104 MSC INTEGRATED COURSE - BIOLOGICAL SCIENCES

PHYSICS
(SHIFT I)

1. The density of a material in the form of a cube is measured using its dimensions and mass. If the error in measurement of length and mass is 0.6% and 1.2% respectively, the maximum error in calculation of density is

(A) 3.0%
(B) 4.0%
(C) 4.5%
(D) 6.0%

2. If m is the mass of a body and E its kinetic energy, then its linear momentum is

(A) $m\sqrt{E}$
(B) $2\sqrt{mE}$
(C) $\sqrt{mE}$
(D) $\sqrt{2mE}$

3. The separation between carbon and oxygen in CO molecule is 0.12 nm. What is the distance of the center of mass from the carbon atom?

(A) 0.03 nm
(B) 0.068 nm
(C) 0.05 nm
(D) 0.06 nm

4. In a Young's double slit experiment, let S_1 and S_2 be two slits and C be the center of the screen. If angle $\angle S_1CS_2 = \theta$, and λ is the wavelength, the fringe width will be

(A) $\frac{\lambda}{\theta}$
(B) $\lambda\theta$
(C) $\frac{2\lambda}{\theta}$
(D) $\frac{\lambda}{2\theta}$

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5. For a series RLC circuit driven with voltage of amplitude V_m and frequency $\omega_o = \frac{1}{\sqrt{LC}}$, the current exhibits resonance. The quality factor, Q of the circuit is given by

(A) $\omega_o L/R$
(B) $\omega_o R/L$
(C) $R/(\omega_o L)$
(D) CR/ω_o

6. The half-life of ^{215}At is 100 μs. The time taken for the radioactivity decay of a sample of ^{215}At to 1/16th of its initial value is

(A) 400 μs
(B) 6.3 μs
(C) 40 μs
(D) 300 μs

7. The shortest wavelength of X-rays emitted from an X-ray tube depends on

(A) the current in the tube
(B) the voltage applied to the tube
(C) the nature of the gas in the tube
(D) the atomic number of the target material

8. The electromagnetic waves detected using a thermopile and used in physiotherapy are

(A) X - rays
(B) γ – rays
(C) ultraviolet radiations
(D) infrared radiations

9. If the wavelength of an electromagnetic wave is about the diameter of an apple, the region of radiation is

(A) X-ray
(B) UV
(C) infrared
(D) microwave

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10. In an AC circuit containing a pure resistor and an inductor in series, the phase lag between current and voltage is

(A) dependent on the AC frequency
(B) independent of AC frequency
(C) always zero
(D) always 90°

11. Kirchhoff's junction rule is a reflection of

(A) conservation of energy
(B) conservation of charges
(C) conservation of momentum
(D) conservation of current density

12. If the carrier power of a 100% modulated AM wave is suppressed, the percentage saving in power will be

(A) 50%
(B) 100%
(C) 66.66%
(D) 75%

13. White X-rays are called "white" because

(A) they are produced most abundantly in X-ray tubes
(B) they have a nature similar to visible white light
(C) they have a continuous range of frequencies
(D) they can be converted into visible light coated screens

14. An antenna uses electromagnetic waves of frequency 5 MHz. For proper working, the size of the antenna should be

(A) 15 m
(B) 3 km
(C) 60 m
(D) 300 m

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15. The rectangular Cartesian components of grad φ are

(A) $\frac{\partial \phi}{\partial x}, \frac{\partial \phi}{\partial y}, \frac{\partial \phi}{\partial z}$

(B) $\frac{\partial \phi}{\partial x^2}, \frac{\partial \phi}{\partial y^2}, \frac{\partial \phi}{\partial z^2}$

(C) $\frac{\partial^2 \phi}{\partial x^2}, \frac{\partial^2 \phi}{\partial y^2}, \frac{\partial^2 \phi}{\partial z^2}$

(D) $\varphi,\ \varphi^2,\ \varphi^3$

16. An ideal gas undergoes a thermodynamic process such that $dW = 0$ and $dQ < 0$. Then for the gas

(A) the temperature will decrease
(B) the temperature will increase
(C) the volume will increase
(D) there is no change in temperature

17. Optical fibres transmit light signals from one place to another place by

(A) internal conical refraction
(B) double refraction
(C) interference of light signals
(D) total internal reflection

18. When the source and the listener move in the same direction with a speed equal to the half of the speed of sound, the change in frequency of the sound is

(A) zero
(B) 25%
(C) 50%
(D) 75%

19. Two vectors A and B are said to be parallel to each other if

(A) $A \times B \neq 0$
(B) $A \times B = 0$
(C) $A \times B = B \times A$
(D) $A \times B = AB$

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20. Two protons are kept at a separation of 10 nm. If F_e and F_n represent the electromagnetic force and nuclear force, then

(A) $F_e \gg F_n$
(B) F_e and F_n differ only slightly
(C) $F_e = F_n$
(D) $F_e \ll F_n$

