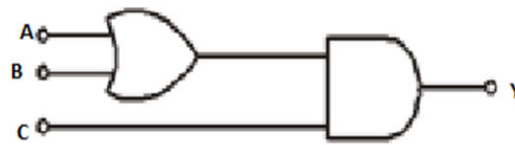


PHYSICS

1. An athlete completes one round of a circular track of radius R in 40 s. What will be his displacement at the end of 2 min 20 seconds?
(A) $7 R$
(B) $2 R$
(C) $2 \pi R$
(D) $7 \pi R$
2. The phase difference between the displacement and velocity of a particle executing SHM is
(A) $\pi/2$
(B) π
(C) $\pi/4$
(D) 0
3. The work done per unit volume in stretching a wire is
(A) $\frac{\text{force} \times \text{extension}}{2}$
(B) $\frac{\text{stress} \times \text{strain}}{2}$
(C) $\text{force} \times \text{extension}$
(D) $\text{stress} \times \text{strain}$
4. A capacitor connected to a cell of emf E is fully charged. If V is the potential difference across the capacitor, then which one of the following is correct?
(A) $V > E$
(B) $V = E = 0$
(C) $V = E$
(D) $V < E$
5. In a common emitter amplifier circuit using an $n-p-n$ transistor, the phase difference between the input and the output voltage will be
(A) 135°
(B) 180°
(C) 45°
(D) 90°

6. If λ is the decay constant, $T_{1/2}$ is the half life and T is the mean life of a radioactive element, then which of the following is true
- (A) $T_{1/2} = \frac{1}{\lambda}$, $T = \frac{\ln 2}{\lambda}$
- (B) $T_{1/2} = \frac{\ln 2}{\lambda}$, $T = \frac{1}{\lambda}$
- (C) $T_{1/2} = \lambda \ln 2$, $T = \frac{1}{\lambda}$
- (D) $T_{1/2} = \frac{\lambda}{\ln 2}$, $T = \frac{\ln 2}{\lambda}$
7. Ozone layer in the atmosphere absorbs
- (A) radio waves
- (B) infrared
- (C) ultra violet rays
- (D) X-rays
8. In a Rutherford experiment, for head-on collision of α - particles with a gold nucleus, the impact parameter is
- (A) of the order of 10^{-14} m
- (B) of the order of 10^{-10} m
- (C) of the order of 10^{-6} m
- (D) zero
9. The speed of electromagnetic waves in free space is $3 \times 10^8 \text{ ms}^{-1}$. The frequency of a radio wave of wavelength 150 m is
- (A) 45 MHz
- (B) 2 MHz
- (C) 20 kHz
- (D) 2 kHz
10. In a series resonant circuit, the AC voltages across R, L and C are respectively 5 V, 10 V and 10 V. The AC voltage applied to the circuit is
- (A) 25 V
- (B) 15 V
- (C) 5 V
- (D) 20 V

11. To get output 1 for the following circuit, the correct choice for the input is



- (A) $A = 0, B = 1, C = 0$
(B) $A = 1, B = 0, C = 0$
(C) $A = 1, B = 1, C = 0$
(D) $A = 1, B = 0, C = 1$
12. For a transistor amplifier, the voltage gain
- (A) is high at high and low frequencies and constant at middle frequency range
(B) constant at high frequencies and low at low frequencies
(C) remains constant at all frequencies
(D) is low at high and low frequencies and constant at mid frequencies
13. Frequency of revolution of an electron revolving in the n^{th} orbit of H- atom is proportional to
- (A) n
(B) $\frac{1}{n^3}$
(C) $\frac{1}{n^2}$
(D) n^2
14. In which of the following devices, the eddy current effect is not used?
- (A) Induction furnace
(B) Magnetic braking in train
(C) Electromagnet
(D) Electric heater
15. The center of mass of a system of particles does not depend on
- (A) mass of the particles
(B) position of the particles
(C) forces on the particles
(D) relative distance between particles

16. Vectors A and B have same magnitude. In addition, the magnitude of their resultant is also equal to the magnitude of either of them. Then A and B are at an angle
- (A) 120°
 - (B) 60°
 - (C) 90°
 - (D) 45°
17. In a sample of radioactive material, what percentage of initial number of active nuclei will decay during one mean life?
- (A) 37%
 - (B) 63%
 - (C) 50%
 - (D) 69.3%
18. In a compound microscope, maximum magnification is obtained when the image
- (A) is formed at infinity
 - (B) is formed at the least distance of distinct vision
 - (C) coincides with objective lens
 - (D) is at any finite distance
19. If P , Q and R are physical quantities having different dimensions, which one of the following combinations can never be a meaningful quantity?
- (A) $PQ - R$
 - (B) $\frac{PR - Q^2}{R}$
 - (C) $\frac{P - Q}{R}$
 - (D) $\frac{PQ}{R}$
20. Light of a certain frequency and intensity is incident on a photosensitive material causing photoelectric effect. If both the frequency and intensity are doubled, the photoelectric saturation current becomes
- (A) unchanged
 - (B) doubled
 - (C) halved
 - (D) quadrupled

21. The phenomenon involved in the reflection of radio waves by ionosphere is similar to
- (A) scattering of light by air particles
 - (B) total internal reflection of light in air during a mirage
 - (C) reflection of light by plane mirror
 - (D) dispersion of light by water molecules during the formation of a rainbow
22. Gyromagnetic ratio of a nucleus is
- (A) a vector
 - (B) a scalar
 - (C) a tensor
 - (D) zero
23. The following four wires of length L and radius r are made of the same material. Which of these wires will have the largest extension, when the same tension is applied?
- (A) $L = 50 \text{ cm}$, $r = 0.25 \text{ mm}$
 - (B) $L = 100 \text{ cm}$, $r = 0.5 \text{ mm}$
 - (C) $L = 200 \text{ cm}$, $r = 1 \text{ mm}$
 - (D) $L = 300 \text{ cm}$, $r = 1.5 \text{ mm}$
24. Kepler's second law regarding constancy of aerial velocity of a planet is a consequence of conservation of
- (A) energy
 - (B) mass
 - (C) linear momentum
 - (D) angular momentum
25. A hollow metal sphere carrying electric charge produces no electric field at the points
- (A) outside the sphere
 - (B) inside the sphere
 - (C) on its surface
 - (D) at a distance more than its radius
26. When the force between two charges in vacuum is 0.6 N , then what will be the force if vacuum is replaced by a medium whose permittivity is five times greater than that of in vacuum?
- (A) 0.30 N
 - (B) 0.12 N
 - (C) 8.33 N
 - (D) 4.165 N

