

**INSTRUCTIONS**

1. This test will be a 3hour 20 minutes Test.
2. This test consists of Physical, Chemistry, Botany and Zoology questions with equal weightage of 180 marks.
3. Each question is of 4 marks.
4. There are four parts in the question paper, consisting Part – I Physics (Q. no. 1 to 50), Part – II Chemistry (Q.no. 51 to 100). Part – III Botany (Q. no. 101 to 200)
5. There will be only one correct choice in the given four choices for each question. For each question 4 marks will be awarded for correct choice, 1mark will be deducted for incorrect choice and zero mark will be awarded for unattempted question.
6. Any textual, printed or written material, mobile phones, calculator etc, is not allowed for the student appearing for the test.
7. All calculations/written work should be done in the rough sheet provided.

**SYLLABUS**

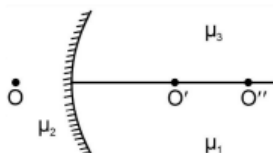
Physics: Ray Optics, Mirrors, Lens, Prism, Wave Optics, Interference (YDSE), Diffraction, Polarization.

Chemistry: Haloalkanes and Haloarenes, Biomolecules, Alcohols, Phenols and Ethers.

Biology: Strategies for Enhancement in food Production, Biotechnology: Principle and Process, Biotechnology and its Applications.

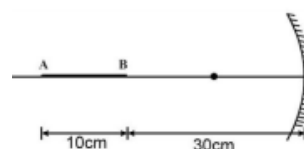
**PHYSICS**  
**Section -A**

1. Total internal reflection can take place only if
  - (a) Light goes from optically rarer medium (smaller refractive index) to optically denser medium
  - (b) Light goes from optically denser medium to rarer medium
  - (c) the refractive indices of the two media are close to each other
  - (d) the refractive indices of the two media are widely different
2. Figure shows three transparent media of refractive indices  $\mu_1, \mu_2$  and  $\mu_3$ . A point object O is placed in the medium  $\mu_2$ . If the entire medium on the right of the spherical surface has refractive index  $\mu_1$ . The image forms at  $O'$ . If this entire medium has refractive index  $\mu_3$ , the image forms at  $O''$ . In the situation shown.

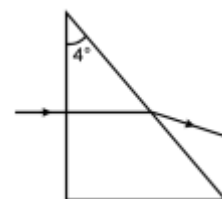


- (a) the image forms between  $O'$  and  $O''$
- (b) the image forms to the left of  $O'$
- (c) the image forms to the right of  $O''$
- (d) two images form, one at  $O'$  and the other at  $O''$

3. A wire AB is placed before a concave mirror having radius of curvature 40 cm as shown in figure. The total length of the image formed is.
  - (a) 10 cm
  - (b) 20 cm
  - (c) 30 cm
  - (d) 15 cm

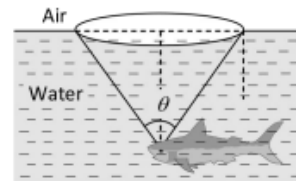


4. Find the angle of deviation suffered by the light ray shown in figure. The refractive index  $\mu = 1.5$  for the prism material.
  - (a)  $2^\circ$
  - (b)  $4^\circ$
  - (c)  $3^\circ$
  - (d)  $2.5^\circ$



5. A 5.0 diopter lens forms a virtual image which is 4 times the object placed perpendicularly on the principal axis of the lens. The distance of the object from the lens is.  
 (a) 20 cm (b) 10 cm  
 (c) 15 cm (d) 30 cm
6. A man runs towards a mirror at a speed of 15 m/s. What is the speed of his image with respect to the mirror  
 (a) 7.5 m/s (b) 15 m/s  
 (c) 30 m/s (d) 45 m/s
7. The near and far points of Shashi Tharoor are at 40 cm and 250 cm respectively. Find the power of the lens he should use while reading at 25 cm.  
 (a) + 1.5 D (b) - 1.5 D  
 (c) - 0.4 D (d) + 0.4 D
8. The light reflected by a plane mirror may form a real image  
 (a) If the rays incident on the mirror are diverging  
 (b) If the rays incident on the mirror are converging  
 (c) If the object is placed very close to the mirror  
 (d) Under no circumstances
9. The refractive indices of flint glass for red and violet light are 1.613 and 1.632 respectively. Find the angular dispersion produced by a thin prism of flint glass having a refracting angle  $5^\circ$   
 (a)  $0.405^\circ$  (b)  $0.95^\circ$   
 (c)  $0.040^\circ$  (d)  $0.095^\circ$
10. Two sources are called coherent if they produce waves  
 (a) of equal wavelength  
 (b) of equal velocity  
 (c) having same shape of wavelength  
 (d) having a constant phase difference
11. The slits in a Young's double slit experiment have equal width and the source is placed symmetrically with respect to the slits. The intensity at the central fringe is  $I_0$ . If one of the slits is closed, the intensity at this point will be  
 (a)  $I_0$  (b)  $I_0/4$   
 (c)  $I_0/2$  (d)  $4I_0$
12. Two coherent sources of different intensities send waves which interfere. The ratio of maximum to minimum intensity is 25:1. The intensities of the sources are in the ratio:  
 (a) 25:1 (b) 5:1  
 (c) 9:4 (d) 625:1
13. A plate of thickness  $t$  made of a material of refractive index  $\mu$  is placed in front of one of the slits in a double slit experiment. What should be the minimum thickness  $t$  which will make the intensity at the centre of the fringe pattern zero. Wavelength of the light used is  $\lambda$ . Neglect any absorption of light in the plate.  
 (a)  $\frac{\lambda}{2(\mu-1)}$  (b)  $(\mu-1)\lambda$   
 (c)  $\frac{\lambda}{(\mu-1)}$  (d)  $2(\mu-1)\lambda$
14. An object is placed 40 cm from a concave mirror of focal length 20 cm. The image formed is  
 (a) Real, inverted and same in size  
 (b) Real, inverted and smaller  
 (c) Virtual, erect and larger  
 (d) Virtual, erect and smaller
15. For light diverging from a point source  
 (a) The wavefront is spherical  
 (b) The intensity decreases proportional to the distance  
 (c) The wavelength is parabolic  
 (d) The intensity of the wavelength does not depend on the distance
16. The focal lengths of the objective and eye-lens of a microscope are 1 cm and 5 cm respectively. If the magnifying power for the relaxed eye is 45, then the length of the tube is  
 (a) 30 cm (b) 25 cm  
 (c) 15 cm (d) 12 cm
17. When the length of a microscope tube increases, its magnifying power  
 (a) Decrease  
 (b) Increase  
 (c) Does not change  
 (d) May decrease or increase
18. Two lenses whose powers are +2D and -4D respectively. The power of combination  
 (a) -2D (b) +2D  
 (c) -4D (d) +4D
19. Unpolarised light is incident on a plane glass surface of refractive index  $\sqrt{3}$ . What should be the angle of incidence so that the reflected and refracted rays are perpendicular to each other?  
 (a)  $30^\circ$  (b)  $60^\circ$   
 (c)  $45^\circ$  (d)  $15^\circ$

