PHYSICS

(SECTION-A)

1. When light wave suffers reflection at the interface from air to glass, the change in phase of the reflected wave is equal to

(A) 0 (B) $\frac{\pi}{2}$

(C) π (D) 2π

2. A plane mirror produces a magnification of

(A) -1

(B) $+1$

(C) Zero

(D) Between 0 and $+\infty$

3. If an observer is walking away from the plane mirror with $6m/sec$. Then the velocity of the image with respect to observer will be

(A) $6m/sec$ (B) $-6m/sec$

(C) $12m/sec$ (D) $3m/sec$

4. The velocity of light emitted by a source S observed by an observer O, who is at rest with respect to S is c. If the observer moves towards S with velocity v, the velocity of light as observed will be

(A) $c+v$ (B) $c-v$

(C) c (D) $\sqrt{1-\frac{v^2}{c^2}}$

5. **Assertion :** Ultraviolet radiation are of higher frequency waves are dangerous to human being.

Reason : Ultraviolet radiation are absorbed by the atmosphere

(A) If both assertion and reason are true and the reason is the correct explanation of the assertion.

(B) If both assertion and reason are true but reason is not the correct explanation of the assertion.

(C) If assertion is true but reason is false.

(D) If the assertion and reason both are false.

6. A diminished virtual image can be formed only in

(A) Plane mirror

(B) A concave mirror

(C) A convex mirror

(D) Concave-parabolic mirror

7. Given a point source of light, which of the following can produce a parallel beam of light

(A) Convex mirror

(B) Concave mirror

(C) Concave lens

(D) Two plane mirrors inclined at an angle of $90°$

8. A virtual image larger than the object can be obtained by

(A) Concave mirror (B) Convex mirror

(C) Plane mirror (D) Concave lens

9. The focal length of a convex mirror is 20 cm its radius of curvature will be

(A) 10 cm (B) 20 cm

(C) 30 cm (D) 40 cm

10. When a ray of light emerges from a block of glass, the critical angle is

(A) Equal to the angle of reflection

(B) The angle between the refracted ray and the normal

(C) The angle of incidence for which the refracted ray travels along the glass-air boundary

(D) The angle of incidence

11. The ratio of the refractive index of red light to blue light in air is

(A) Less than unity

(B) Equal to unity

(C) Greater than unity

(D) Less as well as greater than unity depending upon the experimental arrangement

12. When light travels from one medium to the other of which the refractive index is different, then which of the following will change

(A) Frequency, wavelength and velocity

(B) Frequency and wavelength

(C) Frequency and velocity

(D) Wavelength and velocity

13. Light of different colours propagates through air

(A) With the velocity of air

(B) With different velocities

(C) With the velocity of sound

(D) Having the equal velocities

14. The index of refraction of diamond is 2.0, velocity of light in diamond in *cm/second* is approximately

(A) 6×10^{10} (B) 3.0×10^{10}

(C) 2×10^{10} (D) 1.5×10^{10}

15. Light travels through a glass plate of thickness t and having refractive index n. If c is the velocity of light in vacuum, the time taken by the light to travel this thickness of glass is

(A) $\frac{t}{nc}$ (B) tnc (C) $\frac{nt}{c}$ (D) $\frac{tc}{n}$

16. When a light wave goes from air into water, the quality that remains unchanged is its
(A) Speed (B) Amplitude
(C) Frequency (D) Wavelength

17. If ${}_i\mu_j$ represents refractive index when a light ray goes from medium *i* to medium *j*, then the 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) ${}_4\mu_2$

18. Monochromatic light of frequency $5 \times 10^{14}\,Hz$ travelling in vacuum enters a medium of refractive index 1.5. Its wavelength in the medium is
(A) 4000 $\mathring{A}$ (B) 5000 $\mathring{A}$
(C) 6000 $\mathring{A}$ (D) 5500 $\mathring{A}$

19. Ray optics is valid, when characteristic dimensions are
(A) Of the same order as the wavelength of light
(B) Much smaller than the wavelength of light
(C) Of the order of one millimetre
(D) Much larger than the wavelength of light

20. Electromagnetic radiation of frequency *n*, wavelength λ, travelling with velocity *v* in air, enters a glass slab of refractive index μ. The frequency, wavelength and velocity of light in the glass slab will be respectively
(A) $\frac{n}{\mu}, \frac{\lambda}{\mu}, \frac{v}{\mu}$ (B) $n, \frac{\lambda}{\mu}, \frac{v}{\mu}$
(C) $n, \lambda, \frac{v}{\mu}$ (D) $\frac{n}{\mu}, \frac{\lambda}{\mu}, v$

21. Stars are twinkling due to
(A) Diffraction (B) Reflection
(C) Refraction (D) Scattering

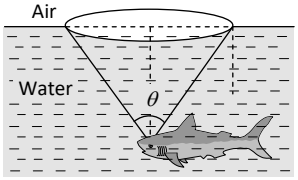
22. An astronaut in a spaceship see the outer space as
(A) White (B) Black
(C) Blue (D) Red

23. Speed of light is maximum in
(A) Water (B) Air
(C) Glass (D) Diamond

24. A cut diamond sparkles because of its
(A) Hardness
(B) High refractive index
(C) Emission of light by the diamond
(D) Absorption of light by the diamond

25. Critical angle of light passing from glass to air is minimum for
(A) Red (B) Green
(C) Yellow (D) Violet

26. A fish is a little away below the surface of a lake. If the critical angle is 49°, then the fish could see things above the water surface within an angular range of θ^o where



(A) $\theta = 49^o$ (B) $\theta = 90^o$
(C) $\theta = 98^o$ (D) $\theta = 24\frac{1^o}{2}$

27. **Assertion :** The images formed by total internal reflections are much brighter than those formed by mirrors or lenses.
Reason : There is no loss of intensity in total internal reflection.
(A) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(B) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(C) If assertion is true but reason is false.
(D) If the assertion and reason both are false.

