

## HINT AND SOLUTIONS

### PHYSICS

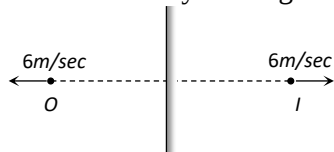
1. (A)

Subtract the given time from 11: 60<sup>hr. min.</sup>

Time in mirror = 11 : 60 – 3 : 25 = 8 : 35

2. (C)

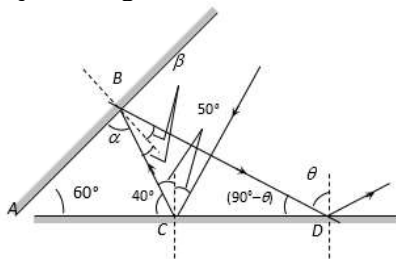
Relative velocity of image w.r.t. object



$$= 6 - (-6) = 12 \text{ m / sec}$$

3. (C)

Let required angle be  $\theta$



From geometry of figure

In  $\triangle ABC$ ;  $\alpha = 180^\circ - (60^\circ + 40^\circ) = 80^\circ$

$\Rightarrow \beta = 90^\circ - 80^\circ = 10^\circ$

In  $\triangle ABD$ ;  $\angle A = 60^\circ$ ,  $\angle B = (\alpha + 2\beta)$

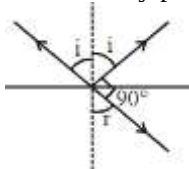
$= (80 + 2 \times 10) = 100^\circ$  and  $\angle D = (90^\circ - \theta)$

$\therefore \angle A + \angle B + \angle D = 180^\circ$

$\Rightarrow 60^\circ + 100^\circ + (90^\circ - \theta) = 180^\circ \Rightarrow \theta = 70^\circ$

4. (C)

For polarisation, reflected ray and refracted ray must be mutually perpendicular



$$\therefore i + 90^\circ + r = 180^\circ$$

$$\Rightarrow i + 33.6^\circ = 90$$

$$\therefore i = 56.4^\circ$$

5. (A)

For real image  $m = -2$ ,

$$\text{so by using } m = \frac{f}{f - u}$$

$$\Rightarrow -2 = \frac{-50}{-50 - u} \Rightarrow u = -75 \text{ cm}$$

6. (A)

$$\mu_{\text{blue}} > \mu_{\text{red}}$$

7. (A)

$$\lambda_{\text{medium}} = \frac{\lambda_{\text{air}}}{\mu} = \frac{6000}{1.5} = 4000 \text{ \AA}$$

8. (C)

Let  $v'$  and  $\lambda'$  represents frequency and wavelength of light in medium respectively.

$$\text{so } v' = \frac{v}{\lambda'} = \frac{c/\mu}{\lambda/\mu} = \frac{c}{\lambda} = v$$

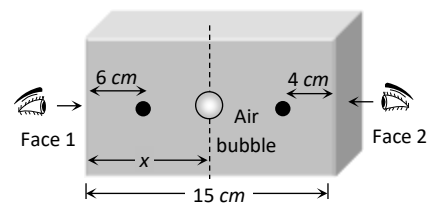
9. (B)

$$\mu = \frac{1}{\sin C} = \frac{1}{\sin 30} = 2$$

$$\therefore v = \frac{3 \times 10^8}{2} = 1.5 \times 10^8 \text{ m/s}$$

10. (D)

When viewed from face (1)



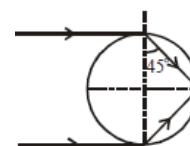
$$\mu = \frac{u}{v} = \frac{x}{v} = \frac{x}{6} \quad \dots(i)$$

Now when viewed from face (2)

$$\mu = \frac{15 - x}{v} = \frac{15 - x}{4} \quad \dots(ii)$$

$$\text{From equation (i) and (ii) } \mu = \frac{15 - 6\mu}{4} \Rightarrow \mu = 1.5.$$

11. (C)



$$\mu = \frac{1}{\sin \theta_c}, \mu = \frac{1}{\sin 45^\circ} = \sqrt{2}$$

12. (C)

Since the wavelength of light becomes  $\frac{2}{3}$  times of the wavelength in free space, the refractive index of the material of lens is  $\frac{3}{2} = 1.5$