20. In Young's double-slit experiment using monochromatic light of wavelength  $\lambda$  the intensity of light at a point on the screen where path difference is  $\lambda$ , is K units. What is the intensity of light at a point where path difference is  $\lambda/3$ ?
- (a) K (b) K/2  
(c) K/4 (d) K/8
21. Huygen's conception of secondary waves
- (a) Allow us to find the focal length of a thick lens  
(b) Is a geometrical method to find a wavelength  
(c) Is used to determine the velocity of light  
(d) Is used to explain polarization
22. A light beam is being reflected by using two mirrors, as in a periscope used in submarines. If one of the mirrors rotates by an angle  $\theta$ , the reflected light will deviate from its original path by the angle
- (a)  $2\theta$  (b)  $0^\circ$   
(c)  $\theta$  (d)  $4\theta$
23. A convex mirror of focal length  $f$  forms an image which is  $\frac{1}{n}$  times the object. The distance of the object. The distance of the object from the mirror is
- (a)  $(n-1)f$  (b)  $\left(\frac{n-1}{n}\right)f$   
(c)  $\left(\frac{n+1}{n}\right)f$  (d)  $(n+1)f$
24. The focal length of a concave mirror is  $f$  and the distance from the object to the principle focus is  $x$ . The ratio of the size of the image to the size of the object is
- (a)  $\frac{f+x}{f}$  (b)  $\frac{f}{x}$   
(c)  $\sqrt{\frac{f}{x}}$  (d)  $\frac{f^2}{x^2}$
25. In a concave mirror experiment, an object is placed at a distance  $x_1$  from the focus and the image is formed at a distance  $x_2$  from the focus. The focal length of the mirror would be
- (a)  $x_1x_2$  (b)  $\sqrt{x_1x_2}$   
(c)  $\frac{x_1+x_2}{2}$  (d)  $\sqrt{\frac{x_1}{x_2}}$
26. Monochromatic light is refracted from air into the glass of refractive index  $\mu$ . The ratio of the wavelength of incident and refracted waves is
- (a)  $1 : \mu$  (b)  $1 : \mu + 1$   
(c)  $\mu : 1$  (d)  $1 : 1$
27. A beam of light propagating in medium A with index of refraction  $n(A)$  passes across an interface into medium B with index of refraction  $n(B)$ . The angle of incidence is greater than the angle of refraction;  $v(A)$  and  $v(B)$  denotes the speed of light in A and B. Then which of the following is true.
- (a)  $v(A) > v(B)$  and  $n(A) > n(B)$   
(b)  $v(A) > v(B)$  and  $n(A) < n(B)$   
(c)  $v(A) < v(B)$  and  $n(A) > n(B)$   
(d)  $v(A) < v(B)$  and  $n(A) < n(B)$
28. A vessel of depth  $2d$  cm is half filled with a liquid of refractive index  $\mu_1$  and the upper half with a liquid refractive index  $\mu_2$ . The apparent depth of the vessel seen perpendicularly is
- (a)  $d\left(\frac{\mu_1\mu_2}{\mu_1+\mu_2}\right)$  (b)  $d\left(\frac{1}{\mu_1} + \frac{1}{\mu_2}\right)$   
(c)  $2d\left(\frac{1}{\mu_1} + \frac{1}{\mu_2}\right)$  (d)  $2d\left(\frac{1}{\mu_1\mu_2}\right)$
29. If  $\hat{i}$  denotes a unit vector along incident light ray,  $\hat{r}$  a unit vector along refracted ray into a medium of refractive index  $\mu$  and  $\hat{n}$  unit vector normal to boundary of medium directed towards incident medium, then law of refraction is
- (a)  $\hat{i} \cdot \hat{n} = \mu(\hat{r} \cdot \hat{n})$   
(b)  $\hat{i} \times \hat{n} = \mu(\hat{r} \times \hat{n})$   
(c)  $\hat{i} \times \hat{n} = \mu(\hat{r} \times \hat{n})$   
(d)  $\mu(\hat{i} \times \hat{n}) = \hat{r} \times \hat{n}$
30. A fish is a little away below the surface of a lake. If the critical angle  $49^\circ$ , then the fish could see things above the water surface within an angular range of  $\theta^\circ$  where



- (a)  $\theta = 49^\circ$  (b)  $\theta = 90^\circ$   
(c)  $\theta = 98^\circ$  (d)  $\theta = 24\frac{1}{2}^\circ$

31. If two waves represented by  $y_1 = 4 \sin \omega t$  and  $y_2 = 3 \sin\left(\omega t + \frac{\pi}{2}\right)$  interfere at a point, the amplitude of the resulting wave will be about
- (a) 7 (b) 6  
(c) 5 (d) 3.5

32. Newton postulated his corpuscular theory on the basis of
- Newton's rings
  - Colours of thin films
  - Rectilinear propagation of light
  - Dispersion of white light
33. In Young's double slit experiment, if  $L$  is the distance between the slits and the screen upon which interference pattern is observed,  $x$  is the average distance between the adjacent fringes and  $d$  being the slit separation. The wavelength of light is given by
- $\frac{xd}{L}$
  - $\frac{xL}{d}$
  - $\frac{Ld}{x}$
  - $\frac{1}{Ldx}$
34. The focal length of the objective of a microscope is-
- Greater than the focal length of eye piece
  - Lesser than the focal length of the eye piece
  - Equal to the focal length of the eye piece
  - Any of (a) and (c)
35. Two identical light sources  $S_1$  and  $S_2$  emit light of same wavelength  $\lambda$ . These light rays will exhibit interference if
- Their phase difference remain constant
  - Their phases are distributed randomly
  - Their light intensities remain constant
  - Their light intensities change randomly

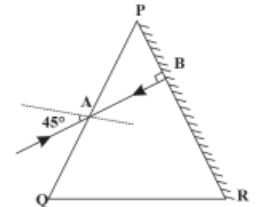
### Section - B

36. Two polaroids are placed in the path of unpolarized beam of intensity  $I_0$  such that no light is emitted from the second polaroid. If a third polaroid whose polarization axis makes an angle  $\theta$  with the polarization axis of first polaroid, is placed between these polaroids then the intensity of light emerging from the last polaroid will be
- $\left(\frac{I_0}{8}\right) \sin^2 2\theta$
  - $\left(\frac{I_0}{4}\right) \sin^2 2\theta$
  - $\left(\frac{I_0}{2}\right) \cos^4 \theta$
  - $I_0 \cos^4 \theta$
37. Wavelength of light of frequency 100 Hz
- $2 \times 10^6 m$
  - $3 \times 10^6 m$
  - $4 \times 10^6 m$
  - $5 \times 10^6 m$
38. Two beams of light having intensities  $I$  and  $4I$  interfere to produce a fringe pattern on a screen. The phase difference between the beams is  $\pi/2$  at point A and  $\pi$  at point B. The difference between the resultant intensities at A and B is

- 2I
- 4I
- 5I
- 9I

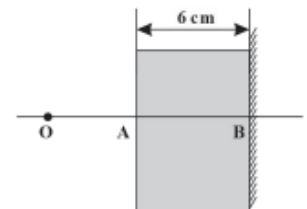
39. The face PR of a prism PQR of angle  $30^\circ$  is silvered. A ray is incident on face PQ at angle of  $45^\circ$  as shown in figure. The refracted ray undergoes reflection on face PR and retraces its path. The refractive index of the prism is

- $\sqrt{2}$
- $3/\sqrt{2}$
- 1.5
- 1.33



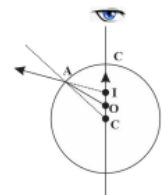
40. The two waves represented by  $y_1 = a \sin(\omega t)$  and  $y_2 = b \cos(\omega t)$  have a phase difference of
- 0
  - $\frac{\pi}{2}$
  - $\pi$
  - $\frac{\pi}{2}$
41. An object O is placed at 8 cm in front of a glass slab, whose one face is silvered as shown in fig. The thickness of the slab is 6 cm. If the image formed 10 cm behind the silvered face, find the refractive index of glass

- 3/5
- 3/2
- 4/5
- 2/3



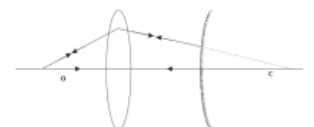
42. There is a small air bubble inside a glass sphere ( $\mu = 1.5$ ) of radius 10 cm. The bubble is 4.0 cm below the surface and is viewed normally from the outside. Find the apparent depth of the bubble approximately.

- 4 cm
- 5 cm
- 10 cm
- 3 cm



43. An object is placed at a distance of 15 cm from a convex lens of focal length 10 cm. On the other side of the lens, a convex mirror is placed at its focus such that the image formed by combination coincides with the object itself. The focal length of convex mirror is.

