



Aakash

Medical | IIT-JEE | Foundations

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

MM : 720

Final Test Series(P1)_NEET2026_Test-02A

Time : 180 Min.

PHYSICS

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

CHEMISTRY

- | | |
|---------|---------|
| 46. (2) | 69. (3) |
|---------|---------|

- 102. (2)
- 103. (1)
- 104. (3)
- 105. (2)
- 106. (4)
- 107. (3)
- 108. (3)
- 109. (4)
- 110. (1)
- 111. (2)
- 112. (1)
- 113. (3)

- 125. (1)
- 126. (4)
- 127. (3)
- 128. (1)
- 129. (2)
- 130. (3)
- 131. (1)
- 132. (3)
- 133. (2)
- 134. (3)
- 135. (4)

ZOOLOGY

- 136. (3)
- 137. (4)
- 138. (2)
- 139. (4)
- 140. (2)
- 141. (2)
- 142. (4)
- 143. (3)
- 144. (3)
- 145. (1)
- 146. (2)
- 147. (4)
- 148. (3)
- 149. (2)
- 150. (3)
- 151. (1)
- 152. (3)
- 153. (3)
- 154. (1)
- 155. (2)
- 156. (3)

- 159. (4)
- 160. (1)
- 161. (4)
- 162. (1)
- 163. (1)
- 164. (3)
- 165. (4)
- 166. (3)
- 167. (4)
- 168. (3)
- 169. (2)
- 170. (4)
- 171. (3)
- 172. (2)
- 173. (3)
- 174. (1)
- 175. (1)
- 176. (2)
- 177. (3)
- 178. (2)
- 179. (1)

157. (2)

180. (4)

158. (3)



Hints and Solutions

PHYSICS

(1) Answer : (1)

Solution:

$$f = mw^2r \leq \mu mg$$

$$\mu \geq \frac{w^2r}{g}$$

(2) Answer : (3)

Hint:

$$\frac{a_{rod}}{a_{wedge}} = \tan \theta$$

Solution:

$$a_{wedge} = \frac{9}{\tan 37^\circ} = 12 \text{ m/s}^2$$

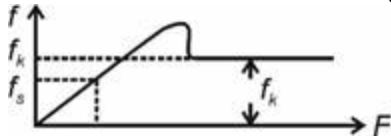
$$N \sin 37^\circ = 10 \times a_{wedge} = 120$$

$$N = \frac{120 \times 5}{3} = 200 \text{ N}$$

(3) Answer : (4)

Solution:

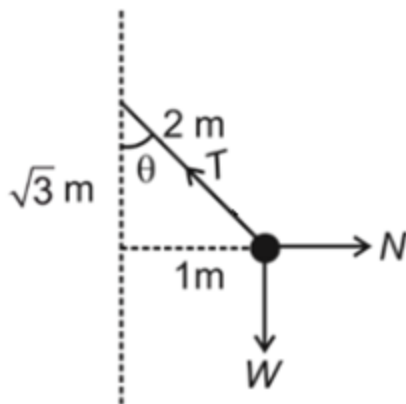
Kinetic friction cannot exceed limiting value of static friction but can have value more than static friction.



(4) Answer : (2)

Solution:

When body is in equilibrium, net force on the body is zero.



$$T \cos \theta = W$$

$$T \times \frac{\sqrt{3}}{2} = W$$

$$T = \frac{2W}{\sqrt{3}}$$

(5) Answer : (2)

Solution:

$$\tan \theta = \frac{v^2}{Rg} = \frac{10 \times 10}{20 \times 10} = \frac{1}{2}$$

$$\theta = \tan^{-1} \left(\frac{1}{2} \right)$$

(6) Answer : (3)

Solution:

Maximum acceleration of block B:

$$a_{\max} = \mu g = 4 \text{ m/s}^2$$

$$F = 4 \times 9 = 36 \text{ N}$$

(7) Answer : (1)

Solution:

$$a = \frac{v}{m} \frac{dm}{dt} = \frac{10}{4} \times 2 = 5 \text{ m/s}^2$$

(8) Answer : (3)

Solution:

$$P_{\text{out}} = \eta \frac{W}{t} = \eta \frac{m}{t} gh = 0.8 \times 20 \times 10 \times 50$$

$$= 8000 \text{ W}$$

$$P_{\text{out}} = 8 \text{ kW}$$

(9) Answer : (2)

Solution:

Velocity of 'Q' after collision = v_0

At the time of maximum compression, both the blocks move with same velocity.

$$\therefore mv_0 = 3mv \Rightarrow v = \frac{v_0}{3}$$

$$\frac{1}{2}Kx^2 + \frac{1}{2}(3m)\left(\frac{v_0}{3}\right)^2 = \frac{1}{2}mv_0^2$$

$$x = v_0 \sqrt{\frac{2m}{3k}}$$

(10) Answer : (2)

Solution:

Using $F = -\frac{dU}{dx}$

$$dU = -Fdx$$

$$\int_{-3}^U dU = -\int_0^3 (2x+3)dx$$

$$U - (-3) = -\left[\frac{2x^2}{2} + 3x\right]_0^3$$

$$U + 3 = -(9 + 9)$$

$$U + 3 = -18$$

$$U = -21 \text{ J}$$

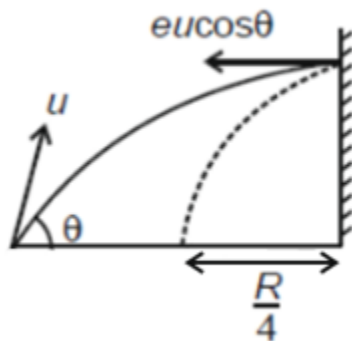
(11) Answer : (3)

Solution:

In elastic oblique collision between two identical bodies if one is at rest, they deflect at angle of 90° to each other.

(12) Answer : (1)

Solution:



$$\text{Time to reach highest point} = \frac{u \sin \theta}{g}$$

There will be no change in vertical component of velocity due to collision.

Horizontal component will be $eu \cos \theta$ due to collision.

$$\therefore \frac{R}{4} = eu \cos \theta \times \frac{u \sin \theta}{g}$$

$$\frac{u^2 \sin 2\theta}{4g} = \frac{eu^2 \sin \theta \cos \theta}{g}$$

$$\frac{2 \sin \theta \cos \theta}{4} = e \sin \theta \cos \theta$$

$$\Rightarrow \boxed{e = \frac{1}{2}}$$

(13) Answer : (3)**Solution:**

$$P_{av} = \frac{\text{Net work done}}{\text{Total time taken}}$$

Net work done = Δ K.E.

$$= \frac{1}{2} \times m \times v^2$$

$$= \frac{1}{2} \times 4 \times 25 = 50 \text{ J}$$

$$P_{av} = \frac{50}{20} = 2.5 \text{ W}$$

(14) Answer : (3)**Solution:**The angle between normal force and displacement is 90° . Therefore its work done on block is zero.**(15) Answer : (1)****Solution:**

$$K = \frac{P^2}{2m} \Rightarrow K \propto \frac{1}{m}$$

(16) Answer : (1)**Solution:**

$$\vec{r} = -2\hat{i} + 2\hat{j}$$

$$\text{and } \vec{F} = -4\hat{j}$$

$$\vec{\tau} = \vec{r} \times \vec{F} = (-2\hat{i} + 2\hat{j}) \times (-4\hat{j})$$

$$\vec{\tau} = +8\hat{k}$$

(17) Answer : (3)**Solution:**

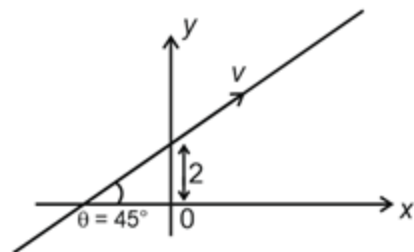
$$\omega = \omega_0 - \alpha t$$

$$\alpha = \frac{\omega_0}{t} = \frac{2\pi(240)}{60 \times 60}$$

$$\alpha = \frac{8\pi}{60} \text{ rad/s}^2$$

Now, $\tau = I\alpha$

$$= 4 \times \frac{8\pi}{60} = \frac{8\pi}{15} \text{ N m}$$

(18) Answer : (2)**Solution:**

$$L = mvr \sin \theta$$

$$= 1 \times 2 \times 2 \times \sin 45 = 2\sqrt{2} \text{ kg m}^2\text{s}^{-1}$$

(19) Answer : (3)**Solution:**

$$a = \frac{2m-m}{3m} \times g = \left(\frac{g}{3}\right)$$

$$\therefore \vec{a}_{cm} = \frac{(2m) \times \frac{g}{3} (-\hat{j}) + m \times \left(\frac{g}{3}\right) \hat{j}}{2m+m}$$

$$= \frac{g}{9} \text{ downwards}$$

(20) Answer : (3)

Solution:

Moment of inertia of the ring is minimum about the diameter.