Consider refraction from first surface,

$$\frac{1.5}{v_1} - \frac{1}{u} = \frac{1.5 - 1}{R}$$

For refraction from second surface,

$$\frac{1}{v_2} - \frac{1.5}{v_1} = \frac{1 - 1.5}{\infty}$$

$$\text{Hence, } \frac{1}{v_2} - \frac{1}{u} = \frac{0.5}{R}$$

Magnification of the lens is given by

$$M_1 \times M_2 = \frac{v_1}{u} \times \frac{v_2}{v_1} = \frac{v_2}{u} = \frac{-1}{3} \text{ (negative since}$$

image is real)

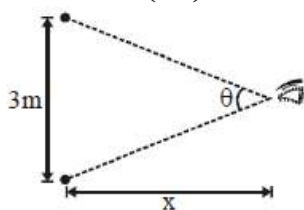
It is given that  $v_2 = 8$

$$\Rightarrow u = -24 \text{ m}$$

Hence,  $R = 3 \text{ m}$

13. (A)

$$\theta = 1 \text{ min} = \left( \frac{1}{60} \right) = \frac{1}{60} \times \frac{\pi}{180} = \frac{\pi}{10800} \text{ rad}$$



$$\theta = \frac{3 \times 10^{-3}}{x}$$

$$x = \frac{3 \times 10^{-3}}{\theta} = \frac{3 \times 10^{-3}}{\frac{\pi}{10800}} \approx 10 \text{ km}$$

14. (A)

$$L = v_0 + f_e$$

$$15 = v_0 + 3$$

$$v_0 = 12 \text{ cm}$$

Image by objective

$$\frac{1}{v_0} - \frac{1}{u_0} = \frac{1}{f_0}$$

$$\frac{1}{12} - \frac{1}{-u_0} = \frac{1}{2}$$

$$u_0 = 2.4 \text{ cm}$$

15. (C)

Suppose slit width's are equal, so they produce waves of equal intensity say  $I$ . Resultant intensity at any point  $I_R = 4I' \cos^2 \phi$  where  $\phi$  is the phase difference between the waves at the point of observation.

For maximum intensity  $\phi = 0^\circ$

$$\Rightarrow I_{\max} = 4I' = I \quad \dots (i)$$

If one of slit is closed, Resultant intensity at the same point will be  $I$  only i.e.  $I = I_0 \quad \dots (ii)$

Comparing equation (i) and (ii) we get

$$I = 4I_0$$

16. (C)

$$m = \frac{15}{15 - (-10)} = \frac{15}{25} = \frac{3}{5}$$

$$\frac{I}{5} = \frac{3}{5} I = 3 \text{ cm}$$

The positive sign indicates that the image is virtual.

17. (A)

$$\frac{1}{-50} - \frac{1}{-(25)} = \frac{1}{f}$$

$$\frac{1}{f} = \frac{1}{50} \Rightarrow P = \frac{100}{f(\text{cm})} = \frac{100}{50} = 2D$$

Now in second case

$$\frac{1}{-150} - \frac{1}{\infty} = \frac{1}{f'}$$

$$f' = -150 \text{ cm}$$

$$\Rightarrow P = \frac{100}{-150} = -\frac{2}{3} D$$

18. (D)

$$\beta = \frac{\lambda D}{d} \Rightarrow (4 \times 10^{-3}) = \frac{4 \times 10^{-7} \times D}{0.1 \times 10^{-3}} \Rightarrow D = 1 \text{ m}$$

19. (D)

Distance between the first dark fringes on either side of central maxima = width of central maxima

$$= \frac{2\lambda D}{d} = \frac{2 \times 600 \times 10^{-9} \times 2}{1 \times 10^{-3}} = 2.4 \text{ mm}$$

20. (C)

$$\text{Semi vertical angle} = C = \sin^{-1} \left( \frac{1}{\mu} \right) = \sin^{-1} \left( \frac{3}{4} \right)$$

21. (D)

$$I \propto A^2 \Rightarrow \frac{I_2}{I_1} = \left( \frac{A_2}{A_1} \right)^2 = \frac{\pi r^2 - \frac{\pi r^2}{4}}{\pi r^2} = \frac{3}{4}$$

$$\Rightarrow I_2 = \frac{3}{4} I_1 \text{ and focal length remains unchanged.}$$

22. (A)

Focal length of the combination can be calculated as

$$\frac{1}{F} = \frac{1}{f_1} + \frac{1}{f_2} \Rightarrow \frac{1}{F} = \frac{1}{(+40)} + \frac{1}{(-25)}$$

$$\Rightarrow F = -\frac{200}{3} \text{ cm}$$

$$\therefore P = \frac{100}{F} = \frac{100}{-200/3} = -1.5 D$$

23. (C)

$$f = \frac{R}{(\mu - 1)} \Rightarrow 30 = \frac{10}{(\mu - 1)} \Rightarrow \mu = 1.33$$