- 10 cm
- 20 cm
- 30 cm
- 40 cm



44. Evidence for the wave nature of light cannot be obtained from  
 (a) Reflection (b) Doppler effect  
 (c) Interference (d) Diffraction
45. In a double-slit experiment, the slits are separated by a distance  $d$  and the screen is at a distance  $D$  from the slits. If a maximum is formed just opposite to one slit, then what is the order of the fringe so formed?  
 (a)  $\frac{d^2}{2\lambda D}$  (b)  $\frac{2d^2}{\lambda D}$   
 (c)  $\frac{d^2}{\lambda D}$  (d)  $\frac{d^2}{4\lambda D}$
46. The diameter of the eye – ball of a normal eye is about 2.5 cm. The power of the eye lens varies from  
 (a) 2D to 10 D (b) 40 D to 32 D  
 (c) 9 D to 8 D (d) 44 D to 40 D
47. A ray of light makes an angle of  $10^\circ$  with the horizontal above it and strikes a plane mirror which is inclined at an angle  $\theta$  to the horizontal. The angle  $\theta$  for which the reflected ray becomes vertical is  
 (a)  $40^\circ$  (b)  $50^\circ$   
 (c)  $80^\circ$  (d)  $100^\circ$
48. The intensity ratio of two coherent sources of light is  $p$ . They are interfering in some region and produce interference pattern. Then the fringe visibility is  
 (a)  $\frac{1+p}{2\sqrt{p}}$  (b)  $\frac{2\sqrt{p}}{1+p}$   
 (c)  $\frac{p}{1+p}$  (d)  $\frac{2p}{1+p}$
49. In young's double slit experiment the phase difference between the two waves reaching at the location of the third dark fringe is:  
 (a)  $\pi$  (b)  $6\pi$   
 (c)  $5\pi$  (d)  $7\pi$
50. Read the following statements carefully  
 (i) Owls can move freely during night because they have large number of rods on their retina  
 (ii) The refractive index of diamond is  $\sqrt{6}$  and that of liquid is  $\sqrt{3}$ . If the light travels from diamond to the liquid, it will totally reflected when the angle of incidence is  $30^\circ$ .  $\mu = \frac{1}{\sin C}$ , where  $\mu$  is the refractive index of diamond with respect to liquid  
 (iii) Just before setting, the sun may appear to be elliptical. This happens due to scattering.  
 (iv) The resolving power of an electron microscope is higher than that of an optical

microscope. The wavelength of electron is more than the wavelength of visible light.

(v) Newton's rings are formed in the reflected system. When the space between the lens and the glass plate is filled with a liquid of refractive index greater than that of glass, the central spot of the pattern is dark because the reflection is Newton's ring cases will be from a denser to a rarer medium and the two interfering rays are reflected under similar conditions.

(vi) For best contrast between maximum and minima in the interference pattern of Young's double slit experiment, the intensity of light emerging out of the two slits should be equal because the intensity of interference pattern is proportional to square of amplitude

(vii) The unpolarised light and polarized light can be distinguished from each other by using polaroid as a polaroid is capable of producing plane polarized beams of light

(viii) Corpuscular theory fails in explaining the velocity of light in air and water. According to corpuscular theory, light should travel faster in denser medium than, in rarer medium.

Choose the incorrect statements from the above statements.

- (a) (iii), (v), (vi) (b) (ii), (iii), (vii), (viii)  
 (c) (i), (iv), (vi) (d) (ii), (vii), (viii)

## CHEMISTRY

### Section - A

51. Assertion: Addition of bromine to trans-2- butene yields meso -2, 3-dibromobutane  
 Reason: Bromine addition to an alkene is an electrophilic addition.  
 (a) Assertion and reason both are true and the reason is correct explanation of assertion  
 (b) Assertion and reason both are true but reason is not correct explanation of assertion  
 (c) Assertion is true but reason is wrong  
 (d) Assertion and reason both are wrong
52. Glucose has difference from fructose in that it  
 (a) Does not undergo hydrolysis  
 (b) Gives silver mirror with Tollen's reagent  
 (c) is a monosaccharide  
 (d) None of these
53. When methyl iodide is heated with ammonia, the product obtained is  
 (a) Methylamine  
 (b) Dimethylamine  
 (c) Trimethylamine  
 (d) A mixture of the above three amines

54. Solid  $CO_2$  on reaction with ethyl magnesium bromide gives

- (a) Ethanoic acid (b) Propanoic acid  
(c) Butanoic acid (d) None of these

55. Propene,  $CH_3 - CH = CH_2$  can be converted to 1-propanol by oxidation. Which set of reagents among the following is ideal to effect the conversion

- (a) Alkaline  $KMnO_4$   
(b)  $B_2H_6$  and alkaline  $H_2O_2$   
(c)  $O_3/Zn$  dust  
(d)  $OsO_4/CH_4, Cl$

56. Which one of the following will produce a primary alcohol by reacting with  $CH_3MgI$

- (a) Acetone (b) Methyl cyanide  
(c) Ethylene oxide (d) Ethyl acetate

57. Assertion: Alcohol and phenol can be distinguished by sodium hydroxide.

Reason: Phenol is acidic while alcohol is neutral.

- (a) Assertion and reason both are true and the reason is correct explanation of assertion  
(b) Assertion and reason both are true but reason is not correct explanation of assertion.  
(c) Assertion is true but reason is wrong  
(d) Assertion and reason both are wrong

58. Primary alcohols can be obtained from the reaction of the  $RMgX$  with

- (a)  $CO_2$  (b)  $HCHO$   
(c)  $CH_3CHO$  (d)  $H_2O$

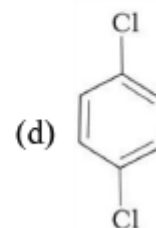
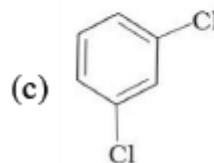
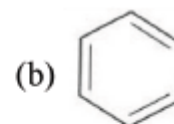
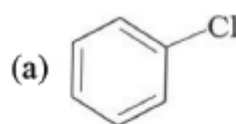
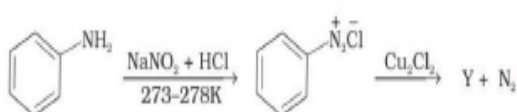
59.  $LiAlH_4$  converts acetic acid into

- (a) Acetaldehyde (b) Methane  
(c) Ethyl alcohol (d) Methyl alcohol

60. Benzyl alcohol is obtained from benzaldehyde by

- (a) Fittig's reaction  
(b) Cannizaro's reaction  
(c) Kolbe's reaction  
(d) Wurtz's reaction

61. Identify the compound Y in the following reaction



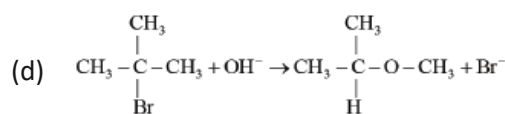
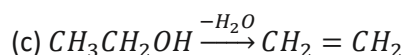
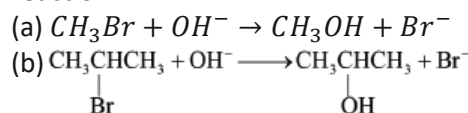
62. The odd decomposition of carbon chlorine bond form

- (a) Two free ions  
(b) Two-carbonium ion  
(c) Two carbanion  
(d) A cation and an anion

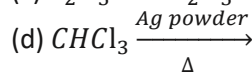
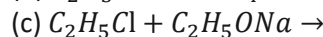
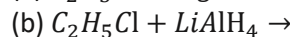
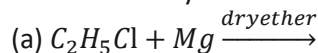
63. A new carbon-carbon bond formation is possible in

- (a) Cannizzaro reaction  
(b) Friedel-Craft's alkylation  
(c) Clemmensen reduction  
(d) None of these

64. Which of the following is the example of  $S_N2$  reaction



65. Wurtz reaction of methyl iodide yields an organic compound X. Which one of the following reactions also yields X



66. Which of these do not form Grignard reagent

- (a)  $CH_3F$  (b)  $CH_3Cl$   
(c)  $CH_3Br$  (d)  $CH_3I$

67. An organic compound A ( $C_4H_9Cl$ ) on reaction with  $Na/diethyl$  ether gives a hydrocarbon, which on monochlorination gives only one chloro derivative A is
- $t$  - butyl chloride
  - $S$  -butyl chloride
  - Isobutyl chloride
  - $n$  - butyl chloride