28. 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 wavefront
(C) Is used to determine the velocity of light
(D) Is used to explain polarisation

29. By Huygen's wave theory of light, we cannot explain the phenomenon of
(A) Interference (B) Diffraction
(C) Photoelectric effect (D) Polarisation

30. The phenomenon of interference is shown by
(A) Longitudinal mechanical waves only
(B) Transverse mechanical waves only
(C) Electromagnetic waves only
(D) All the above types of waves

31. Light appears to travel in straight lines since
(A) It is not absorbed by the atmosphere
(B) It is reflected by the atmosphere
(C) Its wavelength is very small
(D) Its velocity is very large

32. A wave can transmit ..... from one place to another
(A) Energy (B) Amplitude
(C) Wavelength (D) Matter

33. If the ratio of intensities of two waves is 1 : 25, then the ratio of their amplitudes will be
(A) 1 : 25 (B) 5 : 1
(C) 26 : 24 (D) 1 : 5

34. Two sources of waves are called coherent if
(A) Both have the same amplitude of vibrations
(B) Both produce waves of the same wavelength
(C) Both produce waves of the same wavelength having constant phase difference
(D) Both produce waves having the same velocity

35. If two light waves having same frequency have intensity ratio 4 : 1 and they interfere, the ratio of maximum to minimum intensity in the pattern will be
(A) 9 : 1 (B) 3 : 1
(C) 25 : 9 (D) 16 : 25

(SECTION-B)

36. Wavefront means
(A) All particles in it have same phase
(B) All particles have opposite phase of vibrations
(C) Few particles are in same phase, rest are in opposite phase
(D) None of these

37. The ratio of intensities of two waves are given by 4 : 1. The ratio of the amplitudes of the two waves is
(A) 2 : 1 (B) 1 : 2
(C) 4 : 1 (D) 1 : 4

38. Young's experiment establishes that
(A) Light consists of waves
(B) Light consists of particles
(C) Light consists of neither particles nor waves
(D) Light consists of both particles and waves

39. In Young's experiment, the distance between the slits is reduced to half and the distance between the slit and screen is doubled, then the fringe width
(A) Will not change
(B) Will become half
(C) Will be doubled
(D) Will become four times

40. In the Young's double slit experiment, the spacing between two slits is 0.1 *mm*. If the screen is kept at a distance of 1.0 *m* from the slits and the wavelength of light is 5000 Å, then the fringe width is
(A) 1.0 *cm* (B) 1.5 *cm*
(C) 0.5 *cm* (D) 2.0 *cm*

41. In Young's double slit experiment, carried out with light of wavelength λ = 5000 Å, the distance between the slits is 0.2 *mm* and the screen is at 200 *cm* from the slits. The central maximum is at x =0. The third maximum (taking the central maximum as zeroth maximum) will be at x equal to
(A) 1.67 *cm* (B) 1.5 *cm*
(C) 0.5 *cm* (D) 5.0 *cm*

42. Young's double slit experiment is performed with light of wavelength 550 *nm*. The separation between the slits is 1.10 *mm* and screen is placed at distance of 1 *m*. What is the distance between the consecutive bright or dark fringes
(A) 1.5 *mm* (B) 1.0 *mm*
(C) 0.5 *mm* (D) None of these

43. In the Young's double slit experiment with sodium light. The slits are 0.589 *m* a part. The angular separation of the third maximum from the central maximum will be (given λ = 589 *mm*)
(A) $\sin^{-1}(0.33\times10^{8})$
(B) $\sin^{-1}(0.33\times10^{-6})$
(C) $\sin^{-1}(3\times10^{-8})$
(D) $\sin^{-1}(3\times10^{-6})$

44. If the sodium light in Young's double slit experiment is replaced by red light, the fringe width will
(A) Decrease
(B) Increase
(C) Remain unaffected
(D) First increase, then decrease

45. The two slits at a distance of 1 *mm* are illuminated by the light of wavelength $6.5\times10^{-7}m$. The interference fringes are observed on a screen placed at a distance of 1*m*. The distance between third dark fringe and fifth bright fringe will be
(A) 0.65 *mm* (B) 1.63 *mm*
(C) 3.25 *mm* (D) 4.88 *mm*

46. In Fresnel's biprism experiment, on increasing the prism angle, fringe width will
(A) Increase
(B) Decrease
(C) Remain unchanged
(D) Depend on the position of object

47. In which of the following is the interference due to the division of wave front
(A) Young's double slit experiment
(B) Fresnel's biprism experiment
(C) Lloyd's mirror experiment
(D) Demonstration colours of thin film

48. A star producing light of wavelength 6000 Å moves away from the earth with a speed of 5 *km/sec*. Due to Doppler effect the shift in wavelength will be $(c = 3 \times 10^8 m / sec)$
(A) 0.1 Å (B) 0.05 Å (C) 0.2 Å (D) 1 Å

49. If the shift of wavelength of light emitted by a star is towards violet, then this shows that star is
(A) Stationary
(B) Moving towards earth
(C) Moving away from earth
(D) Information is incomplete

50. Doppler's effect in sound in addition to relative velocity between source and observer, also depends while source and observer or both are moving. Doppler effect in light depend only on the relative velocity of source and observer. The reason of this is
(A) Einstein mass - energy relation
(B) Einstein theory of relativity
(C) Photoelectric effect
(D) None of these

CHEMISTRY

(SECTION-A)

51. When an aldehyde was heated with alkali, part of it was converted into an alcohol and part of it into an acid. The aldehyde is –
(A) An aliphatic aldehyde other than formaldehyde
(B) An aliphatic aldehyde or salicylaldehyde
(C) An aromatic aldehyde other than salicylaldehyde
(D) An aromatic aldehyde or formaldehyde

52. The specific reagent for the reducing aldehyde and ketone to alcohol is -
(A) Sodium and ethanol
(B) Aluminium isopropoxide
(C) Amalgamated zinc and concentrated hydrochloric acid
(D) Sodium bisulphite

53. Which gives a ketone on treating with a Grignard's reagent -
(A) Formaldehyde (B) Ethyl alcohol
(C) Methyl cyanide (D) Methyl iodide

54. Which of the following is more reactive towards nucleophillic reagents ?
(A) HCHO (B) CH_3COCH_3
(C) CH_3CHO (D) None

55. Carbonyl compounds react with which of the following reagent to form a colorless crystalline precipitate-
(A) PCl_5 (B) HCN
(C) NH_2OH (D) $NaHSO_3$

