All India Aakash Test Series for NEET - 2026

TEST - 6 (Code-C)

Click here for Code-D Sol.

Test Date : 16/03/2025

ANSWERS

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

HINTS & SOLUTIONS

[PHYSICS]

1. Answer (1)

Hint & Sol.: The SI unit of molar specific heat at constant pressure is J mol^{-1} K^{-1}.

2. Answer (1)

Hint: Use, $\frac{C_P}{C_V} = \gamma$

Sol.: $\gamma = \frac{f+2}{f}$

Degree of freedom for monoatomic gas is 3 and for diatomic gas is 6.

$\gamma_{mono} = \frac{5}{3}$

$\gamma_{dia} = \frac{7}{5}$

3. Answer (3)

Hint: Use $PV = nRT$

Sol.: $\frac{n_1RT_1}{P_1} = \frac{n_2RT_2}{P_2}$

$\frac{m \times 600}{P_1} = \frac{m_2 \times 400}{\frac{P_1}{2}}$

$m_2 = \frac{3}{4}m$

$m_2 = \frac{3}{4} \times 8$

= 6 g

Amount of gas leaked = (8 – 6) g = 2 g

4. Answer (2)

Hint: $U = \frac{1}{2}nfRT$

Sol.: $\frac{1}{2}n_1fRT_1 + \frac{1}{2}n_2fRT_2 = \frac{1}{2}(n_1+n_2)fRT$

$1 \times T_0 + 2 \times 3T_0 = (1+2)T$

$T_1 = \left(\frac{7T_0}{3}\right)$

5. Answer (4)

Hint: $v_{rms} = \sqrt{\frac{3RT}{M}}$

Sol.: $\frac{v}{v_1} = \frac{\sqrt{\frac{T}{M}}}{\sqrt{\frac{3T}{M}}}$

$\frac{v}{v_1} = \frac{1}{\sqrt{3}}$

$\Rightarrow v_1 = \sqrt{3}\, v$

6. Answer (4)

Hint & Sol.: $\frac{1}{\sqrt{2} \cdot \pi n d^2} = \frac{K_BT}{\sqrt{2}\pi d^2 P}$

7. Answer (3)

Hint & Sol.: $U = \frac{1}{2}nfRT$

So internal energy of the gas depends on temperature and nature of the gas.

8. Answer (1)

Hint: Use, $\eta = 1 - \frac{T_L}{T_H}$

Sol.: $\frac{30}{100} = 1 - \frac{T_L}{T}$

$T_L = \frac{7T}{10}$

$\frac{1}{2} = 1 - \frac{T_L}{T_H}$

$\frac{T_L}{T_H} = \frac{1}{2} \Rightarrow T_H = 2T_L$

$T_H = 2 \times \frac{7T}{10}$

$T_H = \frac{7T}{5}$

9. Answer (4)

Hint: Q is not a state variable. 'ΔQ' is extensive.

Sol.: In $\Delta Q = \Delta U + P\Delta V$ quantities on both sides are extensive.

10. Answer (3)

Hint: Area under pressure and volume curve is work done.

Sol.: $W = W_{AB} + W_{BC}$

$= 0 + P_0(3V_0 - V_0)$

$= 2P_0V_0$

11. Answer (3)

Hint & Sol.: In free expansion, work done will be zero, chamber is insulated so ΔQ will be zero. So, ΔU will be zero and temperature will be constant.

12. Answer (1)

Hint: Work done in isobaric process is $W = nR\Delta T$

Sol.: $Q = nC_P\Delta T$

$$Q = \frac{nR\Delta T\gamma}{\gamma - 1}$$

$$nR\Delta T = \frac{Q(\gamma - 1)}{\gamma}$$

$$W = \frac{Q\left(\frac{7}{5} - 1\right)}{\left(\frac{7}{5}\right)}$$

$$= \frac{2Q}{7}$$

13. Answer (2)

Hint: Use, $a = \omega^2 A$

Sol.: $\omega = 2\pi f$

$= 2\pi \times 50$

$= 100\pi$

$a = (100\pi)^2 \times 0.02$

$= 200\ \pi^2\ m/s^2$

14. Answer (1)

Hint: At $t = \frac{T}{4}$ particle will be at extreme position.

Sol.: $x = A\sin(\omega t)$

$v = A\ \omega\cos(\omega t)$

at $t = \frac{T}{4}$

$v = 0$

15. Answer (3)

Hint: Time period of spring-mass system depends on mass and stiffness of system.

Sol.: Time period of oscillation of spring mass system $T = 2\pi\sqrt{\frac{m}{k}}$

16. Answer (3)

Hint: For particle undergoing SHM, $K.E._{max} = \frac{1}{2}kA^2$

Sol.: $A_R = \sqrt{A^2 + A^2 + 2A^2\cos 90^\circ}$

$= \sqrt{2}A$

$k = m\omega^2$

$K.E._{max} = \frac{1}{2}m\omega^2\left(\sqrt{2}A\right)^2$

$= m\omega^2A^2$

17. Answer (2)

Hint & Sol.: $x = \sin\omega t$

$y = 3\sin\omega t$

$y = 3x$, this is equation of straight line, so path of particle will be a straight line.

18. Answer (4)

Hint: Use, $v_{max} = A\omega$

Sol.: $F = -9x$

$a = -9x$

$\omega = \sqrt{9}$

$= 3$

$A\omega = v_{max}$

$A \times 3 = 30 \times 10^{-2}$

$A = 0.1$ m

19. Answer (3)

Hint: Fundamental frequency of closed pipe

$$f = \frac{v}{4l}$$

Sol.: First overtone of open pipe $f = \frac{v}{l}$

$$\frac{v}{4l_1} = \frac{v}{l_2}$$

$l_2 = 4 \times 20$

$= 80$ cm

20. Answer (1)

Hint & Sol.: The velocity of sound is greatest in steel among the given option.

21. Answer (2)

Hint & Sol.: Displacement and acceleration of a particle executing S.H.M. are in opposite phase.

22. Answer (2)

Hint & Sol.: $y = A \sin\omega t \cos kx$ represents the expression of standing wave.

23. Answer (1)

Hint & Sol.: Progressive wave is a wave that moves from one point to another in space.

Speed of progressive wave is given by $v = \frac{\omega}{k}$

24. Answer (3)

Hint & Sol.: The phenomenon of interference follows conservation of energy. Equal amplitude of waves is not an essential condition for interference phenomenon.

25. Answer (4)

Hint: Time interval between two consecutive maximum and minimum intensities of sound is

$= \frac{1}{2(f_1 - f_2)}$

Sol.: $(f_1 - f_2) = \left(\frac{5}{4}\right)$

$\frac{1}{|f_1 - f_2|} = \frac{4}{5} = 0.8$

$\frac{1}{2|f_1 - f_2|} = \frac{0.8}{2}$ = 0.4 s

26. Answer (3)

Hint: For open tube fundamental frequency $f_1 = \frac{v}{2l}$

Sol.: $f_1 = \frac{v}{2l}$

$f_2 = \frac{v}{4 \times \frac{l}{3}}$

$f_2 = \frac{3v}{4l}$

$\frac{f_1}{f_2} = \frac{2}{3}$

27. Answer (3)

Hint: Frequency of third harmonic = $\frac{3v}{2l}$

Sol.: $v = \sqrt{\frac{T}{\rho A}}$

$= \sqrt{\frac{110}{7 \times 10^3 \times \frac{22}{7} \times \frac{10^{-6}}{4}}}$

= 141 m/s

$f = \frac{3v}{2l}$

$= \frac{3}{2} \times 141$

$\approx$ 210 Hz

28. Answer (1)

Hint: String vibrates in two loops.

Sol.: $L = \frac{\lambda}{2} + \frac{\lambda}{2}$

$= \lambda$

$\frac{2\pi}{\lambda} = 0.11$

$\lambda = \frac{2 \times 22}{0.11 \times 7}$

$= \frac{400}{7}$

$\approx$ 57 cm

29. Answer (2)

Hint: $\sin^2 \omega t = \frac{1 - \cos 2\omega t}{2}$

Sol.: $y = \sin^2\omega t$

$y = \frac{1 - \cos 2\omega t}{2}$

$y - \frac{1}{2} = \frac{-\cos 2\omega t}{2}$

$y' = \frac{-\cos 2\omega t}{2}$

$T = \frac{2\pi}{2\omega}$

$= \frac{\pi}{\omega}$

So, $y = \sin^2\omega t$ is periodic function with time period $\frac{\pi}{\omega}$

Rest all other functions are not periodic.

30. Answer (4)

Hint: Maximum value of $a\sin\omega t + b\cos\omega t$ is $\sqrt{a^2+b^2}$

Sol.: $y = 5 + 3\sin\omega t + 4\cos\omega t$

$y - 5 = \sqrt{3^2+4^2}$

$y_{max} = \sqrt{25}$

= 5 cm

31. Answer (3)

Hint: In cyclic process change in internal energy is zero.

Sol.: $Q = W + E$

$E = 0$

$Q = W$

32. Answer (3)

Hint: Process A to B is isochoric.

Sol.: $Q = \Delta U + W$

In isochoric process $W = 0$

$Q = \Delta U$

$\frac{Q}{\Delta U} = 1$

33. Answer (1)

Hint & Sol.: $C_V = \frac{R}{\gamma - 1}$ and remaining all other expressions are correct.

34. Answer (1)

Hint: $U = \frac{1}{2}nfRT$

Sol.: $U = \frac{1}{2}n_1f_1RT + \frac{1}{2}n_2f_2RT$

$= \frac{1}{2}\times 3\times 5RT + \frac{1}{2}\times 4\times 3RT$

$= \frac{15RT}{2} + \frac{12RT}{2}$

$= \frac{27RT}{2}$

= 13.5RT

35. Answer (1)

Hint: $PV = \frac{1}{3}m'N(V_{rms})^2$

Sol.: $PV = \frac{1}{3}m'N(V_{rms})^2$

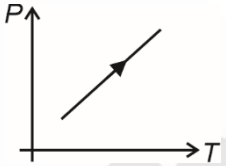
$KE = \frac{1}{2}m'N(V_{rms})^2$

$P = \frac{2E}{3}$

36. Answer (1)

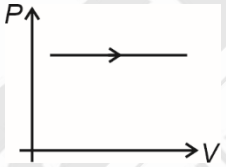
Hint: $\Delta U = nC_V\Delta T$ and $W = \int PdV$

Sol.:



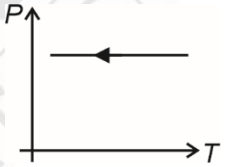
Volume is constant, so $W = 0$

Temperature is increasing, so ΔU is positive.

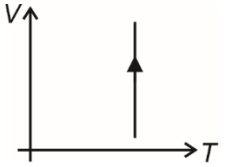


Both volume and temperature increasing.

So, both W and ΔU will positive.



Both volume and temperature decreasing, so both W and ΔU will negative.



Volume increasing, so W is positive and temperature is constant, so ΔU is zero.

37. Answer (4)

Hint & Sol.: $U = \frac{1}{2}nfRT$

$= \frac{1}{2}\times\frac{8}{32}\times 5\times 8.3\times 298$

= 1546 J

38. Answer (3)

Hint: For adiabatic process PV^{γ} = constant

Sol.: $PV = nRT$

$$V = \frac{nRT}{P}$$

PV^{γ} = constant

$$P\left(\frac{nRT}{P}\right)^{\gamma} = \text{constant}$$

$$P \propto (T)^{\frac{\gamma}{\gamma-1}}$$

$$\Rightarrow \frac{\gamma}{\gamma-1} = k$$

and $\gamma = \frac{7}{5}$

$$k = \frac{7}{2}$$

39. Answer (3)

Hint & Sol.: In isobaric process pressure is constant and temperature changes, so change in internal energy will not be zero.

40. Answer (1)

Hint: Time taken to reach from extreme position to mid-point is $\frac{T}{6}$

Sol.: $v = \frac{A}{2 \times \frac{T}{6}}$

$= \frac{3A}{T}$

$$T = \frac{2\pi}{\omega}$$

$$v = \frac{3A\omega}{2\pi}$$

41. Answer (3)

Hint: For S.H.M., $F = -kx$

Sol.: $F = -kx$

$-80 = -k \times 0.2$

$k = 400$

$$\omega = \sqrt{\frac{k}{m}}$$

$\omega = 20$ rad/s

42. Answer (4)

Hint: Differential equation of S.H.M. is

$$\frac{d^2x}{dt^2} + \omega^2 x = 0$$

Sol.: $\frac{d^2x}{dt^2} + 16x = 0$

$\omega^2 = 16$

$\omega = 4$

$$T = \frac{2\pi}{\omega}$$

$= \frac{\pi}{2}$ s

43. Answer (3)

Hint & Sol.: The frequency of the transverse wave in string is independent of position x from free end along the rope.

44. Answer (3)

Hint & Sol.: Velocity of particle and velocity of a transverse wave are perpendicular to each other. So $\vec{u} \cdot \vec{v} = 0$

45. Answer (4)

Hint: The frequency of wave depends on the source only.