21. An inductor of inductance L and a resistor R are joined in series and connected to a source of frequency ω. The power dissipated in the circuit is

(A) $\dfrac{V^2 R}{R^2 + \omega^2 L^2}$
(B) $\dfrac{V^2 R}{\sqrt{R^2 + \omega^2 L^2}}$
(C) $\dfrac{R^2 + \omega^2 L^2}{V}$
(D) $\dfrac{V^2}{R^2 + \omega^2 L^2}$

22. Find the odd one out

(A) silicon
(B) gallium arsenide
(C) barium titanate
(D) Cadmium sulphide

23. The two nearest harmonics of a tube closed at one end and open at other end are 220 Hz and 260 Hz. What is the fundamental frequency of the system?

(A) 10 Hz
(B) 20 Hz
(C) 30 Hz
(D) 40 Hz

24. If a stone and a pencil are dropped simultaneously in vacuum from the top of a tower, which of the two will reach the ground first?

(A) Pencil
(B) Stone
(C) Both will reach the ground simultaneously
(D) Either stone or pencil depending on which is heavier

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25. A conductor AB = r carries a current i in a magnetic field B. The force on the conductor F is

(A) $F = r \times B$
(B) $F = i\,(r \times B)$
(C) $F = i\,(B \times r)$
(D) $|F| = i\,(r.B)$

26. Three small identical spheres having charges -8.4×10^{-16} C, -7.2×10^{-16} C and 0.6×10^{-16} C are brought in contact and then separated. Now the number of electrons on each ball is

(A) 3375
(B) 3125
(C) 2925
(D) 2775

27. Nichrome wire has been used as heating element because of its

(A) low melting point
(B) high conductivity
(C) low specific resistance
(D) high specific resistance

28. The torque on a rectangular coil placed in an uniform magnetic field is large, when the

(A) number of turns is large
(B) number of turns is less
(C) plane of the coil is perpendicular to the field
(D) area of the coil is small

29. When a moving coil galvanometer is shunted with a resistance of 30 Ohms, then its deflection is reduced to half. The actual resistance of the galvanometer is

(A) 10 Ohms
(B) 15 Ohms
(C) 20 Ohms
(D) 30 Ohms

30. Canal rays were discovered by

(A) Neil Bohr
(B) J.J. Thomson
(C) Millikan
(D) Eugen Goldstein

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31. Which of the following transition produces the spectral line of maximum wavelength in hydrogen atom?

(A) $4 \rightarrow 3$
(B) $3 \rightarrow 2$
(C) $5 \rightarrow 4$
(D) $6 \rightarrow 5$

32. The bandwidth of the amplitude modulation is

(A) equal to the signal frequency
(B) twice the signal frequency
(C) thrice the signal frequency
(D) four times the signal frequency

33. Which one of the following of carrier wave remains constant in amplitude modulation?

(A) amplitude and phase
(B) frequency and phase
(C) amplitude and frequency
(D) phase and time

34. What will be the input current when a step up transformer has a power input of 23 kW at 230 volts?

(A) 1 A
(B) 10 A
(C) 52.9 A
(D) 100 A

35. In an AC generator, the current from the coil is transferred to the external circuit through

(A) split rings
(B) slip rings
(C) O-rings
(D) field magnet

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36. A long solenoid having N turns, length (l), area of cross section A, carrying a current I is placed in a magnetic field of inductance B. The total magnetic flux is

(A) $\varphi = \mu_o N I$
(B) $\varphi = \mu_o N I / l$
(C) $\varphi = \mu_o N I A / l$
(D) $\varphi = \mu_o N^2 I A / l$

37. In Raman spectrum, the intensity of Stokes lines will be _____ the intensity of corresponding anti Stokes lines.

(A) greater than
(B) less than
(C) equal to
(D) greater or less than

38. In an X-ray tube, when 35 kV is applied, the minimum wavelength of the emitted radiation is

(A) 3.0 Å
(B) 1.5 Å
(C) 0.821 Å
(D) 0.333 Å

39. The half-life period of a particle is 624 s. Its mean life is

(A) 11.3 s
(B) 22.6 s
(C) 90 s
(D) 900 s

40. What will be the energy of the thermal neutrons?

(A) few MeV
(B) few keV
(C) few eV
(D) 0.025 eV

41. Which one of the following is not purely an electrostatic accelerator?

(A) Betatron
(B) Linear accelerator
(C) Van de Graff generator
(D) Cockcroft-Walton accelerator

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42. The moment of inertia of a disc of mass M and radius R about its diameter as axis is

(A) $MR^2/2$
(B) $MR^2/4$
(C) MR^2
(D) $(3/4)\ MR^2$

43. An electron beam is moving horizontally towards east. If this beam is passed through a uniform magnetic field directed vertically upwards, then the direction of the deflected beam is

(A) east
(B) west
(C) north
(D) south

44. A pn-junction diode works as insulator if it is connected

(A) in forward bias
(B) in reverse bias
(C) to a.c.
(D) to d.c.