(21) Answer : (2)

Solution:

$$\tau = I\alpha$$

$$\alpha = \frac{d\omega}{dt} = 3 + 2t = 3 + 2 = 5$$

$$\tau = 5MK^2$$

(22) Answer : (3)

Solution:

Apply conservation of angular momentum principle here.

$$I_1\omega_1 = I_2\omega_2 \Rightarrow \frac{R_1^2}{T_1} = \frac{R_2^2}{T_2} \therefore T_2 = 6 \text{ hour}$$

(23) Answer : (4)

Solution:

$$F = ma = \mu mg$$

$$a = \mu g$$

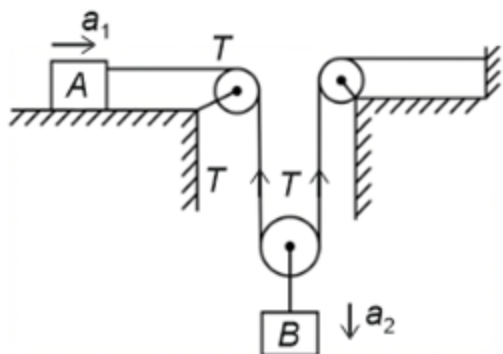
$$x = \frac{v^2}{2\mu g} = \frac{P^2}{2m^2\mu g}$$

$$\mu = \frac{P^2}{2m^2gx} = \frac{160}{2 \times 4 \times 10 \times 8} = 0.25$$

(24) Answer : (3)

Solution:

Using constraint relation, we can conclude that acceleration of block A is twice of block B.



$$T = 2a_1 \quad \dots(i)$$

$$3g - 2T = 3a_2 \quad \dots(ii)$$

$$a_1 = 2a_2$$

$$T = 4a_2$$

$$2T = 8a_2 \quad \dots(iii)$$

$$3g = 11a_2 \Rightarrow a_2 = \frac{30}{11} \text{ m/s}^2$$

(25) Answer : (2)

Solution:

$$F = (m_A + m_B)a$$

$$a = \left(\frac{F}{4m} \right)$$

For no slipping between A and B

$$f_{max} \geq mg$$

$$\mu ma \geq mg$$

$$\mu \frac{mF}{4m} \geq mg$$

$$F \geq \left(\frac{4mg}{\mu} \right)$$

(26) Answer : (1)

Solution:

Work done along a closed path is zero for conservative forces.

(27) Answer : (4)**Solution:**

$$\frac{F_1 - F_2}{m_1 + m_2} = a \Rightarrow \frac{100 - x}{10} = a$$

$$F_1 - N = m_1 a$$

$$100 - 40 = 6 \times \left(\frac{100 - x}{10} \right)$$

$$600 = 6 \times (100 - x)$$

$$x = \text{Zero}$$

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

With respect to ground, frame of reference moving with constant velocity is inertial and moving with constant acceleration is non-inertial.

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

$$mg - T = ma$$

$$mg - \frac{2mg}{3} = ma$$

$$a = \frac{g}{3}$$

(30) Answer : (3)**Solution:**

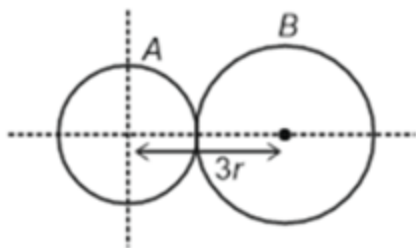
$$N = mg \cos \theta$$

Since $a = 0$, therefore friction is equal to $mg \sin \theta$

$$\text{Contact force } F = \sqrt{N^2 + f^2}$$

$$F = \sqrt{(mg \sin \theta)^2 + (mg \cos \theta)^2}$$

$$= mg$$

(31) Answer : (1)**Solution:**

$$m \propto r^3$$

$$x_{cm} = \frac{r_2^3(r_1 + r_2)}{r_1^3 + r_2^3}$$

$$= \frac{(2r)^3(r + 2r)}{r^3 + (2r)^3}$$

$$= \frac{8r}{3}$$

(32) Answer : (2)**Solution:**

$$I = \frac{MR^2}{4} + M \left(\frac{R}{2} \right)^2$$

$$I = \frac{MR^2}{4} + \frac{MR^2}{4}$$

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

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

(33) Answer : (3)**Solution:**

$$\vec{L} = I \vec{\omega}$$


Aakash
 Medical | IIT-JEE | Foundations

In uniform circular motion, angular velocity of the particle will be constant so angular momentum will be constant.

(34) Answer : (4)

Solution:

$$K.E = \frac{L^2}{2I}$$

$$L_i = L_f = MR^2\omega$$

$$I = 3MR^2$$

$$K.E = \frac{M^2 R^4 \omega^2}{6MR^2}$$

$$= \frac{MR^2\omega^2}{6}$$

(35) Answer : (1)

Solution:

$$\tau = I\alpha$$

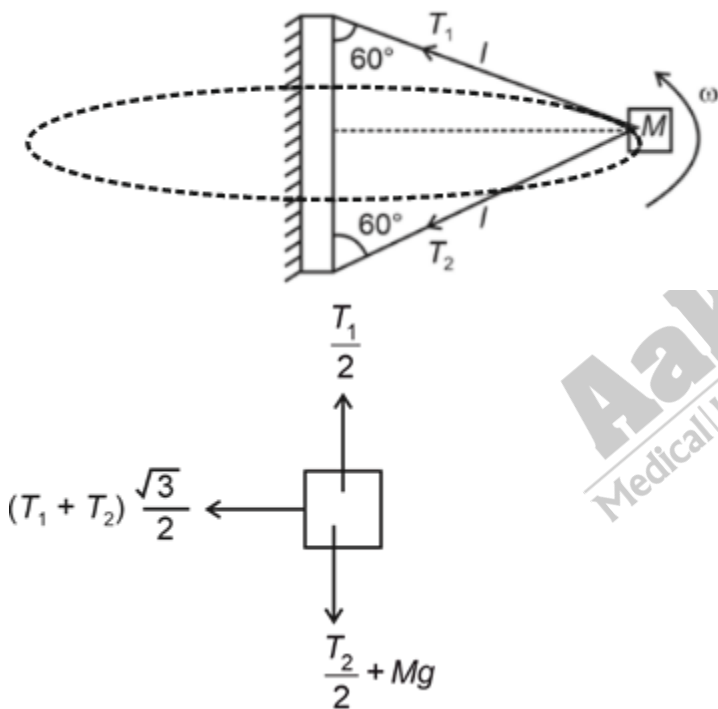
$$\frac{3F}{2}R + F \times R = \frac{MR^2}{2}\alpha$$

$$\frac{5FR}{2} = \frac{MR^2}{2}\alpha$$

$$\alpha = \left(\frac{5F}{mR}\right)$$

(36) Answer : (1)