Sol.: $v = \sqrt{\frac{\gamma RT}{M}}$

$$\frac{\lambda_1}{\lambda_2} = \frac{v_1}{v_2}$$

$$\frac{\lambda_1}{\lambda_2} = \sqrt{\frac{T_1}{T_2}}$$

$$\frac{100}{\lambda_2} = \sqrt{\frac{300}{600}}$$

$\lambda_2 = 141$ cm

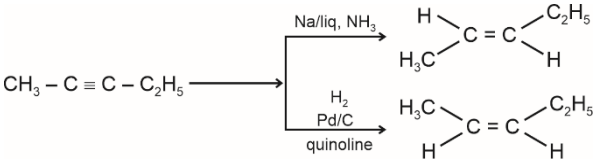
[CHEMISTRY]

46. Answer (2)

Hint: Hydrogenation using Na/liq. NH_3 yields 'trans' alkene

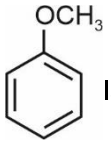
Hydrogenation using Pd/C in presence of quinoline yields 'cis' alkene.

Sol.:



47. Answer (1)

Hint: More is the electron density in the benzene ring ; more is the reactivity towards electrophilic reagent.

Sol.: 

Is most reactive towards electrophilic substitution reaction due to +R of oxygen lone pair.

48. Answer (2)

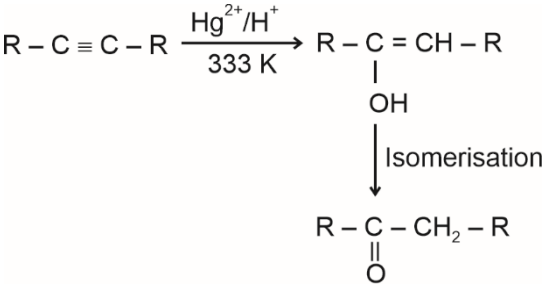
Hint: 1-Butyne and 2-butyne can be distinguished by the reagent which react only with one of the species.

Sol.: $NaNH_2$ reacts with 1-butyne due to the acidic proton present in 1-butyne and liberates NH_3 gas; while 2-butyne does not

49. Answer (2)

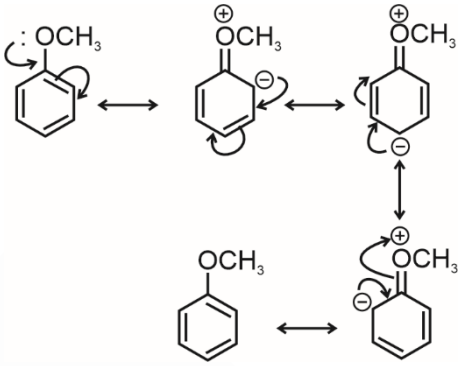
Hint: Alkyne on hydration form vinyl alcohol which on isomerisation yield carbonyl compound.

Sol.:



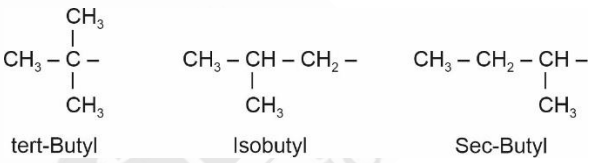
50. Answer (4)

Hint & Sol.:



51. Answer (3)

Hint & Sol.:



52. Answer (2)

Hint: PbS is black colour.

Sol.: $[Fe(CN)_5NOS]^{4-} \longrightarrow$ Violet

$[Fe(SCN)]^{2+} \longrightarrow$ Blood red

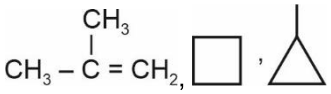
$Fe_4[Fe(CN)_6]_3 \cdot xH_2O \longrightarrow$ Prussian blue

53. Answer (4)

Hint: Compounds which have same molecular formula but different structural formula are structural isomers.

Sol.: $CH_3 - CH_2 - HC = CH_2$,

$CH_3 - CH = CH - CH_3$,



54. Answer (4)

Hint: More is the +I effect of substituent, lesser is the acidity.

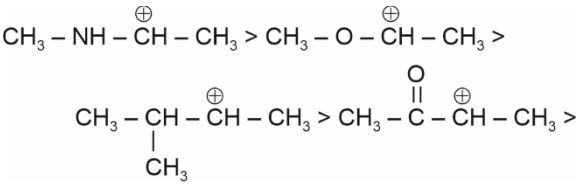
Sol.: Acidic nature: $CH_3COOH > C_2H_5COOH > C_3H_7COOH > C_4H_9COOH$

55. Answer (1)

Hint: Mesomeric effect stabilises the carbocation.

Sol.: +M (Nitrogen) > + M (Oxygen)

Hence, Order of stability is:



56. Answer (2)

Hint: Kjeldahl method is used for the estimation of nitrogen.

Sol.: Kjeldahl method is not applicable to compounds containing nitrogen in nitro and azo group and nitrogen present in ring as nitrogen of these compound does not change to ammonium sulphate under these condition.

57. Answer (3)

Hint: 188 g of AgBr contains 80 g of bromine.

Sol.: 188 g AgBr contains = 80 g Bromine

0.08 g AgBr contain = $\frac{80}{188} \times 0.08$ g Bromine

$$\% \text{ of Bromine} = \frac{\frac{80 \times 0.08}{188} \times 100}{0.1}$$

% of Bromine = 34.04%

58. Answer (4)

Hint: White precipitate soluble in NH_4OH indicates the presence of chlorine.

Sol.: Yellowish precipitate which is sparingly soluble in NH_4OH shows the presence of Bromine.

Yellow precipitate which is insoluble is NH_4OH shows the presence of Iodine.

59. Answer (2)

Hint & Sol.:

$$Na_3PO_4 + 3HNO_3 \longrightarrow H_3PO_4 + 3NaNO_3$$

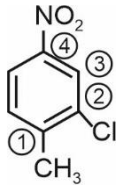
$$H_3PO_4 + 12(NH_4)_2MoO_4 + 21HNO_3$$

$$\longrightarrow (NH_4)_3 \cdot 12MoO_3 + 21NH_4NO_3 + 12H_2O$$

60. Answer (3)

Hint: Lowest set of locant rule is applied.

Sol.:

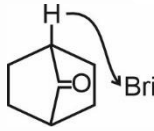


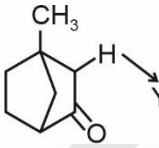
2-Chloro-1-methyl-4-nitrobenzene

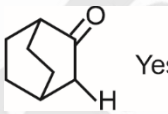
61. Answer (3)

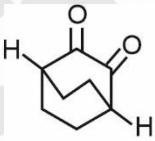
Hint: For tautomerism, there must be α-Hydrogen attached to sp^3-C with respect with C = O; also, that α-Hydrogen must not be at bridging position.

Sol.:





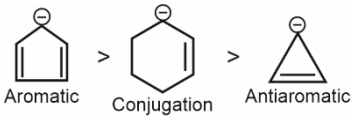




Hydrogen on bridging position

62. Answer (4)

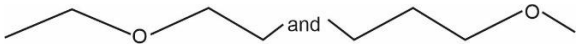
Hint & Sol.:



63. Answer (3)

Hint: Different alkyl chains on either side of functional groups in molecule.

Sol.:

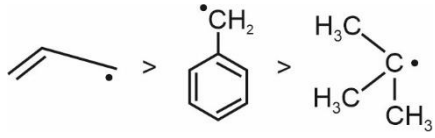


are metamers.

64. Answer (4)

Hint: The stability of free radical is compared the bond dissociation data.

Sol.:



65. Answer (2)

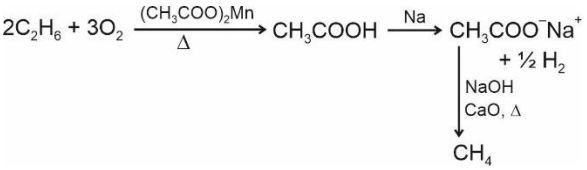
Hint: Homolytic cleavage can be shown as

$$R-X \xrightarrow[\text{Light}]{\text{Heat}} \dot{R}+\dot{X}$$

Sol.: $:CH_3-Z \longrightarrow :CH_3^- + Z^+$
(Heterolytic cleavage)

66. Answer (2)

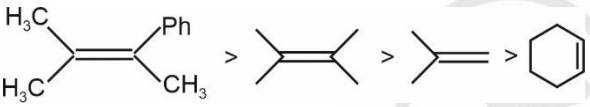
Hint & Sol.:



67. Answer (4)

Hint: Stability of alkenes depends upon the resonance and hyperconjugation.

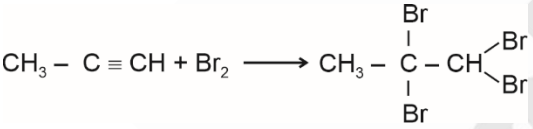
Sol.: Stability order:



68. Answer (2)

Hint: Addition of halogen on alkyne is electrophilic addition reaction.

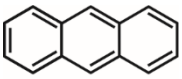
Sol.:



69. Answer (2)

Hint: Anthracene is an aromatic compound hence it will have $(4n + 2)\pi$ electrons.

Sol.:

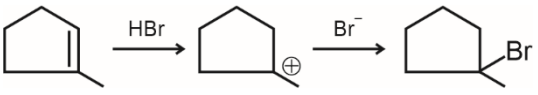

Anthracene

It has 7 π bonds and 14 π electrons.

70. Answer (4)

Hint: This is an example of electrophilic addition reaction.

Sol.:

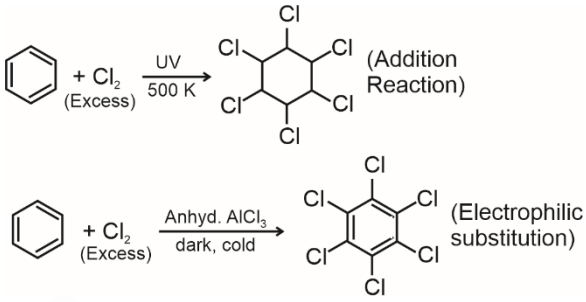


71. Answer (3)

Hint & Sol.: $CaC_2 + 2H_2O \longrightarrow Ca(OH)_2 + C_2H_2$

72. Answer (4)

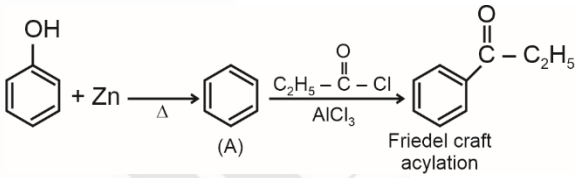
Hint & Sol.:



73. Answer (4)

Hint: Friedel Craft acylation is electrophilic substitution reaction.

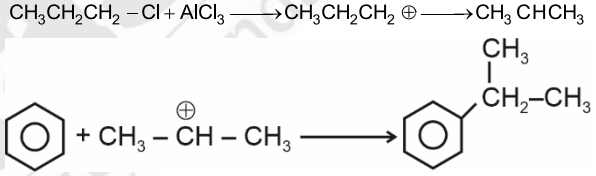
Sol.:



74. Answer (2)

Hint: Rearrangement of carbocation takes place.

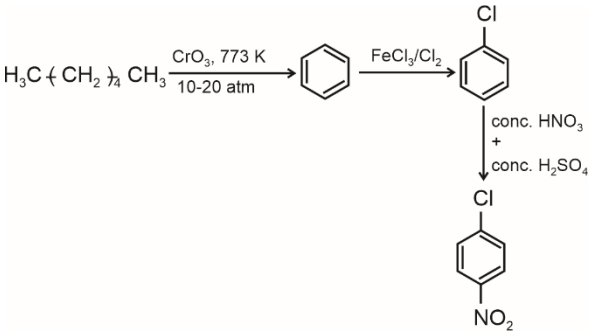
Sol.:



75. Answer (1)

Hint: Halogenation over aromatic compound leads via electrophilic substitution reaction.

Sol.:



76. Answer (3)

Hint: Halogenation of alkane is supposed to proceed via free radical chain mechanism.

Sol.: $CH_4 + I_2 \rightleftharpoons CH_3I + HI$

Iodination is too slow and a reversible reaction.

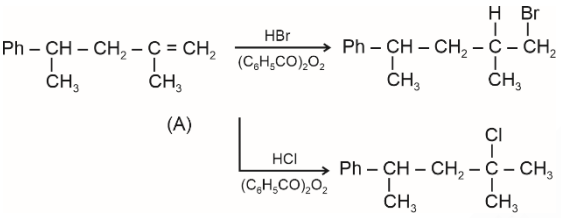
77. Answer (4)

Hint & Sol.: $\underset{(sp)}{HC} \equiv \underset{(sp)}{C} - \underset{(sp^3)}{CH_2} - \underset{(sp^2)}{\overset{\overset{O}{\|}}{C}} - \underset{(sp^3)}{O} - \underset{(sp^3)}{CH_2} - \underset{(sp^3)}{CH_3}$

78. Answer (3)

Hint: In HBr/Peroxide, Kharash effect is predominant which leads to the anti-Markovnikov addition via radical mechanism.

Sol.:



79. Answer (4)

Hint: –Cl is ortho/para directing with +M effect.