56. When acetaldehyde is treated with Aluminium ethoxide, it forms -
(A) Ethyl alcohol
(B) Ethyl acetate
(C) Acetic acid
(D) Methyl propionate

57. The following statement is true for Cannizzaro reaction -
(A) The aldehyde is oxidised as well as reduced
(B) The aldehydes not containing a-Hydrogen atoms give the reaction
(C) The reaction is not given by aldehydes containing a-Hydrogen atoms
(D) All of these

58. Doctors detect diabetes disease by testing the presence of glucose in urine with -
(A) Nessler's reagent
(B) Fehling's solution
(C) Fenton's reagent
(D) $AgNO_3$ solution

59. Keto-enol tautomerism is shown by –
(A) C_6H_5CHO
(B) $C_6H_5CO.CCl_3$
(C) $C_6H_5COC_6H_5$
(D) $C_6H_5COCH_2COCH_3$

60. Reduction of benzoyl chloride with Pd and $BaSO_4$ produces –
(A) Benzoic acid (B) Benzaldehyde
(C) Benzoyl cyanide (D) Benzyl alcohol

61. In the reaction between benzaldehyde and formaldehyde, point out the wrong statement
(A) Benzaldehyde is reduced to benzyl alcohol
(B) Formaldehyde is oxidised to formic acid
(C) Benzyl formate is formed
(D) The reaction is known as crossed aldol condensation

62. Which of the following acids on heating gives acetic acid?
(A) Malonic acid (B) Maleic acid
(C) Malic acid (D) None of these

63. The main reason for the fact that carboxylic acids undergo ionization is -
(A) Absence of α-hydrogen
(B) Resonance stabilization of the carboxylate ion
(C) High reactivity of α-hydrogen
(D) Hydrogen bonding

64. Choose the pair in which both the compounds show H-bonding -
(A) Acetic acid, acetyl chloride
(B) Acetamide, acetic acid
(C) Acetic anhydride, acetic acid
(D) Ethyl acetate, acetic anhydride

65. Which of the following pairs forms strongest Hydrogen bonding?
(A) SiH_4 and SiF_4
(B) CH_3COCH_3 and $CHCl_3$
(C) HCOOH and CH_3COOH
(D) None of these

66. Highest boiling point would be of -
(A) Formic acid (B) Water
(C) Acetic acid (D) Ethanol

67. Suitable reagent to distinguish between carboxylic acid and phenol is –
(A) Phosphorous pentachloride
(B) Thionyl chloride
(C) Sodium carbonate
(D) Ferric chloride solution

68. Acetic acid on reduction in the presence of $LiAlH_4$ produces -
(A) $CH_3 - CH_3$ (B) $CH_3 - CHO$
(C) $CH_3 - OH$ (D) $CH_3 - CH_2OH$

69. Propionic acid when reacted with Br_2 in presence of phosphorous in sunlight gives -
(A) $CH_3CHBrCOBr$
(B) $CH_3CHBrCOOH$
(C) CH_3CH_2COBr
(D) CH_2BrCH_2COOH

70. The sodium salt of which of the following acid gives a sodium salt of dicarboxylic acid on heating -
(A) Acetic acid (B) Formic acid
(C) Carbonic acid (D) Malonic acid

71. All of the following reaction takes place except
(A) $CH_3COOH+NH_3 \longrightarrow CH_3CONH_2 + H_2O$

(B) $CH_3COOH + NH_2NH_2 \longrightarrow CH_3 - \underset{\underset{N-NH_2}{\|}}{C} - OH + H_2O$

(C) $3CH_3COOH + PCl_3 \longrightarrow 3CH_3COCl + H_3PO_3$
(D) $CH_3CHO + H_2NOH \longrightarrow CH_3CH=NOH + H_2O$

72. $X \xrightarrow{Cl_2}$ Benzotrichloride $\xrightarrow{\text{Hydrolysis}} Y$, X Y respectively are–
(A) Benzene, benzaldehyde
(B) Toluene, benzaldehyde
(C) Toluene, benzoic acid
(D) Benzene, benzoic acid

73. Benzoyl chloride is prepared from benzoic acid by –
(A) Cl_2, hν (B) SO_2Cl_2
(C) $SOCl_2$ (D) Cl_2H_2O

74. Which is not an alcohol ?
(A) $CH_2 = CH\text{-}CH_2OH$
(B) $CH_2OH.\ CH_2OH$
(C) $C_6H_5\ CH_2OH$
(D) C_6H_5OH

75. Which of the following reductants is used in Bouveault Blanc reduction ?
(A) Zn + HCl (B) $LiAlH_4$
(C) $Na + C_2H_5OH$ (D) $Ni + H_2$

76. The correct order of solubility of 1º, 2º and 3º alcohol in water is-
(A) 3º > 2º > 1º (B) 1º > 2º > 3º
(C) 3º > 1º > 2º (D) None of these

77. The name of the compound B in the following sequence is-

$$CH_3CHOHCH_3 \xrightarrow{PCl_5} A \xrightarrow[KOH]{\text{Alcoholic}} B$$

(A) Propene (B) Propane
(C) Propyne (D) Propanol

78. Which of the following compound can give most stable carbonium ion during dehydration with H_2SO_4?
(A) $(CH_3)_2CHCH_2OH$
(B) $(CH_3)_3COH$
(C) $CH_3(CH_2)_2CH_2OH$
(D) $CH_3CHOHCH_2CH_3$

79. Pyroligneous acid is the source of -
(A) Wood gas + wood charcoal
(B) Woodtar + acetic acid
(C) Acetone + methanol + Acetic acid
(D) Ethanol + acetone + acetic acid

80. Phenol and ethanol are distinguished by the reaction with-
(A) Red litmus (B) $NaHCO_3$
(C) $FeCl_3$ (D) NaOH

81. Which of the following is least reactive towards $ZnCl_2$ and conc. HCl mixture ?
(A) 2-Butanol (B) 1-Butanol
(C) 2-Methyl 2-butanol (D) All of the above

82. An organic compound A reacts with sodium metal and forms B. On heating with conc. H_2SO_4, A gives diethyl ether. So A and B are -
(A) C_3H_7OH and CH_3ONa
(B) CH_3OH and CH_3ONa
(C) C_4H_9OH and C_4H_9ONa
(D) C_2H_5OH and C_2H_5ONa