Solution:



$$\Rightarrow (T_1 + T_2) \frac{\sqrt{3}}{2} = M\omega^2 l \frac{\sqrt{3}}{2} \dots (i)$$

$$\frac{T_1}{2} = \frac{T_2}{2} + Mg \dots (ii)$$

From (i) and (ii),

$$T_2 = \frac{M\omega^2 l - 2Mg}{2}$$

For minimum value of ω ,

$$T_2 \rightarrow 0$$

$$\Rightarrow M\omega^2 l = 2Mg$$

$$\Rightarrow \omega_{\min} = \sqrt{\frac{2g}{l}}$$

(37) Answer : (1)

Solution:

Angular Impulse

$$J = \tau t = L_2 - L_1$$

$$\omega_1 = 0, \omega_2 = \omega$$

$$F \frac{1}{2} t = \frac{ML^2}{12} \omega \Rightarrow t = \frac{\omega ml}{6F}$$

(38) Answer : (1)

Solution:

$$\Delta x = \frac{2mL}{(2m+10m)}$$

$$\frac{2 \times 2.4}{12} = x$$

$$x = 0.4 \text{ m}$$

(39) Answer : (2)

Solution:

$$U = A - Bx^2 \Rightarrow F = -\frac{dU}{dx} = 2Bx \Rightarrow F \propto x$$

(40) Answer : (1)

Solution:

By conservation of energy

$$mgH = \frac{1}{2} Kx^2$$

$$x = \sqrt{\frac{2mgH}{K}}$$

(41) Answer : (4)

Solution:

$$\vec{F} = m \vec{a} = m(3x^2 \hat{i} + 2y \hat{j})$$

$$W = \int \vec{F} \cdot d\vec{r}$$

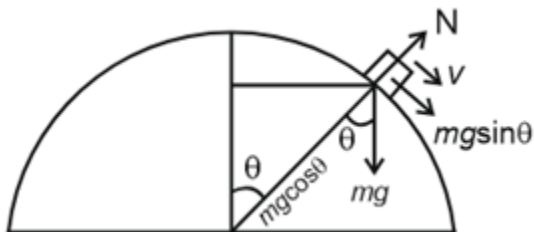
$$= m \int_1^3 3x^2 dx + m \int_1^4 2y dy = m \times (x^3)_1^3 + m(y^2)_1^4 = 41m$$

$$m \times 41 = 82$$

$$m = 2 \text{ kg}$$

(42) Answer : (1)

Solution:



$$F_{\text{net}} = m \times a$$

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

When the block loses the contact, then

$$N = 0$$

$$\frac{mv^2}{R} = mg \cos \theta$$

Applying energy conservation:

$$mg(R - R \cos \theta) = \frac{1}{2} mv^2$$

$$mg(R - R \cos \theta) = \frac{1}{2} R mg \cos \theta$$

$$mg(R - R \cos \theta) = \frac{mgR \cos \theta}{2}$$

$$\cos \theta = \frac{2}{3}$$

$$\frac{mv^2}{R} = \frac{2mg}{3}$$

$$\frac{1}{2} mv^2 = \left(\frac{mgR}{3} \right)$$

(43) Answer : (2)


Aakash
 Medical | IIT-JEE | Foundations

Solution:

$$\vec{F} \cdot \vec{v} = 0$$

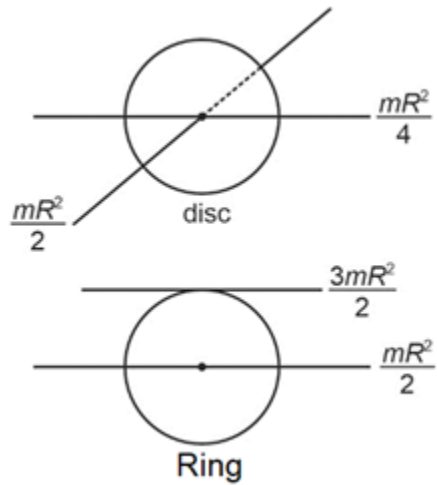
$$(7\hat{i} + 2\hat{j} - 3\hat{k}) \cdot (\hat{i} + \hat{j} + 2c\hat{k})$$

$$9 - 6c = 0$$

$$c = \frac{3}{2}$$

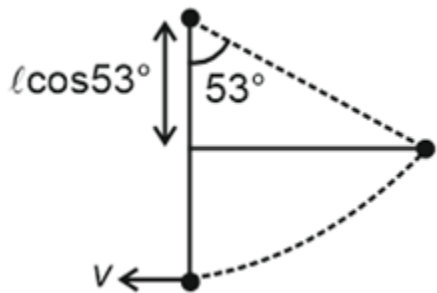
(44) Answer : (1)

Solution:



(45) Answer : (2)

Solution:



$$mg(l - l \cos 53^\circ) = \frac{1}{2}mv^2$$

$$mgl\left(1 - \frac{3}{5}\right) = \frac{1}{2}mv^2$$

$$\frac{4mg}{5} = \left(\frac{mv^2}{l}\right)$$



Aakash
Medical | IIT-JEE | Foundations

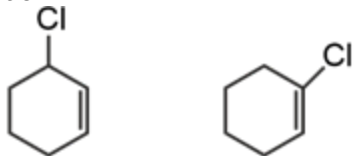
$$T = mg + \frac{mv^2}{r}$$

$$= \left(\frac{9mg}{5}\right)$$

CHEMISTRY

(46) Answer : (2)

Solution:



Allylic chloride Vinylic chloride

(47) Answer : (2)

Hint:

Para-isomers are high melting as compared to their ortho and meta-isomers.

Solution:

Compound	Melting point/K
	256
	249
	323

(48) Answer : (4)

Hint:

 S_N2 reaction is preferred in polar aprotic solvent

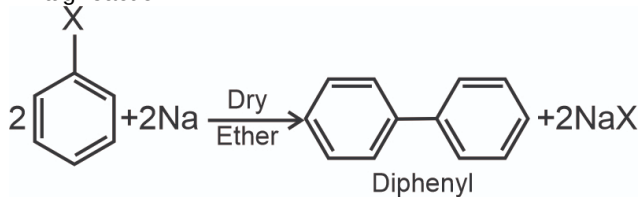
Solution:

Vinyl chloride is less reactive than allyl chloride due to partial double bond nature of C – Cl bond.
For chiral alkyl halide there is inversion in configuration during S_N2 mechanism.

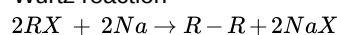
(49) Answer : (1)

Solution:

• Fittig reaction



• Wurtz reaction

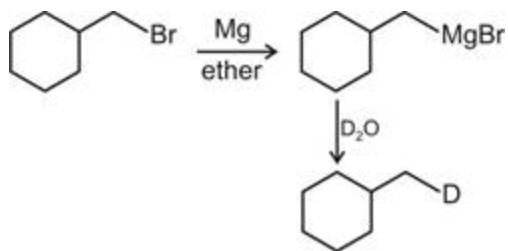


(50) Answer : (3)

Hint:

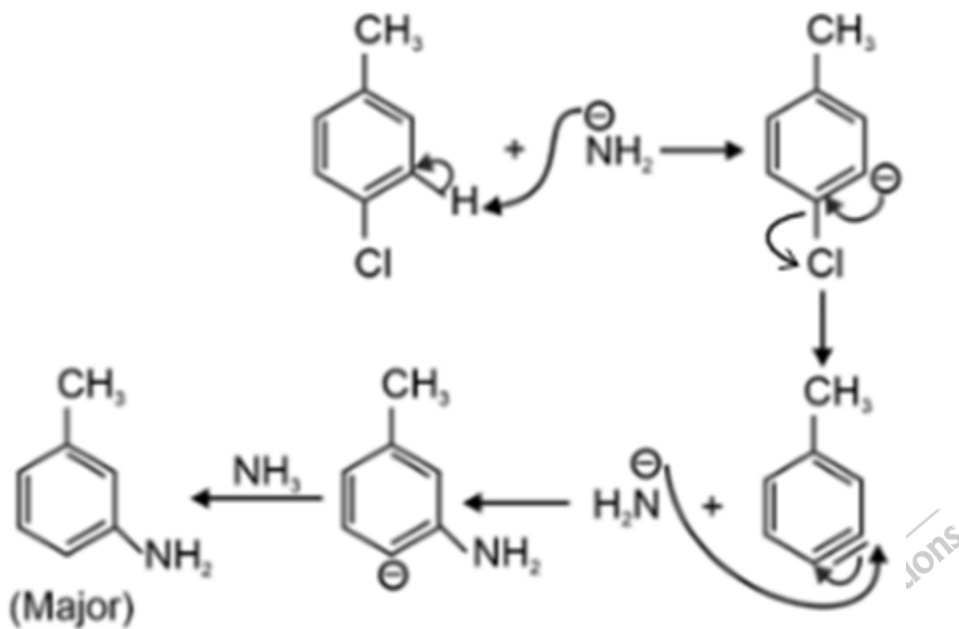
Alkylhalide on reaction with Mg in presence of ether forms Grignard reagent.