45. A passenger is sitting in a fast moving car. The car blows horn with a frequency of f Hz. If the apparent frequency of the sound heard by the passenger is f' Hz, then

(A) $f' = f$
(B) $f' < f$
(C) $f' > f$
(D) $f' = 1/f$

46. Let v_{max} and a_{max} are the maximum velocity and maximum acceleration of a simple harmonic oscillator respectively, then its time period in terms of v_{max} and a_{max} is

(A) zero
(B) 2π
(C) $\left[2\pi v_{max}\right]/\alpha_{max}$
(D) $\left[2\pi\alpha_{max}\right]/v_{max}$

47. A red paper illuminated by green light appears

(A) black
(B) blue
(C) green
(D) yellow

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48. A thermodynamics system goes from state (i) P_1, V to 2 P_1, V (ii) P_1, V to P_1, 2 V. Then the work done in the two cases will be

(A) zero and $P_1 V$
(B) $P_1 V$ and zero
(C) $P_1 V$ and $P_1 V$
(D) zero and zero

49. Which one of the following pair of physical quantities do not have same dimension?

(A) Planck's constant and Angular momentum
(B) Impulse and moment of force
(C) Force and rate of change of linear momentum
(D) Pressure and Young's modules

50. The exponential law of radioactive decay is

(A) $\frac{N}{N_0} e^{-\lambda/t} = 1$

(B) $\frac{N_0}{N} e^{-\lambda/t} = 1$

(C) $\frac{N_0}{N} e^{\lambda/t} = 1$

(D) $\frac{N}{N_0} e^{\lambda t} = 1$

51. Which of the following is the universal gate?

(A) NOT
(B) OR
(C) AND
(D) NAND

52. When metals combine with non-metals, then

(A) electrons of the outer shells are shared
(B) electrons in the outer shells of non-metals are transferred to metals
(C) electrons in the outer shells of metals are transferred to the non-metals atoms
(D) hydrogen gas is given off

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53. The Compton shift is maximum for scattering angle of

(A) 0°
(B) 45°
(C) 90°
(D) 180°

54. A stone released with zero velocity from the top of a tower, reaches the ground in 4 s. The height of the tower is (g = 10 m/s^2)

(A) 20 m
(B) 40 m
(C) 80 m
(D) 120 m

55. Swimming is possible on account of

(A) first law of motion
(B) second law of motion
(C) third law of motion
(D) Newton's law of gravitation

56. A steel wire is stretched to double its length, then its Young's modulus

(A) becomes half
(B) becomes double
(C) remains same
(D) becomes one-fourth

57. Thermoelectric thermometer is based on

(A) Photoelectric effect
(B) Seebeck effect
(C) Compton effect
(D) Joule effect

58. The number of degrees of freedom for each atom of a monatomic gas is

(A) 3
(B) 5
(C) 6
(D) 1

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59. The capacity of parallel plate capacitor depends on

(A) metal used to make plates
(B) thickness of plate
(C) potential applied across the plate
(D) area of plate

60. A hydrogen atom is paramagnetic. A hydrogen molecule is

(A) diamagnetic
(B) paramagnetic
(C) ferromagnetic
(D) ferrimagnetic

61. 10 cm is a wavelength corresponding to the spectrum of

(A) infrared rays
(B) ultraviolet rays
(C) microwaves
(D) X-rays

62. In a semiconductor, the forbidden energy gap between the valance band and conduction band is of the order of

(A) 1 MeV
(B) 0.1 MeV
(C) 1 eV
(D) 5 eV

63. The mass of a ship is 2×10^7 kg. On applying a force of 25×10^5 N, it is displaced through 25 m. After the displacement, the velocity acquired by the ship will be

(A) 12.5 m/s
(B) 5 m/s
(C) 3.7 m/s
(D) 2.5 m/s

64. A system consists of 3 particles each of mass m located at points (1, 1), (2, 2) and (3, 3). The coordinates of the centre of mass are

(A) (6, 6)
(B) (3, 3)
(C) (1, 1)
(D) (2, 2)

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65. If a spring extends by 'x' on loading, then the energy stored by the spring is (if T is tension in the spring and k is spring constant)

(A) $T^2/2x$
(B) $T^2/2k$
(C) $2x/T^2$
(D) $2T^2/k$

66. A simple pendulum is executing simple harmonic motion with a time period T. If the length of the pendulum is increased by 21%, the percentage increase in the time period of the pendulum of increased length is

(A) 10%
(B) 21%
(C) 30%
(D) 50%

67. If a diamagnetic substance is brought near north or south pole of a bar magnet, it is

(A) attracted by the poles
(B) repelled by the poles
(C) repelled by the north pole and attracted by the south pole
(D) attracted by north pole and repelled by south pole