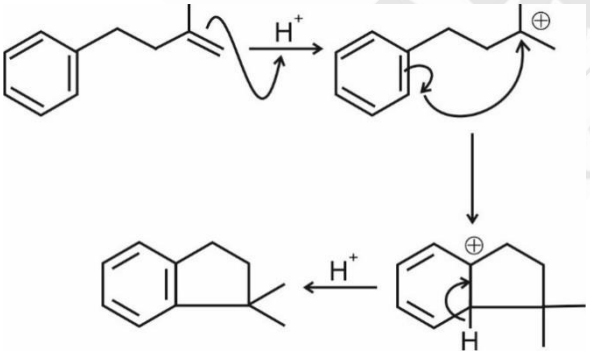
Sol.: –OH, –F $\Rightarrow$ Ortho/para directing

–CHO $\Rightarrow$ Meta directing

80. Answer (3)

Hint: In the presence of acid; the reaction pathway follows carbocation as intermediate.

Sol.:



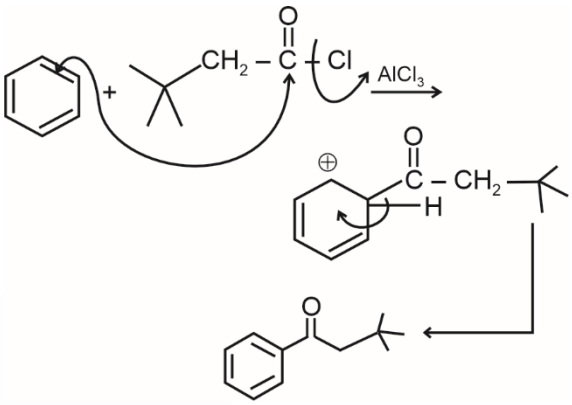
81. Answer (3)

Hint & Sol.: Polynuclear hydrocarbons containing more than two benzene rings fused together are toxic and said to possess carcinogenic property, they enter into human body and undergo various biochemical reactions and finally damage DNA.

82. Answer (1)

Hint: This reaction is Friedel-Crafts acylation.

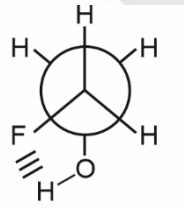
Sol.:



83. Answer (2)

Hint: Hydrogen bonding is the main factor for its stability.

Sol.:



(Hydrogen Bonding)

84. Answer (1)

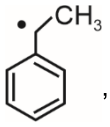
Hint: Aldehydes and ketones undergo reduction with amalgamated zinc and conc. HCl yielding alkanes.

Sol.:

$$CH_3 - \overset{\overset{O}{\|}}{C} - CH_3 \xrightarrow[\text{Conc. HCl}]{\text{Zn – Hg}} \underset{(X)}{CH_3 - CH_2 - CH_3}$$

85. Answer (2)

Hint: More the stable free radical formation, lesser is the bond dissociation enthalpy.

Sol.: 

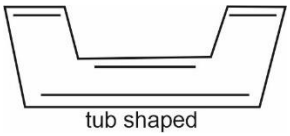
, is most stable radical among the options given.

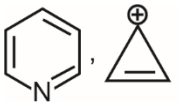
86. Answer (1)

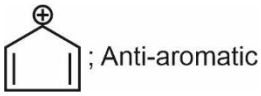
Hint: For aromaticity; the compound must be planar, have cyclic conjugation and follow

$(4n + 2)\pi e^-$.

Sol.:  non-planar as it exists as



 (Aromatic)

 ; Anti-aromatic

87. Answer (4)

Hint: $CH_4 + O_2 \xrightarrow[\text{Combustion}]{\text{Complete}} CO_2 + H_2O$

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

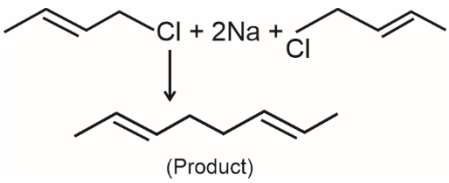
$CH_4 + O_2 \xrightarrow[\Delta]{Mo_2O_3} HCHO + H_2O$

$CH_4 + H_2O \xrightarrow[\Delta]{Ni} CO + 3H_2$

88. Answer (1)

Hint: When alkyl halide react with sodium in the pressure of dry ether yields alkane known as Wurtz reaction.

Sol.:



89. Answer (2)

Hint: Pyrolysis is a decomposition reaction into smaller fragments by the application of heat.

Sol.:

$C_{12}H_{26} \xrightarrow[973\ K]{Pt} C_7H_{16} + C_5H_{10} + \text{Other product}$

90. Answer (1)

Hint: Cold concentrated sulphuric acid adds to alkenes in accordance with Markovnikov rule.

Sol.:

$CH_3 - CH_2 - CH = CH_2 + \text{conc. } H_2SO_4$

$\downarrow$

$CH_3 - CH_2 - \underset{\displaystyle OSO_2OH}{\underset{|}{CH}} - CH_3$

[BOTANY]

91. Answer (3)

Hint: During log phase, growth progresses rapidly or exponentially.

Sol.: Lag phase represents the beginning of growth of microbes where their cell number is small.

92. Answer (1)

Hint: Secondary phloem is formed by the process similar to differentiation.

Sol.: Secondary phloem and secondary cortex are examples of redifferentiated tissue. Interfascicular vascular cambium is dedifferentiated tissue.

93. Answer (1)

Hint: The tip of the coleoptile is the source of auxin.

Sol.: Charles Darwin and Charles Francis observed bending of coleoptile of canary grass towards illuminated light. After series of experiments, it was concluded that tip of the coleoptile was the site of transmittable influence that cause its bending.

94. Answer (2)

Hint: Bolting occurs just prior to reproductive phase and leads to internode elongation enormously.

Sol.: Gibberellins promote bolting in rosette plants.

95. Answer (3)

Hint: ABA is an antagonist to GA.

Sol.: ABA inhibits the protein and RNA synthesis and causes destruction of chlorophyll.

Abscisic acid promotes abscission of flowers and fruits.

96. Answer (3)

Hint: Ethylene ($CH_2 = CH_2$) is a gaseous phytohormone.

Sol.: Gibberellic acid is composed of terpenes.

Cell dividing activity is shown by kinetin. It is adenine derivative. ABA is a derivative of carotenoids.

97. Answer (1)

Hint: This phytohormone also induces stem elongation in rosette habit plant.

Sol.: When gibberellin is sprayed on sugarcane crop, the length of the stem increases. As a result, the sugar content increases which finally increases the yield.

98. Answer (4)

Hint: Zeatin is isolated from corn kernels and coconut milk.

Sol.: Kinetin does not occur naturally in plants.

99. Answer (2)

Hint: Ethylene is synthesised in tissue undergoing senescence and during ripening of fruits.

Sol.: Ethylene breaks dormancy of seeds and initiate germination in seeds. It promotes rapid elongation of internodes in deep rice water plants.

100. Answer (3)

Hint: ABA stimulates the closure of stomata.

Sol.: ABA increases the tolerance of plants to various kinds of stresses. Therefore, it is called stress hormone.

101. Answer (2)

Hint: Miller et al. discovered PGR from degraded product of autoclaved herring sperm DNA.

Sol.: F. Skoog and his coworkers observed that tobacco callus formation occurs only when in addition with auxin, the culture medium is provided either with extract of yeast or coconut milk.

102. Answer (3)

Hint: This PGR also delay senescence.

Sol.: Gibberellins causes fruits like apple to elongate and improve its shape.

103. Answer (4)

Hint: Zeatin is first natural cytokinin.

Sol.: Inhibitor B, Dormin and Abscission II were proved to be chemically identical and later it was named abscisic acid.

104. Answer (2)

Hint: Cytokinin is synthesised in an area where rapid cell division occurs.

Sol.: Cytokinin is a modified form of adenine. It helps to produce new leaves.

Ethylene is involved in the formation of apical hook in dicot seedling.

105. Answer (3)

Hint: Relative growth rate

$$= \frac{\text{Growth per unit time}}{\text{Initial size}} \times 100$$

Sol.: Measurement and comparison of total growth per unit time is called the absolute growth rate.

106. Answer (4)

Hint: Tricarboxylic acid cycle involves citrate synthase enzyme.

Sol.: Glycolysis can take place in absence of oxygen.

In oxidative phosphorylation ATP is synthesised in the presence of ATP synthase.

Oxidative decarboxylation occurs when pyruvate is converted into acetyl CoA. This reaction is catalysed by pyruvate dehydrogenase.

107. Answer (2)

Hint: First irreversible reaction of glycolysis is conversion of glucose to glucose 6-phosphate.

Sol.: The first irreversible reaction of glycolysis is catalysed by the enzyme hexokinase.

108. Answer (3)

Hint: In one turn of tricarboxylic acid cycle, two decarboxylation reactions take place.

Sol.: For two molecules of Acetyl CoA, four decarboxylation reactions will take place in TCA cycle. It results in the release of four molecules of CO_2.

109. Answer (4)

Hint: It is a two-carbon compound.

Sol.: Before entering Krebs' cycle, the respiratory substrates proteins, fats and carbohydrates get converted into acetyl CoA, a common intermediate.

110. Answer (2)

Hint: Removal of CO_2 does not take place in glycolysis.

Sol.: Decarboxylation reaction takes place in link reaction and Krebs' cycle.

111. Answer (3)

Hint: In ATP synthase, F_1 is a headpiece and F_0 is an integral membrane protein complex.

Sol.: Proton gradient required for phosphorylation is obtained with the use of energy of oxidation and reduction. F_0 is an integral membrane protein complex that form the channel through which proton cross the inner membrane.

112. Answer (4)

Hint: Krebs cycle requires the reducing agent that reduces NAD^+ to NADH + H^+.

Sol.: Krebs cycle does not involve intermediate containing three carbons.

113. Answer (2)

Hint: Different respiratory substrates have different respiratory quotients.

Sol.: Respiratory quotient depends on types of respiratory substrate used.

114. Answer (3)

Hint: 1 pyruvic acid form one Acetyl CoA.

Sol.: 1 ATP/GTP is formed through substrate level phosphorylation in one round of Krebs' cycle.

115. Answer (2)

Hint: Total 10 molecules of $NADH^+ + H^+$ and two molecules of $FADH_2$ are formed from one glucose molecule through glycolysis and Krebs' cycle.

Sol.: There is a net gain of 38 molecules during aerobic respiration of one molecule of glucose.

116. Answer (1)

Hint: Succinate dehydrogenase enzyme is involved in the Krebs' cycle.

Sol.: In ETS of mitochondria, complex I has FMN and FeS.

Complex II is also involved in Krebs' cycle.

Complex III has cytochrome *b* and cytochrome c_1.

Complex IV contains two copper centres.

117. Answer (4)

Hint: Ubiquinone is found in inner mitochondrial membrane.

Sol.: Cytochrome *c* is a small protein attached to the outer surface of inner membrane and acts as a mobile carrier for transfer of electrons between complex III and complex IV.

118. Answer (2)

Hint: The first member of citric acid cycle is a 4 carbon compound.

Sol.: The first member of Krebs' cycle is oxaloacetic acid.

119. Answer (3)

Hint: In glycolysis, pay off phase is the energy yielding phase which is substrate level phosphorylation.

Sol.: In energy yielding step of glycolysis, substrate and product both contain three carbon molecules.

120. Answer (2)

Hint: Parthenocarpic fruits are produced by the application of PGR containing indole compound.

Sol.: Auxins such as IAA and IBA in diluted form are used to produce parthenocarpic or seedless fruits.

121. Answer (3)

Hint: It has powerful cytokinesis promoting effect.

Sol.: Miller et al. discovered the first cytokinin from degraded product of autoclaved herring sperm DNA.

122. Answer (4)

Hint: Ethylene occurs naturally in plants.

Sol.: Ethephon is used as source of ethylene in artificial ripening of fruits.

123. Answer (2)

Hint: It is a derivative of carotenoids.

Sol.: The concentration of ABA increases in the leaves of plants during stressful conditions. As a result stomata present in the epidermis of leaves closes to prevent the loss of water.

124. Answer (3)

Hint: 4-carbon compounds are formed during TCA cycle.

Sol.: Succinic acid and malic acid are 4-carbon compounds.

125. Answer (2)

Hint: RQ of glucose is 1.

Sol.: Tripalmitin (0.7) < Proteins (0.9) < Glucose (1) < Malic acid (1.33).

B < D < A < C

126. Answer (4)

Hint: The direct synthesis of ATP from metabolites is called substrate level phosphorylation.

Sol.: The substrate level phosphorylation reaction in glycolysis occurs during the conversion of 1, 3-bisphosphoglyceric acid to 3-phosphoglyceric acid.

127. Answer (2)

Hint: Pyruvic acid decarboxylase enzyme is involved in conversion of pyruvic acid to acetaldehyde.

Sol.: Pyruvic acid decarboxylase enzyme catalyses first step of alcoholic fermentation in which pyruvic acid is decarboxylated and it results in the formation of acetaldehyde and CO_2.

128. Answer (4)

Hint: Ubiquinone is located within the inner mitochondrial membrane.

Sol.: Ubiquinone receives reducing equivalents from both complex I and complex II.

129. Answer (3)

Hint: TCA cycle occurs twice for a molecule of glucose and it produces 2 $FADH_2$.

Sol.: To produce 6 molecules of $FADH_2$ through TCA cycle 6 turns of TCA cycle and 3 glucose molecules are required.

130. Answer (4)

Hint: One CO_2 in link reaction and two carbon dioxide in a TCA cycle are evolved during aerobic respiration.

Sol.: In aerobic respiration, the complete oxidation of pyruvate by the step wise removal of all the hydrogen atoms leaving three molecules of CO_2.

Krebs' cycle is also called citric acid cycle because of the formation of citric acid in the first step of this cycle.