Solution:



(51) Answer : (2)

Solution:



(52) Answer : (2)

Solution:

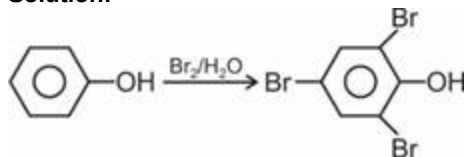
The stereoisomers related to each other as non-superimposable mirror images are called enantiomers.

(53) Answer : (3)

Hint:

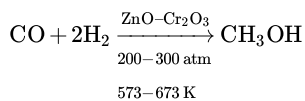
-OH highly activates the benzene ring towards electrophilic substitution reaction.

Solution:

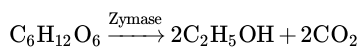


(54) Answer : (1)

Hint:



Solution:

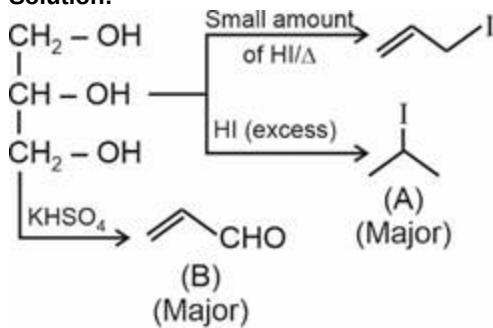


(55) Answer : (2)

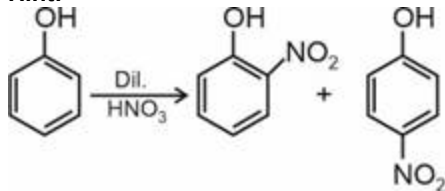
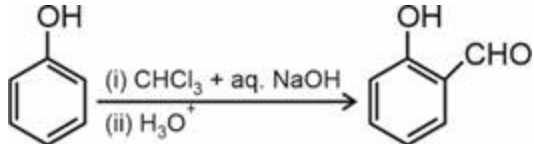
Solution:

Boiling point of alcohol is more than the ether and hydrocarbon of similar molecular mass due to the presence of hydrogen bonding.

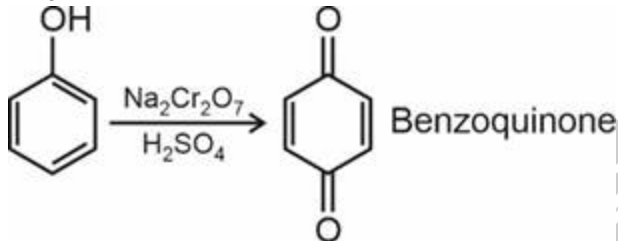
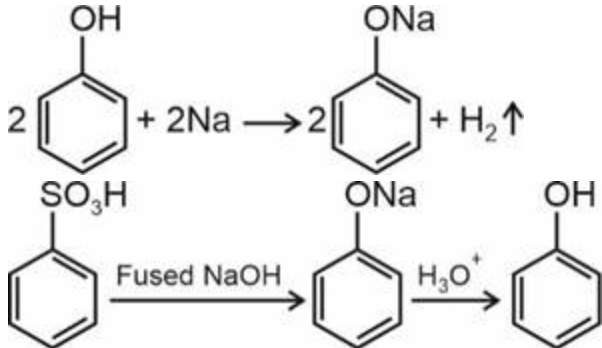
(56) Answer : (4)

Hint:KHSO₄ is a dehydrating agent.**Solution:**

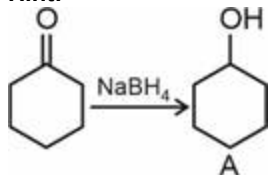
(57) Answer : (2)

Hint:**Solution:**

(58) Answer : (4)

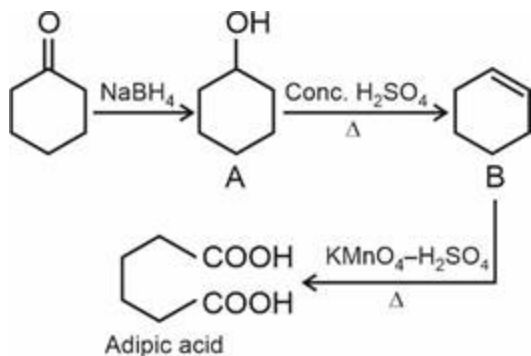
Hint:**Solution:**

(59) Answer : (1)

Hint:**Solution:**

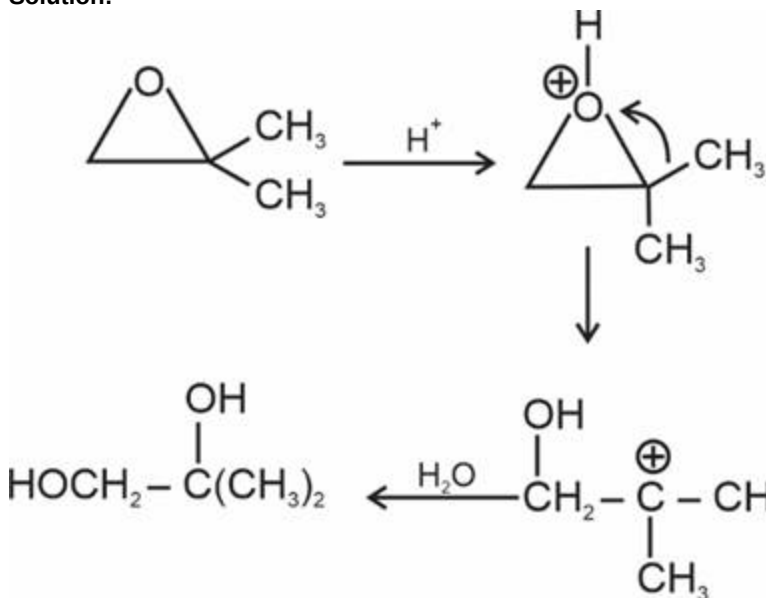
Akash

 Medical | IIT-JEE | Foundations



(60) Answer : (4)

Solution:



(61) Answer : (3)

Hint:

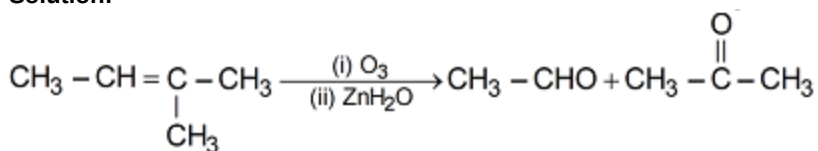
Cold dilute and alkaline KMnO_4 is known as Baeyer's reagent.

Solution:

$\text{CrO}_3 - \text{H}_2\text{SO}_4$	Jones Reagent
Cold dilute Alkaline KMnO_4	Baeyer's Reagent
Ammoniacal AgNO_3 Solution	Tollen's Reagent
Aq. CuSO_4 and Rochelle salt (aq) in equal amount	Fehling solution

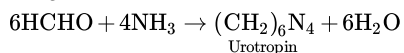
(62) Answer : (2)

Solution:

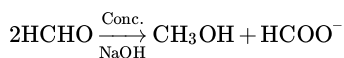


(63) Answer : (2)

Hint:



Solution:

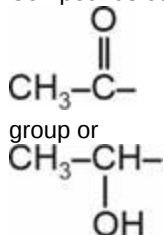


HCHO disproportionates to methanol and sodium formate.