68. The inductive reactance of an inductor of $1/\pi$ Henry at 50 Hz frequency is

(A) $50/\pi$ Ohm
(B) $\pi/50$ Ohm
(C) 100 Ohm
(D) 50 Ohm

69. How fast a person should drive his car so that the red signal of light appears green ($\lambda_{red} = 6200$ Å, $\lambda_{green} = 5400$ Å)

(A) 1.5×10^8 m/s
(B) 7×10^7 m/s
(C) 3.9×10^7 m/s
(D) 2×10^8 m/s

70. The position of a particle is given by $x = a \sin \omega t$, $y = a \cos 2\omega t$. The trajectory is

(A) parabola
(B) hyperbola
(C) straight line
(D) cycloid

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71. If an annular disc of radii r_1 and r_2 is heated, then

(A) r_1 increases, r_2 decreases
(B) r_2 increases, r_1 decreases
(C) both r_1 and r_2 increase
(D) r_1 increases, r_2 remains unchanged

72. Velocity of sound in air is 332 m/s. Its velocity in vacuum is

(A) > 332 m/s
(B) 3×10^8 m/s
(C) 332 m/s
(D) zero

73. A steady current flows in a metallic conductor of non-uniform cross-section. The quantity/quantities constant along the length of the conductor is/are

(A) current, electric field and drift velocity
(B) drift speed only
(C) current and drift speed
(D) current only

74. A convex lens is dipped in a liquid whose refractive index is equal to refractive index of the lens. Then its focal length will

(A) remain unchanged
(B) be 0
(C) be infinity
(D) be small but non zero

75. AND gate can be produced using two gates of

(A) NOT
(B) NOR
(C) XOR
(D) NAND

CHEMISTRY UG

76. Iodine crystals are

(A) electrical conductors
(B) insulators
(C) semiconductors
(D) high melting

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77. In an ionic solid with the larger anions and smaller cations, the ions that form close packed structure are

(A) anions
(B) cations
(C) half of total anions
(D) half of total cations

78. When a piece of copper is added to concentrated hydrochloric acid,

(A) it remains insoluble
(B) it readily dissolves
(C) it slowly dissolves
(D) it dissolves with the release of hydrogen

79. The electrode potential of a half cell

(A) does not vary with concentration of the solution
(B) depends on the concentration of the solution
(C) depends on the rate of diffusion of the cation
(D) depends on the rate of diffusion of the anion

80. A catalyst

(A) decreases the ΔG of a reaction
(B) increases the ΔG of a reaction
(C) does not alter the ΔG of a reaction
(D) shifts the equilibrium of the reaction

81. As per the Freundlich's adsorption isotherm, the amount adsorbed per gram of the adsorbent is independent of pressure, when

(A) $n = 0$
(B) $n > 1$
(C) $n = 1$
(D) $1/n = 0$

82. When an ideal solution is formed from pure n-hexane and n-heptane, the wrong statement is

(A) no heat is evolved
(B) no volume change occurs
(C) large quantity of heat is evolved
(D) it obeys Raoult's law

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83. If cells placed in sodium chloride solution shrink, the solution is called

(A) hypertonic
(B) hypotonic
(C) isotonic
(D) azeotropic

84. The van't Hoff's factor for ethanoic acid in benzene is equal to

(A) zero
(B) close to 0.5
(C) unity
(D) two

85. When a dilute solution of KI is added to a dilute solution of $AgNO_3$,

(A) a positively charged sol results
(B) a negatively charged sol results
(C) a neutral sol results
(D) both the positive and negative sol particles result

86. Hardy – Schulze rule states that the ease of coagulation of a negatively charged colloid with the cations varies in the order

(A) $Fe^{3+} > Mg^{2+} > K^+$
(B) $K^+ > Mg^{2+} > Fe^{3+}$
(C) $Mg^{2+} > Fe^{3+} > K^+$
(D) $Fe^{3+} > K^+ > Mg^{2+}$

87. For the following reaction, the initial concentration of HI (0.005 mol L^{-1}) becomes half of it after 25 min. The rate of decomposition of HI is equal to

$2HI_{(g)} \rightarrow H_{2(g)} + I_{2(g)}$

(A) -0.0005 mol L^{-1} min^{-1}
(B) 0.00005 mol L^{-1} min^{-1}
(C) -0.0001 mol L^{-1} min^{-1}
(D) $+0.000.2$ mol L^{-1} min^{-1}

88. When acetone is added to ethanol, the solution shows

(A) positive deviation from Raoult's law
(B) negative deviation from Raoult's law
(C) no deviation from Raoult's law
(D) ideal behavior

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89. For the Daniel cell of emf 1.1 V, if an external emf of 1.5V is applied,

(A) the copper electrode will dissolve
(B) the zinc electrode will dissolve
(C) the electrode reactions will be ceased
(D) copper will be deposited

90. The material that shows increase in conductivity with increase in temperature is

(A) copper
(B) silver
(C) alumina
(D) titania

91. One mole of a gas expands from 6 m^3 to 8 m^3 in a container against a constant external pressure of 3 Pa at 300 K. The work done on the gas, w, is