131. Answer (3)

Hint: One of the synthetic auxins is used as weedicide.

Sol.: 2, 4-D is widely used to kill dicotyledonous weeds and it does not affect monocot plants.

132. Answer (4)

Hint: PGR containing indole compound promotes apical dominance in plants.

Sol.: Spraying juvenile conifers with gibberellic acid hastens their maturity period.

Auxin promotes apical dominance.

Cytokinin promotes nutrient mobilisation which helps in the delay of leaf senescence.

Ethylene also promotes root growth and root hair formation.

133. Answer (2)

Hint: This PGR was first isolated from human urine.

Sol.: Auxin helps to prevent fruit and leaf drop at early stages but promotes the abscission of older mature leaves and fruits.

134. Answer (3)

Hint: Environmental and developmental heterophylly is observed in buttercup and larkspur respectively.

Sol.: The leaves in the juvenile plant are different in shape from those in mature plant in larkspur. In buttercup, there is difference in shapes of leaves produced in air to those produced in water.

135. Answer (2)

Hint: The cells present just next to the cells of meristem zone are in the elongation phase.

Sol.: Cells found in elongation zone show increased vacuolation.

[ZOOLOGY]

136. Answer (2)

Hint: Structure present between hepatic caeca and Malpighian tubules

Sol.: In cockroach, foregut comprises the mouth, pharynx, oesophagus, crop and gizzard/proventriculus. Mesenteron is midgut.

The hind gut comprises ileum, colon and rectum.

137. Answer (3)

Hint: Structure present only in male cockroach

Sol.: Both in male and in female cockroaches, the 10^{th} segment bears a pair of jointed filamentous structures called anal cerci. A pair of anal style/caudal style is present only in male cockroaches.

138. Answer (3)

Hint: Passive process

Sol.: In cockroach, the respiratory system consists of a network of trachea, that open through 10 pairs of spiracles present on the lateral side of the body. Thin branching tubes carry oxygen from the air to all the parts. The exchange of gases takes place at the tracheoles by diffusion.

139. Answer (2)

Hint: Irregular spots are present

Sol.: In frogs, the colour of the dorsal side of body is generally olive green with dark irregular spots. On the ventral side, the skin is uniformly pale yellow.

140. Answer (2)

Hint: Eggs are more than oothecae.

Sol.: On an average, a female cockroach produces 9-10 oothecae, each containing 14-16 eggs.

141. Answer (4)

Hint: Mammals show internal fertilisation.

Sol.: Members of the class Osteichthyes exhibit external fertilisation. *Betta* (bony fish) shows external fertilisation. Reptiles, aves and mammals exhibit internal fertilisation.

142. Answer (2)

Hint: Male shows parental care.

Sol.: Pisces, amphibians and reptiles are poikilothermous. *Hippocampus* has four pairs of gills covered with operculum and is a marine bony fish. *Clarias* also possesses four pairs of gills covered with operculum but it is a fresh water bony fish. *Pristis* is a marine cartilaginous fish. It possesses five pairs of gills without operculum. *Salamandra* is an amphibian.

143. Answer (2)

Hint: *Petromyzon* is a jawless animal.

Sol.: Cyclostomata is a class under the division Agnatha. They have sucking and circular mouth without jaws.

Phylum Chordata is divided into 3 subphyla: Urochordata, Cephalochordata and Vertebrata.

144. Answer (4)

Hint: Egg laying mammal

Sol.: *Ornithorhynchus* is an egg laying mammal. *Myxine* belongs to the class Cyclostomata under the division Agnatha. *Amphioxus* is a cephalochordate. Cephalochordates and urochordates are often referred to as protochordates. *Bangarus* is a limbless reptile that belongs to the super class Tetrapoda.

145. Answer (1)

Hint: Exhibit migration

Sol.: *Torpedo* and *Trygon* are marine cartilaginous fishes. *Hippocampus* is a marine bony fish. *Clarias* is a fresh water bony fish.

146. Answer (3)

Hint: Identify a cephalochordate.

Sol.: *Ascidia*, *Salpa* and *Doliolum* are urochordates. In urochordates, notochord is present only in the larval tail. *Branchiostoma* is a cephalochordate. Notochord extends from the head to tail region and is persistent throughout the life in cephalochordates, cyclostomes and cartilaginous fishes.

147. Answer (2)

Hint: Caudal fin is present.

Sol.: Cyclostomes have an elongated body bearing 6-15 pairs of gill slits for respiration. Their body is devoid of scales and paired fins. Cranium and vertebral column are cartilaginous.

148. Answer (3)

Hint: *Pristis* is also called saw fish.

Sol.: *Torpedo* possesses electric organs while *Trygon* possesses poison sting. All the mentioned fishes are cartilaginous and marine in nature.

149. Answer (3)

Hint: Bile is secreted from liver.

Sol.: In frogs, digestion of food takes place by the action of HCl and gastric juice secreted from the walls of the stomach. Pancreas secretes pancreatic juices whereas bile is secreted from the liver and is stored in the gall bladder.

150. Answer (3)

Hint: Its basal part is called hypothalamus.

Sol.: In frogs, cerebral hemispheres and olfactory lobes are paired structures present in the forebrain. Diencephalon is an unpaired structure present in the forebrain of frogs. The midbrain is characterised by a pair of optic lobes.

151. Answer (2)

Hint: An unpaired bone in humans

Sol.: In cockroaches, maxilla and mandible are paired mouth parts while labrum and labium are unpaired. Grinding and incising regions are present on mandibles.

152. Answer (3)

Hint: Gizzard leads to midgut.

Sol.: In cockroach, the oesophagus dilates to form crop which is the largest part of the foregut. Crop leads to gizzard/proventriculus.

Gizzard has an outer layer of thick circular muscles and thick inner cuticle forming six highly chitinous plates called teeth. Gizzard helps in grinding the food particles.

153. Answer (2)

Hint: Haemocoel is filled with haemolymph.

Sol.: Blood vascular system of cockroach is an open type. Blood vessels are poorly developed and open into space called haemocoel. Visceral organs located in the haemocoel are bathed into blood (haemolymph).

154. Answer (3)

Hint: Nitrogenous waste products are converted into uric acid.

Sol.: Each Malpighian tubule is lined by glandular and ciliated cells. They absorb nitrogenous waste products and convert them into uric acid which is excreted out through the hindgut.

155. Answer (1)

Hint: Presence of pneumatic bones

Sol.: Not all the birds can fly. Birds that can fly have functional wings. Birds are usually aerial animals. They need light body weight to fly. For this, they show some aerial adaptations. Their long bones are hollow with air cavities (pneumatic) and forelimbs are modified into wings.

156. Answer (3)

Hint: Heart is dorsal in non-chordates.

Sol.: Tunicata and Vertebrata are subphyla under the phylum Chordata. Fundamental chordate characters are common in both tunicates and vertebrates. Presence of ventral muscular heart is one of the fundamental character. Jaws are present in gnathostomes only. Vertebral column is unique feature of vertebrates. Tunicates possess notochord in the larval tail only.

157. Answer (3)

Hint: Feature of crocodiles.

Sol.: Both amphibians and reptiles share some common features. In both the animal groups, tympanum represents ear. *Ichthyophis* and snakes are limbless amphibian and reptile respectively. Amphibians and reptiles usually have two pairs of limbs. Reptiles and amphibians have three chambered heart, except crocodiles, which possess a four-chambered heart.

158. Answer (1)

Hint: Similar feature is exhibited by insects

Sol.: Pharynx is the usual part of the digestive tract. The crop and gizzard are additional chambers present in the digestive tract of birds and insects.

Birds are warm-blooded animals. They are oviparous and development is direct.

159. Answer (3)

Hint: CNS is solid in non-chordates.

Sol.: In chordates, central nervous system is dorsal, hollow and single, while non-chordates have ventral, solid and double central nervous system. Phylum Chordata is divided into three subphyla: Urochordata, Cephalochordata and Vertebrata.

160. Answer (2)

Hint: Bear 6-15 pairs of gill slits

Sol.:

Mammalia	–	All members do not possess functional mammary glands; only female members have functional mammary glands
Cyclostomata	–	All living members of this class are ectoparasites on some fishes
Reptilia	–	They are oviparous and show direct development

161. Answer (3)

Hint: Body adapted for swimming.

Sol.: Both bony and cartilaginous fishes have streamlined body. Air bladder and operculum are present only in bony fishes while these are absent in cartilaginous fishes. Placoid scales are present only in cartilaginous fishes.

162. Answer (2)

Hint: Tympanum represents ear.

Sol.: *Rana* is an amphibian. Its body is divisible into head and trunk and tail is absent. *Salamandra* is an aquatic amphibian that possesses tail. *Panthera* (mammal) and *Crocodilus* (reptile), both possess a tail.

163. Answer (3)

Hint: Includes limbless amphibia

Sol.: *Ichthyophis* is a limbless amphibian while *Naja* is a limbless reptile. *Calotes, Chelone*, *Testudo* and *Hyla* have paired limbs.

164. Answer (1)

Hint: Include excretory structure in cockroach

Sol.: Pons is a part of hindbrain in mammals which is absent in frogs. Urecose gland is an excretory structure in cockroaches. The prominent endocrine glands found in frog are pituitary, thyroid, parathyroid, thymus, pineal body, pancreatic islets, adrenals and gonads.

165. Answer (3)

Hint: Hepatic and hypophyseal portal system are are present in humans.

Sol.: In frogs, special venous connection present between kidneys and lower parts of body is called renal portal system which is absent in humans. Hepatic portal system is a venous connection between liver and intestine that is present in both, frogs and humans.

166. Answer (4)

Hint: The structure helps in croaking.

Sol.: Male frogs can be distinguished by the presence of sound producing vocal sacs and also a copulatory pad on the first digit of the forelimbs which are absent in female frogs. In frogs, eyes are bulged and covered by a nictitating membrane that protects them while in water.

167. Answer (3)

Hint: Seen in mammals.

Sol.: Amphibians possess three-chambered heart that has two auricles and one ventricle. Ventricle receives both oxygenated and deoxygenated blood and pumps out mixed blood.

168. Answer (4)

Hint: Identify a reptile with limbs.

Sol.: Lancelet – *Branchiostoma*

Saw fish – *Pristis*

Turtle – *Chelone*

Great white shark – *Carcharodon*

169. Answer (4)

Hint: Gastric caeca secrete digestive juice.

Sol.:

Male genital pouch	–	Bounded ventrally by 9th sternum
Malpighian tubules	–	Lined by glandular and ciliated cells
Hepatic caeca	–	Secrete digestive juice
Mushroom-shaped gland	–	Present in 6th-7th abdominal segments in male

170. Answer (3)

Hint: Feature of warm-blooded animals

Sol.: The members of the class Osteichthyes are cold-blooded (poikilothermous) *i.e.,* they lack the capacity to regulate their body temperature. Warm-blooded animals like birds and mammals have the ability to regulate their body temperature.

171. Answer (2)

Hint: *Pteropus* is a mammal.

Sol.: Mammals are found in a variety of habitats. Some of them have adapted to fly (*Pteropus*) or live in water (dolphins).

172. Answer (2)

Hint: Structure which is modified into wings.

Sol.: In birds, the forelimbs are modified into wings. The hindlimbs generally have scales and are modified for walking, swimming or clasping the tree branches.

173. Answer (1)

Hint: Exclude reptiles

Sol.: The features mentioned are exhibited by cartilaginous fishes. *Carcharodon* is a cartilaginous fish that exhibits the mentioned features. *Clarias* is a freshwater bony fish. *Crocodilus* and *Alligator* are reptiles.

174. Answer (3)

Hint: Unique feature of mammals

Sol.: Presence of hair on skin is a unique feature of mammals. *Ornithorhynchus* is an egg laying mammal. *Pavo*, *Struthio* and *Neophron* are birds.

175. Answer (2)

Hint: Nodal musculature is auto-excitable.

Sol.: Frogs possess myogenic heart. This kind of heart has specialised nodal tissues which are auto-excitable. Hence, heart of a frog continues to beat for sometime even if it is taken out of the body.

In frogs, a triangular structure called sinus venosus joins the right atrium. The ventricle opens into a sac-like conus arteriosus on the ventral side of the heart.

176. Answer (2)

Hint: Used for flight

Sol.: Forewings (mesothoracic) called tegmina are opaque, dark and leathery and cover the hindwings when at rest. The hindwings are called metathoracic wings. They are transparent, membranous and are used in flight.

177. Answer (1)

Hint: Vasa efferentia arise from testes.

Sol.: The correct pathway for the passage of sperms in male frogs is

Testes $\rightarrow$ Vasa efferentia $\rightarrow$ Kidney $\rightarrow$ Bidder's canal $\rightarrow$ Urinogenital duct $\rightarrow$ Cloaca

178. Answer (3)

Hint: True for cutaneous respiration.

Sol.: In frogs, skin acts as the aquatic respiratory organ when they are in water. Dissolved oxygen in the water is exchanged through the skin by diffusion.

179. Answer (4)

Hint: True for testes.

Sol.: In female frogs, the ovaries are situated near kidneys and there is no functional connection with kidneys. Males have urinogenital ducts. Larva of frog is called tadpole.

In male frogs, a pair of yellowish ovoid testes are found adhered to the upper part of kidneys by a double fold of peritoneum called mesorchium.