27. In a thermocouple at one of the junction, the Peltier coefficient depends on
- (A) the temperature of the junction
 - (B) the current in the junction
 - (C) the time for which the current flows
 - (D) the heat absorbed or evolved
28. An ideal voltmeter has
- (A) zero resistance
 - (B) finite resistance
 - (C) infinite resistance
 - (D) resistance depends on the load
29. The intensity of the X-rays emitted in an X-ray tube can be increased by
- (A) increasing the target potential
 - (B) increasing the filament current
 - (C) increasing the target resistance
 - (D) increasing the filament resistance
30. A photon having energy 15.2 eV will have the frequency
- (A) 3.67×10^{15} Hz
 - (B) 2.29×10^{15} Hz
 - (C) 3.67×10^{22} Hz
 - (D) 2.29×10^{22} Hz
31. The wave number of the sodium vapour lamp having spectral line of wavelength $5890 \text{ \AA}$ is,
- (A) $1.6978 \times 10^6 \text{ m}^{-1}$
 - (B) $1.6978 \times 10^8 \text{ m}^{-1}$
 - (C) $5.0933 \times 10^6 \text{ m}^{-1}$
 - (D) $5.0933 \times 10^8 \text{ m}^{-1}$
32. Which part of the electromagnetic wave is used for the communication purpose?
- (A) Radio waves only
 - (B) Microwaves only
 - (C) Infrared waves only
 - (D) Both radio waves and microwaves

33. If E_c and E_s are the amplitudes of the carrier and signal waves, then the magnitude of the upper side band and lower side band is
- (A) $m E_c / 2$
 - (B) $m E_s / 2$
 - (C) $m (E_c + E_s) / 2$
 - (D) $m (E_c - E_s) / 2$
34. A rectangular coil having 100 turns of size $5 \text{ cm} \times 2 \text{ cm}$ is placed perpendicularly in a magnetic field of induction 0.10 Wb/m^2 . When the magnetic field of induction is changed to 0.01 Wb/m^2 in 0.1 second, then the emf induced is
- (A) 0.09 V
 - (B) 0.06 V
 - (C) 0.03 V
 - (D) 0.003 V
35. The self-inductance of a long solenoid having N turns, length (l), area of cross section A in air medium is
- (A) $L = N \phi$
 - (B) $L = \mu_0 N^2 A / l$
 - (C) $L = \mu_0 \phi N A / l$
 - (D) $L = N \phi / l$
36. Herapathite (iodoquinine sulphate) is a
- (A) polarizer
 - (B) uniaxial crystal
 - (C) biaxial crystal
 - (D) reflector
37. Tyndall effect is due to the _____ of light.
- (A) reflection
 - (B) refraction
 - (C) polarization
 - (D) scattering

38. From the Laue pattern, one can get information about the material
- (A) crystal system
 - (B) Bravais lattice
 - (C) lattice constants
 - (D) crystal symmetry
39. A nuclear reactor is producing energy of 1000 MW. When the energy per fission is 200 MeV, then the number of fission per second is
- (A) 3.125×10^{19}
 - (B) 5.000×10^{19}
 - (C) 6.250×10^{19}
 - (D) 9.375×10^{19}
40. The coolant materials used in the nuclear reactors have the characteristic of _____ specific heat capacity and _____ boiling point.
- (A) high, high
 - (B) high, low
 - (C) low, high
 - (D) low, low
41. One Curie is equal to _____ disintegrations per second.
- (A) 3.7×10^8
 - (B) 3.7×10^9
 - (C) 3.7×10^{10}
 - (D) 3.7×10^{12}
42. The average binding energy per nucleon in the mass number region 20 to 80 is
- (A) 8.7 MeV
 - (B) 5.8 MeV
 - (C) 6.9 MeV
 - (D) 7.8 MeV
43. Three resistances each of 1Ω are connected to form a triangle. The resistance between any two terminals is
- (A) 2Ω
 - (B) $2/3 \Omega$
 - (C) $3/2 \Omega$
 - (D) $1/3 \Omega$

44. When a piece of copper and another of germanium are cooled from room temperature to 89 K then the resistance of
- (A) copper decreases and germanium increases
 - (B) copper increases and germanium decreases
 - (C) each of them decreases
 - (D) each of them increases
45. A sonometer wire vibrates with a frequency f Hz. It is replaced by another wire of thrice the diameter. The frequency of vibration of the wire, when the tension and other parameters remain constant, is
- (A) $3f$ Hz
 - (B) $f/3$ Hz
 - (C) $f/9$ Hz
 - (D) $9f$ Hz
46. Sound waves are travelling in a medium whose adiabatic elasticity is E and isothermal elasticity is E' . Then the velocity of sound waves is proportional to
- (A) E'
 - (B) $\sqrt{E'}$
 - (C) E
 - (D) $\sqrt{E}$
47. A converging lens is used to form an image on a screen. When the upper half of the lens is covered by an opaque screen
- (A) half the image will disappear
 - (B) intensity of the image will increase
 - (C) complete image will be formed
 - (D) intensity of the image will remain same
48. The motion of the molecules of a monoatomic gas is
- (A) vibratory
 - (B) rotatory
 - (C) translatory
 - (D) constant

49. When a charged particle absorbs radiant energy ε in the time $2\pi/\omega$, then the linear momentum transferred to the particle in the same time is
- (A) ε/c
 - (B) c/ε
 - (C) $c + \varepsilon$
 - (D) $c - \varepsilon$
50. Which of the following is correct in terms of the relative strength of the four fundamental forces of nature in their decreasing order?
- (A) Gravitational, electromagnetic, electroweak and strong
 - (B) Strong, electroweak, electromagnetic and gravitational
 - (C) Strong, electroweak, gravitational and electromagnetic
 - (D) Strong, electromagnetic, electroweak and gravitational
51. The principle involved when we squeeze one end of a tube to get toothpaste out from the other end is
- (A) Archimedes principle
 - (B) Pascal's principle
 - (C) principle of reflection
 - (D) principle of superposition for forces
52. Of the following radiations, which one penetrates less through matter?
- (A) Gamma
 - (B) Beta
 - (C) Alpha
 - (D) X-rays
53. The electric field intensity at the surface of charged conductor is
- (A) perpendicular to the surface
 - (B) at 45° to the surface
 - (C) zero
 - (D) tangential to the surface
54. When milk is churned, cream gets separated due to
- (A) centripetal force
 - (B) centrifugal force
 - (C) frictional force
 - (D) gravitational force

55. Two bodies of masses m and $4m$ are moving with equal kinetic energies. The ratio of their linear momenta will be
- (A) 1:4
 - (B) 4:1
 - (C) 1:2
 - (D) 2:1
56. At which temperature, Centigrade and Fahrenheit scales are equal?
- (A) 40 degrees
 - (B) -40 degrees
 - (C) 37 degrees
 - (D) -80 degrees
57. During melting of ice, its entropy
- (A) increases
 - (B) decreases
 - (C) remains same
 - (D) cannot change
58. The average acceleration in one time period in simple harmonic motion is
- (A) $A\omega^2$
 - (B) $A\omega^2/2$
 - (C) $A\omega^2/\sqrt{2}$
 - (D) zero
59. Below the superconducting transition temperature, the material exhibits
- (A) ferromagnetism
 - (B) super fluidity
 - (C) super capacitance
 - (D) diamagnetism
60. A 100 millihenry coil carries a current of 1 A. Energy stored in its magnetic field is
- (A) 0.5 J
 - (B) 1 J
 - (C) 0.05 J
 - (D) 0.1 J