24. (A)

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} \text{ (Given } u = -20 \text{ cm, } f = 10 \text{ cm, } v = ?)$$

$$\therefore \frac{1}{10} = \frac{1}{v} - \frac{1}{(-20)} \Rightarrow v = 20 \text{ cm}$$

25. (A)  
 $f_{\text{water}} = 4 \times f_{\text{air}}$ , air lens is made up of glass.  
 By using lens makes formula for lens in water and air

26. (A)  

$$\frac{1}{f} = (\mu_a - 1) \left( \frac{1}{R_1} - \frac{1}{R_2} \right) = \left( \frac{2}{3} - 1 \right) \left( \frac{2}{10} \right)$$
 $\Rightarrow f = -15 \text{ cm}$ , so behaves as concave lens.

27. (D)  

$$f = \frac{R}{2(\mu - 1)}, f' = \frac{R}{(\mu - 1)} \Rightarrow f' = 2f$$

28. (A)  
 By using formula  $\frac{\mu_2}{v} - \frac{\mu_1}{u} = \frac{\mu_2 - \mu_1}{R}$   

$$\Rightarrow \frac{1.5}{v} - \frac{1}{(-15)} = \frac{(1.5 - 1)}{+30} \Rightarrow v = -30 \text{ cm}.$$

Negative sign shows that, image is obtained on the same side of object i.e. towards left.

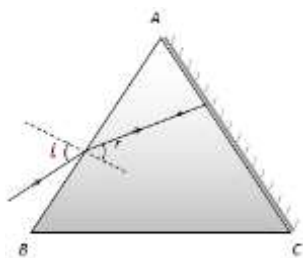
29. (D)  

$$\frac{\sin \frac{A + \delta_m}{2}}{\sin \frac{A}{2}} = \mu, \text{ But } \frac{A + \delta_m}{2} = i = 45^\circ$$
  
 So  $\frac{\sin 45^\circ}{\sin(A/2)} = \sqrt{2} \Rightarrow \frac{1}{2} = \sin \frac{A}{2} \Rightarrow A = 60^\circ$

30. (C)  
 $A = r + 0 \Rightarrow r = 30^\circ$   
 From Snell's law at surface AB  

$$\mu = \frac{\sin i}{\sin r}$$

$$\Rightarrow \sqrt{2} = \frac{\sin i}{\sin 30^\circ} \Rightarrow i = 45^\circ$$



31. (B)  
 For dispersion without deviation  $\frac{A}{A'} = \frac{(\mu' - 1)}{(\mu - 1)}$   

$$\frac{4}{A_F} = \frac{(1.72 - 1)}{(1.54 - 1)} = \frac{0.72}{0.54} \text{ or } A_F = \frac{4 \times 0.54}{0.72} = 3^\circ$$

32. (C)  

$$I_{\text{max}} = (\sqrt{I_1} + \sqrt{I_2})^2 = (\sqrt{I} + \sqrt{4I})^2 = 9I$$
  

$$I_{\text{min}} = (\sqrt{I_1} - \sqrt{I_2})^2 = (\sqrt{I} - \sqrt{4I})^2 = I$$

33. (B)  
 $\phi = \pi/3, a_1 = 4, a_2 = 3$   
 So,  $A = \sqrt{a_1^2 + a_2^2 + 2a_1 a_2 \cos \phi} \Rightarrow A \approx 6$

34. (C)  

$$\beta = \frac{\lambda D}{d} = \frac{5 \times 10^{-7} \times 2}{10^{-3}} \text{ m} = 10^{-3} \text{ m} = 1.0 \text{ mm}.$$

35. (D)  

$$\beta = \frac{\lambda D}{d} \Rightarrow \text{If } D \text{ becomes twice and } d \text{ becomes half so } \beta \text{ becomes four times.}$$

36. (A)  

$$\beta = \frac{\lambda D}{d}; \therefore B \propto \lambda$$
  

$$\frac{\lambda'}{\lambda} = \frac{0.4}{4/3} \Rightarrow \lambda' = 0.3 \text{ mm}$$

37. (D)  
 In the presence of thin glass plate, the fringe pattern shifts, but no change in fringe width.