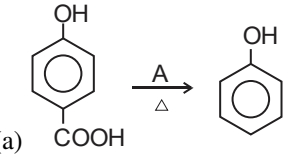
83. In the presence of an acid catalyst, two alcohol molecules will undergo dehydration to give:
(A) Ester
(B) Anhydride
(C) Ether
(D) Unsaturated hydrocarbon

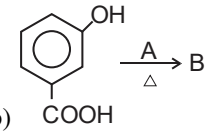
84. On strong oxidation, diethyl ether gives -

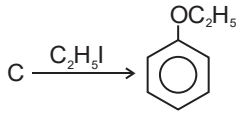
(A) Ethyl alcohol (B) Acetaldehyde

(C) Acetic acid (D) Methyl alcohol

85. Identify A, B, and C in the following reactions–

(a) 

(b) 

(c) 

(A) Sodalime, benzene, potassium phenoxide

(B) Zn, benzene, sodium ethoxide

(C) Zn, cyclohexanone, sodium ethoxide

(D) None of the above

(SECTION-B)

86. A carbon compound A forms B with sodium metal and again A forms C with PCl_5 but B and C form diethylether. Therefore A, B & C are -

(A) C_2H_5OH, C_2H_5ONa, C_2H_5Cl

(B) C_2H_5Cl, C_2H_5ONa, C_2H_5OH

(C) C_2H_5OH, C_2H_6, C_2H_5Cl

(D) C_2H_5OH, C_2H_5 Cl, C_2H_5ONa

87. The best reagent for converting ethanol to chloroethane is -

(A) PCl_3 (B) PCl_5

(C) $SOCl_2$ (D) $HCl + ZnCl_2$

88. In Hunsdiecker reaction -

(A) A sodium salt of an acid reacts with bromine.

(B) A calcuim salt of an acid reacts with HBr.

(C) A silver salt of an acid reacts with bromine.

(D) A silver salt of an acid reacts with HBr.

89. The yield of alkyl bromide obtained as a result of heating the dry silver salt of carboxylic acid with bromine what will be the order of formation w.r.t. alkyl bromide ?

(A) $1° > 3° > 2°$ bromides

(B) $1° > 2° > 3°$ bromides

(C) $3° > 2° > 1°$ bromides

(D) $3° > 1° > 2°$ bromides

90. The correct order of density is -

(A) $C_2H_5I > C_2H_5Br > C_2H_5Cl$

(B) $C_2H_5 > C_2H_5Br > C_2H_5I$

(C) $C_2H_5Cl > C_2H_5I > C_2H_5CBr$

(D) None of these

91. Action of alcoholic $AgNO_3$ on chlorobenzene is similar to the action on -

(A) Allyl chloride (B) Vinyl chloride

(C) Isopropyl chloride (D) Benzyl chloride

92. Tertiary butyl halide on boiling with water gives tertiary butyl alcohol. The reaction follows -

(A) SE mechanism (B) S_N1 mechanism

(C) S_N2 mechanism (D) E1 mechanism

93. Ethyl bromide and Isopropyl chloride can be distinguished by -

(A) Alcoholic $AgNO_3$

(B) Comparing their colours

(C) Burning the compounds on spatula

(D) Aqueous KOH solution

94. Action of sodium ethoxide on an alkyl iodide is

(A) A nucleophilic addition

(B) An electrophilic addition

(C) A nucleophilic substitution

(D) An electrophilic subsititution

95. Ethyl bromide reacts with lead sodium alloy to form -

(A) Tetraethyl lead

(B) Tetraethyl bromide

(C) (A) and (B) both

(D) Lead bromide

96. The name of the reaction of an alkyl halide with an arene in the presence of anhydrous $AlCl_3$ is -

(A) Friedel Craft's reaction

(B) Grignard reaction

(C) Wurtz-fitting reaction

(D) Wurtz reaction

97. Which of the following does not give white precipitate when boiled with alcoholic silver nitrate?

(A) Allyl chloride

(B) tert-Butyl chloride

(C) Chlorobenzene

(D) Benzyl chloride

98. A sample of chloroform being used as an anaesthetic is tested by -

(A) Fehling solution

(B) Ammoniacal CuCl solution

(C) $AgNO_3$ solution

(D) $AgNO_3$ solution after boiling with alc. KOH

99. **Assertion :** Acetaldehyde undergoes aldol condensation instead of hydrate formation in the presence of OH^-/H_2O.

Reason : Enolate of aldehyde is better nucleophile than OH^-.

(A) If both (A) and (R) are true, and (R) is the correct explanation of (A).

(B) If both (A) and (R) are true but (R) is not the correct explanation of (A).

(C) If (A) is true but (R) is false.

(D) If (A) is false but (R) is true.

100. **Assertion :** 3-hydroxy - butan-2-one on treatment with $[Ag(NH_3)_2]^{\oplus}$ cause precipitation of silver.

Reason : $[Ag(NH_3)_2]^{\oplus}$ oxidises 3-hydroxy butan-2-one to butan-2-3-dione

(A) If both (A) and (R) are true, and (R) is the correct explanation of (A).

(B) If both (A) and (R) are true but (R) is not the correct explanation of (A).

(C) If (A) is true but (R) is false.

(D) If (A) is false but (R) is true.

BIOLOGY

BOTANY (SECTION-A)

101. Reverse transcriptase is an enzyme used to synthesise complementary DNA (cDNA) by using mRNA as a template. It was discovered by
(A) Har Govind Khorana.
(B) Temin and Baltimore.
(C) A. Kornberg.
(D) Paul Berg.

102. The role of DNA ligase in the construction of recombinant' DNA molecule is
(A) Formation of glycosidic bonds.
(B) Cutting of DNA at a specific site.
(C) Location of purine and pyrimidine bases.
(D) Formation of phosphodiester bonds between two DNA fragments.

104. The cos ends of DNA of lambda phage has nucleotides.
(A) Ten (B) Twelve
(C) Fifteen (D) Eighteen

105. An ideal cloning vector should have
(A) Restriction sites.
(B) Selectable marker.
(C) Origin of replication.
(D) All of these.