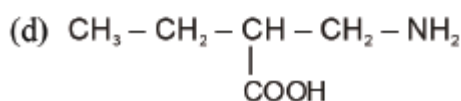
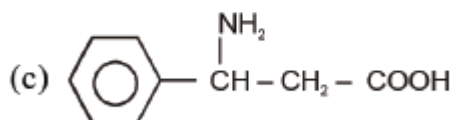
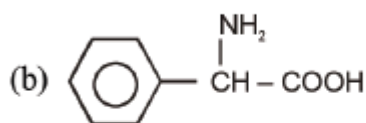
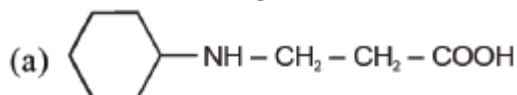
68. Among the following the most reactive towards alcoholic KOH is
- $CH_2 = CHBr$
  - $CH_3COCH_2CH_2Br$
  - $CH_3CH_2Br$
  - $CH_3CH_2CH_2Br$

69. Which one of the following posses highest melting point.
- Chlorobenzene
  - $o$  -dichlorobenzene
  - $m$  -dichlorobenzene
  - $p$ - dichlorobenzene

70. What would be the product formed when 1 - Bromo-3-cyclobutane reacts with two equivalents of metallic sodium in ether



71. Which of the following is  $\alpha$  - amino acid?



72. The hybridization state of carbon atoms in the product formed by the reaction of ethyl chloride with aqueous potassium hydroxide is
- $sp$
  - $sp^2$
  - $sp^3$
  - $sp^3d$

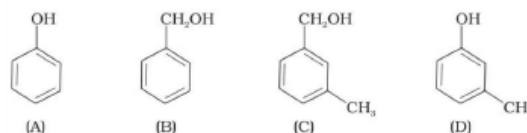
73. Which of the following compounds does not undergo nucleophilic substitution reactions
- Vinyl chloride
  - Ethyl bromide
  - Benzyl chloride
  - Isopropyl chloride

74. Replacement of  $Cl$  of chlorobenzene to give phenol requires drastic conditions but chlorine of 2, 4 - dinitrochlorobenzene is readily replaced because
- $NO_2$  make ring electron rich at ortho and para
  - $NO_2$  withdraws  $e^-$  from meta position
  - $NO_2$  donates  $e^-$  at meta position
  - $NO_2$  withdraws  $e^-$  from ortho/para positions

75. Among the following one with the highest percentage of chlorine is
- Chloral
  - Pyrene
  - PVC
  - Gammexene

76.  $CH_3CH_2OH$  can be converted into  $CH_3CHO$  by
- Catalytic hydrogenation
  - treatment with  $LiAlH_4$
  - treatment with pyridinium chlorochromate
  - treatment with  $KMnO_4$

77. Which of the following compounds is aromatic alcohol?



- A, B, C, D
- A, D
- B, C
- A

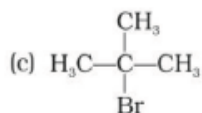
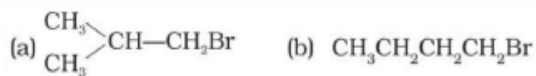
78. Glycolysis is
- Conversion of glucose to glycogen
  - Oxidation of glucose to glutamate
  - Conversion of pyruvate to citrate
  - Oxidation of glucose to pyruvate

79. **Assertion:** Electron withdrawing group in aryl halides decrease the reactivity towards nucleophilic substitution.

**Reason:** 2, 4-Dinitrochlorobenzene is less reactive than chlorobenzene.

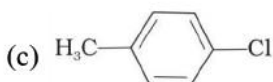
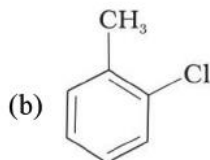
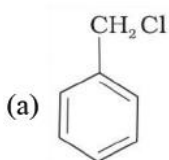
- Assertion and reason both are true and the reason is correct explanation of assertion
- Assertion and reason both are true but reason is not correct explanation of assertion
- Assertion is true but reason is wrong
- Assertion and reason both are wrong

80. Arrange the following compounds in increasing order of their boiling points



- (a) (b) < (a) < (c)      (b) (a) < (b) < (c)  
(c) (c) < (a) < (b)      (d) (c) < (b) < (a)

81. The reaction of toluene with chlorine in the presence of iron and in the absence of light yields \_\_\_\_\_



- (d) Mixture of (b) and (c)

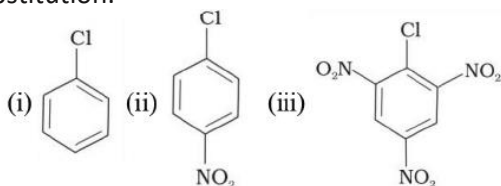
82. Methanol and ethanol are miscible in water due to

- (a) Covalent character  
(b) Hydrogen bonding character  
(c) Oxygen bonding character  
(d) None of these

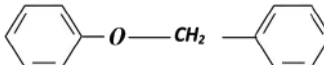
83. In methyl alcohol solution, bromine reacts with ethylene to yield  $\text{BrCH}_2\text{CH}_2\text{OCH}_3$  in addition to 1, 2 - dibromoethane because

- (a) The ion formed initially may react with  $\text{Br}^-$  or  $\text{CH}_3\text{OH}$   
(b) The methyl alcohol solvates the bromine  
(c) The reaction follows Markownik off's rule  
(d) This is a free - radical mechanism

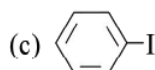
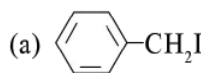
84. Increasing order towards nucleophilic substitution:



- (a) (iii) < (ii) < (i)      (b) (ii) < (iii) < (i)  
(c) (i) < (iii) < (ii)      (d) (i) < (ii) < (iii)

85. The ether 

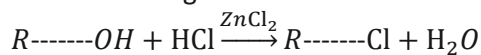
When treated with HI produces



- (d) Both (a) and (b)

### Section - B

86. What is the correct order of reactivity of alcohols in the following reaction?



- (a)  $1^\circ > 2^\circ > 3^\circ$       (b)  $1^\circ < 2^\circ > 3^\circ$   
(c)  $3^\circ > 2^\circ > 1^\circ$       (d)  $3^\circ > 1^\circ > 2^\circ$

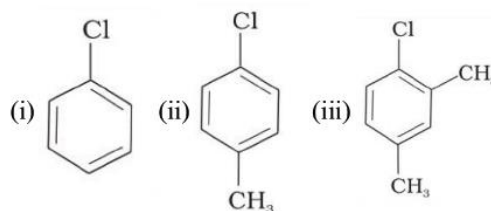
87. Which of the following pairs form the same osazone?

- (a) Glucose and fructose  
(b) Glucose and galactose  
(c) Glucose and arabinose  
(d) Lactose and maltose

88. Which of the following is correct statement

- (a) Troleins are amino acid  
(b)  $\alpha$  - hydrogen is present in fructose  
(c) Starch is polymer of  $\alpha$  - glucose  
(d) Amylose is compound of cellulose

89. Arrange the following on the basis of rate of nucleophilic substitution.



- (a) (i) < (ii) < (iii)      (b) (ii) < (i) < (iii)  
(c) (iii) < (ii) < (i)      (d) (i) < (iii) < (ii)

90. Monochlorination of toluene in sunlight followed by hydrolysis with aq. NaOH yields.

- (a) o-Cresol  
(b) m-Cresol  
(c) 2, 4-Dihydroxytoluene  
(d) Benzyl alcohol



91. Acetone on treatment with  $CH_3 - Mg - I$  and on further hydrolysis gives  
 (a) Isopropyl alcohol  
 (b) Primary alcohol  
 (c) Acetic acid  
 (d) 2 - methyl 2- propanol
92. Phenol is obtained by heating aqueous solution of  
 (a) Aniline  
 (b) Benzene diazonium chloride  
 (c) Benzoic acid  
 (d) None of these
93. An alcohol on oxidation is found to give  $CH_3COOH$  and  $CH_3CH_2COOH$ . The structure of the alcohol is  
 (a)  $CH_3CH_2CH_2OH$   
 (b)  $(CH_3)_2C(OH)CH_2CH_3$   
 (c)  $CH_3CH_2CHOHCH_3$   
 (d)  $CH_3CH(OH)CH_2CH_2CH_3$
94. Ethylidene chloride is a/an \_\_\_\_\_.  
 (a) vic -dihalide (b) gem - dihalide  
 (c) allylic halide (d) vinylic halide
95. The strongest acid among the following aromatic compounds is  
 (a) ortho-nitrophenol  
 (b) para-chlorophenol  
 (c) para-nitrophenol  
 (d) meta-nitrophenol
96. When glycerine is added to a liter of water which of the following behavior is observed  
 (a) Water evaporates more easily  
 (b) The temperature of water is increased  
 (c) The freezing point of water is lowered  
 (d) The viscosity of water is lowered
97. Benzenediazonium chloride on reaction with phenol in weakly basic medium gives  
 (a) Diphenyl ether  
 (b) *p* -hydroxyazobenzene  
 (c) Chlorobenzene  
 (d) Benzene
98. Ethylene glycol, on oxidation with per-iodic acid, gives  
 (a) Oxalic acid (b) Glycol  
 (c) Formaldehyde (d) Glycollic acid

