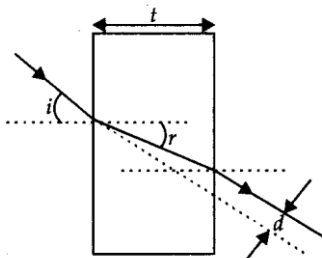


1. The wavelength of light belongs to the part of the spectrum:
 (a) Visible (b) Ultraviolet
 (c) Infrared (d) Both (a) and (c)

2. What can be the largest distance of an image of a real object from a convex mirror of radius of curvature is 20cm?
 (a) 10 cm (b) 20 cm (c) Infinity (d) Zero

3. Which of the following is correct for the beam which enters the medium?
 (a) Travel as a cylindrical beam
 (b) Diverge
 (c) Converge
 (d) Diverge near the axis and converge near the periphery

4. A ray of light is incident on a thick slab of glass of thickness t as shown in the figure. The emergent ray is parallel to the incident ray but displaced sideways by a distance d . If the angles are small then d is :



- (a) $t\left(1 - \frac{i}{r}\right)$ (b) $rt\left(1 - \frac{i}{r}\right)$
 (c) $it\left(1 - \frac{r}{i}\right)$ (d) $t\left(1 - \frac{r}{i}\right)$

5. Critical angle of glass is θ_1 and that of water is θ_2 . The critical angle for water and glass surface would be ($\mu_g = 3/2\mu_w = 4/3$).
 (a) Less than θ_2 (b) Between θ_1 and θ_2
 (c) Greater than θ_2 (d) Less than θ_1

6. For a total internal reflection, which of the following is correct?
 (a) Light travel from rarer to denser medium.
 (b) Light travel from denser to rarer medium.
 (c) Light travel in air only.
 (d) Light travel in water only.

7. A convergent beam of light passes through a diverging lens of focal length 0.2 m and comes to focus 0.3 m behind the lens. The position of the point at which the beam would converge in the absence of the lens is :
 (a) 0.12 m (b) 0.6 m (c) 0.3 m (d) 0.15 m

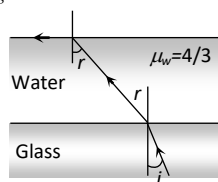
8. A double convex lens made of glass of refractive index 1.56 has both radii of curvature of magnitude 20 cm. If an object is placed at a distance of 10 cm from this lens. The position of the image formed is:
 (a) 22.86 same side of the object
 (b) 22.86 opposite side of the object
 (c) 44.89 same side of the object
 (d) 44.89 opposite side of the object

9. A man is trying to start a fire by focusing sunlight on a piece of paper using an equiconvex lens of focal length 10 cm. the diameter of the sun is 1.39×10^9 m and its mean distance from the earth is 1.5×10^{11} m, the diameter of the sun's image on the paper is :
 (a) 3.1×10^{-4} m (b) 6.5×10^{-5} m
 (c) 6.5×10^{-4} m (d) 9.2×10^{-4} m

10. A convex lens of focal length 15 cm is placed on a plane mirror. An object is placed at 30 cm from the lens. The image is :
 (a) Real, at 30 cm in front of the mirror
 (b) Real, at 30 cm behind the mirror
 (c) Real, at 10 cm in front of the mirror
 (d) Virtual, at 10 cm behind the mirror

11. Two identical glass $\mu_g = \frac{3}{2}$ equiconvex lenses of focal length F are kept in contact. The space between the two lenses is filled with water ($\mu_w = \frac{4}{3}$). The focal length of the combination is :
- (a) f (b) $\frac{f}{2}$ (c) $\frac{4f}{3}$ (d) $\frac{3f}{4}$
12. A mark placed on the surface of a sphere is viewed through glass from a position directly opposite. If the diameter of the sphere is 10 cm and refractive index of glass is 1.5. The position of the image will be:
- (a) -20 cm (b) 30 cm (c) 40 cm (d) -10 cm
13. The angle of minimum deviation from prism of angle $\pi/3$ is $\pi/6$, if the velocity of light in vacuum is $3 \times 10^8 \text{ ms}^{-1}$, then the velocity of light in material of the prism is :
- (a) $2.12 \times 10^8 \text{ ms}^{-1}$ (b) $1.12 \times 10^8 \text{ ms}^{-1}$
(c) $4.12 \times 10^8 \text{ ms}^{-1}$ (d) $5.12 \times 10^8 \text{ ms}^{-1}$
14. Which of the following statement is correct?
- (a) At sunset or sunrise, the sun's rays have to pass through a small distance in the atmosphere.
(b) At sunset or sunrise the sun's rays have to pass through a larger distance in the atmosphere.
(c) Rayleigh scattering which is proportional to $\frac{1}{\lambda^4}$
(d) Most of the blue and other shorter wavelength are not removed by scattering.
15. An astronomical refractive telescope has an objective of focal length 20 m and an eyepiece of focal length 2 cm. Then:
- (a) The magnification is 1000
(b) The length of the telescope tube is 20.02 m
(c) The image formed is inverted
(d) All of these
16. Different objects at different distances are seen by the eye. The parameter that remains constant is :
- (a) The focal length of the eye lens
(b) The object distance from the eye lens
(c) The radii of curvature of the eye lens
(d) The image distance from the eye lens
17. A passenger in an aeroplane shall
- (a) Never see a rainbow.
(b) May see a primary and a secondary rainbow as concentric circles.
(c) May see a primary and a secondary rainbow as concentric arcs.
(d) Shall never see a secondary rainbow
18. The apparent depth of needle lying at the bottom of the tank, which is filled with water of refractive index 1.33 to a height of 12.5 cm is measured by a microscope to be 9.4 cm. If water is replaced by a liquid of refractive index 1.63 upto the same height. What distance would the microscope have to be moved to focus on the needle again?
- (a) 1.73 cm (b) 2.13 cm (c) 1.5 cm (d) 2.9 cm
19. A giant telescope in an observatory has an objective of focal length 19 m and an eye-piece of focal length 1.0 cm. In normal adjustment, the telescope is used to view the moon. What is the diameter of the image of the moon formed by the objective? The diameter of the moon is $3.5 \times 10^6 \text{ m}$ and the radius of the lunar orbit round the earth is $3.8 \times 10^8 \text{ m}$:
- (a) 10 cm (b) 12.5 cm (c) 15 cm (d) 17.5 cm
20. A ray of light incident on the first mirror parallel to the second and is reflected from the second mirror parallel to first mirror. The angle between two mirrors is
- (a) 30° (b) 60° (c) 75° (d) 90°