38. (A)  
 Using  $d \sin \theta = n\lambda$ , for  $n = 1$   

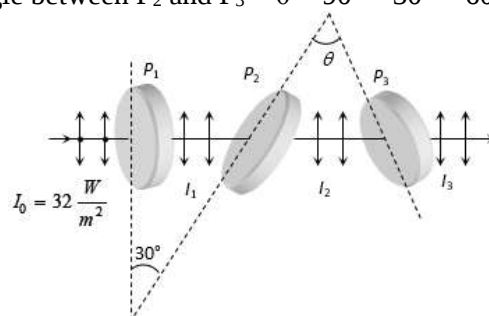
$$\sin \theta = \frac{\lambda}{d} = \frac{550 \times 10^{-9}}{0.55 \times 10^{-3}} = 10^{-3} = 0.001 \text{ rad}$$

39. (B)  
 By using  $I = 4I_0 \cos^2 \left( \frac{\phi}{\lambda} \right) = 4I_0 \cos^2 \left( \frac{\pi \Delta}{\lambda} \right)$   

$$\left\{ \because \phi = \frac{2\pi}{\lambda} \Delta \right\}$$

$$\Rightarrow \frac{I_1}{I_2} = \frac{\cos^2 \left( \frac{\pi \Delta_1}{\lambda} \right)}{\cos^2 \left( \frac{\pi \Delta_2}{\lambda} \right)} = \frac{\cos^2 \left( \frac{\pi \cdot \frac{\lambda}{4}}{\lambda} \right)}{\cos^2(0)} = \frac{1}{2}$$

40. (B)  
 Angle between  $P_1$  and  $P_2 = 30^\circ$  (given)  
 Angle between  $P_2$  and  $P_3 = \theta = 90^\circ - 30^\circ = 60^\circ$



The intensity of light transmitted by  $P_1$  is

$$I_1 = \frac{I_0}{2} = \frac{32}{2} = 16 \frac{W}{m^2}$$

According to Malus law the intensity of light transmitted by  $P_2$  is

$$I_2 = I_1 \cos^2 30^\circ = 16 \left( \frac{\sqrt{3}}{2} \right)^2 = 12 \frac{W}{m^2}$$

Similarly, intensity of light transmitted by  $P_3$  is

$$I_3 = I_2 \cos^2 \theta = 12 \cos^2 60^\circ = 12 \left( \frac{1}{2} \right)^2 = 3 \frac{W}{m^2}$$

41. (B)  
For dark fringe path difference  

$$\Delta = (2n - 1) \frac{\lambda}{2};$$
 Here  $n = 3$  and  $\lambda = 6000 \times 10^{-10} \text{ m}$   
 So,  $\Delta = (2 \times 3 - 1) \times \frac{6 \times 10^{-7}}{2} = 15 \times 10^{-7} \text{ m}$   
 $= 1.5 \text{ microns.}$

42. (C)  
Theory Based

43. (C)  
By using  $m_{\infty} = \frac{(L_{\infty} - f_o - f_e).D}{f_o f_e}$   

$$\Rightarrow 45 = \frac{(L_{\infty} - 1 - 5) \times 25}{1 \times 5} \Rightarrow L_{\infty} = 15 \text{ cm}$$

44. (C)  

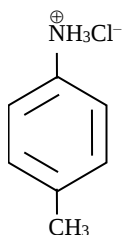
$$\theta = (\mu_v - \mu_R) A = (1.6 - 1.5) \times 5 = 0.5^\circ$$

45. (A)  
Resolving limit  

$$x \propto \lambda \Rightarrow \frac{x_1}{x_2} = \frac{\lambda_1}{\lambda_2} \Rightarrow \frac{0.1}{x_2} = \frac{6000}{4800} \Rightarrow x_2 = 0.08 \text{ mm}$$

## CHEMISTRY

46. (D)  
Most reactive compound is



47. (D)  
NaBH<sub>4</sub> does not reduce ester and alkene.

48. (C)  

$$X = \text{C}_6\text{H}_5\text{SO}_3\text{H} \quad Y = \text{C}_6\text{H}_5\text{ONa} \quad \text{Product} = \text{C}_6\text{H}_5\text{OH}$$

49. (D)  

$$\text{CH}_3\text{COCl} + \text{C}_6\text{H}_5\text{OH} \rightarrow \text{CH}_3\text{COOC}_6\text{H}_5 \quad (\text{A})$$

$$\text{CH}_3\text{COCl} + \text{CH}_3\text{COONa} \rightarrow \text{CH}_3\text{COOC(CH}_3\text{)}_2 \quad (\text{B})$$

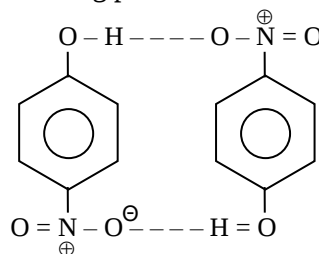
50. (D)  
OH<sup>-</sup> is better proton acceptor than phenoxide ion.