99. **Assertion:** The *pka* of acetic acid is lower than that of phenol.  
**Reason:** Phenoxide ion is more resonance stabilize.  
 (a) Assertion and reason both are true and the reason is correct explanation of assertion.  
 (b) Assertion and reason both are true but reason is not correct explanation of assertion.  
 (c) Assertion is true but reason is wrong.  
 (d) Assertion and reason both are wrong.
100. Mark the given statements True (T) of False (F).  
 (i) Phenol is a weak acid then ethanol  
 (ii) Groups with +M effect and - I effect decrease acidity at *p* -position.  
 (iii) Phenol undergo Kolbe reaction, ethanol does not.  
 (iv) Phenoxide ion is more basic than ethoxide ion.  
 (v) Lucas reagent is a mixture of anhydrous  $ZnCl_2$  and concentrated HCl  
 (vi) Primary alcohol produce ppt. with Lucas reagents  
 (vii)  $CHCl_3$  is stored in transparent bottles and is oxidized in dark.  
 (viii) Alkyl halides are soluble in organic solvents  
 (ix) *p* - dichlorobenzene possesses low melting point.  
 (x)  $CCl_4$  is not a fire extinguisher and is insoluble in water.
- |     | (i) | (ii) | (iii) | (iv) | (v) | (vi) | (vii) | (viii) | (ix) | (x) |
|-----|-----|------|-------|------|-----|------|-------|--------|------|-----|
| (a) | T   | T    | T     | F    | T   | F    | F     | T      | F    | F   |
| (b) | T   | T    | T     | T    | T   | F    | F     | T      | F    | T   |
| (c) | T   | T    | T     | T    | T   | T    | F     | F      | T    | F   |
| (d) | F   | T    | T     | T    | T   | T    | F     | T      | T    | F   |

### BIOLOGY

#### Section - A

101. If we added alien DNA at site Sal I in pBR322, than-  
 (a) Transformed colonies become sensitive for tetracycline  
 (b) Transformed colonies remains sensitive for ampicillin  
 (c) Transformed colonies remains resistant for both tetracycline and ampicillin  
 (d) Proteins involved in the replication of the plasmid does not formed .
102. For heat shock competent cells and recombinant DNA are briefly placed at \_\_\_\_\_ temperature.  
 (a)  $38^\circ C$  (b)  $70^\circ C$   
 (c)  $72^\circ C$  (d)  $42^\circ C$

103.  $\alpha - 1$  – antitrypsin is used for the treatment of-
- (a) Emphysema (b) Cystic Fibrosis  
(c) Cancer (d) Pneumonia
104. In convention for naming restriction endonuclease, second two letter come from:
- (a) Species of the prokaryotic cell from which they were isolated  
(b) Species of the eukaryotic cell on which they shows action  
(c) Genus of the prokaryotic cell from which they were isolated  
(d) Genus of the eukaryotic cell on which they shows action.
105. Match the following column:
- |                |                    |  |  |
|----------------|--------------------|--|--|
| X              | Y                  |  |  |
| A. Cauliflower | (i) Pusa A – 4     |  |  |
| B. Okra        | (ii) Pusa sem -3   |  |  |
| C. Flat bean   | (iii) Pusa shubhra |  |  |
| D. Wheat       | (iv) Himgiri       |  |  |
- Option:
- |     |     |     |    |    |     |     |    |    |     |
|-----|-----|-----|----|----|-----|-----|----|----|-----|
|     | A   | B   | C  | D  |     | A   | B  | C  | D   |
| (a) | i   | iii | ii | iv | (b) | iii | ii | iv | i   |
| (c) | iii | i   | ii | iv | (c) | iv  | ii | i  | iii |
106. Which of the following are not disease resistant varieties
- (a) Pusa shubhara (b) Pusa sawani  
(c) Pusa komal (d) Pusa sadabahar
107. Indian Agricultural Research Institute through biofortification has formed spinach rich in
- (a) Vitamin C, Ca, Vitamin A  
(b) Fe, Ca, Vitamin A  
(c) Protein, Fe, Vitamin A  
(d) Ca, Vitamin C, Fe
108. Which of the following crosses resulted in formation of commercially viable hybrid having desirable combination of characteristics?
- (a) *Solanum tuberosum* × *Lycopersion esculentum*  
(b) *Brassica oleracea* × *Lycopersicon esculentum*  
(c) *Saccharum barberi* × *Saccharum officinarum*  
(d) *Solanum melongena* × *Raphanus sativus*
109. Features of cotton plant which leads to non-preference for jassids and cotton bollworm respectively are
- (a) Smooth leaves, nectarless variety  
(b) Hairy leaves, smooth leaves  
(c) Solid stem, smooth leaves  
(d) Low sugar content, nectarless variety
110. Breeding programme involved in creating Yellow Mosaic Virus resistance in mung bean is
- (a) Classical plant breeding  
(b) Mutational breeding  
(c) Somatic hybridization  
(d) Micropropagation
111. The first restriction endonuclease \_\_\_\_\_A\_\_\_\_\_, whose functioning depend on a \_\_\_\_\_B\_\_\_\_\_ nucleotide sequence was isolated and characterized five year later:
- (a)  $A \rightarrow$  *HindII*,  $B \rightarrow$  *Specific DNA*  
(b)  $A \rightarrow$  *EcoRI*,  $B \rightarrow$  *Specific DNA*  
(c)  $A \rightarrow$  *HindII*,  $B \rightarrow$  *Specific RNA*  
(d)  $A \rightarrow$  *EcoRI*,  $B \rightarrow$  *Specific RNA*
112. Which one is considered as permanent cure for ADA deficiency:
- (a) Enzyme replacement therapy  
(b) Transfer of genetically engineered lymphocytes having functional ADA cDNA  
(c) Transfer of genetically engineered lymphocytes having functional ADAcDNA at an early embryonic stages  
(d) Regular blood transfusion
113. Which one of the following is a correct statement?
- (a) “Bt” in “Bt – cotton” indicates that it is a genetically modified organism produced through biotechnology  
(b) Somatic hybridization involves fusion of two complete plant cells carrying desired genes  
(c) The anticoagulant hirudin is being produced from transgenic, *Brassica napus* seeds.  
(d) “Flavr Savr” variety of tomato has enhanced the production of ethylene which improves its taste
114. In pBR322 amp<sup>R</sup> site have recognition sequence for:
- (a) Pvu I and BamH I  
(b) Pvu I and Pst I  
(c) BamH I and Sal I  
(d) BamH II and Hind III
115. Agarose extracted from sea weeds finds use in
- (a) Gel electrophoresis  
(b) Spectrophotometry  
(c) Tissue Culture  
(d) PCR