(A) –2 J
(B) –6 J
(C) +575 J
(D) –575 J

92. The latent heat of phase change from ice to water is 80 cal per gram at 0 °C. Then change in entropy (in eu) for the surrounding, when 1 mole water freezes at 0 °C

(A) ≈ –5.3 eu
(B) ≈ 5.3 eu
(C) ≈ 0.3 eu
(D) zero

93. At 25 °C, *p*Kw is 14. The degree of dissociation of water is nearly

(A) 10^{-4}
(B) 1.8×10^{-9}
(C) 10^{-7}
(D) 5.6×10^{-6}

94. Which one of the following uranium isotopes is used as atomic fuel?

(A) $^{233}U_{92}$
(B) $^{235}U_{92}$
(C) $^{236}U_{92}$
(D) $^{238}U_{92}$

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95. Most abundant element in the earth crust is

(A) O
(B) Al
(C) Fe
(D) Si

96. Soda acid type fire extinguishers contain H_2SO_4 and

(A) $NaHCO_3 + Na_2CO_3$
(B) $NaHCO_3$ solution
(C) Na_2CO_3
(D) $CaCO_3$

97. The correct order of electronegativity of N, O, F and P is

(A) F > O > N > P
(B) F > N > P > O
(C) F > O > P > N
(D) N > O > P > F

98. Find the correct order of electron affinity on the following elements.

S, O and Se

(A) S > O > Se
(B) O > S > Se
(C) S > Se > O
(D) Se > O > S

99. The solution of sodium metal in liquid ammonia acts as a strong reducing agent due to the presence of

(A) Sodium atoms
(B) Solvated electrons
(C) Sodium hydroxide
(D) Sodium azide

100. The isostructural group with I_3^- ion is

(A) NO_2^-, XeF_2, N_3^-
(B) ICl_2^-, XeF_2, N_3^-
(C) NH_2^-, NO_2^-, ICl_2^-
(D) BH_3, CO_2, ICl_2^-

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101. The diamagnetic metal complex ion is

(A) $[NiCl_4]^{2-}$
(B) $[CoCl_4]^{2-}$
(C) $[CoF_6]^{3-}$
(D) $[Ni(CN)_4]^{2-}$

102. The CFSE of cobalt(II) in complex ion $[CoCl_4]^{2-}$ is

(A) $0.6\Delta t$
(B) $1.2\Delta t$
(C) $1.8\Delta t$
(D) $2.4\Delta t$

103. The species in which the colour is not due to d-d transitions is

(A) $[Ti(H_2O)_6]^{3+}$
(B) $[CoF_6]^{3-}$
(C) $[Cu(NH_3)_4]^{2+}$
(D) $[CrO_4]^{2-}$

104. Per ton of the material consumed, which is expected to produce the greatest quantity of $SO_2(g)$?

(A) Burning coal
(B) Burning natural gas
(C) Smelting zinc sulphide
(D) Smelting lead sulphide

105. The acceptable value for the missing quantum number in the following set of quantum numbers is:

$n = 3, l = ?, m_l = 2, m_s = +½$

(A) $l = 3$
(B) $l = 1$
(C) $l = 2$
(D) $l = 0$

106. Which must possess greater velocity to produce matter waves of same wavelength?

(A) protons
(B) neutrons
(C) electrons
(D) α-particles

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107. Which of the following ions has a trigonal planar shape?

(A) SO_3^{2-}
(B) PO_4^{3-}
(C) PF_6^-
(D) CO_3^{2-}

108. Number of angular nodes for 4*d* orbital is

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

109. What type of radioactive decay causes the atomic number of a nucleus to increase by one unit?

(A) Electron capture
(B) α-emission
(C) β-emission
(D) γ-ray emission

110. The type of hybridization of each carbon in the compound, $H_3C{-}CH{=}C{=}CH{-}CH_3$ is

(A) sp^3, sp^2, sp^2, sp^2, sp^3
(B) sp^3, sp^2, sp, sp^2, sp^3
(C) sp^3, sp, sp, sp, sp^3
(D) sp^3, sp, sp^2, sp, sp^3

111. If the sodium fusion extract of an organic compound gives violet colour upon treatment with sodium nitroprusside, then which of the following statement is correct?