51. (D)  
Acidity  $\propto$  Stability of conjugate anion  

$$\text{Acidity} \propto \frac{-M, -I}{+M, +I}$$

52. (D)  
PCC oxidise 1° alcohol into aldehyde.

53. (B)  
In p-nitrophenol, intermolecular hydrogen bonding present



54. (C)  
Because of intramolecular H-bonding, H<sup>+</sup> removal from o-nitrophenol is difficult.

55. (B)  

$$X = \text{C}_6\text{H}_3(\text{SO}_3\text{H})_2 \quad Y = \text{C}_6\text{H}_3(\text{NO}_2)_3$$

$$Z = \text{C}_6\text{H}_3(\text{NO}_2)_3$$

56. (B)  
Phenol has more electron density than that of benzene due to +M effect of -OH group.

57. (B)  
Conceptual

58. (C)  
Reactivity towards nucleophilic

Addition  $\propto$  electron withdrawing group at  $-\overset{\text{O}}{\parallel}{\text{C}}-$   

$$\text{Addition} \propto \frac{1}{\text{steric crowding}}$$

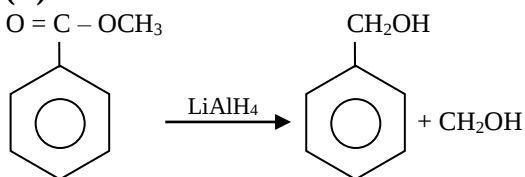
59. (A)  
Informative

60. (B)  
For comparable molecular mass  
Boiling point order – Alcohol > Aldehyde > ether  
> alkane

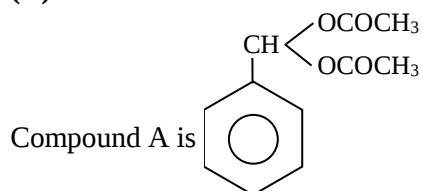
61. (C)

Both A and C are  $\text{CH}_3 - \overset{\text{O}}{\parallel} \text{C} - \text{CH}_3$

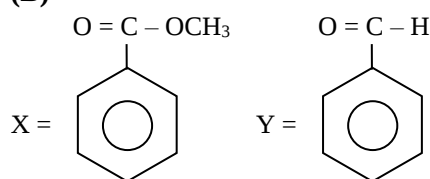
62. (D)  
 $\text{O} = \text{C} - \text{OCH}_3$



63. (C)



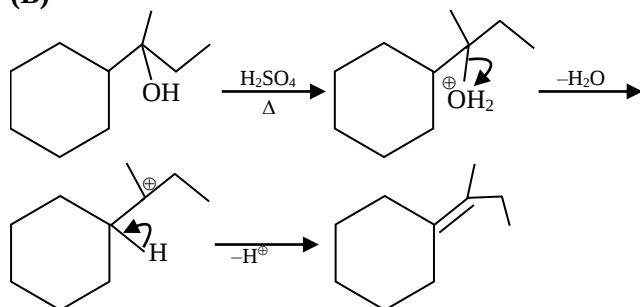
64. (B)



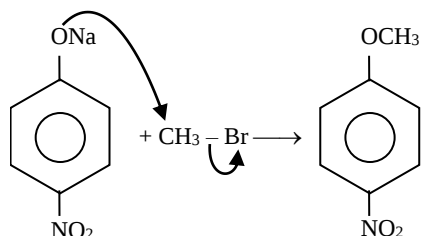
65. (D)  
Informative

66. (B)  
 $\text{E}_{1\text{CB}}$

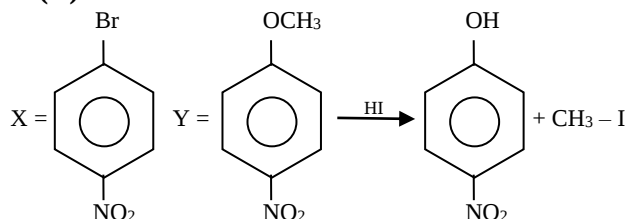
67. (B)



68. (D)



69. (C)