61. When a drop of oil spread on a water surface, it displays beautiful colours in daylight because of
- (A) dispersion of light
 - (B) reflection of light
 - (C) polarization of light
 - (D) interference of light
62. The resistance $R = V/I$ where $V = 100 \pm 5$ volts and $I = 10 \pm 0.2$ amperes. What is the total error in R ?
- (A) 5%
 - (B) 7%
 - (C) 5.2%
 - (D) 5/2%
63. A shell of mass 10 kg is moving with a velocity of 10 ms^{-1} . Then it blasts and forms two parts of mass 9 kg and 1 kg respectively. If the 1st mass is stationary, the velocity of the 2nd is
- (A) 1 m/s
 - (B) 10 m/s
 - (C) 100 m/s
 - (D) 1000 m/s
64. If the distance between two masses is doubled, the gravitational attraction between them
- (A) is doubled
 - (B) become four times
 - (C) is reduced to half
 - (D) is reduced to quarter
65. In a Carnot engine, when $T_2 = 0^\circ\text{C}$ and $T_1 = 200^\circ\text{C}$, its efficiency is η_1 , and when $T_1 = 0^\circ\text{C}$ and $T_2 = -200^\circ\text{C}$ its efficiency is η_2 . Then η_1/η_2 , is given by
- (A) 0.577
 - (B) 0.733
 - (C) 0.638
 - (D) 1.577

66. Eight drops of mercury of equal radii combine to form a big drop. Then the radius of bigger drop compared to each individual small drop is
- (A) 8 times
 - (B) 4 times
 - (C) 2 times
 - (D) 32 times
67. The self inductance of a coil is 5 Henry. A current of 1 Amp changes to 2 Amp within 5 second through the coil. The value of induced e.m.f. will be
- (A) 10 volt
 - (B) 0.10 volt
 - (C) 1.0 volt
 - (D) 100 volt
68. Relation between critical angles of water and glass is
- (A) $C_w > C_g$
 - (B) $C_w < C_g$
 - (C) $C_w = C_g$
 - (D) $C_w = C_g = 0$
69. If the potential difference applied across X-ray tube is V volts, then approximately minimum wavelength of the emitted X-rays will be
- (A) $1227/\sqrt{V} \text{ \AA}$
 - (B) $1240/V \text{ \AA}$
 - (C) $2400/V \text{ \AA}$
 - (D) $12400/V \text{ \AA}$
70. A satellite is launched into a circular orbit of radius R around the earth. A second satellite is launched into an orbit of radius (1.01)R. The period of the second satellite is larger than the first one by approximately
- (A) 0.7%
 - (B) 1%
 - (C) 1.5%
 - (D) 3%

71. The potential energy of a simple harmonic oscillator when the particle is half way to its end point is
- (A) $E/2$
 - (B) $2E/3$
 - (C) $E/8$
 - (D) $E/4$
72. At the top of the trajectory of a projectile, the acceleration is
- (A) maximum
 - (B) minimum
 - (C) zero
 - (D) g
73. A potential of $V = 200\sqrt{2} \cos \omega t$ is passed through a dc voltmeter. Its reading will be
- (A) $200\sqrt{2}$ V
 - (B) 200 V
 - (C) 100 V
 - (D) zero
74. Which of the following properties show light is a transverse wave?
- (A) Interference
 - (B) Reflection
 - (C) Diffraction
 - (D) Polarization
75. The energy released when $1/12$ carbon atom of $^{12}_6\text{C}$ (or 1 amu) is converted into energy is
- (A) 931 MeV
 - (B) 939 MeV
 - (C) 935 MeV
 - (D) 938 MeV

CHEMISTRY

76. The packing efficiency of simple cubic unit cell is
- (A) higher than that of ccp
 - (B) higher than that of bcc
 - (C) lower than that of both ccp and bcc
 - (D) equal to that of ccp and bcc

77. The density of a unit cell is
- (A) higher than that of its crystal
 - (B) lower than that of its crystal
 - (C) same as that of its crystal
 - (D) None of the above
78. The conductivity of 0.001028 M acetic acid is $4.95 \times 10^{-5} \text{ S cm}^{-1}$ and its limiting molar conductivity is $390.5 \text{ S cm}^2 \text{ mol}^{-1}$. Its degree of dissociation is equal to
- (A) 0.0012
 - (B) 0.1233
 - (C) 0.2233
 - (D) 0.0123
79. If a current of 500 ampere is passing for one second, it is equal to
- (A) 0.000518 F per sec
 - (B) 0.518 F per sec
 - (C) 0.0518 F per sec
 - (D) 0.00518 F per sec
80. Freundlich adsorption isotherm of a gas on a solid surface is
- (A) applicable only at high pressures
 - (B) applicable only at low pressures
 - (C) applicable only at moderate pressures
 - (D) applicable at low and moderate pressures
81. Zeolites are
- (A) microporous crystalline alumino silicates
 - (B) non-porous crystalline alumino silicates
 - (C) amorphous alumino silicates
 - (D) microporous crystalline magnesium silicates
82. An azeotropic mixture at its boiling point
- (A) can be separated into its components
 - (B) has different composition for the liquid and vapour
 - (C) cannot be separated into its components
 - (D) has different components for the liquid and vapour

83. The wrong statement of chemisorption is
- (A) it is highly specific
 - (B) it is very exothermic
 - (C) it is reversible
 - (D) it involves formation of a strong bond
84. The unit cell edge of an element with the bcc structure is 288×10^{-10} cm. Its density is 7.2 g/cm^3 . The number of unit cells in 208 g of the element is equal to
- (A) 10.01×10^{23}
 - (B) 12.08×10^{23}
 - (C) 14.04×10^{23}
 - (D) 16.03×10^{23}
85. The semiconductors are
- (A) alkalimetal oxides
 - (B) alkaline earth metal oxides
 - (C) most of the transition metal oxides
 - (D) oxides of group IV elements
86. According to Le Chatelier's principle, high temperature favours the formation of more products at equilibrium, if the forward reaction
- (A) Accompanied by decrease in number of gas molecules
 - (B) Accompanied by increase in number of gas molecules
 - (C) Is endothermic
 - (D) Is exothermic
87. The coordination of each particle in simple cubic, body centred cubic, face centred and hexagonal cubic packing are
- (A) 6, 8, 12, 12
 - (B) 6, 8, 12, 14
 - (C) 4, 8, 12, 12
 - (D) 6, 6, 6, 6
88. Vapour pressure of water at 296 K is 19.8 mm of Hg. 0.1 mole of glucose is dissolved in 172.8 g of water. The vapour of the solution is
- (A) 19.6 mm
 - (B) 16.9 mm
 - (C) 19.0 mm
 - (D) 18.9 mm