(64) Answer : (2)

Hint:

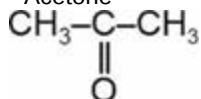
Compounds containing



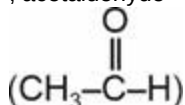
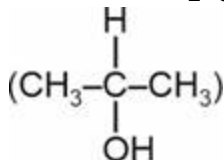
group will give positive iodoform test.

Solution:

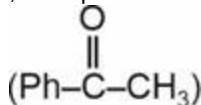
• Acetone



, acetaldehyde

, ethyl alcohol (C₂H₅OH), isopropanol

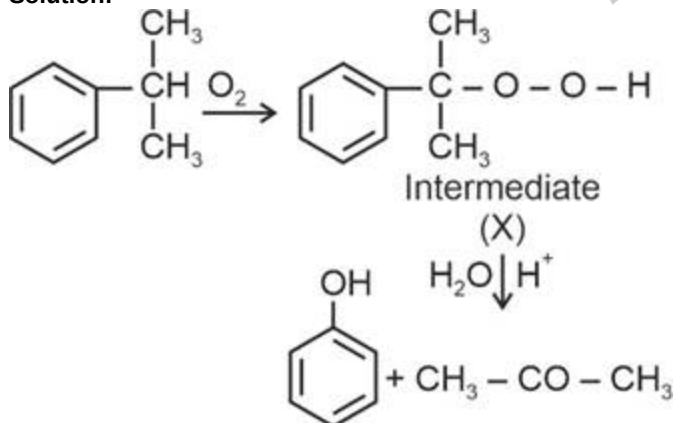
, acetophenone



give positive iodoform test.

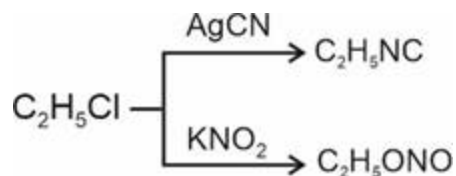
• Both acetaldehyde and ethyl alcohol will give positive iodoform test hence the pair cannot be distinguished by iodoform test.

(65) Answer : (2)

Hint:Phenol is manufactured from hydrocarbon, cumene. Cumene is oxidized in the presence of air (O₂) to Cumene hydroperoxide.**Solution:**

(66) Answer : (2)

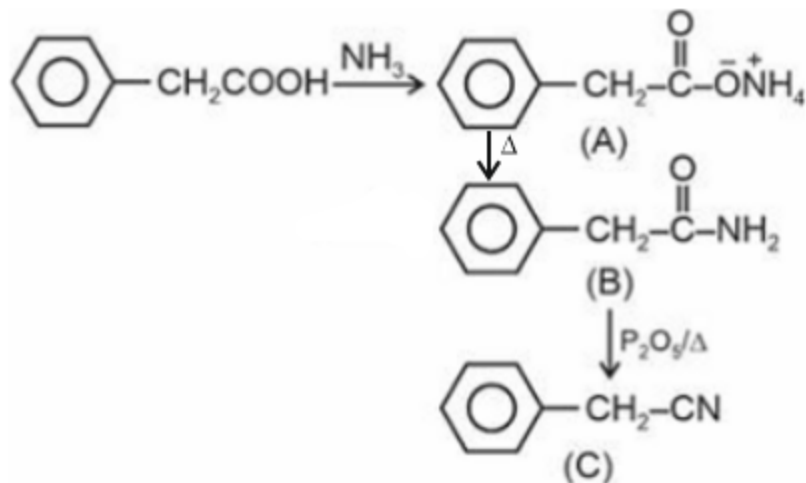
Solution:



(67) Answer : (4)

Hint:

Carboxylic acid reacts with ammonia to give ammonium salt which on further heating at high temperature gives acid amide.

Solution:

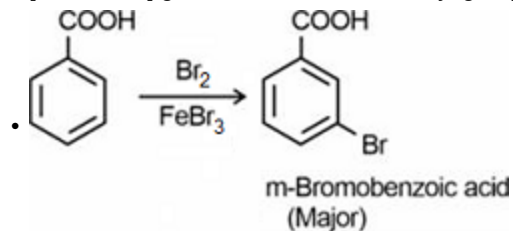
(68) Answer : (3)

Hint:

Carboxyl group is deactivating in nature.

Solution:

Benzoic acid does not undergo Friedel-Crafts reaction because the carboxyl group is deactivating and the catalyst AlCl_3 [Lewis acid] gets bonded to the carboxyl group.



(69) Answer : (3)

Solution:

Higher the positive charge on carbonyl carbon, higher is the reactivity for nucleophilic substitution.

(70) Answer : (3)

Solution:

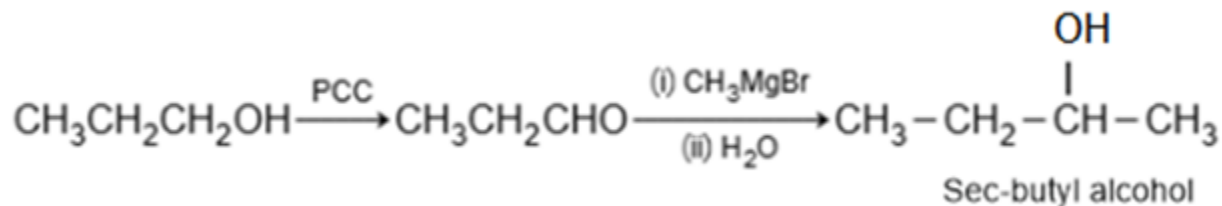
Solubility of carboxylic acids decreases with increasing size of alkyl group.

(71) Answer : (3)

Solution:Due to large size of Iodine, I^- ion is a better leaving group than the Cl^- ion.

(72) Answer : (2)

Solution:

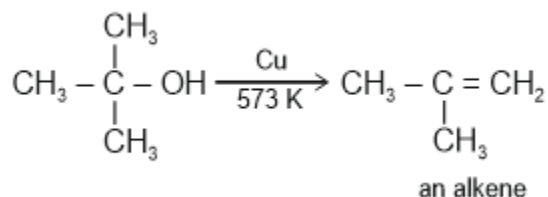


(73) Answer : (1)

Solution:

In Hofmann elimination reaction less substituted alkene product is the major product. In this reaction a proton eliminated from the β -carbon with more hydrogen atoms.

(74) Answer : (2)

Solution:

(75) Answer : (4)

Solution:

Biphenyls show optical isomerism when (i) each ring in biphenyl should have two different ortho substituted groups (ii) No phenyl ring should have a plane of symmetry.

(76) Answer : (1)

Solution:

Carbonyl compounds which do not have α -H atoms, in the presence of 50% NaOH undergo disproportionation reaction to produce corresponding alcohol and sodium salt of acid. This reaction is known as Cannizzaro reaction.



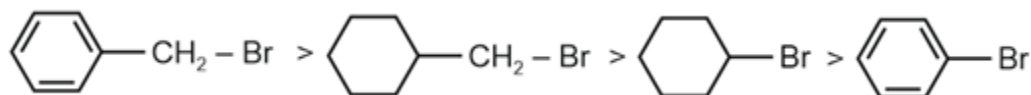
(77) Answer : (1)

Solution:

Rate of $\text{S}_{\text{N}}2$ reaction increases as the stability of transition state increases.

Benzyl bromide will form most stable transition state among the given compounds.

Therefore the correct order of rate of $\text{S}_{\text{N}}2$ reaction will be



(78) Answer : (1)

Solution:

Tertiary alcohols are most reactive and immediately produce turbidity at room temperature while primary alcohols do not react with Lucas reagent at room temperature.