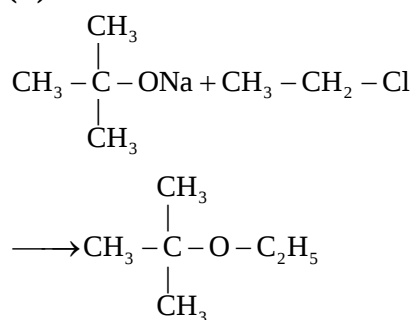


70. (A)  
 $\text{S}_{\text{N}}1$  Mechanism

71. (B)  
 $\text{S}_{\text{N}}2$  Mechanism

72. (C)  
Conceptual

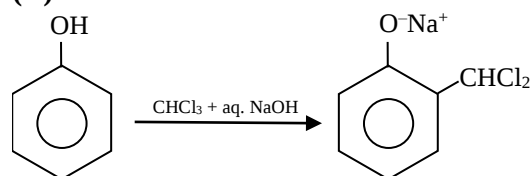
73. (B)



74. (C)  
Most stable carbocation easily dehydrating

75. (B)  
Informative

76. (A)



77. (B)  
Tertiary alcohol reacts with Lucas reagent (HCl and  $\text{ZnCl}_2$ ) most readily by  $\text{S}_{\text{N}}1$  mechanism.

78. (D)  
Conceptual

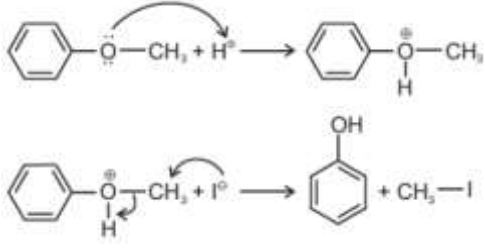
79. (B)  
Reactivity towards  $\text{S}_{\text{N}}1 \propto$  Stability of carbocation

80. (D)  
Swarts reaction

81. (B)



82. (D)  
Reactivity towards  $S_N2$  –  
 $\text{CH}_3 - \text{X} > \text{CH}_2=\text{CH}-\text{CH}_2-\text{X} > (\text{CH}_3)_2\text{CH}-\text{X} > (\text{CH}_3)_3\text{C}-\text{X}$
83. (A)  
 $\text{C}_6\text{H}_5\text{MgBr} + \text{CH}_3-\overset{\text{CH}_3}{\underset{\text{OH}}{\text{C}}}-\text{CH}_3 \longrightarrow \text{C}_6\text{H}_6 + (\text{CH}_3)_2\text{COMgBr}$
84. (B)  
 $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{S}}-\text{CH}_3$  is a polar aprotic solvent
85. (A)  
Reactivity towards  $S_N1 \propto$  Stability of carbocation
86. (B)  
In Swarts reaction C – X bond formed

87. (B)  
 $\text{CHX}_3 + 6\text{Ag} + \text{CHX}_3 \longrightarrow \text{CH} \equiv \text{CH}$
88. (C)  
Aldehydes (except formaldehyde) gives  $2^\circ$  alcohol with  $\text{RMgX}$ .
89. (B)  

90. (D)  
In  $S_N2$ , inversion of configuration takes place.

## BIOLOGY

91. (B)  
S.L. Miller created electric discharge in closed flask containing  $\text{CH}_4$ ,  $\text{NH}_3$ ,  $\text{H}_2$  and water vapours at  $800^\circ\text{C}$ .
92. (C)  
Formation of life was preceded by chemical evolution, i.e., formation of diverse organic molecules from inorganic constituents
93. (D)  
Conventional religious literature give the theory of special creation which have three connotations. They are as follows-  
  - All living organisms as we see today were created as such
  - Earth is about 4000 years old
  - Diversity was always same since creation and will be the same in future
94. (A)  
The first cellular form of life did not possibly originate till about 2000 million years ago.
95. (C)  
There has been gradual evolution of life forms.
96. (C)  
Comparative anatomy and morphology show similarities and differences among organisms of today and those that existed years ago during evolution.
97. (C)  
Homology indicates common ancestry and divergent evolution.
98. (D)  
Alfred Wallace, a naturalist worked in Malay Archipelago had conclusion similar to those of Charles Darwin that in due course of time, apparently new type of organisms appears.
99. (D)  
Analogy are anatomically different structures evolving for similar function. Analogous structures are the results of convergent evolution. Ex- Eye of octopus and eyes of mammals or the flippers or penguins and dolphins.
100. (A)  
The work of Thomas Malthus on populations influenced Darwin.
101. (D)  
Example of homologous structures in plants – Bougainvillea (thorn) and Cucurbita (tendrils).
102. (D)  
Homologous structures show divergent evolution.
103. (A)  
This figure represents adaptive radiation of marsupials of Australia which start from a point and radiating to other areas of geography.
104. (D)  
Hardy-Weinberg principle says the allele frequencies a population if are stable and is constant from generation to generation. The gene pool (total genes and their alleles in a population) remains a constant which is called genetic equilibrium. Sum total of all the allelic frequencies is 1.