89. The boiling point of an azeotropic mixture in water-ethanol is less than that of both water and ethanol. This means that the mixture
- (A) Shows negative deviation from Raoult's law
 - (B) Shows positive deviation from Raoult's law
 - (C) Shows no deviation from Raoult's law
 - (D) Is an ideal solution
90. A calculator battery provides a current of 10^{-5} A. The number of coulombs required to operate 1000 hours is
- (A) 1.0
 - (B) 10
 - (C) 0.010
 - (D) 36
91. The potential of half-cell consisting of zinc electrode in 0.01 M ZnSO_4 solution at 25°C is ($E^\circ = -0.763$ V)
- (A) -0.704 V
 - (B) -0.822 V
 - (C) -0.382 V
 - (D) $+0.704$ V
92. The rate constant for a first order reaction is 60 s^{-1} . The time taken to reduce the initial concentration of the reactant to its $1/16^{\text{th}}$ value will be
- (A) 0.00462 s
 - (B) 0.462 s
 - (C) 0.0462 s
 - (D) 4.63 s
93. Standard free energies of formation (in kJ mol^{-1}) at 298 K are -237.2 , -394.4 and -8.2 for $\text{H}_2\text{O}(\text{l})$, $\text{CO}_2(\text{g})$, and pentane(g), respectively. The value of E°_{cell} for the pentane-oxygen fuel cell is
- (A) 1.968 V
 - (B) 2.0968 V
 - (C) 0.0968 V
 - (D) 1.0968 V

94. In what way the ionization energy varies in the 1st group elements?
- (A) Increases down the group
 - (B) Decreases down the group
 - (C) Remains unchanged
 - (D) Variation is not regular
95. The set containing only amphoteric oxides is
- (A) ZnO, K₂O and SO₃
 - (B) SnO₂, Al₂O₃ and ZnO
 - (C) ZnO, P₂O₅ and Cl₂O₇
 - (D) PbO₂, SnO₂ and SO₃
96. Which of the following has more than one unshared pair of electrons on the central atom?
- (A) BrF₅
 - (B) ClF₃
 - (C) NF₃
 - (D) IF₇
97. In metallurgical processes, aluminium acts as
- (A) a reducing agent
 - (B) an oxidizing agent
 - (C) a flux
 - (D) a solder
98. Which of the following imparts violet colouration to the Bunsen burner non-luminous flame?
- (A) NaCl
 - (B) BaCl₂
 - (C) CaCl₂
 - (D) KCl
99. The complex, which exhibit optical isomerism, is
- (A) trans-[Co(en)₂Cl₂]Cl
 - (B) [PtCl₂(NH₃)₂]
 - (C) [Co(en)₃]Cl₃
 - (D) [Fe(η⁵-C₅H₅)₂]

100. Which of the following is π -acid ligand?
- (A) NH_3
 - (B) CO
 - (C) F^-
 - (D) ethylenediammine
101. The magnetic moment of the complex ion, $[\text{MnF}_6]^{3-}$, is
- (A) 1.73 BM
 - (B) 3.90 BM
 - (C) 4.90 BM
 - (D) 2.73 BM
102. Which of the following nuclides is most radioactive?
- (A) $^{31}\text{P}_{15}$
 - (B) $^{66}\text{Zn}_{30}$
 - (C) $^{37}\text{Cl}_{17}$
 - (D) $^{108}\text{Ag}_{47}$
103. Which of the following is not a green house gas?
- (A) CO
 - (B) CO_2
 - (C) Water vapour
 - (D) CH_4
104. What type of orbital is designated for the set of quantum numbers: $n = 4$, $l = 2$, $m_l = -2$?
- (A) 4 p
 - (B) 4 f
 - (C) 4 d
 - (D) 4 s
105. Which of the following sets of quantum numbers is not allowed?
- (A) $n = 3$, $l = 2$, $m_l = -1$
 - (B) $n = 6$, $l = 2$, $m_l = -1$
 - (C) $n = 4$, $l = 3$, $m_l = -1$
 - (D) $n = 3$, $l = 0$, $m_l = +1$

106. Ionic size decreases in the order

- (A) $\text{N}^{3-} > \text{O}^{2-} > \text{F}^- > \text{Na}^+ > \text{Mg}^{2+}$
- (B) $\text{N}^{3-} > \text{O}^{2-} > \text{F}^- > \text{Mg}^{2+} > \text{Na}^+$
- (C) $\text{N}^{3-} > \text{F}^- > \text{O}^{2-} > \text{Na}^+ > \text{Mg}^{2+}$
- (D) $\text{O}^{2-} > \text{N}^{3-} > \text{F}^- > \text{Na}^+ > \text{Mg}^{2+}$

107. The $t_{1/2}$ of a radioisotope is 15 min. What percent of radioactivity of that isotope will remain after 45 min?

- (A) 10%
- (B) 12.5%
- (C) 15%
- (D) 17.5%

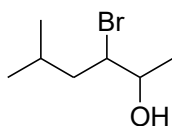
108. Water gas is a mixture of

- (A) $\text{H}_2\text{O} + \text{air}$
- (B) $\text{CO} + \text{H}_2$
- (C) $\text{CO} + \text{CO}_2$
- (D) $\text{H}_2 + \text{CO}_2$

109. Which category of synthetic detergents is used in toothpaste?

- (A) Zwitterionic detergent
- (B) Anionic detergent
- (C) Cationic detergent
- (D) Non-ionic detergent

110. The IUPAC name of the following compound is

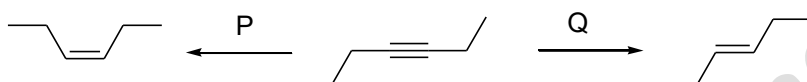


- (A) 4-bromo-5-hydroxy-2-methylhexane
- (B) 1,4,4-trimethyl-2-bromobutanol
- (C) 2-bromo-2-isobutyl-1-methylethanol
- (D) 3-bromo-5-methylhexan-2-ol

111. On complete combustion, 0.25 g of an organic compound gave 0.30 g of carbon dioxide and 0.10 g of water. The percentage compositions of carbon and hydrogen in the compound are

(A) C = 32.73 and H = 4.44
 (B) C = 30.73 and H = 5.33
 (C) C = 34.36 and H = 5.33
 (D) C = 36.36 and H = 4.44

112. The reagents P and Q in the following transformations are



(A) P = H_2 , Pd- CaCO_3 , Pb(OAc) $_2$, quinoline & Q = Li, $\text{NH}_3(\ell)$
 (B) P = H_2 , Ni & Q = Na, $\text{NH}_3(\ell)$
 (C) P = H_2 , Pd- CaCO_3 , Pb(OAc) $_2$, quinoline & Q = H_2 , Ni
 (D) P = NaBH_4 & Q = H_2 , Pd- CaCO_3 , Pb(OAc) $_2$, quinoline

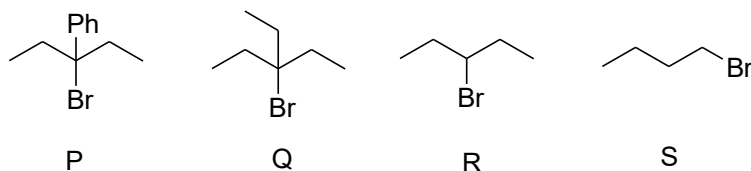
113. Which of the following alkenes forms acetone as the only product upon ozonolysis?