21. A ray of light is incident at the glass–water interface at an angle i , it emerges finally parallel to the surface of water, then the value of μ_g would be



- (a) $(4/3) \sin i$ (b) $1/\sin i$ (c) $4/3$ (d) 1

22. A double convex lens made of a material of refractive index 1.5 and having a focal length of 10 cm is immersed in liquid of refractive index 3.0. The lens will behave as

- (a) Diverging lens of focal length 10 cm
 (b) Diverging lens of focal length $10/3$ cm
 (c) Converging lens of focal length $10/3$ cm
 (d) Converging lens of focal length 30 cm

23. If ${}^i\mu_j$ represents the refractive index when a ray of light goes from medium i to medium j , then product ${}^2\mu_1 \times {}^3\mu_2 \times {}^4\mu_3$ is equal to-

- (a) ${}^3\mu_1$ (b) ${}^3\mu_2$ (c) $\frac{1}{{}^1\mu_4}$ (d) ${}^4\mu_2$

24. If the refracting angle of a prism is 60° and minimum deviation is 30° , the angle of incidence is-

- (a) 30° (b) 45° (c) 60° (d) 90°

25. One of the refracting surfaces of a prism of angle 30° is silvered. A ray of light incident at an angle of 60° retraces its path. The refractive index of the material of the prism is -

- (a) $\sqrt{2}$ (b) $\sqrt{3}$ (c) $3/2$ (d) 2

26. Which the following is correct for light diverging from a point source?

- (a) The intensity decreases in proportion for the distance squared.
 (b) The wavefront is parabolic.
 (c) The intensity at the wavelength does not depend on the distance.
 (d) None of these

27. The idea of secondary wavelets for the propagation of a wave was first given by :

- (a) Newton (b) Huygens
 (c) Maxwell (d) Fresnel

28. The 6563 \AA H_α line emitted by hydrogen in a star found to be red- shifted by 15 \AA . The speed with which the star is be receding from the earth is :

- (a) $3.2 \times 10^5 \text{ ms}^{-1}$ (b) $6.87 \times 10^5 \text{ ms}^{-1}$
 (c) $2 \times 10^5 \text{ ms}^{-1}$ (d) $12.74 \times 10^5 \text{ ms}^{-1}$

29. The earth is moving towards a fixed star with a velocity of 30 km s^{-1} . An observer on the earth observes a shift of 0.58 \AA in the wavelength of light coming from the star. The actual wavelength of light emitted by the star:

- (a) 5800 \AA (b) 2400 \AA (c) 1200 \AA (d) 6000 \AA

30. Light from two coherent source of the same amplitude A and wavelength λ illuminates the screen. The intensity of the central maximum is I_0 if the source were incoherent, the intensity at the same point will be :

- (a) $4/I_0$ (b) $2/I_0$ (c) I_0 (d) $I_0/2$

31. In a double slit experiment using light of wavelength 600 nm , the angular width of a fringe on a distant screen is 0.1° . The spacing between the two slits is :

- (a) $3.44 \times 10^{-4} \text{ m}$ (b) $1.54 \times 10^{-4} \text{ m}$
 (c) $1.54 \times 10^{-3} \text{ m}$ (d) $1.44 \times 10^{-3} \text{ m}$

32. Interference fringes were produced in Young's double slit experiment using light of wavelength 5000 \AA . When a film of material $2.5 \times 10^{-3} \text{ cm}$ thick was placed over one of the slits, the fringes pattern shifted by a distance equal to 20 fringe widths. The refractive index of the material of the film is:

- (a) 1.25 (b) 1.33 (c) 1.4 (d) 1.5

33. In Young's double slit experiment two disturbances arriving at a point P have phase difference of $\frac{\pi}{3}$. The intensity of this point expressed as a fraction of maximum intensity I_0 is:
- (a) $\frac{3}{2}I_0$ (b) $\frac{1}{2}I_0$ (c) $\frac{4}{3}I_0$ (d) $\frac{3}{4}I_0$
34. In a two slit experiment with monochromatic light fringes are obtained on a screen placed a some distance from the plane of slits . If the screen is moves by 53×10^{-3} m. If the distance between slits is 10^{-3} m, the wavelength of light will be :
- (a) 3000Å (b) 4000Å (c) 6000Å (d) 7000Å
35. Yellow light of wavelength 6000Å produces fringes of width 0.8 mm in Young's double slit experiment. If the source is replaced by another monochromatic source of wavelength 7500Å and the separation between the slits is doubled then the fringe width beco1mes :
- (a) 0.1mm (b) 0.8mm (c) 4.3mm (d) 1mm
36. The intensity ratio of the maxima and minima in an interference pattern produced by two coherent source of light is 9:1 The intensities of the used light sources are in ratio:
- (a) 3:1 (b) 4:1 (c) 9:1 (d) 10:1
37. A narrow slit of width 2 nm is illuminated by monochromatic light of wavelength 500 nm. The distance the first minima on either side on a screen at a distance of 1 m is :
- (a) 5 nm (b) 0.5 nm (c) 1 nm (d) 10 nm
38. The two coherent source with intensity ratio β produced interference. The fringe visiblity will be:
- (a) $\frac{2\sqrt{\beta}}{1+\beta}$ (b) 2β (c) $\frac{2}{(1+\beta)}$ (d) $\frac{\sqrt{\beta}}{1+\beta}$
39. A parallel beam of light of wavelength 500nm falls on a narrow slit and the resulting diffraction pattern is observed on a screen 1m away. It is observed that the first minima is at a distance of 2.5 mm from the centre of the screen. The width of the slit is :
- (a) 0.2 nm (b) 1 nm (c) 2 nm (d) 1.5 nm
40. Light of wavelength 600nm is incident on an aperture of size 2 nm . The distance upto which light can travel such that its spread is less than the size of the aperture is :
- (a) 12.13 m (b) 6.67 m (c) 3.33 m (d) 2.19 m
41. For the same objective . what is the ratio of the least separation between tow points to be distinguished by a microscope for light of 5000Å and electrons accelerated through 100V used as an illuminating substance?
- (a) 3075 (b) 3575 (c) 4075 (d) 5075
42. Two points separated by distance of 0.1 mm can just be inspected in a microscope when light of wavelength 6000Å is used. If the light of wavelength 4800Å is used then limit of resolution will become :
- (a) 0.8 mm (b) 0.12 mm (c) 0.1 mm (d) 0.08 mm
43. In the case of linearly polarized light, the magnitude of the electric field vector:
- (a) Is parallel to the direction of propagation
(b) Does not change with time
(c) Increases linearly with time
(d) Varies periodically with time
44. If the angle between the pass axis of the polarizer and the analyzer is 45° , the ratio of the intensities of original light and the transmitted light after passing through the analyzer is:
- (a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) 1 (d) $\frac{1}{4}$