- 105. (B)**  
 $D^2 + 2Dd + d^2 = 1$  (According to Hardy-Weinberg law)  
 $D = 0.7$  (given)  
 $d = 0.3$  (given)  
 $2Dd$  (Heterozygous) =  $2 \times 0.7 \times 0.3 = 0.42$
- 106. (D)**  
The first 'human-being like' (hominid) creature was *Homo habilis*.
- 107. (D)**  
Neanderthal man used hides to protect their body and buried their dead.
- 108. (D)**  
NCERT data based
- Sea weeds and few plants existed – 320 mya
  - Invertebrates were formed and active – 500 mya
  - Reptiles of different shapes and sizes dominated – 200 mya
  - Jawless fishes evolved – 350 mya
- 109. (B)**  
Marsupial of Australia shows adaptive radiation and convergent evolution which start from a point and radiating to other areas of geography.
- 110. (B)**  
Natural selection can lead to stabilisation (in which more individuals acquire mean character value), directional change (more individuals acquire value other than the mean character value) or disruption (more individuals acquire peripheral character value at both ends of the distribution curve).
- 111. (A)**  
During Ice Age between 75,000 – 10,000 years ago modern *Homo sapiens* arose.
- 112. (C)**  
Water vapour, methane, carbon dioxide and ammonia released from molten mass covered the surface of the earth.
- 113. (A)**  
Lobefins was bony fish evolved into the first amphibians.
- 114. (B)**  
Evolution for Darwin was gradual while DeVries concept was mutation caused speciation and hence called it saltation.
- 115. (D)**  
Five factors which affect Hardy-Weinberg equilibrium are gene migration or gene flow, genetic drift, mutation, genetic recombination and natural selection.
- 116. (D)**  
Random change in allele frequencies that occur by chance especially in small populations is known as genetic drift.
- 117. (D)**  
**A** is the skull of adult chimpanzee and **B** is the skull of an adult human.
- 118. (B)**  
Extra-terrestrial origin of life was proposed by the 'theory of Panspermia' which is proved to be incorrect.
- 119. (D)**  
Hardy Weinberg equation:  
 $p^2 + 2pq + q^2 = 1$  or  $(p + q)^2 = 1$
- 120. (D)**  
Branching descent and Natural selection are the key concept of Darwin theory of evolution.
- 121. (C)**  
The study of fossil is called Palaeontology.
- 122. (A)**  
Theory of Spontaneous generation state that life came out of decaying and rotting matter like straw, mud etc.
- 123. (D)**  
Potato (modified stem) and Sweet potato (modified root) has storage function is example for analogy which are result of convergent evolution.
- 124. (B)**  
When more than one adaptive radiation in one isolated geographical area (representing different habitats) is called Convergent evolution.
- 125. (C)**  
The Big Bang theory attempts to explain the origin of universe.
- 126. (D)**  
The evolutionary process giving rise to new species adapted to new habitats and ways of life is called adaptive radiation. Ex- Darwin's finches in Galapagos Islands & Australian marsupials.
- 127. (C)**  
Eye of an octopus and eye of a mammal are example of analogous structure.
- 128. (B)**  
Analogous structures are result of convergent evolution.

