

Diffusion, absorption and filtration occurs through simple epithelium.

(176) Answer : (2)

Solution:

Carcharodon belongs to the class Chondrichthyes. *Labeo* belongs to the class Osteichthyes.

(177) Answer : (2)

Solution:

Thin branching tubes called tracheoles carry oxygen from the air to all the parts. Exchange of gases take place at the tracheoles by simple diffusion. They exhibit mosaic vision that has less resolution but more sensitivity.

(178) Answer : (2)

Solution:

12 pairs of alary muscles are present in cockroach which are associated with circulatory system.

1 pair of anal cerci is present.

1 pair of salivary gland is present.

10 pairs of spiracles are present.

(179) Answer : (3)

Solution:

Exocoetus is a marine bony fish whereas *Labeo* is a freshwater bony fish. Both have streamlined body, operculum and are cold blooded animals.

(180) Answer : (4)

Hint:

Humans donot possess special venous connection between kidney and lower parts of the body.

Solution:

Frogs possess special venous connection between liver and intestine as well as the kidney and lower parts of the body. The former is called hepatic portal system and the latter is called renal portal system. In frogs, RBCs are nucleated and contain red coloured pigment namely haemoglobin. Frogs and humans both are ureotelic animals.