45. Transverse nature of light was confirmed by the phenomenon of
- (a) Refraction of light (b) Diffraction of light
(c) Dispersion of light (d) Polarization of light

46. Consider sunlight incident on a slit of width 10^4 \AA . The image seen through the slit shall.

- (a) Be a fine sharp slit white in colour at the centre
(b) A bright slit white at the centre diffusing to zero intensities at the edges
(c) A bright slit white at the centre diffusing to regions of different colours.
(d) Only be a diffused slit white in colour

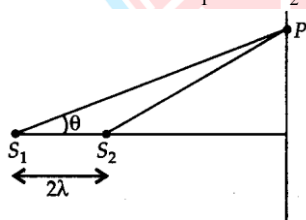
47. A parallel beam of sodium light of wavelength 5890 \AA is incident on a thin glass plate of refractive index 1.5 such that the angle of refraction in the plate is 60° . The smallest thickness of the plate which will make it dark by reflection:

- (a) 3926 \AA (b) 4353 \AA (c) 1396 \AA (d) 1921 \AA

48. In Young's double slit experiment, the slits are horizontal.

The intensity at a point P as shown in figure is $\frac{3}{4} I_0$ where I_0

is the maximum intensity. The value of θ is, (Given the distance between the two slits S_1 and S_2 is 2λ)



- (a) $\cos^{-1}\left(\frac{1}{12}\right)$ (b) $\sin^{-1}\left(\frac{1}{12}\right)$
(c) $\tan^{-1}\left(\frac{1}{12}\right)$ (d) $\sin^{-1}\left(\frac{1}{12}\right)$

49. An unpolarized light beam is incident on a surface at an angle of incidence equal to Brewster's angle. Then,

- (a) The reflected and the refracted beam are both partially polarized
(b) The reflected beam is partially polarized and the refracted beam is completely polarized and are at right angles to each other
(c) The reflected beam is completely polarized and the refracted beam is partially polarized and are at right angles to each other
(d) Both the reflected and the refracted beams are completely polarized and are at right angles to each other.

50. Unpolarized light is incident on a plane glass surface. The angle of incidence is such that the reflected and refracted rays are perpendicular to each other, then

- (a) $\tan i_p = \frac{\mu}{2}$ (b) $\tan i_p = \mu$
(c) $\sin i_p = \mu$ (d) $\cos i_p = \mu$

51. Which of the following is less than zero during adsorption?

- (a) ΔG (b) ΔS (c) ΔH (d) All of these

52. Shape – Selective catalysis is a reaction catalysed by

- (a) Zeolites (b) Enzymes
(c) Platinum (d) Ziegler-Natta catalyst

53. Which kind of catalysis can be explained on the basis of adsorption theory?

- (a) Homogeneous catalysis (b) Heterogeneous catalysis
(c) Negative catalysis (d) Auto catalysis

54. Fog is an example of a colloidal system of

- (a) Liquid in gas (b) Gas in liquid
(c) Solid in gas (d) Gas in solid

55. Which of the following process does not occur at the interface of phases?
 (a) Crystallisations (b) Heterogenous catalysis
 (c) Homogeneous catalysis (d) Corrosion
56. Which one of the following is not a favourable conditions for physical adsorption?
 (a) $\Delta H > 0$ (b) $\Delta G < 0$ (c) $\Delta S < 0$ (d) $\Delta H < 0$
57. Which is correct in case of van der Waals adsorption?
 (a) High temperature, low pressure
 (b) High temperature, high pressure
 (c) Low temperature, low pressure
 (d) Low temperature, high pressure
58. Powdered substances are more effective adsorbents than their crystalline form because
 (a) Adsorption is an exothermic process
 (b) They become inert and do not react with the adsorbate
 (c) The extent of adsorptions increases with increase in surface area of the adsorbent
 (d) Adsorption is more if the size of adsorbent is small.
59. In Freundlich adsorption equation $x/m = kp^{1/n}$, the value of n is
 (a) Always greater than one
 (b) Always smaller
 (c) Always equal to one
 (d) Greater than one at low temperature and smaller than one at high temperature.
60. Adsorption is accompanied by the evolution of heat. So according to Le – Chatelier principle, the amount of substance adsorbed should
 (a) Increase with decreases in temperature
 (b) Increases with increases in temperature
 (c) Decreases with decreases in temperature
 (d) Decreases with increase in temperature
61. Identify the wrong statement from the following
 (a) Salicylic acid's a monobasic acid
 (b) Methyl salicylate is an ester
 (c) Salicylic acid gives violet colour with neutral ferric chloride as well as brisk effervescence with sodium bicarbonate
 (d) Methyl salicylate does not occur in natural oils
62. The name of the compound having the structure $ClCH_2CH_2COOH$ is
 (a) 3-chloropropanoic acid (b) 2-chloropropanoic acid
 (c) 2-chloroethanoic acid (d) Chlorosuccinic acid
63. Which of the following is the formula of tartaremetic
 (a) $\begin{matrix} CH(OH)COOH \\ | \\ CH(OH)COOK \end{matrix}$ (b) $\begin{matrix} CH(OH)COONa \\ | \\ CH(OH)COO(SbO) \end{matrix}$
 (c) $\begin{matrix} CH(OH)COOK \\ | \\ CH(OH)COOK \end{matrix}$ (d) $\begin{matrix} CH(OH)COOK \\ | \\ CH(OH)COONa \end{matrix}$
64. Acetoacetic ester behaves as
 (a) An unsaturated hydroxy compound
 (b) A keto compound
 (c) Both of these ways
 (d) None of these
65. Amphiphilic molecules are normally associated with
 (a) Isoprene based polymers
 (b) Soaps and detergents
 (c) Nitrogen based fertilizers e.g. urea
 (d) Pain relieving medicines such as aspirin
66. Which of the following is not a fatty acid
 (a) Stearic acid (b) Palmitic acid
 (c) Oleic acid (d) Phenyl acetic acid
67. Urea is
 (a) Monoacidic base (b) Diacidic base
 (c) Neutral (d) Amphoteric
68. Urea
 (a) Is an amide of carbonic acid
 (b) It is diamide of carbonic acid
 (c) Gives carbonic acid on hydrolysis
 (d) Resembles carbonic acid