(A) 2-Methylpropene
 (B) But-2-ene
 (C) 2,3-Dimethylbut-2-ene
 (D) 2-Methylbut-1-ene

114. When the nucleophile is changed from H_2O to ^-OH (^-OH is more powerful nucleophile than H_2O) in the nucleophilic substitution reaction of *tert*-butylbromide, to give *tert*-butanol

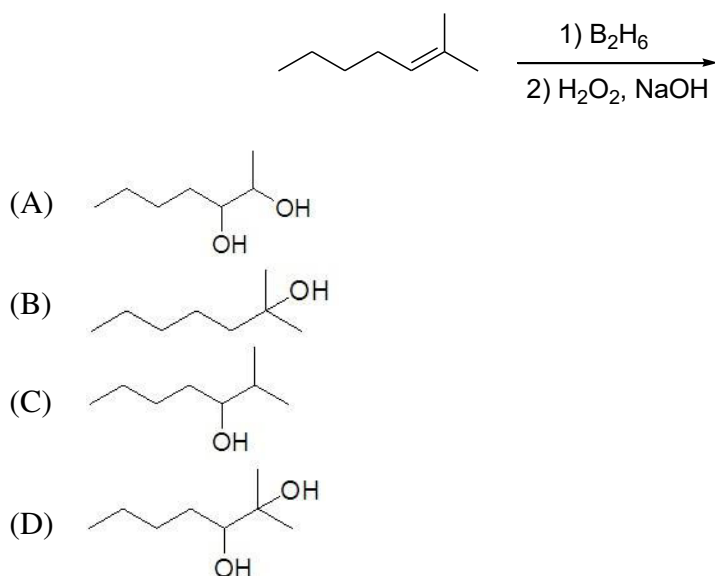
(A) the rate of the reaction remains nearly unaffected
 (B) the rate of the reaction increases substantially
 (C) the rate of the reaction decreases
 (D) mechanism of substitution changes from $\text{S}_{\text{N}}1$ to $\text{S}_{\text{N}}2$

115. Which among the following compounds undergoes fastest $\text{S}_{\text{N}}1$ reaction?

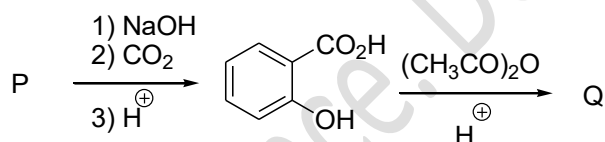


(A) P
 (B) Q
 (C) R
 (D) S

116. Major product of the following reaction is



117. The starting material P and product Q in the following reaction are:

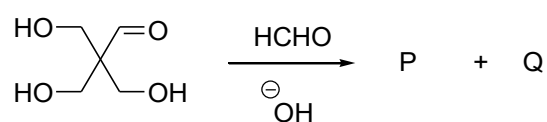


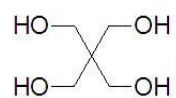
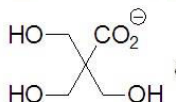
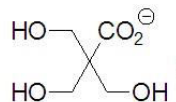
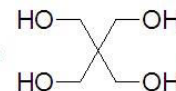
- (A) P = phenol and Q = aspirin
 (B) P = benzoic acid and Q = aspirin
 (C) P = phenol and Q = methyl salicylate
 (D) P = benzoic acid and Q = methyl salicylate

118. An organic compound P with molecular formula C_8H_8O forms an orange-red precipitate with 2,4-dinitrophenylhydrazine and yellow precipitate on heating with iodine in the presence of NaOH. It does not reduce Tollens' or Fehling's reagent and it does not decolorize bromine water. When treated with zinc-amalgam and con. HCl, it gives a compound Q with molecular formula C_8H_{10} . The compounds P and Q are

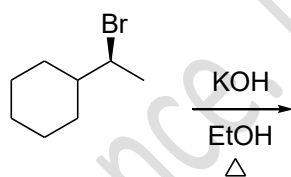
- (A) P = acetophenone and Q = 1,2-dimethylbenzene (*o*-xylene)
 (B) P = 2-phenylacetaldehyde and Q = ethylbenzene
 (C) P = 4-methylbenzaldehyde and Q = 1,4-dimethylbenzene (*p*-xylene)
 (D) P = acetophenone and Q = ethylbenzene

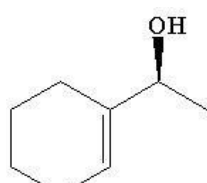
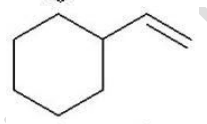
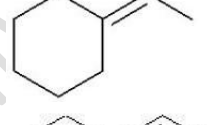
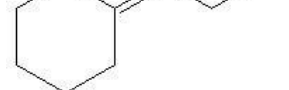
119. The products P and Q in the following reaction are



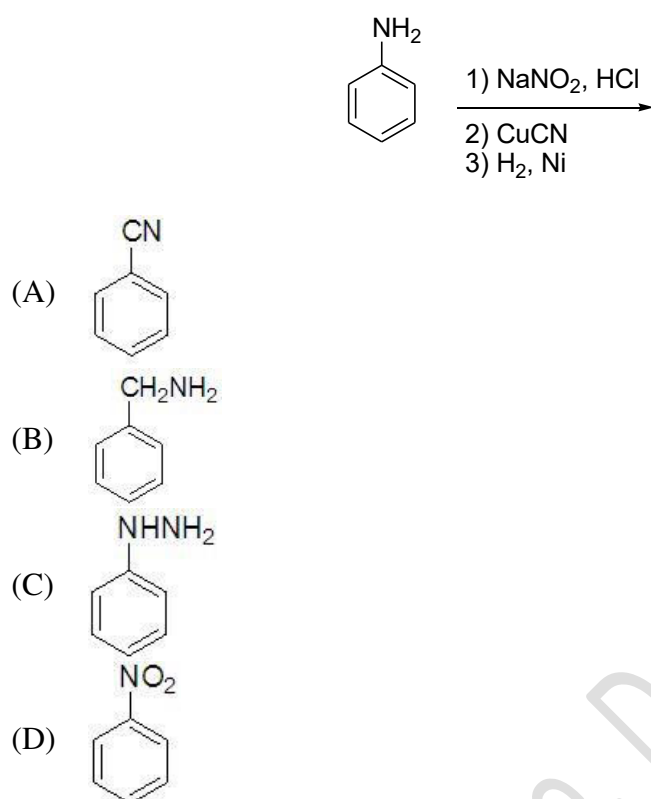
- (A) P =  & Q = HCO_2^-
- (B) P =  & Q = CH_3OH
- (C) P =  & Q = HCO_2^-
- (D) P =  & Q = CH_3OH