180. Answer (1)

Hint: Part of hindbrain

Sol.: In frogs, the medulla oblongata passes out through the foramen magnum and continues into spinal cord, which is enclosed in the vertebral column. Cerebrum and diencephalon are parts of forebrain.

❑ ❑ ❑

All India Aakash Test Series for NEET - 2026

TEST - 6 (Code-D)

Click here for Code-C sol.

Test Date : 16/03/2025

ANSWERS

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

HINTS & SOLUTIONS

[PHYSICS]

1. Answer (4)

Hint: The frequency of wave depends on the source only.

Sol.: $v = \sqrt{\frac{\gamma RT}{M}}$

$\frac{\lambda_1}{\lambda_2} = \frac{v_1}{v_2}$

$\frac{\lambda_1}{\lambda_2} = \sqrt{\frac{T_1}{T_2}}$

$\frac{100}{\lambda_2} = \sqrt{\frac{300}{600}}$

λ_2 = 141 cm

2. Answer (3)

Hint & Sol.: Velocity of particle and velocity of a transverse wave are perpendicular to each other.

So $\vec{u} \cdot \vec{v} = 0$

3. Answer (3)

Hint & Sol.: The frequency of the transverse wave in string is independent of position x from free end along the rope.

4. Answer (4)

Hint: Differential equation of S.H.M. is $\frac{d^2x}{dt^2} + \omega^2 x = 0$

Sol.: $\frac{d^2x}{dt^2} + 16x = 0$

ω^2 = 16

ω = 4

$T = \frac{2\pi}{\omega}$

= $\frac{\pi}{2}$ s

5. Answer (3)

Hint: For S.H.M., $F = -kx$

Sol.: $F = -kx$

$-80 = -k \times 0.2$

k = 400

$\omega = \sqrt{\frac{k}{m}}$

ω = 20 rad/s

6. Answer (1)

Hint: Time taken to reach from extreme position to mid-point is $\frac{T}{6}$

Sol.: $v = \frac{A}{2 \times \frac{T}{6}}$

= $\frac{3A}{T}$

$T = \frac{2\pi}{\omega}$

$v = \frac{3A\omega}{2\pi}$

7. Answer (3)

Hint & Sol.: In isobaric process pressure is constant and temperature changes, so change in internal energy will not be zero.

8. Answer (3)

Hint: For adiabatic process PV^γ = constant

Sol.: $PV = nRT$

$V = \frac{nRT}{P}$

PV^γ = constant

$P\left(\frac{nRT}{P}\right)^\gamma$ = constant

$P \propto (T)^{\frac{\gamma}{\gamma-1}}$

$\Rightarrow \frac{\gamma}{\gamma-1} = k$

and $\gamma = \frac{7}{5}$

$k = \frac{7}{2}$

9. Answer (4)

Hint & Sol.: $U = \frac{1}{2}nfRT$

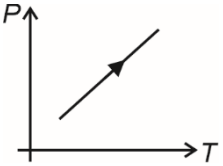
$= \frac{1}{2} \times \frac{8}{32} \times 5 \times 8.3 \times 298$

= 1546 J

10. Answer (1)

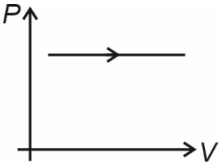
Hint: $\Delta U = nC_V \Delta T$ and $W = \int PdV$

Sol.:



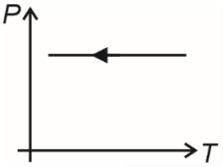
Volume is constant, so $W = 0$

Temperature is increasing, so ΔU is positive.

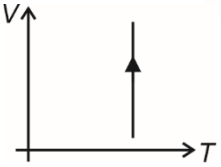


Both volume and temperature increasing.

So, both W and ΔU will positive.



Both volume and temperature decreasing, so both W and ΔU will negative.



Volume increasing, so W is positive and temperature is constant, so ΔU is zero.

11. Answer (1)

Hint: $PV = \frac{1}{3}m'N(V_{rms})^2$

Sol.: $PV = \frac{1}{3}m'N(V_{rms})^2$

$KE = \frac{1}{2}m'N(V_{rms})^2$

$P = \frac{2E}{3}$

12. Answer (1)

Hint: $U = \frac{1}{2}nfRT$

Sol.: $U = \frac{1}{2}n_1f_1RT + \frac{1}{2}n_2f_2RT$

$= \frac{1}{2} \times 3 \times 5RT + \frac{1}{2} \times 4 \times 3RT$

$= \frac{15RT}{2} + \frac{12RT}{2}$

$= \frac{27RT}{2}$

$= 13.5RT$

13. Answer (1)

Hint & Sol.: $C_V = \frac{R}{\gamma - 1}$ and remaining all other expressions are correct.

14. Answer (3)

Hint: Process A to B is isochoric.

Sol.: $Q = \Delta U + W$

In isochoric process $W = 0$

$Q = \Delta U$

$\frac{Q}{\Delta U} = 1$

15. Answer (3)

Hint: In cyclic process change in internal energy is zero.

Sol.: $Q = W + E$

$E = 0$

$Q = W$

16. Answer (4)

Hint: Maximum value of $a\sin\omega t + b\cos\omega t$ is $\sqrt{a^2 + b^2}$

Sol.: $y = 5 + 3\sin\omega t + 4\cos\omega t$

$y - 5 = \sqrt{3^2 + 4^2}$

$y_{max} = \sqrt{25}$

= 5 cm

17. Answer (2)

Hint: $\sin^2 \omega t = \frac{1-\cos 2\omega t}{2}$

Sol.: $y = \sin^2\omega t$

$y = \frac{1-\cos 2\omega t}{2}$

$y - \frac{1}{2} = \frac{-\cos 2\omega t}{2}$

$y' = \frac{-\cos 2\omega t}{2}$

$T = \frac{2\pi}{2\omega}$

$= \frac{\pi}{\omega}$

So, $y = \sin^2\omega t$ is periodic function with time period $\frac{\pi}{\omega}$

Rest all other functions are not periodic.

18. Answer (1)

Hint: String vibrates in two loops.

Sol.: $L = \frac{\lambda}{2} + \frac{\lambda}{2}$

$= \lambda$

$\frac{2\pi}{\lambda} = 0.11$

$\lambda = \frac{2\times 22}{0.11\times 7}$

$= \frac{400}{7}$

≈ 57 cm

19. Answer (3)

Hint: Frequency of third harmonic = $\frac{3v}{2l}$

Sol.: $v = \sqrt{\frac{T}{\rho A}}$

$= \sqrt{\frac{110}{7\times 10^3 \times \frac{22}{7} \times \frac{10^{-6}}{4}}}$

= 141 m/s

$f = \frac{3v}{2l}$

$= \frac{3}{2}\times 141$

≈ 210 Hz

20. Answer (3)

Hint: For open tube fundamental frequency $f_1 = \frac{v}{2l}$

Sol.: $f_1 = \frac{v}{2l}$

$f_2 = \frac{v}{4\times \frac{l}{3}}$

$f_2 = \frac{3v}{4l}$

$\frac{f_1}{f_2} = \frac{2}{3}$

21. Answer (4)

Hint: Time interval between two consecutive maximum and minimum intensities of sound is

$= \frac{1}{2(f_1 - f_2)}$

Sol.: $(f_1 - f_2) = \left(\frac{5}{4}\right)$

$\frac{1}{|f_1 - f_2|} = \frac{4}{5} = 0.8$

$\frac{1}{2|f_1 - f_2|} = \frac{0.8}{2}$ = 0.4 s

22. Answer (3)

Hint & Sol.: The phenomenon of interference follows conservation of energy. Equal amplitude of waves is not an essential condition for interference phenomenon.

23. Answer (1)

Hint & Sol.: Progressive wave is a wave that moves from one point to another in space.

Speed of progressive wave is given by $v = \frac{\omega}{k}$

24. Answer (2)

Hint & Sol.: $y = A \sin\omega t \cos kx$ represents the expression of standing wave.

25. Answer (2)

Hint & Sol.: Displacement and acceleration of a particle executing S.H.M. are in opposite phase.

26. Answer (1)

Hint & Sol.: The velocity of sound is greatest in steel among the given option.

27. Answer (3)

Hint: Fundamental frequency of closed pipe

$$f = \frac{v}{4l}$$

Sol.: First overtone of open pipe $f = \frac{v}{l}$

$$\frac{v}{4l_1} = \frac{v}{l_2}$$

$$l_2 = 4 \times 20$$

= 80 cm

28. Answer (4)

Hint: Use, $v_{max} = A\omega$

Sol.: $F = -9x$

$a = -9x$

$\omega = \sqrt{9}$

= 3

$A\omega = v_{max}$

$A \times 3 = 30 \times 10^{-2}$

A = 0.1 m

29. Answer (2)

Hint & Sol.: $x = \sin\omega t$

$y = 3\sin\omega t$

$y = 3x$, this is equation of straight line, so path of particle will be a straight line.

30. Answer (3)

Hint: For particle undergoing SHM,

$$K.E._{max} = \frac{1}{2}kA^2$$

Sol.: $A_R = \sqrt{A^2 + A^2 + 2A^2\cos 90^\circ}$

$= \sqrt{2}A$

$k = m\omega^2$

$$K.E._{max} = \frac{1}{2}m\omega^2\left(\sqrt{2}A\right)^2$$

$= m\omega^2A^2$

31. Answer (3)

Hint: Time period of spring-mass system depends on mass and stiffness of system.

Sol.: Time period of oscillation of spring mass system $T = 2\pi\sqrt{\frac{m}{k}}$

32. Answer (1)

Hint: At $t = \frac{T}{4}$ particle will be at extreme position.

Sol.: $x = A\sin(\omega t)$

$v = A\,\omega\cos(\omega t)$

at $t = \frac{T}{4}$

$v = 0$

33. Answer (2)

Hint: Use, $a = \omega^2A$

Sol.: $\omega = 2\pi f$

$= 2\pi \times 50$

$= 100\pi$

$a = (100\pi)^2 \times 0.02$

$= 200\ \pi^2$ m/s^2

34. Answer (1)

Hint: Work done in isobaric process is $W = nR\Delta T$

Sol.: $Q = nC_P\Delta T$

$$Q = \frac{nR\Delta T\gamma}{\gamma - 1}$$

$$nR\Delta T = \frac{Q(\gamma - 1)}{\gamma}$$

$$W = \frac{Q\left(\frac{7}{5} - 1\right)}{\left(\frac{7}{5}\right)}$$

$$= \frac{2Q}{7}$$

35. Answer (3)

Hint & Sol.: In free expansion, work done will be zero, chamber is insulated so ΔQ will be zero. So, ΔU will be zero and temperature will be constant.

36. Answer (3)

Hint: Area under pressure and volume curve is work done.

Sol.: $W = W_{AB} + W_{BC}$

$= 0 + P_0(3V_0 - V_0)$

$= 2P_0V_0$

37. Answer (4)

Hint: Q is not a state variable. 'ΔQ' is extensive.

Sol.: In $\Delta Q = \Delta U + P\Delta V$ quantities on both sides are extensive.

38. Answer (1)

Hint: Use, $\eta = 1 - \frac{T_L}{T_H}$

Sol.: $\frac{30}{100} = 1 - \frac{T_L}{T}$

$T_L = \frac{7T}{10}$

$\frac{1}{2} = 1 - \frac{T_L}{T_H}$

$\frac{T_L}{T_H} = \frac{1}{2} \Rightarrow T_H = 2T_L$

$T_H = 2 \times \frac{7T}{10}$

$T_H = \frac{7T}{5}$

39. Answer (3)

Hint & Sol.: $U = \frac{1}{2}nfRT$

So internal energy of the gas depends on temperature and nature of the gas.

40. Answer (4)

Hint & Sol.: $\frac{1}{\sqrt{2} \cdot \pi n d^2} = \frac{K_B T}{\sqrt{2}\pi d^2 P}$

41. Answer (4)

Hint: $v_{rms} = \sqrt{\frac{3RT}{M}}$

Sol.: $\frac{v}{v_1} = \frac{\sqrt{\frac{T}{M}}}{\sqrt{\frac{3T}{M}}}$

$\frac{v}{v_1} = \frac{1}{\sqrt{3}}$

$\Rightarrow v_1 = \sqrt{3}\, v$

42. Answer (2)

Hint: $U = \frac{1}{2}nfRT$

Sol.: $\frac{1}{2}n_1fRT_1 + \frac{1}{2}n_2fRT_2 = \frac{1}{2}(n_1 + n_2)fRT$

$1 \times T_0 + 2 \times 3T_0 = (1+2)T$

$T_1 = \left(\frac{7T_0}{3}\right)$

43. Answer (3)

Hint: Use $PV = nRT$

Sol.: $\frac{n_1RT_1}{P_1} = \frac{n_2RT_2}{P_2}$

$\frac{m \times 600}{P_1} = \frac{m_2 \times 400}{\frac{P_1}{2}}$

$m_2 = \frac{3}{4}m$

$m_2 = \frac{3}{4} \times 8$

$= 6$ g

Amount of gas leaked = (8 – 6) g = 2 g

44. Answer (1)

Hint: Use, $\frac{C_P}{C_V} = \gamma$

Sol.: $\gamma = \frac{f+2}{f}$

Degree of freedom for monoatomic gas is 3 and for diatomic gas is 6.