69. Oleic, stearic and palmitic acids are
 (a) Nucleic acids (b) Amino acids
 (c) Fatty acids (d) None of these
70. Carboic acid is
 (a) C_6H_5CHO (b) C_6H_6
 (c) C_6H_5COOH (d) C_6H_5OH
71. Which of the following on hydrolysis forms acetic acid
 (a) CH_3CN (b) CH_3OH
 (c) C_2H_5OH (d) $C_2H_5NH_2$
72. Acetyl chloride cannot be obtained by treating acetic acid with
 (a) $CHCl_3$ (b) $SOCl_2$
 (c) PCl_3 (d) PCl_5
73. Heating a mixture of ethyl alcohol and acetic acid in presence of conc. H_2SO_4 produces a fruity smelling compound. This reaction is called
 (a) Neutralisation (b) Ester hydrolysis
 (c) Esterification (d) Williamson's synthesis
74. Ammonium acetate reacts with acetic acid at $110^\circ C$ to form
 (a) Acetamide (b) Formamide
 (c) Ammonium cyanate (d) Urea
75. When succinic acid is heated, product formed is
 (a) Succinic anhydride (b) Acetic acid
 (c) CO_2 and methane (d) Propionic acid
76. When CH_3COOH reacts with $CH_3 - Mg - X$
 (a) CH_3COX is formed (b) Hydrocarbon is formed
 (c) Acetone is formed (d) Alcohol is formed
77. In the Gabriel's phthalimide synthesis, phthalimide is treated first with
 (a) C_2H_5I / KOH (b) Ethanolic Na
 (c) Ethanol and H_2SO_4 (d) Ether and $LiAlH_4$
78. Hydrolytic reaction of fats with caustic soda is known as
 (a) Esterification (b) Saponification
 (c) Acetylation (d) Carboxylation
79. Formaldehyde and formic acid can be distinguished using
 (a) Tollen's reagent (b) Fehling solution
 (c) Ferric chloride (d) Sodium bicarbonate
80. Which decolourises the colour of acidic $KMnO_4$
 (a) CH_3COOH (b) CH_3CH_2COOH
 (c) $COOH.COOH$ (d) $CH_3COOC_2H_5$
81. Which of the following can possibly be used as analgesic without causing addiction and moon modification
 (a) Morphine
 (b) *N*-acetyl-para-aminophenol
 (c) Drazepam
 (d) Tetrahydrocatinol
82. $CH_3COOCH_3 + \text{excess } PhMgBr \rightarrow \text{product} \xrightarrow{H^+} X$
 The product X is
 (a) 1, 1-diphenylethanol
 (b) 1, 1-diphenylmethanol
 (c) Methyl phenylethanol
 (d) Methyl phenylketone
83. Which one of the following orders is wrong with respect to the property indicated
 (a) Formic acid > acetic acid > propanoic acid (acid strength)
 (b) Fluoroacetic acid > chloroacetic acid > bromoacetic acid (acid strength)
 (c) Benzoic acid > phenol > cyclohexanol (acid strength)
 (d) Aniline > cyclohexylamine > benzamide (basic strength)

84. Reaction between an acid and alcohol will give
 (a) Higher C containing acid (b) Secondary alcohol
 (c) Alkane (d) Ester

85. In the preparation of an ester, the commonly used dehydrating agent is
 (a) Phosphorus pentoxide
 (b) Anhydrous calcium carbide
 (c) Anhydrous aluminium chloride
 (d) Concentrated sulphuric acid

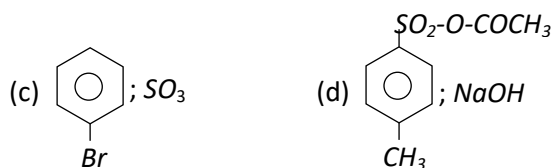
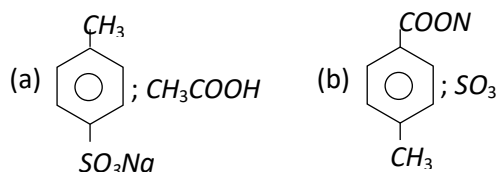
86. Treatment of benzoic acid with $Cl_2 / FeCl_3$ will give
 (a) *p*-chlorobenzoic acid (b) *o*-chlorobenzoic acid
 (c) 2,4-dichlorobenzoic acid (d) *m*-chlorobenzoic acid

87. Consider the acidity of the carboxylic acids
 (a) $PhCOOH$ (b) $o-NO_2C_6H_4COOH$
 (c) $p-NO_2C_6H_4COOH$ (d) $m-NO_2C_6H_4COOH$

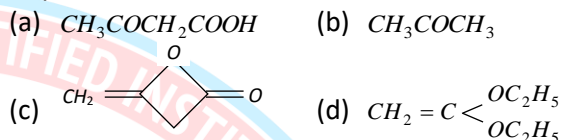
Which of the following order is correct?