106. Match the items given in Column I with their uses in Column II and choose the correct option.

Column I
A. Escherichia coli
B. Thermus aquaticus
C. Agrobacterium tumefaciens
D. Biolistic

Column II
(i) Thermostable DNA polymerase
(ii) Restriction endonuclease
(iii) Gene gun
(iv) Ti plasmid
(A) A-(i), B-(ii), C-(iv), D-(iii)
(B) A-(ii), B-(i), C-(iv), D-(iii)
(C) A-(iv), B-(i), C-(iii), D-(ii)
(D) A-(iii), B-(iv), C-(ii), D-(i)

107. Which of the following are correct statements?
(i) Polyethylene glycol method is used for gene transfer without vector.
(ii) Biolistic gun is a suitable method for transferring gene into animal cell.
(iii) Plasmid is a single-stranded DNA.
(iv) In recombinant DNA technology, cDNA is prepared from mRNA.
(A) (i) and (ii) (B) (ii) and (iii)
(C) (i) and (iv) (D) (ii) and (iv

108. Restriction endonucleases are utilised in genetic engineering as
(A) Molecular cement for combining DNA fragments into long chain.
(B) Tools of recombinant DNA technology.
(C) Molecular scalpels for cutting DNA at specific sites.
(D) Both (B) and (C).

109. Father of genetic engineering is
(A) Kary Mullis. (C) Paul Berg.
(B) Har Govind Khorana. (D) Alec Jeffrey.

110. In order to induce the bacterial uptake of plasmids, the bacteria are made "competent" by first treating with
(A) Sodium chloride.
(B) Calcium chloride.
(C) Zinc chloride.
(D) Potassium chloride.

111. Which of the following statement is incorrect about gel electrophoresis?
(A) The most commonly used matrix is agarose.
(B) DNA fragments move towards cathode under electric field.
(C) DNA fragments are separated according to their size.
(D) Bright orange bands are seen after staining DNA with ethidium bromide.

112. Which of the following is an incorrect statement?
(A) The process of extraction of DNA from the gel piece of agarose matrix is called electroporation.
(B) Shuttle vector remains active in both eukaryotic cell and Escherichia coli.
(C) Monoclonal antibodies are called magical bullets.
(D) Restriction endonucleases are synthesised by bacteria as part of their defence mechanism.

113. Which of the following describes the role of selectable > marker?
(A) It is the site where replication starts.
(B) It is a vector used selectively for plants.
(C) It is a cloning site for alien DNA.
(D) It helps in differentiating between transformants and non-transformants.

114. Which of the following is incorrect regarding vectors . used for gene cloning?
(A) Most commonly used bacteriophages are lambda phage and M13 phage.
(B) Transposons are units of DNA, which can move from one DNA molecule to another.
(C) Agrobacterium is used to deliver genes into plant cells.
(D) YAC vectors are used to clone small fragments of DNA.

115. Which of the following is not a correct statement about plasmids?
(A) It is an extrachromosomal DNA in bacteria.
(B) They are present in one or several copies.
(C) They are linear single-stranded DNA fragments.
(D) Plasmid can transfer from one cell to another and make several copies of itself.

116. What is common between EcoRI and HindII?
(A) Obtained from the same source
(B) Produce flush ends
(C) Produce sticky ends
(D) Hydrolyse phosphodiester bonds

117. Read the following statements and choose the correct option.
Statement I: Agrobacterium tumefaciens, a pathogen of several monocot plants, is able to deliver a piece of DNA known as "T-DNA" to transform normal plant cell into a tumour.
Statement II: The tumour-including (Ti) plasmid of Agrobacterium tumefaciens has now been modified into a cloning vector, which is no more pathogenic to the plants but is still able to use the mechanisms to deliver genes of our interest into a variety of plants.
(A) Both statements are correct.
(B) Both statements are incorrect.
(C) Only statement I is correct.
(D) Only statement II is correct.

118. Identify the wrong statement.
(A) DNA is a hydrophobic molecule.
(B) DNA cannot pass through the cell membranes.
(C) Treatment with divalent cations increase the efficiency with which DNA enters the bacterium through pores in its cell wall.
(D) "Disarmed pathogen" vectors, when allowed to infect the cells, transfer the recombinant DNA into the host.

119. A bacterial cell is transformed by using any of the following methods, except
(A) Electroporation.
(B) Heat shock method.
(C) Using bacteriophage.
(D) Gene gun.

120. If a foreign gene is ligated at the Pvul site in pBR322, which of the following option is correct?
(A) Recombinants will grow in ampicillin-containing medium.
(B) Recombinants will grow in tetracycline-containing medium.
(C) Recombinants will not grow in medium lacking antibiotics.
(D) Recombinants will grow in the presence of ampicillin and tetracycline.

121. The colonies of recombinant bacteria appear white in contrast to blue colonies of non-recombinant bacteria. because of
(A) Insertional inactivation of alpha galactosidase in. recombinant bacteria.
(B) Non-recombinant bacteria containing beta galactosidase.
(C) Insertional inactivation of alpha galactosidase in non-recombinant bacteria.
(D) Inactivation of glucosidase enzyme in recombinant bacteria.

122. Restriction endonucleases are
(A) Present in lysosome of all eukaryotic cells.
(B) Used for ligating foreign DNA with vector DNA.
(C) Formed in bacteria as part of their defence mechanism.
(D) Used for in vitro DNA synthesis.

123. PCR proceeds in three distinct steps governed by temperature in the order of
(A) Extension, annealing, denaturation.
(B) Denaturation, annealing, extension.
(C) Annealing, extension, denaturation.
(D) Denaturation, extension, annealing.

124. Agarose extracted from sea weeds is used in
(A) PCR.
(B) Gel electrophoresis
(C) Electroporation.
(D) Biolistics.

125. Which of the following is an incorrect statement with respect to PCR technique?
(A) Two oligonucleotide primers anneal to each of the two strands of DNA at their 3' complimentary ends.
(B) The optimum temperature for polymerisation is 90°C.
(C) Deoxyribonucleotide triphosphates are used as raw material for the synthesis of new DNA strand.
(D) A 17-25-nucleotides-long primer is needed to bind with the template.