(A) Nitrogen is present in the compound and the violet colour is due to the formation of $[Fe(CN)_6]^{4-}$
(B) Both nitrogen and bromine are present in the compound and the violet colour is due to the formation of $(NH_4)_2MoO_4$
(C) Sulfur is present in the compound and the violet colour is due to the formation of $[Fe(CN)_5NOS]^{4-}$
(D) Both nitrogen and sulfur are present in the compound and the violet colour is due to the formation of $[Fe(SCN)]^{2+}$

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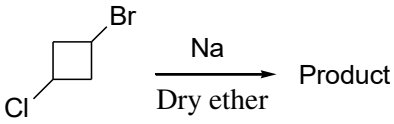
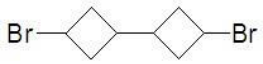
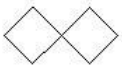
112. Major product of the following reaction is



(A) 

(B)

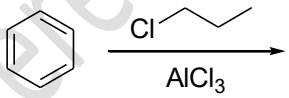
(C)

(D) 

113. When propyne is treated with mercuric sulphate and dilute sulfuric acid at 60 °C, it forms

(A) acetone through anti-Markovnikov addition of water
(B) propionaldehyde through Markovnikov addition of water
(C) acetone through Markovnikov addition of water
(D) propionaldehyde through anti-Markovnikov addition of water

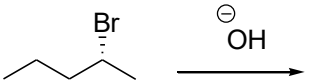
114. Major product formed in the following reaction is

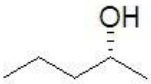


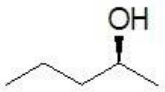
(A) *n*-propylbenzene
(B) isopropylbenzene (cumene)
(C) 1-phenylpropene
(D) 1,3-di-(*n*-propyl)benzene

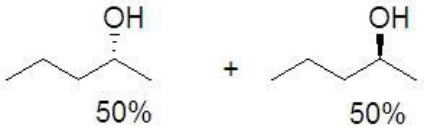
Only for reference. Do not copy

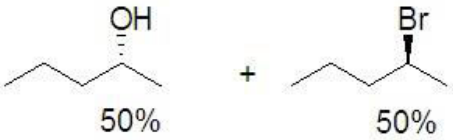
115. The product(s) of the following bimolecular nucleophilic substitution reaction is (are)



(A) 

(B) 

(C) 

(D) 

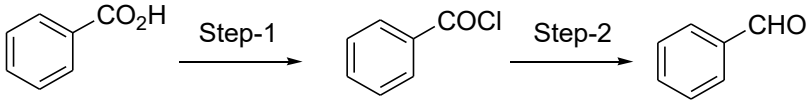
116. A compound P with molecular formula C_9H_{12} upon air oxidation gives compound Q, which upon treatment with dilute acid gives compounds R and S. R gives violet colour when treated with neutral $FeCl_3$. S gives an yellow precipitate on reaction with iodine in the presence of NaOH. The compounds P and S are

(A) P = *n*-propylbenzene and S = acetone
(B) P = *n*-propylbenzene and S = phenol
(C) P = isopropylbenzene (cumene) and S = acetone
(D) P = 1,2,4-trimethylbenzene and S = phenol

117. The major product formed in the nitration of anisole (methoxybenzene) is

(A) *o*-nitroanisole
(B) *p*-nitroanisole
(C) *m*-nitroanisole
(D) 3,4-dinitroanisole

118. Suitable reagents to perform the following transformations are



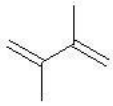
(A) For step-1: $SOCl_2$ and for step-2: H_2, Pd-$BaSO_4$
(B) For step-1: $SOCl_2$ and for step-2: $NaBH_4$
(C) For step-1: Cl_2 and for step-2: H_2, Pd-$BaSO_4$
(D) For step-1: PCl_5 and for step-2: $LiAlH_4$

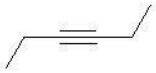
Only for reference. Do not copy

119. A compound P with molecular formula C_6H_{10} decolorizes bromine water and undergoes oxidation with acidified $KMnO_4$ to give a dicarboxylic acid with the same number of carbon atoms. The dicarboxylic acid serves as an important precursor in the manufacture of nylon-6,6. The compound P is

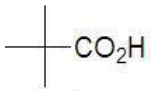
(A)

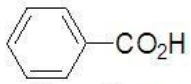
(B)

(C) 

(D) 

120. Which one of the following carboxylic acids would undergo Hell-Volhard-Zelinsky reaction?

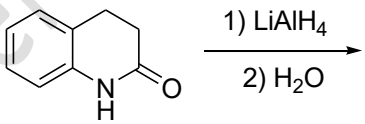
(A) 

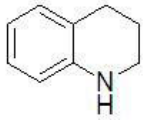
(B) 

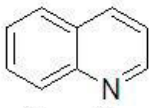
(C)

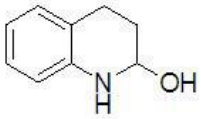
(D) CF_3CO_2H

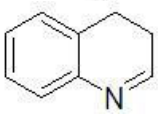
121. Major product formed in the following reaction is



(A) 

(B) 

(C) 

(D) 

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122. Gabriel phthalimide synthesis cannot be used for introducing the NH_2 group in