- (a) $b > d > a > c$ (b) $b > d > c > a$
 (c) $a > b > c > d$ (d) $b > c > d > a$
88. $RCOOH$ on treatment with PCl_5 and KCN , is subjected to hydrolysis followed by Clemmensen's reduction, the product obtained is
 (a) RCH_2-COCl (b) RCH_2-COOH
 (c) $RCOCN$ (d) RCN
 (e) $R-OH$

89. 4-methyl benzene sulphonic acid reacts with sodium acetate to give



90. $CH_3CO_2C_2H_5$ on reaction with sodium ethoxide in ethanol gives A, which on heating in the presence of acid gives B compound B is



91. When the temperature is raised, the viscosity of liquid decreases, this is because

- (a) Decreased volume of the solution
 (b) Increase in temperature increases the average kinetic energy of molecules, which overcome the attractive force between them
 (c) Decreased covalent and hydrogen bond forces
 (d) Increased attraction between molecules

92. The charge on As_2S_3 sol is due to the adsorbed

- (a) H^+ (b) OH^-
 (c) O^{2-} (d) S^{2-}

93. Noble gases are adsorbed by

- (a) Anhydrous calcium chloride
 (b) Ferric hydroxide
 (c) Conc. H_2SO_4
 (d) Activated coconut charcol

94. Mark the correct statement in a reversible reaction

- (a) The catalyst catalyses the forward reaction
 (b) The catalyst catalyses the backward reaction
 (c) The catalyst influences the direct and the reverse reaction to the same extent
 (d) The catalyst increases the rate of forward reaction and decreases the rate of backward reaction

95. An example of autocatalytic reaction is
- The decomposition of nitroglycerine
 - Thermal decomposition of $KClO_3$ and MnO_2 mixture
 - Break down of ${}^6C^{14}$
 - Hydrogenation of vegetable oil using nickel catalysts
96. When a catalyst is added to a system the
- Value of equilibrium constant is decreased
 - The rate of forward reaction is increased and that of backward reaction is decreased
 - Equilibrium concentrations are unchanged
 - Equilibrium concentrations are increased
97. Regarding criteria of catalysis which one of the following statements is not true
- The catalyst is unchanged chemically at the end of the reaction
 - A small quantity of catalyst is often sufficient to bring about a considerable amount of reaction
 - In a reversible reaction the catalyst alters the equilibrium position
 - The catalyst accelerates the reaction
98. Platinized asbestos is used as a catalyst in the manufacture of H_2SO_4 . It is an example of
- Heterogeneous catalyst
 - Autocatalyst
 - Homogeneous catalyst
 - Induced catalyst
99. Sodium stearate forms in water
- True solution
 - A suspension
 - An emulsion
 - A colloidal solution
100. Which of the following has minimum value of flocculating power
- Pb^{+2}
 - Pb^{+4}
 - Sr^{+2}
 - Na^+
101. Which of the following factors affect human health?
- Infections
 - Silent mutation
 - Life style
 - Genetic disorders
- (i), (iii) and (iv)
 - (i), (ii) and (iv)
 - (i) and (ii)
 - (i), (ii), (iii) and (iv)

102. Select the correct option to fill up the blanks.
- Diseases which are easily transmitted from one person to another, are called _____ diseases.
 - In human body, parasite of malaria initially multiplies within the _____ and then attack the _____.
 - _____ is the yellowish fluid secreted by mother during the initial days of lactation.
 - _____ and _____ are the primary lymphoid organs.
- (i) infections (ii) liver cell, RBC, (iii) colostrums, (iv) bone marrow, thymus
 - (i) infectious, (ii) bone marrow, thymus, (iii) colostrums, (iv) liver cell, RBC
 - (i) interferon, (ii) bone marrow, thymus, (iii) colostrums, (iv) infectious, RBC
 - (i) infectious, (ii) liver, cell RBC, (iii) colostrums, (iv) spleen, lymph node
103. The abbreviation AIDS stands for
- Acquired immune disease syndrome
 - Acquired immunity determining syndrome
 - Acquired immunity delay syndrome.
 - Acquired immune deficiency syndrome
104. The disease chikungunya is transmitted by
- House flies
 - Cockroach
 - Aedes mosquitoes
 - Female Anopheles
105. The genes causing cancer are .
- Structural genes
 - Oncogenes
 - Expressor genes
 - Regulatory genes
106. When an apparently healthy person is diagnosed as unhealthy by a psychiatrist, the reason could be that
- The patient was not efficient at his work
 - The patient was not economically prosperous
 - He does not take interest in sports.
 - The patient shows behavioural and social maladjustment.

- 107.** Which of the following are the reason (s) for Rheumatoid arthritis? Choose the correct option.
- (i) The ability to differentiate pathogens or foreign molecules from self cells increases.
- (ii) Body attacks self cells.
- (iii) More antibodies are produced in the body.
- (iv) The ability to differentiate pathogens or foreign molecules from self cells is lost.
- (a) (i) and (ii) (b) (iii) and (iv)
- (c) (ii) and (iv) (d) (i) and (iii)
- 108.** Edward Jenner discovered
- (a) Vaccination against polio
- (b) Vaccination against small pox
- (c) Immunization against polio
- (d) Immunization against small pox
- 109.** Which drug is used as medicine to help patients cope with depression and insomnia?
- (a) Morphine (b) Amphetamines
- (c) Barbiturate (d) Both (b) and (c)
- 110.** In malaria, which of the following is released in blood to cause severe chill
- (a) Hematin (b) Haemozoin
- (c) Haemoglobin (d) Haemolysin
- 111.** AIDS disease was first reported in
- (a) Russia (b) USA (c) Germany (d) France
- 112.** Ganja and LSD are classified in
- (a) Stimulants (b) Narcotics
- (c) Depressants (d) Hallucinogens
- 113.** A person likely to develop tetanus is immunised by administering
- (a) Preformed antibodies (b) Wide spectrum antibiotics
- (c) Weakened germs (d) Dead germs