(79) Answer : (2)

Solution:



(80) Answer : (1)

Solution:Electron withdrawing groups like $-\text{NO}_2$ facilitates nucleophilic substitution reaction in chlorobenzene

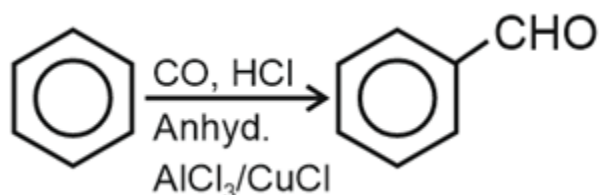
(81) Answer : (1)

Solution:Electron withdrawing group increases the acidic strength of phenol. Therefore the correct order will be $c > a > b$

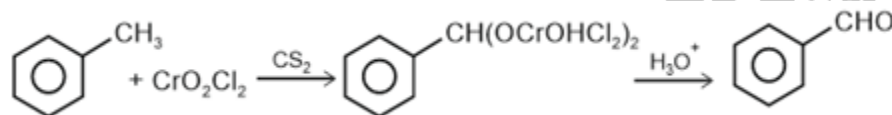
(82) Answer : (1)

Solution:

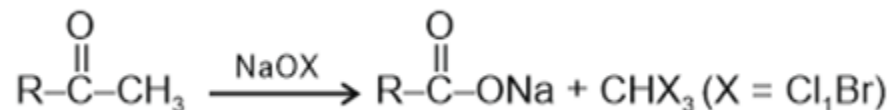
Gatterman-Koch reaction



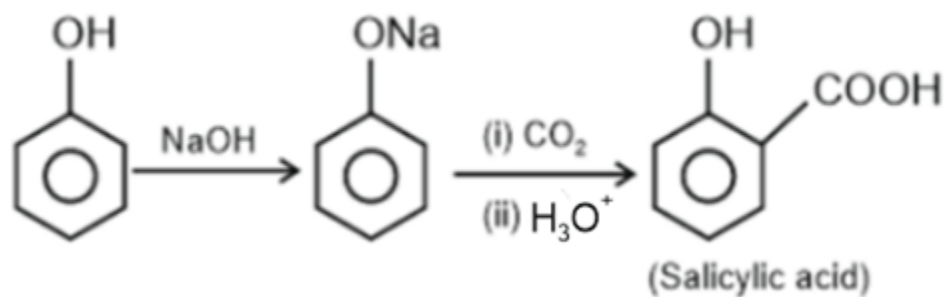
Etard reaction



Haloform reaction

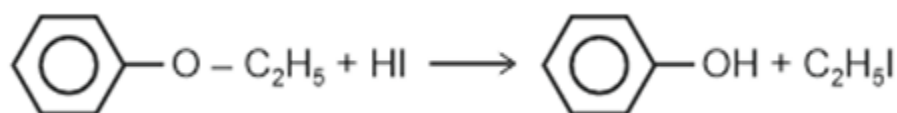


Kolbe's reaction



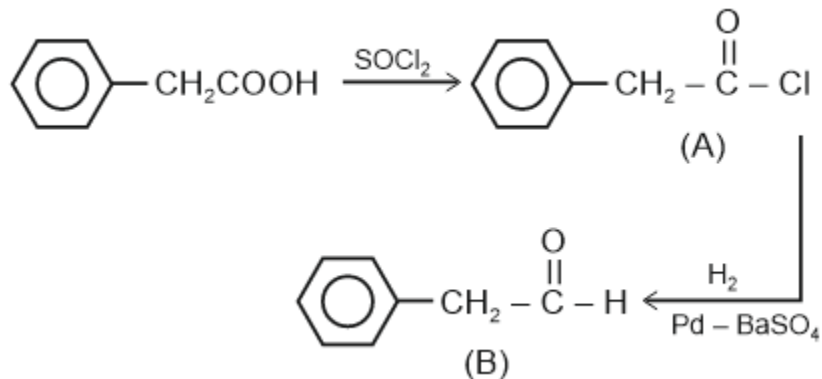
(83) Answer : (3)

Solution:



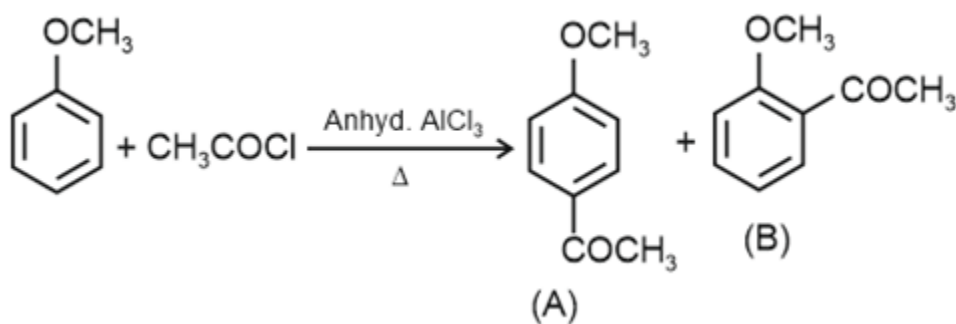
(84) Answer : (1)

Solution:



(85) Answer : (3)

Solution:



(86) Answer : (4)

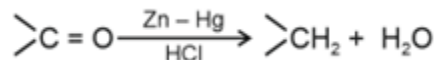
Solution:

On heating an aldehyde with Fehling's reagent a reddish brown precipitate is obtained. Aromatic aldehydes do not respond to this test.

(87) Answer : (1)

Solution:

Clemmensen reduction



Tollens' test: On warming an aldehyde with freshly prepared ammoniacal silver nitrate solution, a bright silver mirror is produced due to the formation of silver metal.

(88) Answer : (1)

Solution:

(a) Schiff's base	(i) R - NH ₂
(b) Oxime	(ii) NH ₂ - OH
(c) Imine	(iii) NH ₃
(d) Acetal	(iv) R - CH ₂ - OH

(89) Answer : (2)

Solution:

The correct order of acidity will be $\text{CHCl}_2\text{COOH} > \text{NO}_2\text{CH}_2\text{COOH} > \text{BrCH}_2\text{COOH} > \text{HCOOH}$

(90) Answer : (2)

Solution:

Aldehydes and Ketones having at least two α -hydrogen undergo Aldol condensation.

BOTANY

(91) Answer : (4)

Solution:

Swiss cheese is ripened by *Propionibacterium sharmanii*.

(92) Answer : (3)

Solution:

Aeration tank is used for secondary treatment in STP (Sewage Treatment Plant).

(93) Answer : (3)

Hint:

The technology of biogas production was developed in India mainly due to the efforts of IARI and KVIC.

Solution:

Ganga Action Plan (1985) was proposed to build a large number of sewage treatment plants, so that only treated sewage may be discharged in the rivers.

(94) Answer : (2)

Hint:

Biofertilisers are the organisms that enrich the nutrient quality of soil.

Solution:

Anabaena, *Azotobacter* and *Azospirillum* are employed as biofertilisers.

Bacillus thuringiensis is a microbial biocontrol agent that can be introduced to control butterfly caterpillars.

(95) Answer : (1)

Solution:

During secondary treatment, microbes consume the major part of organic matter and this significantly reduces BOD.

(96) Answer : (2)

Solution:

In paddy (rice) fields, BGA serves as an important biofertiliser.

(97) Answer : (2)

Hint:

'a' represents species growing under unlimited resources.

Solution:

In the given population growth curve,

a-Exponential growth pattern, when resources are unlimited

b-Logarithmic growth pattern, when resources are limited

K – Carrying capacity.

(98) Answer : (3)

Solution:

Tertiary treatment of waste water is a physico-chemical process.

(99) Answer : (2)

Solution:

Nucleopolyhedrovirus is pathogen that attack insects.

Ladybird is effective to control aphids.

(100) Answer : (4)

Hint:

Small part of activated sludge is pumped back into aeration tank to serve as inoculum.