$\gamma_{mono} = \frac{5}{3}$

$\gamma_{dia} = \frac{7}{5}$

45. Answer (1)

Hint & Sol.: The SI unit of molar specific heat at constant pressure is J mol^{-1} K^{-1}.

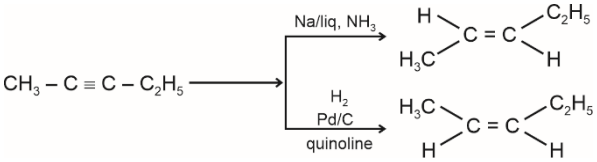
[CHEMISTRY]

46. Answer (2)

Hint: Hydrogenation using Na/liq. NH_3 yields 'trans' alkene

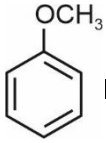
Hydrogenation using Pd/C in presence of quinoline yields 'cis' alkene.

Sol.:



47. Answer (1)

Hint: More is the electron density in the benzene ring ; more is the reactivity towards electrophilic reagent.

Sol.:  Is most reactive towards electrophilic substitution reaction due to +R of oxygen lone pair.

48. Answer (2)

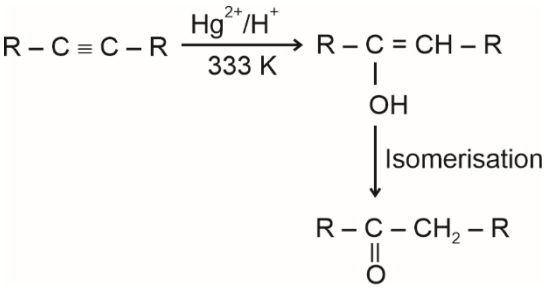
Hint: 1-Butyne and 2-butyne can be distinguished by the reagent which react only with one of the species.

Sol.: $NaNH_2$ reacts with 1-butyne due to the acidic proton present in 1-butyne and liberates NH_3 gas; while 2-butyne does not

49. Answer (2)

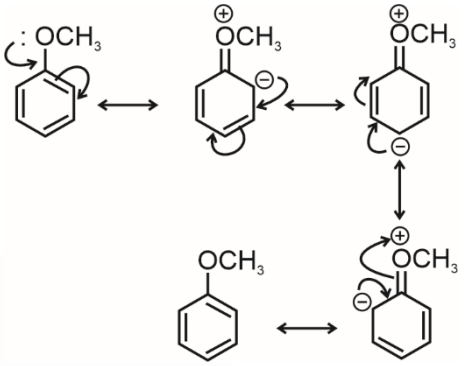
Hint: Alkyne on hydration form vinyl alcohol which on isomerisation yield carbonyl compound.

Sol.:



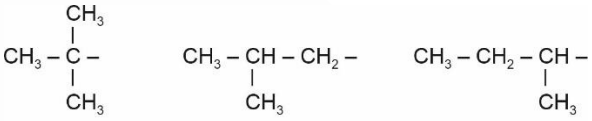
50. Answer (4)

Hint & Sol.:



51. Answer (3)

Hint & Sol.:



52. Answer (2)

Hint: PbS is black colour.

Sol.: $[Fe(CN)_5NOS]^{4-} \longrightarrow$ Violet

$[Fe(SCN)]^{2+} \longrightarrow$ Blood red

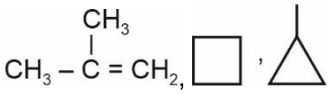
$Fe_4[Fe(CN)_6]_3 \cdot xH_2O \longrightarrow$ Prussian blue

53. Answer (4)

Hint: Compounds which have same molecular formula but different structural formula are structural isomers.

Sol.: $CH_3 - CH_2 - HC = CH_2$,

$CH_3 - CH = CH - CH_3$,



54. Answer (4)

Hint: More is the +I effect of substituent, lesser is the acidity.

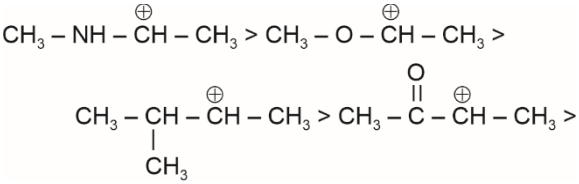
Sol.: Acidic nature: $CH_3COOH > C_2H_5COOH > C_3H_7COOH > C_4H_9COOH$

55. Answer (1)

Hint: Mesomeric effect stabilises the carbocation.

Sol.: +M (Nitrogen) > + M (Oxygen)

Hence, Order of stability is:



56. Answer (2)

Hint: Kjeldahl method is used for the estimation of nitrogen.

Sol.: Kjeldahl method is not applicable to compounds containing nitrogen in nitro and azo group and nitrogen present in ring as nitrogen of these compound does not change to ammonium sulphate under these condition.

57. Answer (3)

Hint: 188 g of AgBr contains 80 g of bromine.

Sol.: 188 g AgBr contains = 80 g Bromine

0.08 g AgBr contain = $\frac{80}{188} \times 0.08$ g Bromine

% of Bromine = $\frac{\frac{80 \times 0.08}{188} \times 100}{0.1}$

% of Bromine = 34.04%

58. Answer (4)

Hint: White precipitate soluble in NH_4OH indicates the presence of chlorine.

Sol.: Yellowish precipitate which is sparingly soluble in NH_4OH shows the presence of Bromine.

Yellow precipitate which is insoluble is NH_4OH shows the presence of Iodine.

59. Answer (2)

Hint & Sol.:

$$Na_3PO_4 + 3HNO_3 \longrightarrow H_3PO_4 + 3NaNO_3$$

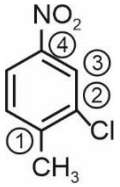
$$H_3PO_4 + 12(NH_4)_2MoO_4 + 21HNO_3$$

$$\longrightarrow (NH_4)_3 \cdot 12MoO_3 + 21NH_4NO_3 + 12H_2O$$

60. Answer (3)

Hint: Lowest set of locant rule is applied.

Sol.:

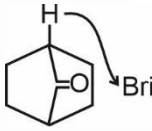


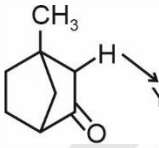
2-Chloro-1-methyl-4-nitrobenzene

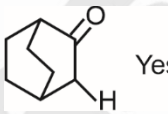
61. Answer (3)

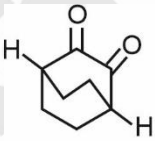
Hint: For tautomerism, there must be α-Hydrogen attached to sp^3-C with respect with C = O; also, that α-Hydrogen must not be at bridging position.

Sol.:





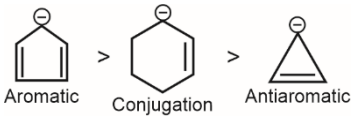




Hydrogen on bridging position

62. Answer (4)

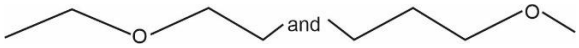
Hint & Sol.:



63. Answer (3)

Hint: Different alkyl chains on either side of functional groups in molecule.

Sol.:

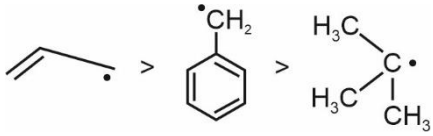


are metamers.

64. Answer (4)

Hint: The stability of free radical is compared the bond dissociation data.

Sol.:



65. Answer (2)

Hint: Homolytic cleavage can be shown as

$$R-X \xrightarrow[\text{Light}]{\text{Heat}} \dot{R}+\dot{X}$$

Sol.: $:CH_3-Z \longrightarrow :CH_3^- + Z^+$
(Heterolytic cleavage)

66. Answer (1)

Hint: Cold concentrated sulphuric acid adds to alkenes in accordance with Markovnikov rule.

Sol.:

$$CH_3-CH_2-CH=CH_2 + \text{conc. } H_2SO_4 \downarrow$$

$$CH_3-CH_2-\underset{\displaystyle OSO_2OH}{\underset{|}{CH}}-CH_3$$

67. Answer (2)

Hint: Pyrolysis is a decomposition reaction into smaller fragments by the application of heat.

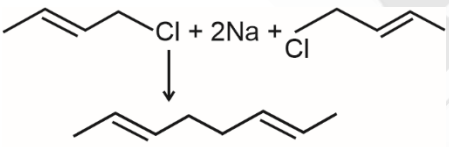
Sol.:

$$C_{12}H_{26} \xrightarrow[973\ K]{Pt} C_7H_{16} + C_5H_{10} + \text{Other product}$$

68. Answer (1)

Hint: When alkyl halide react with sodium in the pressure of dry ether yields alkane known as Wurtz reaction.

Sol.:



(Product)

69. Answer (4)

Hint: $CH_4 + O_2 \xrightarrow[\text{Combustion}]{\text{Complete}} CO_2 + H_2O$

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

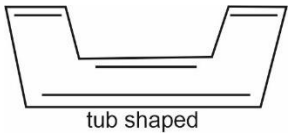
$$CH_4 + O_2 \xrightarrow[\Delta]{Mo_2O_3} HCHO + H_2O$$

$$CH_4 + H_2O \xrightarrow[\Delta]{Ni} CO + 3H_2$$

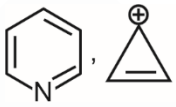
70. Answer (1)

Hint: For aromaticity; the compound must be planar, have cyclic conjugation and follow $(4n + 2)\pi e^-$.

Sol.:  non-planar as it exists as



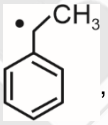
tub shaped

 (Aromatic)

 ; Anti-aromatic

71. Answer (2)

Hint: More the stable free radical formation, lesser is the bond dissociation enthalpy.

Sol.:  , is most stable radical among the options given.

72. Answer (1)

Hint: Aldehydes and ketones undergo reduction with amalgamated zinc and conc. HCl yielding alkanes.

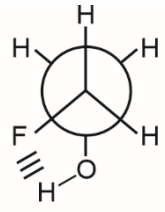
Sol.:

$$CH_3-\overset{\displaystyle O}{\overset{\|}{C}}-CH_3 \xrightarrow[\text{Conc. HCl}]{Zn-Hg} \underset{(X)}{CH_3-CH_2-CH_3}$$

73. Answer (2)

Hint: Hydrogen bonding is the main factor for its stability.

Sol.:

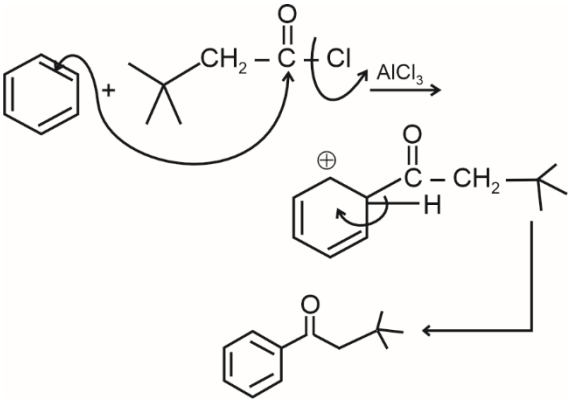


(Hydrogen Bonding)

74. Answer (1)

Hint: This reaction is Friedel-Crafts acylation.

Sol.:



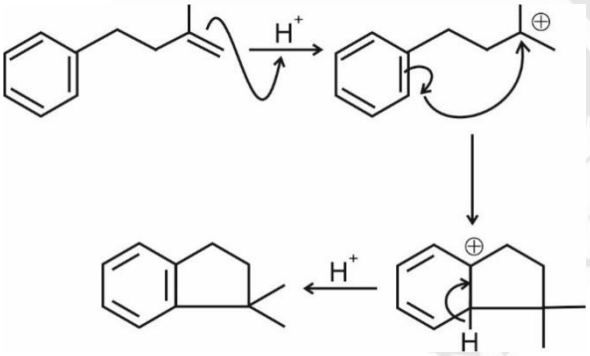
75. Answer (3)

Hint & Sol.: Polynuclear hydrocarbons containing more than two benzene rings fused together are toxic and said to possess carcinogenic property, they enter into human body and undergo various biochemical reactions and finally damage DNA.

76. Answer (3)

Hint: In the presence of acid; the reaction pathway follows carbocation as intermediate.

Sol.:



77. Answer (4)

Hint: –Cl is ortho/para directing with +M effect.

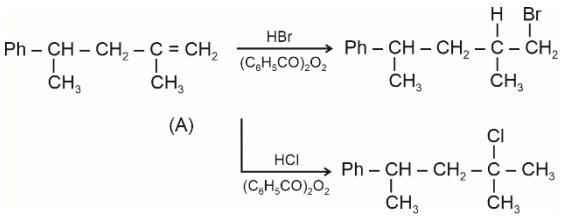
Sol.: –OH, –F ⇒ Ortho/para directing

–CHO ⇒ Meta directing

78. Answer (3)

Hint: In HBr/Peroxide, Kharash effect is predominant which leads to the anti-Markovnikov addition via radical mechanism.

Sol.:



79. Answer (4)

Hint & Sol.: $\underset{(sp)}{HC} \equiv \underset{(sp)}{C} - \underset{(sp^3)}{CH_2} - \underset{(sp^2)}{\overset{\overset{O}{\|}}{C}} - \underset{(sp^3)}{O} - \underset{(sp^3)}{CH_2} - \underset{(sp^3)}{CH_3}$

80. Answer (3)

Hint: Halogenation of alkane is supposed to proceed via free radical chain mechanism.