126. The enzymes required to obtain naked protoplast are
(A) Cellulase and amylase.
(B) Amylase and pectinase.
(C) Cellulase and pectinase.
(D) Amylase and proteinase.

127. One billion copies of DNA are obtained by PCR technique after cycles..
(A) 30 (B) 100
(C) 150 (D) 200

128. Which of the following is an incorrect statement?
(A) Recombinant proteins are synthesised by transgene in heterologous host cells.
(B) Escherichia and Agrobacterium are two useful bacteria in genetic engineering.
(C) In the PCR technique, enzyme helicase is used to separate the strands.
(D) In gel electrophoresis, smaller DNA fragments diffuse more rapidly through the gel than larger ones.

129. The toxin of Bacillus thuringiensis is activated by
(A) Acidic pH of insect stomach.
(B) High temperature.
(C) Alkaline pH of insect gut.
(D) Enzymes in insect gut.

130. Which of the following is incorrect with respect to Bt toxin?
(A) Bt toxin does not kill the bacteria themselves because toxin proteins occur in inactive form called protoxin.
(B) Toxin can kill certain insects such as dipterans, coleopterans, and lepidopterans.
(C) Bt toxin is commonly used to produce herbicide- resistant GM crops.
(D) When an insect ingests an inactive toxin, it is converted into an active form of toxin due to the alkaline pH of the gut that solubilises the protein crystals.

131. Which of the following is an incorrect statement?
(A) GM crops are more tolerant to abiotic stresses such as heat, cold, salinity, and drought.
(B) By using herbicide-resistant GM crops, weeds can be eliminated from the field without the use of manual labour.
(C) RNAi has been used to make tobacco plant resistant to Bacillus thuringiensis.
(D) A nematode Meloidogyne incognita infects the roots of tobacco plants and causes a great reduction in yield.

132. Which of the following is an incorrect statement regarding genetic modification of crops?
(A) It has reduced reliance on chemical pesticides.
(B) It has reduced post-harvest losses.
(C) It has reduced the efficiency of mineral usage by plants.
(D) It has enhanced the nutritional value of food.

133. Read the following statements:
(i) Agrobacterium tumefaciens causes root knot disease and infects the roots of tobacco plant.
(ii) Enzymes present in the saliva of insects convert the inactive form of Bt toxin into active form.
(iii) Bt corn has been made resistant to corn borer by introducing the crylAc gene.
(iv) Foods derived from transgenic crops are called GM foods.
(v) The Nif gene for nitrogen fixation in cereal crops such as wheat, jowar, etc is introduced by cloning Rhizobium meliloti.
Which of these statements are correct?
(A) (i) and (ii) (B) (iii) and (iv)
(C) (iv) and (v) (D) (i) and (v)

134. CryllAb and crylAb produce toxins that control
(A) Tobacco budworms and armyworms, respectively.
(B) Cotton bollworms and corn borer, respectively.
(C) Corn borer and cotton bollworms, respectively.
(D) Nematodes and armyworms, respectively.

135. Genetically, modified organisms (GMOs) have been useful for
(A) Reducing post-harvest losses.
(B) Enhancing the nutritional value of food.
(C) Making crops more tolerant to abiotic stresses.
(D) All of these.

(SECTION-B)

136. Which of the following is an incorrect statement?
(A) In Flavr Savr tomato, the gene polygalacturonase has been blocked. for enzyme
(B) Bt tomato is a transgenic food crop that may help in solving the problem of night blindness in developing countries.
(C) Transgenic plants have genes of other organisms.
(D) The proteins coded by the genes cryIAc and cryIIAb control cotton bollworms.

137. Which of the following is true with respect to Bt toxin?
(A) Bt protein exists as active toxin in Bacillus.
(B) The inactive protoxin gets activated into active toxin in the insect gut.
(C) Bt toxin prevents DNA replication in infected pests.
(D) It uses RNAi to check the growth of pests.

138. The father of Green Revolution is
(A) Verghese Kurien. (B) Ernst Haeckel.
(C) Norman E. Borlaug. (D) Ingo Potrykus.

139. The main objective of the use of herbicide-resistant GM crop is to
(A) Encourage eco-friendly herbicides.
(B) Reduce herbicide accumulation in food articles for health safety.
(C) Eliminate weeds from the field without the use of manual labour.
(D) Eliminate weeds from the field without use of herbicides.

140. Which of the following is an example of gene therapy?
(A) In vitro fertilisation and embryo transfer
(B) Production of hepatitis B vaccine in yeast
(C) Transgenic rice having high vitamin A content
(D) Introduction of gene for adenosine deaminase in persons suffering with severe combined immunodeficiency (SCID)

141. During the processing of the prohormone proinsulin into the mature insulin,
(A) B-peptide is removed from proinsulin.
(B) C-peptide is added to proinsulin.
(C) C-peptide is removed from proinsulin.
(D) A-peptide is removed.

142. Insulin consists of two short polypeptide chains: chain A and chain B, which are linked together by
(A) Hydrogen bonds.
(B) Disulphide bridges.
(C) Glycosidic bonds.
(D) Both (A) and (C).

143. Which of the following is an incorrect statement?
(A) Fifty-one amino acids are present in completely mature insulin.
(B) Insulin used for diabetes was earlier extracted from the pancreas of slaughtered cattle and pigs.
(C) In humans, insulin is synthesised as a prohormone.
(D) The mature insulin has three peptides, chains A, B, and C.

144. Which of the following recombinant protein is used for the treatment of heart attack?
(A) a-l antitrypsin (B) Streptokinase
(C) Interleukins zil (D) Interferons

145. Which of the following is an incorrect statement?
(A) Transgenic pigs are being developed for testing the safety of polio vaccine.
(B) Twenty-seven documented varieties of basmati rice are grown in India.
(C) The first cloned mammal was a sheep.
(D) The maximum number of existing transgenic animals are mice.

146. Which of the following is incorrect with respect to the first transgenic cow Rosie?
(A) It produced human-protein-enriched milk (2.4 gram per litre).
(B) The milk contained the human alpha-lactalbumin.
(C) It was developed in 1983.
(D) Its milk was more balanced product for human babies than natural cow milk.