(A) *n*-butylamine
(B) benzylamine
(C) aniline
(D) 2-aminopropanoic acid

123. In amylose,

(A) α-D-(+)-glucose units are linked through C1-C4 glycosidic linkage
(B) α-D-(+)-glucose units are linked to β-D-(−)-fructose through C1-C2 glycosidic linkage
(C) α-D-(+)-glucose units are linked through C1-C2 glycosidic linkage
(D) β-D-(+)-glucose units are linked through C1-C4 glycosidic linkage

124. The Ziegler-Natta catalyst is

(A) Et_2Zn and $TiCl_4$
(B) Et_3Al and $SnCl_4$
(C) Et_2Zn and $SnCl_4$
(D) Et_3Al and $TiCl_4$

125. Which one of the following is not a tranquilizer?

(A) Meprobamate
(B) Ranitidine
(C) Valium
(D) Serotonin

BIOLOGY

126. The term 'meristem' was coined by

(A) N. Grew
(B) K. Esau
(C) C. Nageli
(D) Hofmeister

127. The balloon-like ingrowths blocking the lumen of xylem vessels from the neighbouring parenchymatous cells in many dicotyledons are called

(A) tylosoids
(B) tyloses
(C) filling tissue
(D) thylakoids

Only for reference. Do not copy

128. Conversion of glucose into pyruvic acid in a cell is known as

(A) Kreb's cycle
(B) TCA cycle
(C) glycolysis
(D) glyoxalation

129. If the stamens are adnate to the tepals, the condition is known as

(A) epiphyllous
(B) episepalous
(C) epipetalous
(D) epibracteolous

130. The cell components are made of a collection of molecules consisting of inorganic and organic compounds called

(A) whirl pool
(B) cellular pool
(C) polymer pool
(D) glycans

131. *Pistia stratiotes* is a good example for

(A) sucker
(B) stolon
(C) runner
(D) offset

132. A sticky covering found on the surface of the pollen that attracts insects is called

(A) nectar
(B) pollenkitt
(C) sporopollenin
(D) tapetum

133. …… is a phenomenon where a single gene affects multiple traits altering the phenotype of an organism.

(A) Pleiotropy
(B) Epistasis
(C) Polygenic inheritance
(D) Atavism

Only for reference. Do not copy

134. Loss of one chromosome from the diploid set is known as

(A) nullisomy
(B) monosomy
(C) autosomy
(D) aneuploidy

135. Some endonuclease enzymes cut the DNA strand resulting in protruding and recessed ends known as

(A) palindromic ends
(B) blunt ends
(C) cohesive ends
(D) flush ends

136. G. Haberlandt cultured plant cells in artificial conditions using the cells of

(A) *Laminaria digitata*
(B) *Lamium album*
(C) *Lamium purpureum*
(D) *Lamium maculatum*

137. The phenomenon of the reversion of mature cells to meristematic state to form callus is known as

(A) dedifferentiation
(B) redifferentiation
(C) differentiation
(D) totipotency

138. *Catharanthus roseus* produces the secondary metabolite

(A) codeine
(B) vincristine
(C) capsaicin
(D) digoxin

139. *Utricularia* is commonly known as

(A) liverwort
(B) stonewort
(C) bladderwort
(D) hornwort

Only for reference. Do not copy

140. If the petiole is modified into a leaf-like structure, it is known as a

(A) cladode
(B) phylloclade
(C) cladophyll
(D) phyllode

141. Seeds that germinate only in the presence of sunlight are said to be

(A) helioblastic
(B) thermoblastic
(C) photoblastic
(D) All the three

142. The movement of decomposed water-soluble organic and inorganic compounds from the surface to lower layers of soil is known as

(A) mineralization
(B) humification
(C) fragmentation
(D) eluviation

143. Species that indicate the health of an ecosystem are called

(A) Keystone species
(B) Dominant species
(C) Flagship species
(D) Indicator species

144. A good example of an alien invasive species is

(A) *Helicteres isora*
(B) *Santalum album*
(C) *Calotropis procera*
(D) *Parthenium hysterophorus*

145. Protecting a species in its own habitat is called …… conservation.

(A) *ex situ*
(B) *in vitro*
(C) *in situ*
(D) *in vivo*

Only for reference. Do not copy

146. World's first cotton hybrid was developed by

(A) B.P. Pal
(B) T.S. Venkataraman
(C) C.R. Dhan
(D) C.T. Patel

147. Tea is a native of

(A) Brazil
(B) Malaysia
(C) Mongolia
(D) China

148. …… is a frog with a pig-nose.

(A) *Nasikabatrachus bhupathi*
(B) *Nyctibatrachus major*
(C) *Rana keralensis*
(D) *Rhacophorus malabaricus*

149. The mesodermal epithelium is called

(A) pleurobium
(B) peristome
(C) periblem
(D) peritoneum

150. Lateral appendages in Nereis are called

(A) pseudopodia
(B) parapodia
(C) cylindropodia
(D) claspopodia

151. Kidneys are mesonephric in

(A) Pisces
(B) Amphibia
(C) Reptilia
(D) Aves

Only for reference. Do not copy

152. Pneumatic bones are seen in

(A) Pisces
(B) Amphibia
(C) Reptilia
(D) Aves

153. …… enhances night vision in nocturnal animals such as cats.