120. Major product formed in the following reaction is

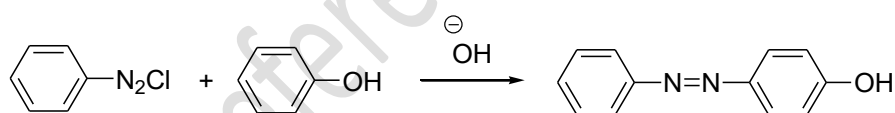


- (A) 
- (B) 
- (C) 
- (D) 

121. Major product formed in the following reaction sequence is



122. Consider the following reaction.



Here, benzene diazonium chloride acts as

- (A) nucleophile
- (B) electrophile
- (C) Lewis base
- (D) Bronsted base

123. The maximum number of dipeptides that could be made from the three different amino acids is

- (A) 4
- (B) 6
- (C) 9
- (D) 8

124. Which one of the following is an example for biodegradable polymers?

- (A) Nylon 6
- (B) Nylon 6,6
- (C) Glyptal
- (D) Nylon 2-nylon 6

125. Which among the following is not a detergent?

- (A) Sodium laurylsulphate
- (B) Sodium dodecylbenzenesulphonate
- (C) cetyltrimethylammonium bromide
- (D) calcium stearate

BIOLOGY

126. Choose the INCORRECT statement pertaining to universal rules of nomenclature

- (A) Biological names are Latinised or derived from Latin irrespective of their origin
- (B) Biological names are printed in italics to indicate their Latin origin
- (C) Both the words in a biological name, when hand written are not underlined separately
- (D) The first word of binomial name denoting genus and the second word denoting species

127. Which of the following is diploid (2n)?

- (A) Male gametophyte
- (B) Endosperm
- (C) Megaspore
- (D) Microspore mother cell

128. Match the following (column I with column II).

Column I		Column II	
(I)	Chlorophyceae	(a)	<i>Polytrichum</i>
(II)	Rhodophyceae	(b)	<i>Dictyota</i>
(III)	Phaeophyceae	(c)	<i>Porphyra</i>
(IV)	Mosses	(d)	<i>Ulothrix</i>

Choose the answer

- (A) (I) - (a), (II) - (b), (III) - (c), (IV) - (d)
- (B) (I) - (c), (II) - (a), (III) - (d), (IV) - (b)
- (C) (I) - (d), (II) - (c), (III) - (b), (IV) - (a)
- (D) (I) - (b), (II) - (d), (III) - (a), (IV) - (c)

129. Select the plant with half inferior ovary
- (A) Brinjal
 - (B) Peach
 - (C) Cucumber
 - (D) Guava
130. The companion cells are specialized parenchymatous cells, which are closely associated with
- (A) Phloem parenchyma
 - (B) Bastfibres
 - (C) Sieve tube elements
 - (D) Tracheids
131. The body of Cockroach is segmented and divisible into distinct regions.
- (A) five
 - (B) three
 - (C) four
 - (D) ten
132. The fact that 'cells divided and new cells are formed from pre-existing cells' was explained by?
- (A) Schwann
 - (B) Rudolf Virchow
 - (C) Schleiden
 - (D) Leeuwenhoek
133. Cell membranes possess protein and lipids. Choose percentage of protein and lipid present in the membrane of human erythrocyte.
- (A) 56 and 42
 - (B) 54 and 40
 - (C) 52 and 42
 - (D) 52 and 40
134. The algal cell wall is made up of
- (A) cellulose, pectins and proteins
 - (B) cellulose, hemicelluloses and galactans
 - (C) hemicellulose and mannans
 - (D) cellulose, galactans and mannans

135. The immunoglobulin related to allergy in human being is
- (A) IgG
 - (B) IgA
 - (C) IgE
 - (D) IgD
136. Based on the nature of R group there are many amino acids. Which of the following amino acids possesses hydrogen as R group?
- (A) Valine
 - (B) Serine
 - (C) Glycine
 - (D) Alanine
137. The blood concentration of glucose in a normal healthy individual is
- (A) 4.0 mmol/L - 5.1 mmol/L
 - (B) 4.2 mmol/L - 6.1 mmol/L
 - (C) 4.1 mmol/L - 5.2 mmol/L
 - (D) 4.1 mmol/L - 7.1 mmol/L
138. The behaviour of the plant cells (or tissues) with regard to water movement depends on the surrounding solution. If the external solution is more dilute than the cytoplasm, it is
- (A) hypotonic
 - (B) isotonic
 - (C) hypertonic
 - (D) flaccid
139. The first stable product of CO₂ fixation in C₄ cycle is
- (A) phosphoglyceric acid
 - (B) malate
 - (C) oxaloacetic acid
 - (D) aspartate
140. Formation of meristems such as, interfascicular cambium and cork cambium from differentiated parenchyma cells is known as
- (A) differentiation
 - (B) dedifferentiation
 - (C) redifferentiation
 - (D) histogenesis

141. Succus entericus is the name given to
- (A) a junction between ileum and large intestine
 - (B) swelling in the gut
 - (C) appendix
 - (D) intestinal juice
142. The average volume of blood pumped out by each ventricle per minute is in a healthy individual.
- (A) 3500 mL
 - (B) 4500 mL
 - (C) 4000-4500 mL
 - (D) 5000 mL
143. Choose parthenogenetically reproducing organism from the list
- (A) Salmon
 - (B) House fly
 - (C) Honey bees
 - (D) Fruit fly
144. The zygote is formed
- (A) outside the ovule
 - (B) within the style
 - (C) inside the ovule
 - (D) inside the megaspore mother cell
145. Two genes 'A' and 'B' are linked. In a dihybrid cross involving these two genes, the F₁ heterozygote is crossed with homozygous recessive parental type (aa bb). What would be the ratio of offspring in the next generation?
- (A) 1:1:1:1
 - (B) 9:3:3:1
 - (C) 3:1
 - (D) 1:1
146. Occurrence of colour blindness in male and female is
- (A) 6 and 0.4%
 - (B) 4 and 0.4%
 - (C) 2 and 0.4%
 - (D) 8 and 0.4%

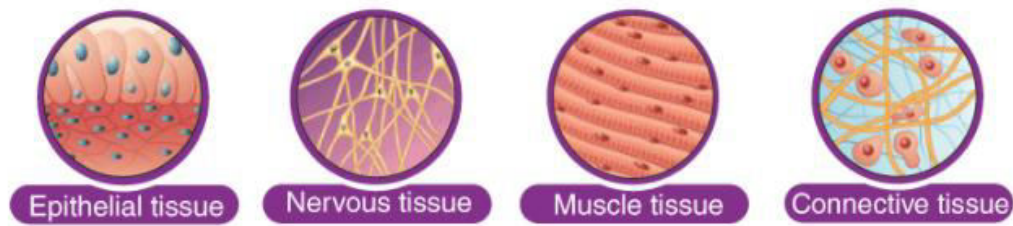
147. Environment (Protection) Act was passed by India in
- (A) 1972
 - (B) 1976
 - (C) 1986
 - (D) 1947
148. According to Robert May, the global species diversity is about
- (A) ten million
 - (B) twelve million
 - (C) nine million
 - (D) seven million
149. The individual transitional communities are termed as
- (A) pioneer community
 - (B) seral community
 - (C) climax community
 - (D) plant community
150. A few organisms can tolerate and thrive in a wide range of temperatures, they are
- (A) Mesotherms
 - (B) Stenothermal
 - (C) Eurythermal
 - (D) Microtherm
151. What is Emigration?
- (A) The number of deaths in the population during a given period
 - (B) The number of births during a given period in the population that are added to the initial density
 - (C) The number of individuals of the same species that have come into the habitat from elsewhere during the time period under consideration
 - (D) The number of individuals of the population who left the habitat and gone elsewhere during the time period under consideration
152. DNA fragments are
- (A) positively charged molecules
 - (B) negatively charged molecules
 - (C) neutral molecules
 - (D) amphoteric molecules