129. (A)  
NCERT data based
- First mammal- Shrew
  - Daggers like teeth- Tyrannosaurs
  - Fish like reptile- Ichthyosaurs
  - Giant ferns - Coal deposits
130. (C)  
Branching descent and Natural selection are the key concept of Darwin theory of evolution.
131. (C)  
For evolutionary success, a mutation must occur in genetic material.
132. (D)  
Hugo DeVries stated that large difference arising suddenly in a population, mutation causes evolution. Mutation caused speciation called saltation (single step large mutation).
133. (A)  
Sometimes the change in allele frequency is so different in the new sample of population that they become a different species. The original drifted population becomes founders and the effect is called Founder effect.
134. (D)  
Early Greek thinkers proposed Panspermia theory.
135. (A)  
Louis Pasteur experimentation demonstrated that life comes from pre-existing life.
136. (B)  
Inbreeding exposes harmful recessive genes that are eliminated by selection.
137. (A)  
Superior female in case of cattle that produces more milk per lactation.
138. (C)  
MOET is Multiple Ovulation Embryo Transfer Technology.
139. (A)  
MOET is programme for herd improvement.
140. (A)  
In interspecific hybridisation, male and female animals of two different related species are mated to produce hybrids.
141. (C)  
Continuous close breeding, usually reduces fertility and productivity. This is called inbreeding depression.
142. (C)  
Poultry is the class of domesticated birds which are used for food or their eggs.
143. (D)  
Hisardale is a new breed of sheep developed by crossing Bikaneri ewes and Marino rams.
144. (D)  
Mule is a sterile animal developed by crossing a horse with a donkey thus is a result of Interspecific hybridisation.
145. (B)  
Bee-keeping or apiculture is the maintenance of hives of honeybees for the production of honey and bees wax.
146. (D)  
“Family planning programme” was initiated in 1951.
147. (A)  
Hormone releasing IUDs make the uterus unsuitable for implantation and the cervix hostile to the sperm.
148. (C)  
Artificial insemination means introduction of semen of a healthy donor into the vagina or uterus.
149. (B)  
Amniocentesis pre-natal diagnosis to detect chromosomal anomalies in the foetus.
150. (D)  
Population growth rate depends upon Birth rate, Death rate and Age-sex ratio.
151. (D)  
Diaphragm and cervical cap doesn't cover vagina hence may cause STDs Birth control pills may cause STD too
152. (C)  
Assisted reproductive technologies (ART) include a number of special techniques which assist infertile couples to have children.
153. (C)  
An ideal contraceptive should be user-friendly, easily available, effective and reversible with no or least side effects.
154. (D)  
Sterilisation methods is considered to be highly effective.
155. (A)  
Failure of a couple to conceive is known as infertility.

- 156. (B)**  
Oral administration inhibits ovulation and implantation & alters the quality of cervical mucus to prevent or retard the entry of sperms.
- 157. (D)**  
Periodic abstinence is a method in which couples avoid from coitus during fertile period.
- 158. (C)**  
Poultry is the class of domesticated birds which are used for meat or their eggs.
- 159. (A)**  
LNG-20 is hormone releasing IUD.
- 160. (B)**  
Sterilisation procedure in the male is called vasectomy.
- 161. (C)**  
In-vitro Fertilisation followed by embryo transfer is known as Test tube baby programme. Ex- ZIFT & IUT.
- 162. (B)**  
Gamete intra fallopian transfer technique leads to in vivo fertilisation.
- 163. (A)**  
Emergency contraceptives are effective if used within 72 hrs of coitus.
- 164. (C)**  
Oral contraceptive pills help in birth control by inhibition of ovulation and implantation.
- 165. (C)**  
In-vitro Fertilisation involves ZIFT & IUT.
- 166. (B)**  
International Rice Research Institute (IRRI) is located in Philippines.
- 167. (B)**  
In 2002, maize hybrids that had twice the amount of the amino acids, lysine and tryptophan were developed.
- 168. (D)**  
Triticale has been developed through cross between Wheat and Rye.
- 169. (D)**  
'Himgiri' a variety of Wheat is resistant to Leaf and stripe rust, hill bunt diseases.
- 170. (B)**  
In mid- 1960s result of plant breeding techniques lead to increase in food production in India. This period this refer as Green revolution.
- 171. (C)**  
Pusa Komal variety of Cow Pea is resistant to Bacterial blight disease.
- 172. (B)**  
Inbreeding increases homozygosity.
- 173. (D)**  
Biofortification is a breeding process of specific crops to increase their nutritional value.
- 174. (D)**  
Crop rotation is used by farmers to increase soil fertility naturally.
- 175. (C)**  
Plants can be made disease resistant through breeding with wild relatives.
- 176. (A)**  
Artificial hybridisation is the transfer of pollen grains to the stigma from flowers with desirable combination.
- 177. (B)**  
Sequential steps to produce a new genetic variety of a crops are as follows-  
Collection of variability → Evaluation & selection of parents → Cross hybridisation among the selected parents → Selection & testing of superior recombinants → Testing and release of new varieties.
- 178. (B)**  
*Saccharum barberi* (North India) and *Saccharum officinarum* (South India) were crossed to get desirable qualities varieties.
- 179. (D)**  
Single cell protein can be obtained from microbes like bacteria, algae and fungi.
- 180. (B)**  
Totipotency refers to capacity to generate a whole plant from any plant cell/explant