- 114.** The term immunity refers to
- (a) The combined actions of all white blood cells
- (b) Events that occur within the lymphatic system
- (c) General defenses against all microorganisms
- (d) Specific defenses against microbes encountered during an earlier exposure.
- 115.** Alcohol is mostly metabolised in
- (a) Liver (b) Kidneys
- (c) All body cells (d) Connective tissue
- 116.** Persons with severe combined immunodeficiency has no
- (a) Interferons (b) Macrophages
- (c) T or B cells (d) Functioning lymph nodes
- 117.** An autoimmune disease is
- (a) Rheumatoid arthritis (b) Multiple sclerosis
- (c) Insulin dependent diabetes (d) All of these
- 118.** Charas or hashish is obtained from
- (a) Leaves of Cannabis
- (b) Resinous secretion of flowering tops of female Cannabis
- (c) Dried leaves of female Cannabis
- (d) Resinous secretion from bark of male plants of Cannabis.
- 119.** The humoral immune system defends mostly against bacteria and viruses in the
- (a) Body fluids (b) Digestive tract
- (c) Internal organs (d) Regions beneath the skin
- 120.** The term 'active immunity' means
- (a) Increasing rate of heart beat
- (b) Increasing quantity of blood
- (c) Resistance developed after disease
- (d) Resistance developed before disease

121. First artificial recombinant DNA molecule was synthesized by:

- (a) S. Cohen and H. Boyer (b) Crick
(c) Alec Jeffereys (d) Beadle and Tatum

122. Arrange the following steps in sequence for construction of artificial recombinant DNA:

- (A) Use of restriction enzymes to isolate to required gene.
(B) Transfer of recombinant DNA into host.
(C) Multiplication of recombinant DNA.
(D) Required gene linked with plasmid DNA.

- (a) B → D → C → A (b) B → C → D → A
(c) A → B → C → D (d) A → D → B → C

123. First artificial DNA molecule was constructed by Cohen and1..... in2..... . They used3..... enzyme to isolate the antibiotic resistance gene. They synthesized recombinant DNA with newly introduced antibiotic resistance gene was then transferred into another bacteria.....6..... .

- (a) 1-Tatum, 3-Restriction, 5-E.coli
(b) 4-Plasmid, 6-Salmonella
(c) 2-1972, 3-Restriction, 6-E.coli
(d) 3-DNA ligase, 4-Plasmid, 5-E.coli

124. By gene gun, also known as1..... ,2..... Velocity particles of3..... or tungsten coated with recombinant DNA are bombarded on4..... cells. Select the incorrect option:

- (a) 1-Biolistics (b) 2-High (c) 3-Silver (d) 4-Plant

125. First restriction endonuclease to be discovered was:

- (a) Hind II (b) EcoRI (c) Bam II (d) pBR 322

126. Biotechnology is the branch in which products are produced by the techniques that use:

- (a) Live organisms (b) Enzymes
(c) Both (a) and (b) (d) Dead organism

127. Number of plasmids per bacteria is usually between:

- (a) 1-5 (b) 15-100 (c) 130-200 (d) 300-400

128. Minimum number of plasmids in a bacteria can be:

- (a) 1-2 (b) 3-5 (c) 5-10 (d) 15-100

129. In which step of PCR, a small chemically synthesized oligonucleotide is added to the separated strands?

- (a) Denaturation of DNA (b) Primer annealing
(c) Extension of primers (d) None of these

130. Transformation is a procedure by which:

- (a) DNA is replicated
(b) RNA is synthesized from DNA
(c) DNA fragment is obtained from host genome
(d) A piece of DNA is introduced in host bacterium

131. Which of the following process will make the bacterial cells more competent so that they can take up plasmid DNA?

- (a) Bacterial cells are treated with specific concentrations of Ca^{2+}
(b) Bacterial are placed in hot water ($> 50^\circ\text{C}$)
(c) Bacterial are kept in moist environment
(d) Bacterial are kept in dry environment

132. Select a coleopteran insect that is killed by action of Bt toxin:

- (a) Beetles (b) Flies
(c) Army worm (d) Tobacco budworm

133. Select the Incorrect statement:

- (a) In developing countries, agrochemicals are very expensive to farmers.
(b) During green revolution, food production was tripled.
(c) Bt toxin is carbohydrate by nature.
(d) Post harvest losses can be reduced by genetic modification of plants.

134. Select the incorrect statement:

- (a) PCR can detect HIV at very low concentrations in patients of AIDS.
(b) In recombinant DNA technology, mutated gene appears on photographic film.
(c) In ELISA, pathogen in body is detected by the presence of either antigen or antibody.
(d) First clinical gene therapy was given in 1990.

135. First gene therapy was given in 1990 to a 4 years old girl suffering from:
- (a) Adenosine deaminase deficiency
 - (b) Sickle cell anemia
 - (c) Haemophilia
 - (d) Thalessemia

136. Which organization in India is authorized to make decisions regarding bio-patents?
- (a) US patent and Trade mark office
 - (b) Genetic Engineering Approval Committee
 - (c) International Union for conservation of nature and Natural resources
 - (d) National Environment Engineering Research Institute

137. Match the columns:

Column A		Column B	
A.	Bt toxin	1.	Silencing of m-RNA
B.	RNA interference	2.	ADA cDNA
C.	RDT	3.	cry gene
D.	Gene Therapy	4.	DNA or RNA probe

- (a) A-1, B-3, C-2, D-4
- (b) A-3, B-1, C-2, D-4
- (c) A-3, B-1, C-4, D-2
- (d) A-2, B-1, C-3, D-4

138. In the process of recombinant DNA technology, the isolated foreign DNA is inserted into another DNA molecule known as—

- (a) DNA vector
- (b) RNA vector
- (c) Protein vector
- (d) Cloning vector

139. Which country has decided to 'label' those GM foods that are found to be 'safe'

- (a) Brazil
- (b) China
- (c) Japan
- (d) South Africa

140. How many statements are wrong

- (a) Exonucleases make cuts at specific positions within DNA.
- (b) In biolistics, recombinant DNA is directly injected into the nucleus without any coating of gold or tungsten.

(c) Proteins encoded by genes cry I Ab and cry II Ab control the bollworms while cry I Ac controls corn borer.