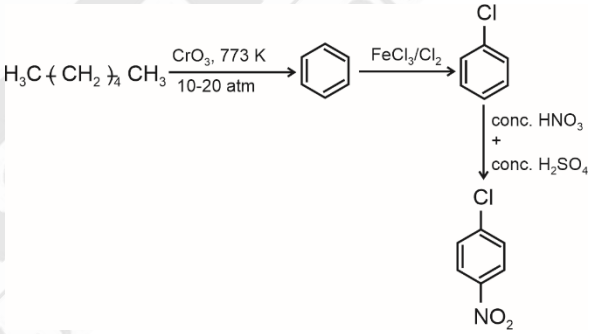
Sol.: $CH_4 + I_2 \rightleftharpoons CH_3I + HI$

Iodination is too slow and a reversible reaction.

81. Answer (1)

Hint: Halogenation over aromatic compound leads via electrophilic substitution reaction.

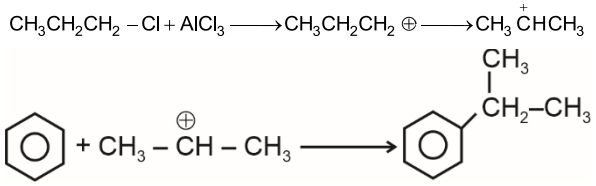
Sol.:



82. Answer (2)

Hint: Rearrangement of carbocation takes place.

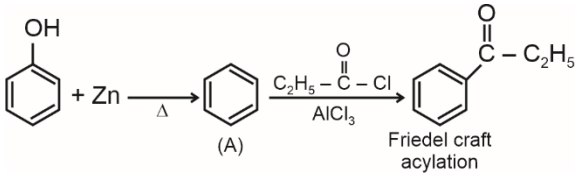
Sol.:



83. Answer (4)

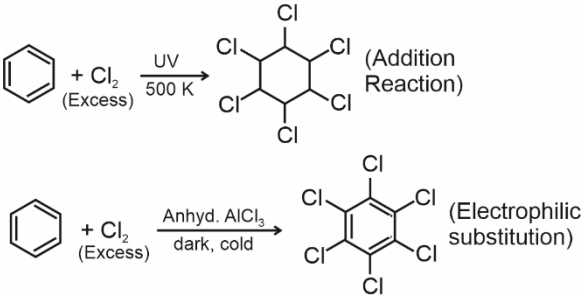
Hint: Friedel Craft acylation is electrophilic substitution reaction.

Sol.:



84. Answer (4)

Hint & Sol.:



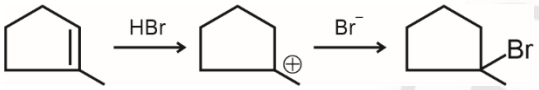
85. Answer (3)

Hint & Sol.: $CaC_2 + 2H_2O \longrightarrow Ca(OH)_2 + C_2H_2$

86. Answer (4)

Hint: This is an example of electrophilic addition reaction.

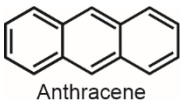
Sol.:



87. Answer (2)

Hint: Anthracene is an aromatic compound hence it will have (4n + 2)π electrons.

Sol.:

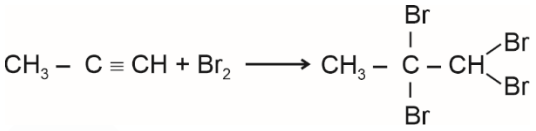


It has 7 π bonds and 14 π electrons.

88. Answer (2)

Hint: Addition of halogen on alkyne is electrophilic addition reaction.

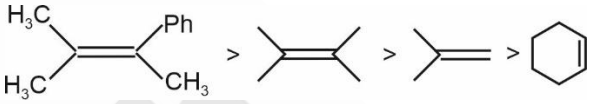
Sol.:



89. Answer (4)

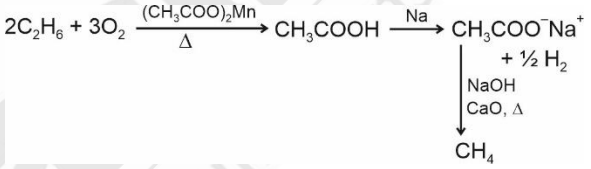
Hint: Stability of alkenes depends upon the resonance and hyperconjugation.

Sol.: Stability order:



90. Answer (2)

Hint & Sol.:



[BOTANY]

91. Answer (2)

Hint: The cells present just next to the cells of meristem zone are in the elongation phase.

Sol.: Cells found in elongation zone show increased vacuolation.

92. Answer (3)

Hint: Environmental and developmental heterophylly is observed in buttercup and larkspur respectively.

Sol.: The leaves in the juvenile plant are different in shape from those in mature plant in larkspur. In buttercup, there is difference in shapes of leaves produced in air to those produced in water.

93. Answer (2)

Hint: This PGR was first isolated from human urine.

Sol.: Auxin helps to prevent fruit and leaf drop at early stages but promotes the abscission of older mature leaves and fruits.

94. Answer (4)

Hint: PGR containing indole compound promotes apical dominance in plants.

Sol.: Spraying juvenile conifers with gibberellic acid hastens their maturity period.

Auxin promotes apical dominance.

Cytokinin promotes nutrient mobilisation which helps in the delay of leaf senescence.

Ethylene also promotes root growth and root hair formation.

95. Answer (3)

Hint: One of the synthetic auxins is used as weedicide.

Sol.: 2, 4-D is widely used to kill dicotyledonous weeds and it does not affect monocot plants.

96. Answer (4)

Hint: One CO_2 in link reaction and two carbon dioxide in a TCA cycle are evolved during aerobic respiration.

Sol.: In aerobic respiration, the complete oxidation of pyruvate by the step wise removal of all the hydrogen atoms leaving three molecules of CO_2.

Krebs' cycle is also called citric acid cycle because of the formation of citric acid in the first step of this cycle.

97. Answer (3)

Hint: TCA cycle occurs twice for a molecule of glucose and it produces 2 $FADH_2$.

Sol.: To produce 6 molecules of $FADH_2$ through TCA cycle 6 turns of TCA cycle and 3 glucose molecules are required.

98. Answer (4)

Hint: Ubiquinone is located within the inner mitochondrial membrane.

Sol.: Ubiquinone receives reducing equivalents from both complex I and complex II.

99. Answer (2)

Hint: Pyruvic acid decarboxylase enzyme is involved in conversion of pyruvic acid to acetaldehyde.

Sol.: Pyruvic acid decarboxylase enzyme catalyses first step of alcoholic fermentation in which pyruvic acid is decarboxylated and it results in the formation of acetaldehyde and CO_2.

100. Answer (4)

Hint: The direct synthesis of ATP from metabolites is called substrate level phosphorylation.

Sol.: The substrate level phosphorylation reaction in glycolysis occurs during the conversion of 1, 3-bisphosphoglyceric acid to 3-phosphoglyceric acid.

101. Answer (2)

Hint: RQ of glucose is 1.

Sol.: Tripalmitin (0.7) < Proteins (0.9) < Glucose (1) < Malic acid (1.33).

B < D < A < C

102. Answer (3)

Hint: 4-carbon compounds are formed during TCA cycle.

Sol.: Succinic acid and malic acid are 4-carbon compounds.

103. Answer (2)

Hint: It is a derivative of carotenoids.

Sol.: The concentration of ABA increases in the leaves of plants during stressful conditions. As a result stomata present in the epidermis of leaves closes to prevent the loss of water.

104. Answer (4)

Hint: Ethylene occurs naturally in plants.

Sol.: Ethephon is used as source of ethylene in artificial ripening of fruits.

105. Answer (3)

Hint: It has powerful cytokinesis promoting effect.

Sol.: Miller et al. discovered the first cytokinin from degraded product of autoclaved herring sperm DNA.

106. Answer (2)

Hint: Parthenocarpic fruits are produced by the application of PGR containing indole compound.

Sol.: Auxins such as IAA and IBA in diluted form are used to produce parthenocarpic or seedless fruits.

107. Answer (3)

Hint: In glycolysis, pay off phase is the energy yielding phase which is substrate level phosphorylation.

Sol.: In energy yielding step of glycolysis, substrate and product both contain three carbon molecules.

108. Answer (2)

Hint: The first member of citric acid cycle is a 4 carbon compound.

Sol.: The first member of Krebs' cycle is oxaloacetic acid.

109. Answer (4)

Hint: Ubiquinone is found in inner mitochondrial membrane.

Sol.: Cytochrome *c* is a small protein attached to the outer surface of inner membrane and acts as a mobile carrier for transfer of electrons between complex III and complex IV.

110. Answer (1)

Hint: Succinate dehydrogenase enzyme is involved in the Krebs' cycle.

Sol.: In ETS of mitochondria, complex I has FMN and FeS.

Complex II is also involved in Krebs' cycle.

Complex III has cytochrome *b* and cytochrome c_1.

Complex IV contains two copper centres.

111. Answer (2)

Hint: Total 10 molecules of $NADH^+ + H^+$ and two molecules of $FADH_2$ are formed from one glucose molecule through glycolysis and Krebs' cycle.

Sol.: There is a net gain of 38 molecules during aerobic respiration of one molecule of glucose.

112. Answer (3)

Hint: 1 pyruvic acid form one Acetyl CoA.

Sol.: 1 ATP/GTP is formed through substrate level phosphorylation in one round of Krebs' cycle.

113. Answer (2)

Hint: Different respiratory substrates have different respiratory quotients.

Sol.: Respiratory quotient depends on types of respiratory substrate used.

114. Answer (4)

Hint: Krebs cycle requires the reducing agent that reduces NAD^+ to $NADH + H^+$.

Sol.: Krebs cycle does not involve intermediate containing three carbons.

115. Answer (3)

Hint: In ATP synthase, F_1 is a headpiece and F_0 is an integral membrane protein complex.

Sol.: Proton gradient required for phosphorylation is obtained with the use of energy of oxidation and reduction. F_0 is an integral membrane protein complex that form the channel through which proton cross the inner membrane.

116. Answer (2)

Hint: Removal of CO_2 does not take place in glycolysis.

Sol.: Decarboxylation reaction takes place in link reaction and Krebs' cycle.

117. Answer (4)

Hint: It is a two-carbon compound.

Sol.: Before entering Krebs' cycle, the respiratory substrates proteins, fats and carbohydrates get converted into acetyl CoA, a common intermediate.

118. Answer (3)

Hint: In one turn of tricarboxylic acid cycle, two decarboxylation reactions take place.

Sol.: For two molecules of Acetyl CoA, four decarboxylation reactions will take place in TCA cycle. It results in the release of four molecules of CO_2.

119. Answer (2)

Hint: First irreversible reaction of glycolysis is conversion of glucose to glucose 6-phosphate.

Sol.: The first irreversible reaction of glycolysis is catalysed by the enzyme hexokinase.

120. Answer (4)

Hint: Tricarboxylic acid cycle involves citrate synthase enzyme.

Sol.: Glycolysis can take place in absence of oxygen.

In oxidative phosphorylation ATP is synthesised in the presence of ATP synthase.

Oxidative decarboxylation occurs when pyruvate is converted into acetyl CoA. This reaction is catalysed by pyruvate dehydrogenase.

121. Answer (3)

Hint: Relative growth rate

$$= \frac{\text{Growth per unit time}}{\text{Initial size}} \times 100$$

Sol.: Measurement and comparison of total growth per unit time is called the absolute growth rate.

122. Answer (2)

Hint: Cytokinin is synthesised in an area where rapid cell division occurs.

Sol.: Cytokinin is a modified form of adenine. It helps to produce new leaves.

Ethylene is involved in the formation of apical hook in dicot seedling.

123. Answer (4)

Hint: Zeatin is first natural cytokinin.

Sol.: Inhibitor B, Dormin and Abscission II were proved to be chemically identical and later it was named abscisic acid.

124. Answer (3)

Hint: This PGR also delay senescence.

Sol.: Gibberellins causes fruits like apple to elongate and improve its shape.

125. Answer (2)

Hint: Miller et al. discovered PGR from degraded product of autoclaved herring sperm DNA.

Sol.: F. Skoog and his coworkers observed that tobacco callus formation occurs only when in addition with auxin, the culture medium is provided either with extract of yeast or coconut milk.

126. Answer (3)

Hint: ABA stimulates the closure of stomata.

Sol.: ABA increases the tolerance of plants to various kinds of stresses. Therefore, it is called stress hormone.

127. Answer (2)

Hint: Ethylene is synthesised in tissue undergoing senescence and during ripening of fruits.

Sol.: Ethylene breaks dormancy of seeds and initiate germination in seeds. It promotes rapid elongation of internodes in deep rice water plants.

128. Answer (4)

Hint: Zeatin is isolated from corn kernels and coconut milk.

Sol.: Kinetin does not occur naturally in plants.

129. Answer (1)

Hint: This phytohormone also induces stem elongation in rosette habit plant.

Sol.: When gibberellin is sprayed on sugarcane crop, the length of the stem increases. As a result, the sugar content increases which finally increases the yield.

130. Answer (3)

Hint: Ethylene ($CH_2 = CH_2$) is a gaseous phytohormone.

Sol.: Gibberellic acid is composed of terpenes.

Cell dividing activity is shown by kinetin. It is adenine derivative. ABA is a derivative of carotenoids.

131. Answer (3)

Hint: ABA is an antagonist to GA.