147. Which of the following cannot be patented?
(A) Cell lines
(B) Strain of microorganism
(C) Wind energy
(D) Genetically modified organism

148. Upon exposure to UV radiation, DNA stained with ethidium bromide will show
(A) Bright red colour
(B) Bright blue colour
(C) Bright yellow colour
(D) Bright orange colour

149. Main steps in the formation of Recombinant DNA are given below. Arrange these steps in a correct sequence.

A. Insertion of recombinant DNA into the host cell

B. Cutting of DNA at specific location by restriction enzyme

C. Isolation of desired DNA fragment

D. Amplification of gene of interest using PCR

Choose the correct answer from the options given below :

(A) B, C, D, A (B) C, A, B, D
(C) C, B, D, A (D) B, D, A, C

150. Which of the following is not a cloning vector?

(A) BAC (B) YAC
(C) pBR322 (D) Probe

ZOOLOGY (SECTION-A)

151. India has 1000 varieties of mango with different size colour and taste due to

(A) Genetic diversity
(B) Species diversity
(C) Omega diversity
(D) Alpha diversity

152. What percentage of global biodiversity is shared by India?

(A) 8.1% (B) 2.4%
(C) 12% (D) 10%

153. Select the incorrect statement:

(A) More than 70% of all species are animals.
(B) Amphibian species are more diverse in Eastern Ghats than in Western Ghats.
(C) Lichens are less diverse than algae.
(D) Number of fungal species in the world is more than combined total of fishes, amphibians, reptiles and mammals.

154. How do ecologist estimate the total number of species present in the world?

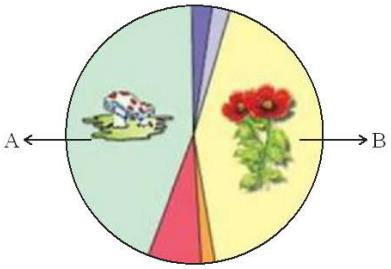
(A) By counting them all.
(B) By counting the number of any one species and applying this to various genus.
(C) By making statistical comparison of the temperate tropical species richness of an exhaustively studied group of insects and extrapolating this rate to other group of plants and animals.
(D) By calculating biomass of all the species.

155. Read the following statements and select the correct option.

A. Genetic diversity within a species often decreases with environmental variability.
B. Genetic diversity plays a key role in the process to speciation.

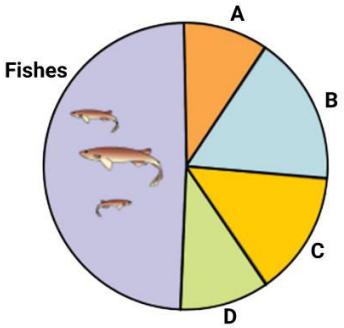
(A) Only (A) is correct
(B) Only (B) is correct
(C) Both (A) and (B) are correct
(D) Both (A) and (B) are incorrect

156. What do A and B represents, respectively, in the given pie chart of global plants biodiversity?



A	B
(A) Fungi	Angiosperms
(B) Fungi	Ferns
(C) Angiosperms	Gymnosperms
(D) Fungi	Algae

157. Identify A, B, C and D in the given pie chart.



	A	B	C	D
(A)	Birds	Mammals	Reptiles	Amphibians
(B)	Amphibians	Birds	Reptiles	Mammals
(C)	Mammals	Birds	Reptiles	Amphibians
(D)	Reptiles	Mammals	Amphibians	Birds

158. How many animal species are recorded in India?

(A) More than 45,000
(B) More than 90,000
(C) Less than 45,000
(D) Less than 90,000

159. Select the mismatched pair:

(A) A.V. Humboldt: Species-area relationship
(B) David Tilman: Outdoor plots
(C) Robert May: Global species diversity
(D) Paul Ehrlich: The term biodiversity

160. Read the following statements and select the correct option that mentions observations shown by David Tilman, who performed long term ecosystem experiment using outdoor plots.

(A) Plots with more species showed less year to year variation in total biomass.
(B) Plots with less species showed less year to year variation in total biomass.
(C) Increased diversity contributed to higher productivity.
(D) Plots with more species showed year to year variation in total rainfall.
(A) (A) and (C)
(B) (A) and (D)
(C) (B) and (D)
(D) (A), (C) and (D)

161. Find the incorrect match (w.r.t. threatened species in the world):
(A) Birds: 12%
(B) Amphibians: 42%
(C) Mammals: 23%
(D) Gymnosperms: 31%

162. Number of species of mammals and amphibians in Amazonian Rain Forest is____ and _____respectively.
(A) 427 and 370 (B) 705 and 427
(C) 105 and 378 (D) 427 and 427

163. All the given characteristics are related to susceptibility of extinction of species except
(A) Small population size
(B) Large body size
(C) Fixed habitat and migratory routes
(D) High reproductive rate

164. Which of the following is the example of recent extinctions from Australia?
(A) Dodo
(B) Quagga
(C) Thylacine
(D) Steller's sea cow

165. Which of the following group is facing the maximum treat of extinction?
(A) Birds (B) Mammals
(C) Amphibians (D) Gymnosperms

166. How many species become extinct in last 20 year?
(A) 784 (B) 27 (C) 80 (D) 87

167. Go through the following matches:
A: Agenda-21-Earth summit
B: IUCN World Conservation Union
C: Sixth extinction-Mass extinction
D: Evil quartet Four major harms of biodiversity loss How many of them are correctly matched?
(A) Four (B) Three
(C) Two (D) Five

168. Find the wrongly matched pair:
(A) Lungs of the planet: Amazon rain forest
(B) Endemism: Species confined to one region and also found in other regions
(C) Hotspot: Regions with species richness
(D) Alien species: Clarias gariepinus

169. Lion and rhinoceros are more susceptible to extinction due to which one of the following population characteristics?
(A) Large body size
(B) High trophic level in food chain
(C) Fixed habitat
(D) Small population size

170. Wildlife (Protection) Act was amended in
(A) 1972 (B) 1991
(C) 1980 (D) 1927

171. Select the incorrect match w.r.t. protected animal and their National Park/Ssanctuary.
A. One-horned rhinoceros Khanchendzonga National Park
B. Elephant-Periyar Sanctuary
C. Snow leopard-Ranthambore National Park
E. Tiger: Kanha National Park
(A) (A). (D) and (E) (C) (D) only
(B) (A) and (C) (D) (B) and (E)