(d) c - peptide is not present in the mature insulin and is removed during maturation

- (a) zero
- (b) 1
- (c) 3
- (d) 2

141. The enzyme TPA or tissue plasminogen activator is used for

- (a) Dissolving blood clots
- (b) Maintaining plasma content
- (c) Clearing turbidity of juices
- (d) Stimulating thromboplastin production

142. Giant Mouse has been produced through

- (a) Tissue culture
- (b) Gene differentiation
- (c) Gene manipulation
- (d) All of the above

143. Genetically engineered microorganism used successfully in bioremediation of oil spills is

- (a) *Trichoderma*
- (b) *Xanthomonas*
- (c) *Bacillus*
- (d) *Pseudomonas putida*

144. Cry 1 endotoxins obtained from *Bacillus thuringiensis* are effective against

- (a) Nematodes
- (b) Mosquitoes
- (c) Bollworms
- (d) Flies

145. What is true about Bt toxin

- (a) The concerned *Bacillus* has antitoxins.
- (b) The inactive protoxin gets converted into active form in the insect gut
- (c) Bt protein exists as active toxin in the *Bacillus*.
- (d) The activated toxin enters the ovaries of the pest to sterilise it and thus prevent its multiplication

- 146.** 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
- 147.** Which one is a **true** statement regarding DNA polymerase used in PCR
(a) It is used to ligate introduced DNA in recipient cell
(b) It serves as a selectable marker
(c) It is isolated from a virus
(d) It remains active at high temperature
- 148.** Tobacco plants resistant to a nematode have been developed by the introduction of DNA that produced (in the host cells).
(a) both sense and anti-sense RNA
(b) a particular hormone
(c) an antifeedant
(d) a toxic protein
- 149.** The first human hormone produced by recombinant DNA technology is
(a) Insulin (b) Estrogen
(c) Thyroxin (d) Progesterone
- 150.** The crops engineered for glyphosate are resistant/tolerant to :
(a) Bacteria (b) Insects
(c) Herbicides (d) Fungi
- 151.** The DNA molecule to which the gene of interest is integrated for cloning is called:
(a) Vector (b) Template
(c) Carrier (d) Transformer
- 152.** Which kind of therapy was given in 1990 to a four-year-old girl with adenosine deaminase (ADA) deficiency?
(a) Radiation therapy (b) Gene therapy
(c) Chemotherapy (d) Immunotherapy
- 153.** In India, the organisation responsible for assessing the safety of introducing genetically modified organisms for public use is
(a) Indian Council of Medical Research (ICMR)
(b) Genetic Engineering Appraisal Committee (GEAC)
(c) Research Committee on Genetic Manipulation (RCGM)
(d) Council for Scientific and Industrial Research (CSIR)
- 154.** 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.
- 155.** Electroporation is
(a) Making transient pores in cell membranes to introduce gene constructs
(b) Fast passage of nutrients through phloem sieve pores by electric stimulation
(c) Opening of stomata by artificial light during night
(d) Purification of saline water with the help of membrane system
- 156.** National bird of India is
(a) *Psittacula* (b) *Passer domesticus*
(c) *Pavo cristatus* (d) Parakeet.
- 157.** How are transformants selected from non-transformants?
(a) Presence of more than one recognition site in the vector DNA
(b) Presence of alien DNA into the vector DNA results into insertional inactivation of selectable marker
(c) Antibiotic resistance gene gets inactivated due to insertion of alien DNA
(d) Both (b) and (c)

158. Which one of the following represents a palindromic sequence in DNA?

- (a) 5'-GAATTC-3
3'-CTTAAG
- (b) 5'-GAATTC-3
3'-GAATCC-5'
- (c) 5'-CATTAC-3
5'-GATAAC-3'
- (d) 5'-CATACC-3
3'-CCTAAG-5'

159. Adenosine deaminase (ADA deficiency) could be permanently cured, if the gene isolated from arrow cells producing ADA is introduced into cell at

- (a) early embryonic stages
- (b) Late embryonic stages
- (c) early childhood
- (d) None of the above

160. In gel electrophoresis which of the following compound is used in the staining of DNA

- (a) Methyl bromide
- (b) Ethylene ethane sulphonate
- (c) Ethidium bromide
- (d) Ethyl bromide

161. Genetically engineered microorganism used successfully in bioremediation of oil spills is

- (a) Trichoderma
- (b) Xanthomonas
- (c) Bacillus
- (d) Pseudomonas putida

162. Ti-plasmid is used for making transgenic plants. It is obtained from

- (a) Azotobacter
- (b) Agrobacterium
- (c) Rhizobium in leguminous root
- (d) Yeast

163. Hirudin is

- (a) A protein produced by *Hordeum vulgare*, which is rich in lysine
- (b) A toxic molecule isolated from *Gossypium hirsutum*, which reduced fertility
- (c) A protein produced from transgenic *Brassica napus*, which prevents blood clotting
- (d) An antibiotic produced by a genetically engineered bacterium *Escherichia coli*

164. Transgenic animals may be useful in

- (a) Producing human protein (Alfa - 1 antitrypsin) that is used in the treatment of emphysema
- (b) Producing organs that may be used in organ transplantation in human
- (c) Diagnosis of some disease like phenylketonuria & cystic fibrosis, Alzheimers, rheumatoid arthritis.
- (d) All of the above

165. Which of the following has been covered under the broad patent category?

- (a) *Triticum*
- (b) *Oryza*
- (c) *Pisum sativum*
- (d) *Brassica*

166. Choose the correct statements :-

- (a) Each restriction endonuclease recognizes a specific palindromic sequences in the DNA
 - (b) Restriction endonucleases are used in genetic engineering to form recombinant molecule of DNA
 - (c) Fragments can be separated by a technique known as gel electrophoresis
 - (d) Separated DNA fragments can be visualised by staining with ethidium bromide in the visible light.
- (a) a, b & d
 - (b) a, b & c
 - (c) b, c & d
 - (d) a, b, c & d

167. Thermostable enzyme which is utilised during amplification of DNA using PCR.

- (a) DNA ligase
- (b) Taq DNA polymerase
- (c) RNA polymerase
- (d) Restriction endonuclease