Solution:

Floc contains aerobic bacteria and fungi. Sedimented floc is termed as activated sludge which get digested in anaerobic sludge digesters.

(101) Answer : (1)

Solution:

Production on an industrial scale, requires growing microbes in a very large vessels called fermentors.

(102) Answer : (2)

Solution:

Not all the parasites are host-specific. In commensalism, removal of the host species may affect the survival of the commensal species.

(103) Answer : (1)

Solution:

Rhizobium is a symbiotic bacterium which fixes nitrogen in legume plants.

(104) Answer : (3)

Hint:

Intrinsic rate of natural increase is represented by r .

Solution:

The value of ' r ' for Norway rat is 0.015.

(105) Answer : (2)

Solution:

Value of r is an important parameter to assess the impact of environmental resistance on population growth.

(106) Answer : (4)

Solution:

Birth = 200

Death = 250

Immigration = 70

Emigration = 20

Net increase in population is $(B + I) - (D + E)$

$= 270 - 270 = 0$

\therefore There will be no net increase in the population size.

(107) Answer : (3)

Hint:

Total number is not an easily adapted measure if the population is huge and counting is time consuming or impossible.

Solution:

Growing population has a very high proportion of pre-reproductive individual, more and more of them enter reproductive phase and rapidly increase the size of population.

(108) Answer : (3)

Solution:

Monarch butterfly adapts a chemical defence to avoid their predators.

(109) Answer : (4)

Solution:

Orchids growing on trees, is an example of population interaction called commensalism.

(110) Answer : (1)

Solution:

Natality and immigration lead to population growth in a given area.

(111) Answer : (2)

Solution:

Nearly 25 per cent of all insects are known to be phytophagous (feeding on plant sap and other parts of plants).

(112) Answer : (1)

Solution:

Organism with very high intrinsic growth rate, have very short generation time and show J-shaped growth curve.

(113) Answer : (3)

Solution:

The interaction between *Ophrys* and bumble bee represents sexual deceit, not mutualism.

(114) Answer : (2)

Solution:

Viruses that infect bacteria are called as bacteriophages. Their structure comprises of head, collar, tail and prongs.

(115) Answer : (1)

Solution:

The first antibiotic was discovered by Alexander Fleming, from a chemical produced by *Penicillium notatum*.

(116) Answer : (2)

Solution:

Lactobacillus is a rod-shaped bacterium that releases acids to coagulate milk and form curd.

(117) Answer : (2)

Solution:

Statins produced by the yeast, *Monascus purpureus*, are used as blood-cholesterol lowering agents.

(118) Answer : (2)

Solution:

Trichoderma can be used as a biocontrol agent.

(119) Answer : (2)

Solution:

Wine and beer have lower alcohol concentration than vodka.

(120) Answer : (3)

Solution:

Due to increasing urbanisation, sewage is being produced in much larger quantities than ever before but STPs has not increased.

(121) Answer : (1)

Solution:

Statins are the blood-cholesterol lowering agents that act by competitively inhibiting the enzyme responsible for the synthesis of cholesterol, HMG CoA reductase.

(122) Answer : (3)

Solution:

Oysters produce a large number of small-sized offsprings.

(123) Answer : (2)

Solution:

The use of biocontrol measures greatly reduces our dependence on toxic chemicals and pesticides because they involve the use of living organisms to control pest populations.

(124) Answer : (2)

Solution:

Mumps is a viral disease, which cannot be treated with antibiotics.
Tertiary treatment is done, so that the water can be used for drinking purpose.

(125) Answer : (1)

Solution:

Mycorrhizal associations do not play role in N₂ fixation.

(126) Answer : (4)

Solution:

Efforts of Ramdeo Misra paved the way for the establishment of Ministry of Environment and Forests in India in 1984.

(127) Answer : (3)

Solution:

Secondary sludge is rich in aerobic microbes, not methanogens.
Only biogas plant contributes directly in energy generation.

(128) Answer : (1)

Solution:

Barnacle *Balanus* and *Chathamalus* do not show resource partitioning.

(129) Answer : (2)

Solution:

Clown fish prevents itself from its predators by living among the stinging tentacles of sea anemone.

(130) Answer : (3)

Solution:

The given population pyramid represents expanding population and it represents population with positive growth rate.

(131) Answer : (1)

Solution:

Trichoderma is used in the production of cyclosporin A.

(132) Answer : (3)

Solution:

Logistic growth is represented by a sigmoid curve, which comprises of a lag phase, log phase and asymptote, at which population density is maximum.

(133) Answer : (2)

Solution:

The Ministry of Environment and Forests has initiated Ganga Action Plan and Yamuna Action plan to save major rivers of our country from pollution.

(134) Answer : (3)

Solution:

Desert lizards show behavioural adaptation to maintain their body temperature.

(135) Answer : (4)

Solution:

If two species compete for the same resource, they could avoid competition by choosing different times for feeding or different foraging patterns.

ZOOLOGY

(136) Answer : (3)

Hint:

Compound epithelium has protective function.

Solution:

Simple epithelium consists of a single layer of cells and it functions as a lining for body cavities, ducts and tubes. Exocrine glands secrete mucus, saliva, ear wax, digestive enzymes, etc.

(137) Answer : (4)

Solution:

Most of the cartilages in vertebrate embryos are replaced by bones in adults.

(138) Answer : (2)

Solution:

Given tissue is bone as it possesses haversian canals and concentric lamellae.

(139) Answer : (4)

Solution:

Tissues are broadly classified into four types *i.e.*,

(i) Epithelial (ii) Connective (iii) Muscular and (iv) Neural

(140) Answer : (2)

Solution:

Basic amino acids are lysine, histidine and arginine while proline is a heterocyclic neutral amino acid.

(141) Answer : (2)

Solution:

Each enzyme (E) has a substrate (S) binding site (active site) in its molecule so that a highly reactive transition state is produced. This complex is short-lived and dissociates into its products (P).

(142) Answer : (4)

Solution:

All the given bonds are involved in providing stability to the tertiary structure of proteins.

(143) Answer : (3)

Hint:

Primary metabolites

Solution:

Primary metabolites have identifiable functions and play known roles in normal physiological processes. We do not at the moment, understand the role of secondary metabolites. However, many of them are useful to human welfare, e.g., rubber, drugs, spices, scents and pigments.

(144) Answer : (3)

Hint:

Ash contains inorganic elements.

Solution:

When the tissue is fully burnt, then all the carbon compounds are oxidised to gaseous form and then they are removed. What is remaining is called 'ash'. This ash contains inorganic elements (like calcium, magnesium, etc.). Inorganic compounds like sulphate, phosphate, etc., are also seen in the acid-soluble fraction.

(145) Answer : (1)

Solution:

Rate of a physical or chemical process refers to the amount of product formed per unit time. It can be expressed as:

$$\text{rate} = \frac{\delta P}{\delta t}$$

(146) Answer : (2)

Solution:

Glucose, and ribose are monosaccharides and will be found in the acid-soluble fraction (filtrate). Glutamic acid is an acidic amino acid which will also be found in the acid-soluble fraction. Collagen, starch and lipids will be found in the acid-insoluble fraction (retentate).

(147) Answer : (4)

Solution:

A diglyceride has 2 fatty acids + 1 glycerol (trihydroxypropane) while a monoglyceride has 1 fatty acid + 1 glycerol.

(148) Answer : (3)

Hint:

Zwitterionic form of an amino acid.

Solution:

A particular property of an amino acid is the ionizable nature of $-\text{NH}_2$ and $-\text{COOH}$ groups. Hence, in solutions of different pH, the structure of an amino acid changes.

(149) Answer : (2)

Solution:

Gizzard is also known as proventriculus, which helps in grinding the food particles with the help of chitinous teeth.

(150) Answer : (3)

Solution:

The first pair of wings arises from mesothorax and second pair from metathorax.

Forewings/tegmina are not used in flight.