172. Which of the following is not a Wildlife Conservation Project?
(A) Project Dodo
(B) Project Indian bustard
(C) Project tiger
(D) Project Hangul

173. The first white tiger in the world was found in
(A) Gir of Saurashtra
(B) Rewa in Madhya Pradesh
(C) Sunderbans in Bengal
(D) Corbett National Park in Uttaranchal

174. All are examples of broadly utilitarian, except
(A) Pollination (B) Oxygen
(C) Aesthetic pleasure (D) Firewood

175. Keystone species deserve protection because these
(A) Are capable of surviving in harsh environmental conditions
(B) Indicate presence of certain minerals in the soil
(C) Have become rare due to overexploitation
(D) Play an important role in supporting other species

176. Protected areas are examples of
(A) In situ conservation
(B) Ex situ conservation
(C) Cryopreservation
(D) Greenhouses

177. The term 'Biodiversity' was popularized by
(A) Robert May
(B) A. Von Humboldt
(C) Edward Wilson
(D) Paul Ehrlich

178. More than _____ % of all species recorded are animals.
(A) 60 (B) 70 (C) 90 (D) 10

179. Arrange the following in their decreasing order of species.
Fishes, Birds, Reptiles, Amphibian
(A) Fishes > Birds > Reptiles > Amphibian
(B) Fishes > Reptiles > Birds > Amphibian
(C) Reptiles > Fishes > Birds > Amphibian
(D) Amphibian > Fishes > Birds > Reptiles

180. Find the false statement.
(A) The number of fungi species is more than the combined total of the species of fishes, amphibians, reptiles and mammals.
(B) Conventional taxonomic methods are not suitable for identifying microbial species.
(C) For many taxonomic groups, species inventories are more complete in temperate than in tropical countries.
(D) Insects forms 70 per cent part of all the species recorded.

181. Which group is most vulnerable to extinction?
(A) Fishes (B) Amphibians
(C) Reptiles (D) Birds

182. Loss of biodiversity in a region may lead to
(A) Decline in plants production.
(B) Lowered resistance to environmental perturbations such as draught.
(C) Increased variability in certain ecosystem processes such as plant productivity, water use, and pest and disease cycle.
(D) All the above

183. The most dramatic examples of habitat loss comes from the
(A) Tropical rain forests
(B) Temperate forests
(C) Grasslands
(D) Deserts

184. 'We save the entire forest to save the tiger'. This approach of conservation is
(A) *In situ* (B) *Ex situ*
(C) *In vitro* (D) *In vivo*

185. Which of the following are benefits of Sacred Grooves?
(a) Repository for various Ayurvedic medicines
(b) Biodiversity Hotspots
(c) Recharging aquifers
(A) 1, 2 (B) 2, 3
(C) 1, 3 (D) All of the above

(SECTION-B)

186. How do ecologists estimate the total number of species present in the world?
(A) By counting them all.
(B) By counting the number of any one species and applying this to various genus.
(C) By making statistical comparison of the temperate–tropical species richness of an exhaustively studied group of insects and extrapolating this ratio to other group of animals and plants.
(D) By calculating biomass of all the species.

187. Presently which of the following face maximum threat of extinction?
(A) Birds (B) Amphibians
(C) Mammals (D) Gymnosperm

188. Loss of biodiversity in a region leads to increase in variability in certain ecosystem processes like
(A) Plant productivity (B) Water use
(C) Pest and disease cycle (D) All of these

189. Find the incorrect match.
(A) Pollinator
– Bees, Bumblebees, Bats and Birds
(B) Legally protected biodiversity rich region
– Biosphere reserve, National park, wildlife sanctuaries, sacred groves
(C) Lung of planet
– Amazonian rain forest
(D) Rivet popper hypothesis
– Harvard ecologist Paul Ehrlich

190. **Assertion :** Tropics have greater biological diversity.
Reason : Tropics have long evolutionary time for species diversification is one of the reasons.
(A) If both the assertion and the reason are true and the reason is a correct explanation of the assertion.
(B) If both the assertion and reason are true but the reason is not a correct explanation of the assertion .
(C) If the assertion is true but the reason is false.
(D) If both the assertion and reason are false.

191. **Assertion :** India is one of the 12 mega biodiversity economies of the world.
Reason : India has only 2.4% of the world's land area. It shares 8.1% if the global species diversity.
(A) If both the assertion and the reason are true and the reason is a correct explanation of the assertion.
(B) If both the assertion and reason are true but the reason is not a correct explanation of the assertion .
(C) If the assertion is true but the reason is false.
(D) If both the assertion and reason are false.

192. What is Mangar Bani?
(A) Sacred Groove (B) A plant
(C) A tribe (D) A folk art

193. Which one of the following is an example of ex-situ conservation?
(A) Wildlife sanctuary (B) Seed bank
(C) Sacred groves (D) National park

194. Which one of the following areas in India is a hotspot of biodiversity?
(A) Eastern Ghats (B) Gangetic Plain
(C) Sunderbans (D) Western Ghats

195. The organization which publishes the Red list of species is
(A) ICFRE (B) IUCN
(C) UNEP (D) WWF

196. Sacred Groves are:
(A) Places for grazing animals.
(B) Parts of large forests that have been left untouched by the local people.
(C) forests earmarked of commercial felling of trees.
(D) forests used ofr planting trees with medicinal properties.

197. Which of the following characteristics is mainly responsible for the diversification of insects of land?
(A) Segmentation
(B) Bilateral symmetry
(C) Exoskeleton
(D) Eyes

198. Which of the following is the most important cause of animals and plants being driven to extinction?
(A) Over-exploitation
(B) Alien species invasion
(C) Habitat loss and fragmentation
(D) Co-extinctions

199. The extinction of passenger pigeon was due to
(A) Increased number of predatory birds
(B) Over exploitation by humans
(C) Non-availability of the food
(D) Bird flu virus infection

200. Which of the following forests is known as the 'lungs of the planet Earth'?
(A) Tiaga forest
(B) Tundra forest
(C) Amazon rain forest
(D) Rain forests of Northeast India