- 168.** Advancement in genetic engineering has been possible due to discovery of
(a) Transposons (b) Endonucleases
(c) Exonucleases (d) Oncogenes
- 169.** An abnormal gene is replaced by normal gene. It is called
(a) Gene therapy (b) Cloning
(c) Mutation (d) None of the above.
- 170.** The enzymes which are commonly used in genetic engineering are
(a) Restriction endonuclease and polymerase
(b) Endonuclease and ligase
(c) Restriction endonuclease and ligase
(d) Ligase and polymerase
- 171.** Inexhaustible but limited source of energy is
(a) Products of lakes and ponds
(b) Products of oceans
(c) Nuclear fuels
(d) Fossil fuels
- 172.** Soil conservation is the process where
(a) Sterile soil is converted to fertile soil
(b) Soil is aerated
(c) Soil erosion is allowed
(d) Soil is protected against loss
- 173.** Minerals and metals are
(a) Renewable resources
(b) Non-renewable resources
(c) Renewable and non-renewable resources
(d) Biodegradable resources
- 174.** Removal of top fertile soil by wind or water is
(a) Siltation (b) Soil erosion
(c) Weathering of soil (d) Leaching
- 175.** Source of energy which does not evolve CO₂ is
(a) Coal (b) Oil
(c) Organic compounds (d) Nuclear energy
- 176.** Which of the following is most dangerous to wild life
(a) Over exploitation (b) Man made forest
(c) Habitat destruction (d) Introduction of foreign species
- 177.** Rare endangered and endemic taxa can be found intact and flourishing in
(a) Sacred groves
(b) Tropical forests
(c) Oases
(d) Buffer zone of biosphere reserve
- 178.** Biodiversity is determined by
(a) Number of individuals in an area
(b) Species richness
(c) Evenness
(d) Both (b) and (c)
- 179.** Red Data Book contains information about
(a) Red coloured insects
(b) Red coloured fishes
(c) Red eyed birds
(d) Endangered plants and animals
- 180.** The Great Indian Bustard is
(a) Rare species (b) Vulnerable species
(c) Endangered species (d) Flourishing species

181. Meiosis occurs in organism during

- (a) Vegetative reproduction
- (b) Sexual reproduction
- (c) Both sexual and vegetative reproduction
- (d) None of these

182. What does (i) and (ii) represent in the given flowchart?

parent cell $\xrightarrow{M-I}$ 2 Daughter cells $\xrightarrow{M-II}$ 4 daughter cells

- (2n) (i) (ii)
- (a) (i) =n (ii)=n
- (b) (i) =2n (ii) =n
- (c) (i) = n (ii) = 2n
- (d) (i) =2n (ii) = 2n

183. Chromosomes decondense into diffuse chromatin -

- (a) At the end of telophase
- (b) At the beginning of prophase
- (c) At the end of interphase
- (d) At the end of metaphase

184. Which of the following phase of the cell cycle is not a part of interphase?

- (a) M
- (b) S
- (c) G₁
- (d) G₂

185. Which of the following phases lasts for more than 95% of the duration of cell cycle -

- (a) M-phase
- (b) G₁-phase
- (c) G₂-phase
- (d) Interphase

186. Cell cycle is the character of -

- (a) Only bacteria
- (b) Only plants and animals
- (c) Only protists
- (d) All organisms

187. Interphase -

- (a) Includes karyokinesis and cytokinesis
- (b) Some time called resting phase, is the preparatory phase for division in which cell undergoes growth and DNA replication in an order
- (c) Is the shortest phase in which biomolecules are synthesized very fast
- (d) Includes 5% duration of the cell cycle

188. If mitotic division is arrested in G₁ phase of a cell cycle, then the condition is known as

- (a) G₂ phase
- (b) S phase
- (c) G₀ phase
- (d) M-phase

189. The major events of mitotic prophase include cell of the following except

- (a) Condensation of chromosomal materials to form compact chromosomes
- (b) Initiation of the assembly of mitosis spindles, helped by cytoplasmic proteinaceous DNA replication
- (c) Nuclear membrane breakdown and nucleolar disaggregation
- (d) DNA replication

190. The milestone that defines telophase is when the chromosomes -

- (a) Separate
- (b) Come together
- (c) Are at opposite poles
- (d) Line up

191. Which of the pair of products are produced by the action of fungi?

- (a) Citric acid and Statins
- (b) Butyric acid and Alcohol
- (c) Streptokinase and Acetic acid
- (d) Curd and Alcohol

192. Select the option that correctly indicates the mechanism of action of statins?

- (a) Increases the catabolism of cholesterol
- (b) Reduces the absorption of cholesterol
- (c) Competitively inhibit the enzyme responsible for synthesis of cholesterol
- (d) Non-competitively inhibit the enzyme responsible for synthesis of cholesterol

193. Penicillin was discovered by:

- (a) A. Fleming
- (b) Florey
- (c) R. Koch
- (d) L. Pastuer

194. Monascus purpureus is a ...A..., which is known for production of a blood cholesterol lowering agent-....B... . A and B are respectively:

- (a) Fungi, Cyclosporine
- (b) Bacteria, Statin
- (c) Protozoa, Streptokinase
- (d) Fungi, Statin

195. In a STP (Sewage Treatment Plant), primary treatment involves:

- (a) Physical removal
- (b) Chemical treatment
- (c) Biological treatment
- (d) All of these

196. Primary effluent in STP (Sewage Treatment plant) obtained as a result of primary treatment is added to:
- (a) Large setting tank (b) Anaerobic sludge digester
(c) Large aeration tank (d) Primary settling tank

197. Activated sludge in a sewage treatment is:
- (a) Grit of sewage
(b) Large masses of bacteria
(c) Settled bacterial flocs
(d) Mixture of gases

199. Biological oxygen demand (BOD) is the amount of oxygen that would be consumed by 1 if all 2..... matter in3..... litre of water is.....4.....

	1	2	3	4
A.	Protozoan	Inorganic	10	Reduced
B.	Protozoan	Organic	1	Reduced
C.	Bacteria	Inorganic	10	Oxidised
D.	Bacteria	Organic	1	Oxidised

200. Which of the following pair is related?
- (a) Ganga action plan –Building of sewage treatment plant
(b) Primary treatment on STP –Activated sludge
(c) Swiss cheese – Ripening by fungi
(d) Cyclosporin A – Clot buster

198. In a sewage treatment plant, major part of activated sludge enters:
- (a) Anaerobic sludge digesters tanks
(b) Primary settling tanks
(c) Large settling tanks
(d) Large aeration tanks