153. Choose the CORRECT sequence
- (A) Annealing-Denaturation-Extension-Amplified fragment
 - (B) Denaturation-Annealing-Extension-Amplified fragment
 - (C) Extension-Denaturation-Annealing-Amplified fragment
 - (D) Denaturation-Extension-Annealing- Amplified fragment
154. Which of the following is a free-living soil bacterium?
- (A) *Rhizobium*
 - (B) *Azospirillum*
 - (C) *Propionibacterium*
 - (D) *Anabaena*
155. Sonalika and Kalyansona are varieties of
- (A) rice
 - (B) sugarcane
 - (C) wheat
 - (D) millets
156. *Bt* toxin is an
- (A) insecticidal lipid
 - (B) insecticidal glycerol
 - (C) insecticidal fatty acid
 - (D) insecticidal protein
157. In urine formation, the effective glomerular pressure which results in ultra-filtration is at mm/Hg.
- (A) 20
 - (B) 15
 - (C) 10
 - (D) 12
158. The cell which does not contain mitochondria is
- (A) white blood cell
 - (B) red blood cell
 - (C) nerve cell
 - (D) sperm cell

159. The P wave of the standard ECG represents
- (A) atrial depolarization
 - (B) ventricular repolarization
 - (C) ventricular depolarization
 - (D) atrial repolarization
160. Trisomic condition of chromosome 13 results in
- (A) Klinefelters syndrome
 - (B) Patau's syndrome
 - (C) Down's syndrome
 - (D) Turner's syndrome
161. Assertion: The corpus luteum will continue to produce progesterone during early pregnancy
Reason: It supports the growth of the lining of the uterus
- (A) Both the assertion and the reason are true and the reason is a correct explanation of the assertion
 - (B) Both the assertion and reason are true but the reason is not a correct explanation of the assertion
 - (C) Assertion is true but reason is false
 - (D) Assertion is false but reason is true
162. Match the following.
- | Column I | Column II |
|-------------------|-------------------|
| (1) Hemerythrin | (i) Molluscs |
| (2) Haemoglobin | (ii) Brachiopods |
| (3) Chlorocruorin | (iii) Vertebrates |
| (4) Hemocyanin | (iv) Leech |
- (A) (1) - (i), (2) - (ii), (3) - (iv), (4) - (iii)
 - (B) (1) - (iii), (2) - (ii), (3) - (iv), (4) - (i)
 - (C) (1) - (iv), (2) - (i), (3) - (ii), (4) - (iii)
 - (D) (1) - (ii), (2) - (iii), (3) - (iv), (4) - (i)
163. The genetically modified variety of herbicide tolerant crop created by using barnase-barstar technology is
- (A) DMH-11
 - (B) Bt Brinjal
 - (C) Bt Cotton
 - (D) None of the above

164. The effect of rising CO_2 tension decreases the affinity of Hb for O_2 , therefore the increased concentration of CO_2 in blood results in breathing.
- (A) shallower and slow
 - (B) slow and deep
 - (C) faster and deeper
 - (D) no effect
165. The calcification of arteries resulting in stiff and rigid structure is termed as
- (A) Arteriosclerosis
 - (B) Arthritis
 - (C) Aneurysm
 - (D) None of the above
166. Choose the correct sequence of events in germinal stage.
- (A) Fertilization → Implantation → Blastulation → Cleavage → Embryonic disc
 - (B) Fertilization → Cleavage → Blastulation → Implantation → Embryonic disc
 - (C) Fertilization → Blastulation → Cleavage → Implantation → Embryonic disc
 - (D) Fertilization → Implantation → Blastulation → Embryonic disc → Cleavage
167. Whether the given statements are right or wrong.
- Statement A: IgM is the antibody that can pass through the placenta.
- Statement B: IgG is a passive immunity.
- (A) A and B is Correct
 - (B) A is wrong and B is correct
 - (C) A and B is wrong
 - (D) A is correct and B is wrong

168. Order the features and functions of the following tissues and choose the correct answer.



- (1) Composed of numerous fine fibrils, called myofibrils
- (2) Absence of blood vessels
- (3) Have greatest control over the body's responsiveness to changing conditions
- (4) Secrete collagen or elastin

- (A) (2), (3), (1), (4)
- (B) (1), (2), (3), (4)
- (C) (3), (4), (2), (1)
- (D) (4), (1), (3), (2)

169. Identify the correct statement about 'antibiotics'.

- (A) Antibiotics are produced by micro organisms
- (B) The term was given by Waksman in 1943
- (C) Antibiotics are capable of curing almost all the diseases
- (D) They are allergic to some people

170. Scheibe-Lomakin equation is

- (A) $I = k \times c^n$
- (B) $k = I \times c^n$
- (C) $c = I \times k^n$
- (D) $k = c \times I^n$

171. The animals were classified based on the presence and absence of red blood cells by

- (A) Carolus Linnaeus
- (B) Aristotle
- (C) Theophrastus
- (D) Ernst Haeckel

172. Telocentric chromosome is not present in
- (A) human
 - (B) mice
 - (C) Both (A) and (B)
 - (D) None of the above
173. The urge to inhale in humans results from
- (A) rising PCO_2
 - (B) rising PO_2
 - (C) falling PCO_2
 - (D) falling PO_2
174. Inulin is a polymer of
- (A) amino acids
 - (B) glucose
 - (C) fructose
 - (D) None of the above
175. Which of the following animals belongs to Phylum Coelenterata?
- (A) Sea horse
 - (B) Sea hare
 - (C) Sea pen
 - (D) Sea cucumber
176. Pseudocoelom is a characteristic feature of
- (A) Annelida
 - (B) Arthropoda
 - (C) Platyhelminthes
 - (D) Aschelminthes
177. Mycorrhiza is the example of
- (A) fungistasis
 - (B) amensalism
 - (C) antibiosis
 - (D) mutualism