116. Read the following statements and choose incorrect one:  
 (a) There are an estimated 200,000 varieties of rice in India alone  
 (b) Most of the industrialized nations are rich financially but poor in biodiversity and traditional knowledge  
 (c) Transgenic cow are being developed for use in testing the safety of vaccines before they are used on humans  
 (d) Probes are formed by using radioactive substances.
117. Out of these statements of 'Bt toxin' which one is not correct:  
 (a) Bt toxin protein exist as inactive protoxins but it converted into an active form due to the alkaline pH of the gut of insects  
 (b) Bt toxins are insect group non-specific  
 (c) Bt toxin is coded by a gene named cry  
 (d) Bt toxin genes were isolated from *Bacillus thuringiensis*
118. Which site on vector must be present to make it autonomously replicate n host cell?  
 (a) Selective marker (b) Recognition site  
 (c) Ori site (d) All of these
119. Match the following technique and the purpose they are used for
- | Column I       | Column II   |
|----------------|---|
| (a) DNA probes | (1) To identify cells that have been transformed  |
| (b) Genetic    | (2) To join DNA fragments together  |
| (c) DNA ligase | (3) Complementary DNA, synthesized from RNA with the help of the enzyme reverse transcriptase |
| (d) cDNA       | (4) To identify and label a piece of DNA containing a certain sequence using Radioisotope     |
- |     | A | B | C | D |
|-----|---|---|---|---|
| (a) | 4 | 1 | 2 | 3 |
| (b) | 1 | 4 | 2 | 3 |
| (c) | 1 | 4 | 3 | 2 |
| (d) | 4 | 2 | 1 | 3 |
120. Which of the following is incorrect?  
 (a) Pest resistant – Flavr savr  
 (b) Vitamin A rich – Golden rice  
 (c) Reistant to Bollworm-Bt cotton  
 (d) Corn borer – Bt toxin coded by cryI Ab
121. An enzyme catalyzing the removal of nucleotides from the ends of DNA is  
 (a) Endonuclease (b) Exonuclease  
 (c) DNA ligase (d) Hind – II
122. The most important features in a plasmid to be used as a vector is  
 (a) origin of replication (ori)  
 (b) Presence of a selectable marker  
 (c) presence of sites for restriction endonuclease  
 (d) its size.
123. An antibiotic resistance gene in a vector usually helps in the selection of  
 (a) Competent cells (b) transformed cells  
 (c) Callus cells (d) none of the above
124. A bacterial cell was transformed with a recombinant DNA that was generated using a human gene. However, the transformed cells did not produce the desired protein. Reasons could be  
 (a) human gene may have intron which bacteria cannot process  
 (b) amino acid codons for humans and bacteria are different  
 (c) human protein is formed but degraded by bacteria  
 (d) all of the above
125. C – peptide of human insulin is  
 (a) a part of mature insulin molecule  
 (b) responsible for formation of disulphide bridges  
 (c) removed durng maturation of pro-insulin to insulin  
 (d) responsible for its biological activity
126. Choose the correct option regarding retrovirus.  
 (a) An RNA virus that can synthesise DNA during infection  
 (b) A DNA virus that can synthesise RNA during infection  
 (c) A ssDNA virus  
 (d) A dsRNA virus
127. In RNAi, genes are silenced using  
 (a) ssDNA (b) dsDNA  
 (c) dsRNA (d) ssRNA

128. The term 'totipotency' refers to the capacity of a
- (a) cell to generate whole plant
  - (b) bud to generate whole plant
  - (c) seed to germinate
  - (d) cell to enlarge in size
129. Interspecific hybridizations is the mating of
- (a) animals within same breed without having common ancestors
  - (b) two different related species
  - (c) superior males and females of different breeds
  - (d) more closely related individuals within same breed for 4 – 6 generations
130. To obtain virus – free healthy plants from a diseased one by tissue culture technique, which part/parts of the diseased plant will be taken?
- (a) Apical meristem only
  - (b) Palisade parenchyma
  - (c) Both apical and axillary meristems
  - (d) Epidermis only
131. "Jaya" and "Ratna" developed for green revolution in India are the varieties of
- (a) maize                      (b) rice
  - (c) wheat                      (d) bajra
132. The name of Norman Borlaug is associated with
- (a) White revolution              (b) Green revolution
  - (c) Yellow revolution              (d) Blue revolution
133. What is the criterion of DNA fragments movement on agarose gel during gel electrophoresis?
- (a) The smaller the fragment size, the farther it moves
  - (b) Positively charged fragments move to farther end
  - (c) Negatively charged fragments do not move
  - (d) The larger the fragment size, the farther it moves
134. Somaclones are
- (a) Somatic hybrids
  - (b) Genetically identical to the original plant
  - (c) used to recover disease free plants
  - (d) sterile plants
135. An analysis of chromosomal DNA using the Southern hybridization technique does not use
- (a) electrophoresis              (b) blotting
  - (c) autoradiography              (d) PCR

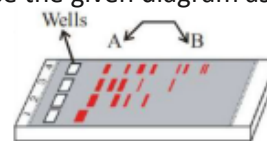
**Section – B**

136. For transformation, micro-particles coated with DNA to be bombarded with gene gun are made up of
- (a) Silver or platinum
  - (b) Platinum or zinc
  - (c) Silicon or platinum
  - (d) Gold or tungsten
137. Two microbes found to be very useful in genetic engineering are
- (a) Crown gall bacterium and *Caenorhabditis elegans*
  - (b) *Escherichia coli* and *Agrobacterium*
  - (c) *Vibrio cholera* and a tailed Bacteriophage
  - (d) *Diplococcus sp.* and *Pseudomonas sp.*
138. Which part of the tobacco plant is infected by *Meloidogyne incognita*?
- (a) Stem                              (b) Root
  - (c) Flower                              (d) Leaf
139. Which body of the Government of India regulates GM research and safety of introduction GM organisms for public services?
- (a) Genetic Engineering Approval Committee
  - (b) Khadi and Village Industries Committee
  - (c) Genetically Modified Organisation
  - (d) Indian Council of Agricultural Research
140. Read the following four statements (A - D) about certain mistakes in two of them.
- (A) The first transgenic buffalo, Rosie produced milk which was human alpha-lactalbumin enriched
  - (B) Restriction enzymes are used in isolation of DNA from other macromolecules
  - (C) Downstream processing is one of the steps of rDNA technology.
  - (D) Disarmed pathogen vectors are also used in transfer of rDNA into the host.
- Which of the two statements have mistakes?
- (a) B and C                              (b) C and D
  - (c) A and C                              (d) A and B
141. A collection of all the alleles of all the genes of a crop plant is called
- (a) Germplasm collection
  - (b) Protoplast collection
  - (c) Herbarium
  - (d) Somaclonal collection

142. Which of the given statement is correct in the context of observing DNA separated by agarose gel electrophoresis?
- DNA can be seen in visible light
  - DNA can be seen without staining in visible light
  - Ethidium bromide stained DNA can be seen in visible light
  - Ethidium bromide stained DNA can be seen under exposure to UV light
143. Which of the following has popularized the PCR (polymerase chain reactions)?
- Easy availability of DNA template
  - Availability of synthetic primers
  - Availability of cheap deoxyribonucleotides
  - Availability of 'thermostable' DNA
144. Which of the following is not a source of restriction endonuclease:
- Haemophilus influenza*
  - Escherichia coli*
  - Entamoeba coli*
  - Bacillus amyloliquifaciens*
145. The agriculture sector of India employs about
- 52 percent of the population
  - 72 percent of the population
  - 32 percent of the population
  - 62 percent of the population
146. Micropropagation involves
- vegetative multiplication of plants by using microorganisms
  - vegetative multiplication of plants by using small explants
  - vegetative multiplication of plants by using microspores
  - non-vegetative multiplication of plants by using micropores and megaspores
147. Golden rice is
- A variety of rice grown along the yellow river in china
  - Long stored rice having yellow color tint
  - A transgenic rice having gene for  $\beta$ - carotene
  - Wild variety of rice with yellow coloured grains
148. ADA is an enzyme which is deficient in a genetic disorder SCID. What is the full form of ADA?
- Adenosine deoxy aminase
  - Adenosine deaminase
  - Aspartate deaminase
  - Arginine deaminase
149. A true breeding plant is
- one that is able to breed on its own
  - Produced due to cross – pollination among unrelated plant
  - near homozygous and produces offspring of its own kind
  - always homozygous recessive in its genetic constitution
150. A technique of micropropagation is
- protoplast fusion
  - embryo rescue
  - somatic hybridization
  - somatic embryogenesis
151. Which one of the following is a case of wrong matching
- |                           |  |
|---------------------------|--|
| (a) Somatic hybridization | Fusion of two diverse cells                          |
| (b) Vector DNA            | Site For tRNA synthesis                              |
| (c) Micropropagation      | In vitro production of plants in large numbers.      |
| (d) Callus                | Unorganised mass of cells produced in tissue culture |
152. 'Himgiri' developed by hybridization and selection for disease resistance against rust pathogens is a variety of
- |               |           |
|---------------|-----------|
| (a) Chilli    | (b) Maize |
| (c) Sugarcane | (d) Wheat |
153. **Assertion:** A single outcross often helps to overcome inbreeding depression  
**Reason:** Out-crossing is best breeding method for increasing milk productivity
- Both assertion and reason are true and reason is the correct explanation of assertion
  - Both assertion and reason are true but reason is not the correct explanation of assertion
  - Assertion is true but reason is false
  - Both assertion and reason are false