Sol.: ABA inhibits the protein and RNA synthesis and causes destruction of chlorophyll.

Abscisic acid promotes abscission of flowers and fruits.

132. Answer (2)

Hint: Bolting occurs just prior to reproductive phase and leads to internode elongation enormously.

Sol.: Gibberellins promote bolting in rosette plants.

133. Answer (1)

Hint: The tip of the coleoptile is the source of auxin.

Sol.: Charles Darwin and Charles Francis observed bending of coleoptile of canary grass towards illuminated light. After series of experiments, it was concluded that tip of the coleoptile was the site of transmittable influence that cause its bending.

134. Answer (1)

Hint: Secondary phloem is formed by the process similar to differentiation.

Sol.: Secondary phloem and secondary cortex are examples of redifferentiated tissue. Interfascicular vascular cambium is dedifferentiated tissue.

135. Answer (3)

Hint: During log phase, growth progresses rapidly or exponentially.

Sol.: Lag phase represents the beginning of growth of microbes where their cell number is small.

[ZOOLOGY]

136. Answer (1)

Hint: Part of hindbrain

Sol.: In frogs, the medulla oblongata passes out through the foramen magnum and continues into spinal cord, which is enclosed in the vertebral column. Cerebrum and diencephalon are parts of forebrain.

137. Answer (4)

Hint: True for testes.

Sol.: In female frogs, the ovaries are situated near kidneys and there is no functional connection with kidneys. Males have urinogenital ducts. Larva of frog is called tadpole.

In male frogs, a pair of yellowish ovoid testes are found adhered to the upper part of kidneys by a double fold of peritoneum called mesorchium.

138. Answer (3)

Hint: True for cutaneous respiration.

Sol.: In frogs, skin acts as the aquatic respiratory organ when they are in water. Dissolved oxygen in the water is exchanged through the skin by diffusion.

139. Answer (1)

Hint: Vasa efferentia arise from testes.

Sol.: The correct pathway for the passage of sperms in male frogs is

Testes $\rightarrow$ Vasa efferentia $\rightarrow$ Kidney $\rightarrow$ Bidder's canal $\rightarrow$ Urinogenital duct $\rightarrow$ Cloaca

140. Answer (2)

Hint: Used for flight

Sol.: Forewings (mesothoracic) called tegmina are opaque, dark and leathery and cover the hindwings when at rest. The hindwings are called metathoracic wings. They are transparent, membranous and are used in flight.

141. Answer (2)

Hint: Nodal musculature is auto-excitable.

Sol.: Frogs possess myogenic heart. This kind of heart has specialised nodal tissues which are auto-excitable. Hence, heart of a frog continues to beat for sometime even if it is taken out of the body.

In frogs, a triangular structure called sinus venosus joins the right atrium. The ventricle opens into a sac-like conus arteriosus on the ventral side of the heart.

142. Answer (3)

Hint: Unique feature of mammals

Sol.: Presence of hair on skin is a unique feature of mammals. *Ornithorhynchus* is an egg laying mammal. *Pavo*, *Struthio* and *Neophron* are birds.

143. Answer (1)

Hint: Exclude reptiles

Sol.: The features mentioned are exhibited by cartilaginous fishes. *Carcharodon* is a cartilaginous fish that exhibits the mentioned features. *Clarias* is a freshwater bony fish. *Crocodilus* and *Alligator* are reptiles.

144. Answer (2)

Hint: Structure which is modified into wings.

Sol.: In birds, the forelimbs are modified into wings. The hindlimbs generally have scales and are modified for walking, swimming or clasping the tree branches.

145. Answer (2)

Hint: *Pteropus* is a mammal.

Sol.: Mammals are found in a variety of habitats. Some of them have adapted to fly (*Pteropus*) or live in water (dolphins).

146. Answer (3)

Hint: Feature of warm-blooded animals

Sol.: The members of the class Osteichthyes are cold-blooded (poikilothermous) *i.e.,* they lack the capacity to regulate their body temperature. Warm-blooded animals like birds and mammals have the ability to regulate their body temperature.

147. Answer (4)

Hint: Gastric caeca secrete digestive juice.

Sol.:

Male genital pouch	–	Bounded ventrally by 9th sternum
Malpighian tubules	–	Lined by glandular and ciliated cells
Hepatic caeca	–	Secrete digestive juice
Mushroom-shaped gland	–	Present in 6th-7th abdominal segments in male

148. Answer (4)

Hint: Identify a reptile with limbs.

Sol.: Lancelet – *Branchiostoma*

Saw fish – *Pristis*

Turtle – *Chelone*

Great white shark – *Carcharodon*

149. Answer (3)

Hint: Seen in mammals.

Sol.: Amphibians possess three-chambered heart that has two auricles and one ventricle. Ventricle receives both oxygenated and deoxygenated blood and pumps out mixed blood.

150. Answer (4)

Hint: The structure helps in croaking.

Sol.: Male frogs can be distinguished by the presence of sound producing vocal sacs and also a copulatory pad on the first digit of the forelimbs which are absent in female frogs. In frogs, eyes are bulged and covered by a nictitating membrane that protects them while in water.

151. Answer (3)

Hint: Hepatic and hypophyseal portal system are are present in humans.

Sol.: In frogs, special venous connection present between kidneys and lower parts of body is called renal portal system which is absent in humans. Hepatic portal system is a venous connection between liver and intestine that is present in both, frogs and humans.

152. Answer (1)

Hint: Include excretory structure in cockroach

Sol.: Pons is a part of hindbrain in mammals which is absent in frogs. Urecose gland is an excretory structure in cockroaches. The prominent endocrine glands found in frog are pituitary, thyroid, parathyroid, thymus, pineal body, pancreatic islets, adrenals and gonads.

153. Answer (3)

Hint: Includes limbless amphibia

Sol.: *Ichthyophis* is a limbless amphibian while *Naja* is a limbless reptile. *Calotes, Chelone*, *Testudo* and *Hyla* have paired limbs.

154. Answer (2)

Hint: Tympanum represents ear.

Sol.: *Rana* is an amphibian. Its body is divisible into head and trunk and tail is absent. *Salamandra* is an aquatic amphibian that possesses tail. *Panthera* (mammal) and *Crocodilus* (reptile), both possess a tail.

155. Answer (3)

Hint: Body adapted for swimming.

Sol.: Both bony and cartilaginous fishes have streamlined body. Air bladder and operculum are present only in bony fishes while these are absent in cartilaginous fishes. Placoid scales are present only in cartilaginous fishes.

156. Answer (2)

Hint: Bear 6-15 pairs of gill slits

Sol.:

Mammalia	–	All members do not possess functional mammary glands; only female members have functional mammary glands
Cyclostomata	–	All living members of this class are ectoparasites on some fishes
Reptilia	–	They are oviparous and show direct development

157. Answer (3)

Hint: CNS is solid in non-chordates.

Sol.: In chordates, central nervous system is dorsal, hollow and single, while non-chordates have ventral, solid and double central nervous system. Phylum Chordata is divided into three subphyla: Urochordata, Cephalochordata and Vertebrata.

158. Answer (1)

Hint: Similar feature is exhibited by insects

Sol.: Pharynx is the usual part of the digestive tract. The crop and gizzard are additional chambers present in the digestive tract of birds and insects.

Birds are warm-blooded animals. They are oviparous and development is direct.

159. Answer (3)

Hint: Feature of crocodiles.

Sol.: Both amphibians and reptiles share some common features. In both the animal groups, tympanum represents ear. *Ichthyophis* and snakes are limbless amphibian and reptile respectively. Amphibians and reptiles usually have two pairs of limbs. Reptiles and amphibians have three chambered heart, except crocodiles, which possess a four-chambered heart.

160. Answer (3)

Hint: Heart is dorsal in non-chordates.

Sol.: Tunicata and Vertebrata are subphyla under the phylum Chordata. Fundamental chordate characters are common in both tunicates and vertebrates. Presence of ventral muscular heart is one of the fundamental character. Jaws are present in gnathostomes only. Vertebral column is unique feature of vertebrates. Tunicates possess notochord in the larval tail only.

161. Answer (1)

Hint: Presence of pneumatic bones

Sol.: Not all the birds can fly. Birds that can fly have functional wings. Birds are usually aerial animals. They need light body weight to fly. For this, they show some aerial adaptations. Their long bones are hollow with air cavities (pneumatic) and forelimbs are modified into wings.

162. Answer (3)

Hint: Nitrogenous waste products are converted into uric acid.

Sol.: Each Malpighian tubule is lined by glandular and ciliated cells. They absorb nitrogenous waste products and convert them into uric acid which is excreted out through the hindgut.

163. Answer (2)

Hint: Haemocoel is filled with haemolymph.

Sol.: Blood vascular system of cockroach is an open type. Blood vessels are poorly developed and open into space called haemocoel. Visceral organs located in the haemocoel are bathed into blood (haemolymph).

164. Answer (3)

Hint: Gizzard leads to midgut.

Sol.: In cockroach, the oesophagus dilates to form crop which is the largest part of the foregut. Crop leads to gizzard/proventriculus.

Gizzard has an outer layer of thick circular muscles and thick inner cuticle forming six highly chitinous plates called teeth. Gizzard helps in grinding the food particles.

165. Answer (2)

Hint: An unpaired bone in humans

Sol.: In cockroaches, maxilla and mandible are paired mouth parts while labrum and labium are unpaired. Grinding and incising regions are present on mandibles.

166. Answer (3)

Hint: Its basal part is called hypothalamus.

Sol.: In frogs, cerebral hemispheres and olfactory lobes are paired structures present in the forebrain. Diencephalon is an unpaired structure present in the forebrain of frogs. The midbrain is characterised by a pair of optic lobes.

167. Answer (3)

Hint: Bile is secreted from liver.

Sol.: In frogs, digestion of food takes place by the action of HCl and gastric juice secreted from the walls of the stomach. Pancreas secretes pancreatic juices whereas bile is secreted from the liver and is stored in the gall bladder.

168. Answer (3)

Hint: *Pristis* is also called saw fish.

Sol.: *Torpedo* possesses electric organs while *Trygon* possesses poison sting. All the mentioned fishes are cartilaginous and marine in nature.

169. Answer (2)

Hint: Caudal fin is present.

Sol.: Cyclostomes have an elongated body bearing 6-15 pairs of gill slits for respiration. Their body is devoid of scales and paired fins. Cranium and vertebral column are cartilaginous.

170. Answer (3)

Hint: Identify a cephalochordate.

Sol.: *Ascidia*, *Salpa* and *Doliolum* are urochordates. In urochordates, notochord is present only in the larval tail. *Branchiostoma* is a cephalochordate. Notochord extends from the head to tail region and is persistent throughout the life in cephalochordates, cyclostomes and cartilaginous fishes.

171. Answer (1)

Hint: Exhibit migration

Sol.: *Torpedo* and *Trygon* are marine cartilaginous fishes. *Hippocampus* is a marine bony fish. *Clarias* is a fresh water bony fish.

172. Answer (4)

Hint: Egg laying mammal

Sol.: *Ornithorhynchus* is an egg laying mammal. *Myxine* belongs to the class Cyclostomata under the division Agnatha. *Amphioxus* is a cephalochordate. Cephalochordates and urochordates are often referred to as protochordates. *Bangarus* is a limbless reptile that belongs to the super class Tetrapoda.

173. Answer (2)

Hint: *Petromyzon* is a jawless animal.

Sol.: Cyclostomata is a class under the division Agnatha. They have sucking and circular mouth without jaws.

Phylum Chordata is divided into 3 subphyla: Urochordata, Cephalochordata and Vertebrata.

174. Answer (2)

Hint: Male shows parental care.

Sol.: Pisces, amphibians and reptiles are poikilothermous. *Hippocampus* has four pairs of gills covered with operculum and is a marine bony fish. *Clarias* also possesses four pairs of gills covered with operculum but it is a fresh water bony fish. *Pristis* is a marine cartilaginous fish. It possesses five pairs of gills without operculum. *Salamandra* is an amphibian.

175. Answer (4)

Hint: Mammals show internal fertilisation.

Sol.: Members of the class Osteichthyes exhibit external fertilisation. *Betta* (bony fish) shows external fertilisation. Reptiles, aves and mammals exhibit internal fertilisation.

176. Answer (2)

Hint: Eggs are more than oothecae.

Sol.: On an average, a female cockroach produces 9-10 oothecae, each containing 14-16 eggs.

177. Answer (2)

Hint: Irregular spots are present

Sol.: In frogs, the colour of the dorsal side of body is generally olive green with dark irregular spots. On the ventral side, the skin is uniformly pale yellow.

178. Answer (3)

Hint: Passive process

Sol.: In cockroach, the respiratory system consists of a network of trachea, that open through 10 pairs of spiracles present on the lateral side of the body. Thin branching tubes carry oxygen from the air to all the parts. The exchange of gases takes place at the tracheoles by diffusion.

179. Answer (3)

Hint: Structure present only in male cockroach

Sol.: Both in male and in female cockroaches, the 10^{th} segment bears a pair of jointed filamentous structures called anal cerci. A pair of anal style/caudal style is present only in male cockroaches.

180. Answer (2)

Hint: Structure present between hepatic caeca and Malpighian tubules

Sol.: In cockroach, foregut comprises the mouth, pharynx, oesophagus, crop and gizzard/proventriculus. Mesenteron is midgut.

The hind gut comprises ileum, colon and rectum.

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