(151) Answer : (1)

Hint:

Male frogs croak

Solution:

Male frog can be distinguished by the presence of sound producing vocal sacs. Neck and tail is absent in frogs. Male frogs have copulatory pads on the first digit of the forelimbs which are absent in female frogs. Both of them have nictitating membrane as well as hindlimbs that end in five digits.

(152) Answer : (3)

Hint:

Locomotory structure

Solution:

Body of a frog is divisible into head and trunk. Eyes are bulged and covered by a nictitating membrane that protects them while in water. The frog never drinks water but absorbs it through the skin.

The fore limbs and hind limbs help in swimming, walking, leaping and burrowing. The hind limbs end in five digits and they are larger and muscular than fore limbs that end in four digits.

(153) Answer : (3)

Hint:

Animals which excrete urea.

Solution:

Frogs are ureotelic animals. Frogs are beneficial for mankind because they eat insects and protect the crops. They also maintain ecological balance.

(154) Answer : (1)

Solution:

The correct pathway is:

Mouth → Buccal cavity → Pharynx → Oesophagus → Stomach → Intestine → Cloaca

(155) Answer : (2)

Solution:

In male frogs, reproductive organs consist of a pair of yellowish ovoid testes, which are found adhered to the upper part of kidneys by a double fold of peritoneum called mesorchium. Vasa efferentia are 10-12 in number that arise from testes.

(156) Answer : (3)

Solution:

The simple columnar epithelium is composed of a single layer of tall and slender cells. Their nuclei are located at the base.

They are found in the lining of stomach and intestine and help in secretion and absorption.

(157) Answer : (2)

Solution:

Gap junctions enable nerve or muscle impulses to spread rapidly among the cells, a process that is crucial for the normal operation of some parts of the nervous system and for the contraction of muscle in the heart, GI tract and uterus.

(158) Answer : (3)

Solution:

Connective tissues are the most abundant and widely distributed tissue in the body of complex animals. Mesodermal embryonic cells called mesenchymal cells give rise to the cells of connective tissue.

(159) Answer : (4)

Solution:

In all connective tissues except blood and lymph, the cells (fibroblasts) secrete fibres of structural proteins called collagen or elastin. These cells also secrete modified polysaccharides.

(160) Answer : (1)

Solution:

Both muscle fibres and nerve fibres are excitable *i.e.*, they are capable of responding to stimuli by generating electrochemical impulses, such as action potentials and propagating them along their cell membranes.

(161) Answer : (4)

Solution:

Cartilage is present in the tip of nose, outer ear joints, between adjacent bones of the vertebral column, limbs and hands in adults.

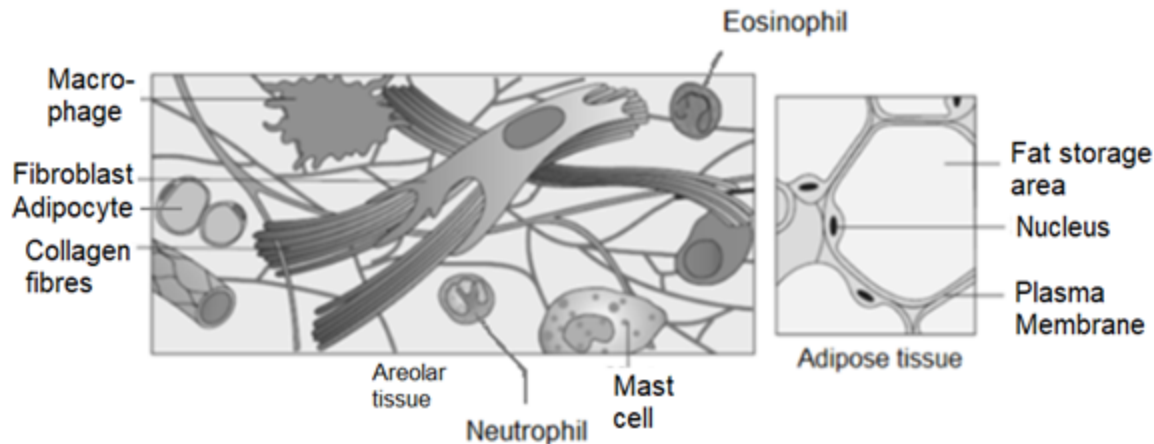
(162) Answer : (1)

Solution:

Cardiac muscles are found exclusively in the heart which pumps blood to all parts of the body. Cardiac muscle fibres are uninucleated, branched, striated and cylindrical in shape.

(163) Answer : (1)

Solution:



(164) Answer : (3)

Solution:

Each muscle is made of many long, cylindrical fibres arranged in parallel arrays. These fibres are composed of numerous fine fibrils, called myofibrils.

(165) Answer : (4)

Solution:

- Lacunae – Fluid-filled spaces present in bone and cartilages
- Lamellae – Present exclusively in bones
- Tendons – Join muscle to bones
- Ligaments – Join bone to bone

(166) Answer : (3)

Solution:

Plant cell wall is made of cellulose whose monomeric unit is glucose. All monosaccharides are reducing sugars.

(167) Answer : (4)

Solution:

Proteins constitute 10-15% of the total cellular mass. Collagen, trypsin and GLUT-4 are proteins while estrogen is a steroid hormone.

(168) Answer : (3)

Solution:

Lecithin possesses two fatty acids. Arachidonic acid is an example of an unsaturated fatty acid that possesses double bonds.

(169) Answer : (2)**Solution:**

Glycerol is a simple lipid. It is also called as trihydroxy propane. Cholesterol does not have fatty acids but do have fat-like properties. Adenosine is a nucleoside in which sugar molecule is attached to the nitrogenous base *via* glycosidic bond.

(170) Answer : (4)**Solution:**

The long protein chain fold upon itself like a hollow woolen ball, giving rise to the tertiary structure.

(171) Answer : (3)**Hint:**

Lipids are strictly not macromolecules, yet they are present in acid-insoluble fraction. They are made of carbon, hydrogen and less amount of oxygen. They are water insoluble but get dissolved in organic solvents. They are not polymers but are assembled from smaller molecules by dehydration.

(172) Answer : (2)**Solution:**

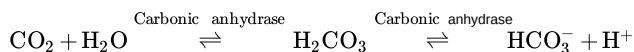
Except ribozymes, other enzymes are proteinaceous in nature.

Glycine possesses a chiral carbon.

Sucrose is a non-reducing sugar.

(173) Answer : (3)**Solution:**

Carbonic anhydrase facilitates the given reaction:



RBCs contain a very high concentration of the enzyme, carbonic anhydrase and minute quantities of the same is present in the plasma too. It belongs to class IV of enzymes.

(174) Answer : (1)**Solution:**

Competitive inhibitors are often used in the control of bacterial pathogens.

(175) Answer : (1)**Solution:**

Hydrolases are class III enzymes that catalyse the hydrolysis of ester, ether, peptide, glycosidic, C – C, C-halide or P–N bonds.

(176) Answer : (2)**Solution:**

Collagen is the most abundant protein in the animal world. It is the main protein in the connective tissue. It acts as the intercellular ground substance.

(177) Answer : (3)**Solution:**

Lysine is a basic amino acid while valine is a neutral amino acid. Cysteine and methionine possess sulphur in its structure.

(178) Answer : (2)**Solution:**

Pigments	Carotenoids, Anthocyanins, etc.
Alkaloids	Morphine, Codeine, etc.
Terpenoides	Monoterpenes, Diterpenes, etc.
Essential oils	Lemon grass oil, etc.
Toxins	Abrin, Ricin
Lectins	Concanavalin A
Drugs	Vinblastin, curcumin, etc.
Polymeric substances	Rubber, gums, cellulose

(179) Answer : (1)**Solution:**

Every enzyme works efficiently at its optimum pH. A rise or fall in level from optimum pH reduces enzymatic activity.

(180) Answer : (4)

Solution:

Pyruvic acid – Formed from glucose through different enzyme catalysed metabolic reactions.

Lactic acid – Formed from glucose anaerobically

Aspartic acid – Acidic amino acid

Trichloroacetic acid – Used for chemical analysis of a living tissue