154. Stirred – tank bioreactors have been designed for
- Purification of product
  - Addition of preservatives to the product
  - Availability of oxygen throughout the process
  - Ensuring anaerobic conditions in the culture vessel
155. The Taq Polymerase enzyme is obtained from
- Bacillus subtilis*
  - Pseudomonas putida*
  - Thermus aquaticus*
  - Thiobacillus ferrooxidans*
156. The colonies of recombinant bacteria appear white in contrast to blue colonies of non – recombinant bacteria because of
- Insertional inactivation of beta galactosidase in recombinant bacteria
  - Inactivation of glycosidase enzyme in recombinant bacteria
  - Non – recombinant bacteria containing beta galactosidase
  - Insertional inactivation of alpha galactosidase in non – recombinant bacteria
157. Which of the following represents a palindromic sequence in DNA?
- 5' – GAATTC – 3'  
3' – CTTAAG – 5'
  - 5' – CCAATG – 3'  
3' – GAATCC – 5'
  - 5' – CATTAG – 3'  
3' – GATAAC – 5'
  - 5' – GATACC – 3'  
3' – CCTAAG – 5'
158. Which of the following companies started selling humulin in the year 1983?
- Eli Lilly
  - Genetech
  - GEAC
  - None of these
159. The introduction of T-DNA into plants involves.
- exposing the plants to cold for a brief period
  - allowing the plant roots to stand in water
  - infection of the plant by *Agrobacterium tumefaciens*
  - altering the pH of the soil, then heat-shocking the plants.
160. Which of the following Bt crops is being grown in India by the farmers?
- Brinjal
  - Soybean
  - Maize
  - Cotton

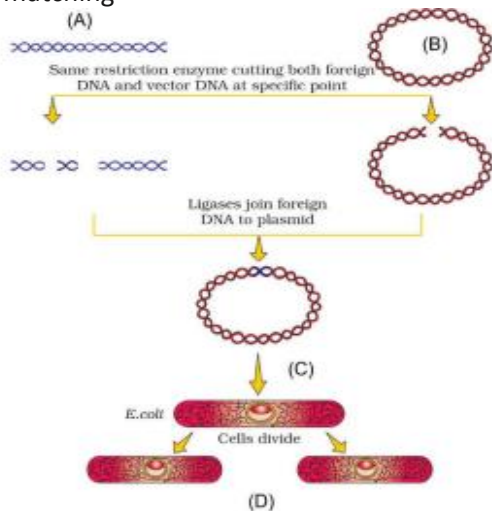
161. Human insulin is being commercially produced from a transgenic species of
- Rhizobium*
  - Saccharomyces*
  - Escherichia*
  - Mycobacterium*
162. The Ti plasmid, is often used for making transgenic plants. The plasmid is found in
- Azotobacter*
  - Rhizobium* of the roots of leguminous plants
  - Agrobacterium*
  - Yeast as a 2 mm plasmid
163. Restriction endonucleases are extracted from:
- Chlamydomonas*
  - Human Cells
  - Bacterial cells
  - Fungal strains
164. In pBR 322, 'BR' stands for:
- Bacterial recombination
  - Bacterial restriction
  - Boliar and Rodriguez
  - Basic requirement
165. Analyse the given diagram as shown



- Which of following option is not correct
- Wells are located towards negative electrode
  - Lane – I – Show digested DNA fragment
  - A stands for largest and B stands for smallest DNA fragments
  - DNA fragments separate according to their size through sieving effect of agarose gel
166. Component host in recombinant DNA technology
- Any human cancer cell
  - The cell ready to uptake foreign DNA
  - A host cell without cell wall
  - Agrobacterium* cell
167. **Assertion:** Single cell proteins can help to meet increasing demands of growing population.  
**Reason:** SCP now, can be produced in high amount commercially, using low cost substrates.
- Both assertion and reason are true and reason is the correct explanation of assertion
  - Both assertion and reason are true but reason is not the correct explanation of assertion
  - Assertion is true reason is false
  - Both assertion and reason are false

168. The illegal use of bio resources by a multinational company without paying proper compensation to the source country is known as:
- (a) Biological deceive      (b) Bio-Safety  
(c) Biopiracy                (d) Bio-Patenting
169. Complete the given below statement:  
Stanley Cohen and Herbert Boyer accomplished construction of first recombinant DNA in \_\_\_\_\_ by isolating the antibiotic resistance gene by cutting out a piece of DNA from a plasmid which was responsible for conferring antibiotic resistance.
- (a) 1974                        (b) 1977  
(c) 1972                        (d) 1988
170. Read the following statements and select the incorrect ones:
- (A) In gel electrophoresis, DNA fragments separate according to their size through sieving effect provided by the agarose gel  
(B) Larger the fragment size, the farther it moves  
(C) Unless one cuts the vector and the source DNA with the same restriction enzyme, the recombinant vector molecule cannot be created  
(D) Now a days the most commonly used matrix is agarose which is a synthetic polymer extracted from sea weed
- (a) A, B, C, D                (b) A, C  
(c) B, D                        (d) C, D
171. Which of the following steps are catalyzed by Taq polymerase in a PCR.
- (a) Annealing of primers to template DNA  
(b) Denaturation of template DNA  
(c) Extension of primer on the template DNA  
(d) All of the above
172. After the biosynthetic phase, the product is separated and purified by the process called as
- (a) Agarose gel electrophoresis  
(b) PCR  
(c) Downstream processing  
(d) Insertional inactivation
173. Bioreactors are useful in:
- (a) Separation & purification of product  
(b) Microinjection  
(c) Processing of large volume of culture  
(d) Isolation of Genetic Material
174. Purified DNA ultimately precipitates out after the addition of chilled ethanol. This DNA that separates out can be removed by
- (a) Electrophoresis  
(b) Downstream processing  
(c) PCR  
(d) Spooling
175. **Assertion:** Biofortification is the practical aspect to improve health of the people  
**Reason:** Biofortification is breeding crops with higher levels of vitamins or minerals or higher proteins and healthier fats
- (a) Both assertion and reason are true and reason is the correct explanation of assertion.  
(b) Both assertion and reason are true but reason is not the correct explanation of assertion  
(c) Assertion is true but reason is false  
(d) Both assertion and reason are false
176. Select the correct statement:
- (A) Transgenic animals are used for study of complex factors involved in growth such as insulin-like growth factor  
(B) Transgenic animals are specially made to serve as models for human disease so that investigation of new treatment for disease is made possible  
(C) First transgenic cow, Rosie, produced human protein-enriched milk containing the human alpha-lactalbumin  
(D) Transgenic mice are being developed for use in testing the safety of vaccines before they are used for humans.
- (a) A, B, C, D                (b) A, B, D  
(c) A, C, D                    (d) B, C, D
177. In 1997, the first transgenic cow Rosie produced human protein-enriched milk (2.5 grams per litre). Milk contains:
- (a) Alpha lactalbumin  
(b) Alpha lactalbumin  
(c) Beta lactalbumin  
(d) Beta lactalbumin
178. The bacteria generally used for genetic engineering is
- (a) Agrobacterium            (b) Bacillus  
(c) Pseudomonas            (d) Clostridium