178. The first human like hominid was called
- (A) *Homo habilis*
 - (B) *Homo erectus*
 - (C) *Homo sapiens*
 - (D) *Rama pithecus*
179. Silver revolution is related to egg production. Silver fiber revolution is related to
- (A) Jute
 - (B) Cotton
 - (C) Honey
 - (D) Cocoa
180. Good ozone is found in
- (A) Mesosphere
 - (B) Troposphere
 - (C) Stratosphere
 - (D) Ionosphere
181. Genetic material of virus is
- (A) DNA
 - (B) RNA
 - (C) DNA or RNA
 - (D) DNA and RNA
182. The first clinical gene therapy was given for treating
- (A) diabetes mellitus
 - (B) chickenpox
 - (C) rheumatoid arthritis
 - (D) adenosine deaminase deficiency
183. Conversion of milk to curd improves its nutritional value by increasing the amount of
- (A) vitamin E
 - (B) vitamin B₁₂
 - (C) vitamin A
 - (D) vitamin D

184. Which of the following is **NOT** an auto immune disease?
- (A) Vitiligo
 - (B) Alzheimer's disease
 - (C) Rheumatoid arthritis
 - (D) Psoriasis
185. The most significant trend in the evolution of *Homo sapiens* from his ancestors is
- (A) shortening of jaws
 - (B) binocular vision
 - (C) increasing brain capacity
 - (D) upright posture
186. Balbiani rings are sites of synthesis of
- (A) lipid
 - (B) nucleotide
 - (C) protein
 - (D) RNA
187. If a colour blind man marries a woman who is homozygous for normal colour vision, the probability of their son being colour blind is
- (A) 0
 - (B) 0.5
 - (C) 0.75
 - (D) 1
188. The tight binding of H1 with a nucleosome indicates that
- (A) transcription is occurring
 - (B) DNA replication is occurring
 - (C) the DNA is condensed into a chromatin fiber
 - (D) the DNA double helix is exposed
189. Presence of phycoerythrin is a characteristic feature of
- (A) Blue green algae
 - (B) Green algae
 - (C) Brown algae
 - (D) Red algae

190. Myelin sheath is produced by
- (A) Osteoclasts, Astrocytes
 - (B) Schwann cells, Oligodendrocytes
 - (C) Astrocytes, Schwann cells
 - (D) Oligodendrocytes, Osteoclasts
191. Alternate phyllotaxy can be seen in which of the following plants?
- (A) Sunflower, Mustard
 - (B) Guava, *Calotropis*
 - (C) *Calotropis*, Sunflower
 - (D) *Alstonia*, Mustard
192. A closed collateral bundle refers to
- (A) xylem and phloem occur on different radii
 - (B) xylem and phloem are separated by cambium
 - (C) collateral bundle without cambium
 - (D) collateral bundle with cambium
193. Identify the net products of glycolysis
- (A) 2 pyruvic acid, 2 ATP, 2 $\text{NADH} + \text{H}^+$
 - (B) 1 pyruvic acid, 2 ATP, 2 $\text{NADH} + \text{H}^+$
 - (C) 2 pyruvic acid, 2 ATP, 1 $\text{NADH} + \text{H}^+$
 - (D) 2 pyruvic acid, 1 ATP, 1 $\text{NADH} + \text{H}^+$
194. The organ of corti is a structure present in
- (A) external ear
 - (B) middle ear
 - (C) malleus
 - (D) cochlea

195. Match column I with column II regarding post fertilization changes; and choose the correct answer.

<u>Column I: Part of the flower</u>	<u>Column II: Change</u>
(a) Ovary wall	(i) Pericarp
(b) Zygote	(ii) Embryo
(c) Hilum	(iii) Scar of the seed
(d) Micropyle	(iv) Seed pore
(A) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)	
(B) (a)-(i), (b)-(ii), (c)-(iv), (d)-(iii)	
(C) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)	
(D) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)	

196. Which of the following is diploid?

- (A) Secondary spermatocytes
- (B) Spermatozoa and ova
- (C) Spermatogonia, oogonia, primary spermatocytes
- (D) Secondary oocytes

197. Match column I with column II and choose the correct answer.

<u>Column I</u>	<u>Column II</u>
(a) Homologous organs	(i) Potato and Sweet potato
(b) Analogous organs	(ii) Tendril and thorn
(c) Adaptive radiation	(iii) Fossils
(d) Paleontological evidence	(iv) Australian marsupials
(A) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)	
(B) (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)	
(C) (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)	
(D) (a)-(i), (b)-(ii), (c)-(iv), (d)-(iii)	

198. pBR322, a cloning vector, contains the following antibiotic resistance genes, which can be used as markers

- (A) amikacin and tetracycline
- (B) ampicillin and tetracycline
- (C) streptomycin and tetracycline
- (D) ampicillin and streptomycin

199. Which of the following is not an example for mutualism?

- (A) Lichen
- (B) Mycorrhiza
- (C) Wasps present in fruits of fig
- (D) Epiphytes

200. Eutrophication by sewage pollution refers to

- (A) nutrient enrichment of freshwater bodies
- (B) nutrient depletion of freshwater bodies
- (C) toxic chemical accumulation in freshwater bodies
- (D) biomagnification of pollutants

Only for reference. Do not copy

FINAL ANSWER KEY**Subject Name: 104 MSc FIVE YEAR INTEGRATED 18-S2**

SI No.	Key	SI No.	Key	SI No.	Key	SI No.	Key	SI No.	Key	SI No.	Key	SI No.	Key
1	B	31	A	61	D	91	A	121	B	151	D	181	C
2	A	32	D	62	B	92	C	122	B	152	B	182	D
3	B	33	A	63	C	93	D	123	C	153	B	183	B
4	C	34	A	64	D	94	B	124	D	154	B	184	B
5	B	35	B	65	A	95	B	125	D	155	C	185	C
6	B	36	A	66	C	96	B	126	C	156	D	186	D
7	C	37	D	67	C	97	A	127	D	157	C	187	A
8	D	38	D	68	A	98	D	128	C	158	B	188	C
9	B	39	A	69	D	99	C	129	A	159	A	189	D
10	A	40	A	70	C	100	B	130	C	160	B	190	B
11	D	41	C	71	D	101	C	131	B	161	A	191	A
12	D	42	D	72	C	102	D	132	B	162	D	192	C
13	B	43	B	73	D	103	A	133	D	163	A	193	A
14	D	44	A	74	D	104	C	134	D	164	C	194	D
15	C	45	B	75	A	105	D	135	C	165	A	195	A
16	A	46	D	76	C	106	A	136	C	166	B	196	C
17	B	47	C	77	C	107	B	137	B	167	B	197	C
18	B	48	C	78	B	108	B	138	A	168	A	198	B
19	C	49	A	79	D	109	B	139	C	169	A	199	D
20	B	50	D	80	D	110	D	140	B	170	A	200	A
21	B	51	B	81	A	111	A	141	D	171	B		
22	B	52	C	82	C	112	A	142	D	172	A		
23	A	53	A	83	C	113	C	143	C	173	A		
24	D	54	B	84	B	114	A	144	C	174	C		
25	B	55	C	85	C	115	A	145	D	175	C		
26	B	56	B	86	C	116	C	146	D	176	D		
27	A	57	A	87	A	117	A	147	C	177	D		
28	C	58	D	88	A	118	D	148	D	178	A		
29	B	59	D	89	B	119	A	149	B	179	B		
30	A	60	C	90	D	120	C	150	C	180	C		