179. Recognise the figure and find out the correct matching



- (a) A – Foreign DNA, B- Vector DNA, C – Translation, D - PCR  
 (b) A – Vector DNA, B – Foreign DNA, C – Transduction, D – electrophoresis  
 (c) A – Foreign DNA, B – Vector DNA, C – Transformation, D – r – DNA technology  
 (d) A – Vector DNA, B – Foreign DNA C – Transformation, D – r – DNA technology
180. The Indian parliament has recently cleared the \_\_\_\_\_ amendment of Indian patent Bill, that takes such issue into consideration, including patent terms emergency provision and research and development initiative  
 (a) First (b) Second  
 (c) Third (d) Fourth
181. Plasmid used to construct the first recombinant DNA was isolated from which bacterium species?  
 (a) Escherichia coli  
 (b) Salmonella typhimurium  
 (c) Agrobacterium tumefaciens  
 (d) Thermus aquaticus
182. An explant is  
 (a) Dead plant  
 (b) Part of the plant  
 (c) Part of the plant used in tissue culture  
 (d) Part of the plant that expresses a specific gene
183. ELISA is used to detect viruses by the principle of  
 (a) Antigen – Antibody reaction  
 (b) Antibody – Antibody reaction  
 (c) DNA probe  
 (d) Copy number

184. In a plasmid vector, any cloning site should be preferably  
 (a) Twice (b) Only one  
 (c) Any number (d) Cloning site not needed

185. Most important part of Ti-Plasmid at which desired gene is put to target into plant cell is  
 (a) Ti – gene (b) Vir-gene  
 (c) T – DNA (d) Ori Site

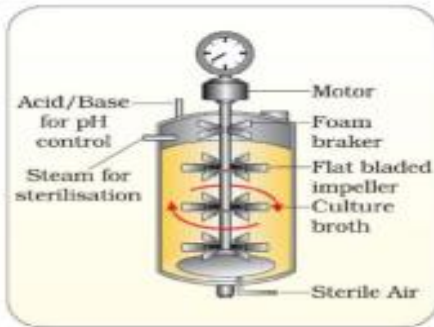
### SECTION - B

186. Separation of DNA band from agarose gel and its extraction from gel piece to solution by cutting the gel, is referred as:  
 (a) Remediation (b) Elution  
 (c) Hybridization (d) Southern blotting
187. Nematode resistant tobacco plant was prepared through a very popular technique namely:  
 (a) RNA incorporation  
 (b) RNA interference  
 (c) Probe hybridization  
 (d) Biolistic method
188. The term 'molecular scissors' refers to  
 (a) Recombinant DNA  
 (b) Restriction enzymes  
 (c) Taq polymerase  
 (d) Palindromic nucleotide sequences
189. Given below are three basic steps of genetical modifying an organisms. Arrange these steps in correct manner:  
 (A) Introduction of the identified DNA into the host  
 (B) Maintenance of introduced DNA in the host and transfer of the DNA to its progeny  
 (C) Identification of DNA with desirable gene  
 (a) A – B – C (b) C – A – B  
 (c) B – A – C (d) C – B – A
190. Among the following select the tools of recombinant DNA technology:  
 (A) Restriction enzyme  
 (B) Polymerase enzyme  
 (C) Ligases  
 (D) Vectors  
 (E) Host organisms  
 (a) A, D, E (b) A, D, C, E  
 (c) A, B, C, D, E (d) Only A

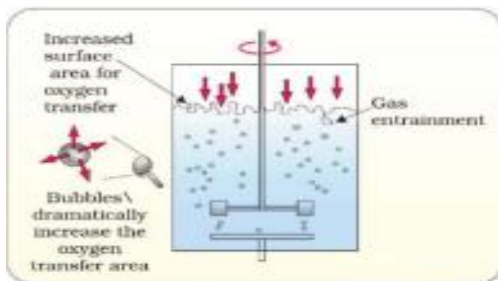


191. Restriction enzymes belong to a large class of the enzyme called  
 (a) Cellulase (b) Nucleases  
 (c) Chitinase (c) Spooling

192. Recognise the figure and find out the correct matching for A and B

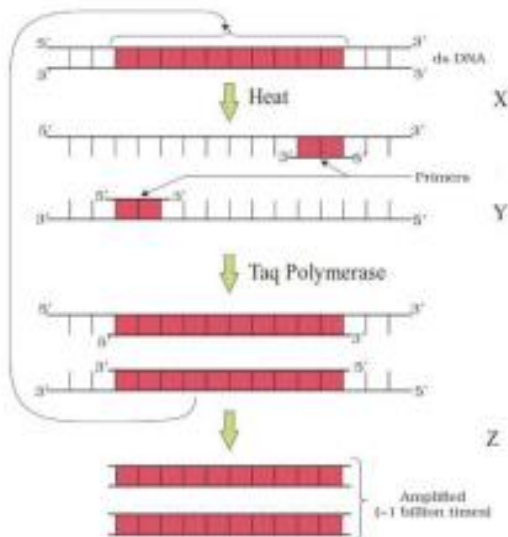


(A)



(B)

- (a) A – Simple stirred tank bioreactor  
 B- Mixed tank bioreactor  
 (b) A – simple stirred tank bioreactor  
 B – Sparged stirred tank bioreactor  
 (c) A – Sparged stired tank bioreactor  
 B – Simple stirred tank bioreactor  
 (d) A – Mixed tank bioreactor  
 B- Sparged stirred tank bioreactor
193. Identify the X, Y, Z in given figure of polymerase chain Reaction.



- (a) X – Annealing, Y – Denaturation, Z – Extension  
 (b) X – Extension, Y – Annealing, Z – Denaturation  
 (c) X – Denaturation, Y – annealing, Z – Extension  
 (d) X – Denaturation, Y-Extension, Z – Annealing

194. Which of the following genes were introduced in cotton to protect it from cotton bollworms?  
 (a) Cry Ac and Cry Ab (b) Bt Ac and Bt Ab  
 (c) *CryI*Ac and *CryII*Ab (d) Nif genes

195. From which of the following technique, early diagnosis of disease is/are not possible  
 (a) ELISA  
 (b) Urine analysis  
 (c) PCR  
 (d) Serum analysis  
 (E) Recombinant DNA technology  
 (a) A, B, D  
 (b) A, C, E  
 (c) A, B  
 (d) B, D

196. Golden rice is yellow in color due too the presence of  
 (a) riboflavins  
 (b)  $\beta$ - carotene  
 (c) vitamin B 1  
 (d) Complex genetic material

197. From all transgenic animals, 95 percent of all existing transgenic animals are:  
 (a) Pig (b) sheep  
 (c) cow (d) mice

198. Today for which of the following human disease transgenic modles exist:  
 (a) Cancer (b) Cystic fibrosis  
 (c) Reumatoid arthritis (d) All of the above

199. Transgenic animals have been used  
 (a) for testing safety of vaccines  
 (b) for testing toxicity of drugs  
 (c) To produce useful biological products  
 (d) All of the above

200. Mark the given statements True (T) or False (F)

- (i) Genetic engineering requires both nucleases and ligases
- (ii) Genetic engineering can overcome the drawbacks of traditional hybridization. Genetic engineering can create desired DNA sequence to meet specific requirements.
- (iii) Restriction enzymes recognize palindromic sequences. Palindromic sequences read same in both directions of the two strands.
- (iv) Human insulin can be produced into bacterial cells using biotechnology
- (v) To produce human insulin the A, B and C polypeptides of the human insulin are produced separately in the bacterial cells, extracted and combined by creating disulfide bonds.
- (vi) The first clinical gene for ADA therapy was given to cure SCID
- (vii) The normal gene was delivered into the patients's cells of ADA disease using retroviral vector
- (viii) 'Cry' proteins are named so because they are toxic proteins
- (ix) 'Cry' proteins are solubilized in acidic environment of insect midgut and then release toxic core fragments after proteolytic action
- (x) Beehives are kept in crop field during flowering period
- (x) Bees are pollinating agents

- |     | (i) | (ii) | (iii) | (iv) | (v) | (vi) | (vii) | (viii) | (ix) | (x) | (xi) |
|-----|-----|------|-------|------|-----|------|-------|--------|------|-----|------|
| (a) | F   | F    | T     | T    | T   | T    | T     | F      | T    | T   | T    |
| (b) | T   | T    | T     | T    | F   | T    | T     | F      | F    | T   | T    |
| (c) | T   | T    | T     | T    | F   | F    | T     | F      | T    | T   | T    |
| (d) | F   | F    | T     | T    | T   | T    | T     | T      | F    | T   | T    |