(A) rods
(B) cones
(C) vitreous humor
(D) tapetum lucidum

154. The protective lubricating mucus in human intestine is secreted by

(A) microvilli
(B) Goblet cell
(C) epithelial cells
(D) None of the above

155. A cartilage cell is known as

(A) chondrocyte
(B) osteocyte
(C) fibroblast
(D) dendrites

156. In Cockroach, the hardened plates of the dorsal side are called

(A) sclerites
(B) tergites
(C) sternites
(D) pleurites

157. The infundibulum of the fallopian tube leads to a wider central portion called

(A) fundus
(B) cervix
(C) ampulla
(D) tunica

Only for reference. Do not copy

158. Gonadotropin Releasing Hormone (GnRH) is released by the

(A) brain
(B) thalamus
(C) hypothalamus
(D) pituitary

159. …… hormone is crucial during childbirth.

(A) Gonadotropin
(B) Somatomammotropin
(C) Lucin
(D) Oxytocin

160. …… refers to immunogenetic D antigen of the Rh blood group system in humans.

(A) Rhesus factor
(B) Immunoglobulin
(C) Erythroblastosis
(D) Platyrrhina

161. Phages are

(A) viruses
(B) bacteria
(C) virions
(D) proteobacteria

162. Modern birds emerged during …… period.

(A) Cretaceous
(B) Triassic
(C) Carboniferous
(D) Permian

163. If the dead remains of an organism is replaced by minerals the type of fossilization is known as

(A) Casts
(B) Natural moulds
(C) Petrifaction
(D) Putrefaction

Only for reference. Do not copy

164. Mutation that leads to a change in the structure of a gene is called …… mutation.

(A) deletion
(B) translocation
(C) point
(D) chromosomal

165. Changes in allele frequencies within a population is known as

(A) microevolution
(B) gene-evolution
(C) genetic drift
(D) natural selection

166. Mosquirix is a vaccine used to prevent

(A) Dengue
(B) Malaria
(C) Chikungunya
(D) Filariasis

167. …… coagulates milk protein and converts lactose to lactic acid.

(A) *Streptococcus thermophilus*
(B) *Saccharomyces cerevisiae*
(C) *Streptomyces griseus*
(D) *Streptomyces aureofaciens*

168. The first bioherbicide was developed from

(A) *Phytophthora infestans*
(B) *Phytophthora palmivora*
(C) *Bacillus thuringiensis*
(D) *Phytophthora ricini*

169. …… are undifferentiated cells found in most higher animals.

(A) Stem cells
(B) Root cells
(C) Red Blood Cells
(D) White Blood Cells

Only for reference. Do not copy

170. Organisms that can tolerate only a narrow range of temperature are called

(A) Homeotherms
(B) Poikilotherms
(C) Stenotherms
(D) Heliotherms

171. Choose the CORRECT order

(A) Phylum-Kingdom- Order-Class-Family-Genus-Species
(B) Kingdom-Class-Division-Family-Order- Species-Genus
(C) Kingdom- Division- Order- Class-Family-Genus-Species
(D) Kingdom-Phylum-Class-Order-Family-Genus-Species

172. A typical embryo sac of angiosperms consists of

(A) 2 antipodals, 3 synergids, 2 polar nuclei and 1 egg cell
(B) 3 antipodals, 3 synergids, 1 polar nucleus and 1 egg cell
(C) 3 antipodals, 2 synergids, 2 polar nuclei and 1 egg cell
(D) 1 synergid, 3 antipodals, 3 polar nuclei and 1 egg cell

173. Which of the following is a non-membrane bound organelle?

(A) Golgi complex
(B) Lysosome
(C) Ribosome
(D) Vacuole

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

Column I (organism)		**Column II (reproductive structure)**	
(I)	*Penicillium*	(a)	Gemmules
(II)	*Chlamydomonas*	(b)	Buds
(III)	Sponge	(c)	Conidia
(IV)	*Hydra*	(d)	Zoospores

Choose the answer

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

Only for reference. Do not copy

175. Most of the minerals present in soil can enter plants through roots. Which of the following is NOT a criterion for essentiality of an element?

(A) The element must be absolutely necessary for supporting normal growth and reproduction
(B) Deficiency of any one element cannot be met by supplying some other element
(C) The requirement of the element must be specific and replaceable by another element
(D) The element must be directly involved in the metabolism of the plant

176. The process of excreting ammonia is ammonotelism. Which one of the following is ammonotelic organism?

(A) Marine fishes
(B) Mammals
(C) Marine amphibians
(D) Aquatic amphibians

177. The amount of carbon fixed annually in the biosphere through photosynthesis is

(A) 4×10^{13} mg
(B) 4×10^{13} kg
(C) 4×10^{13} metric ton
(D) 4×10^{13} g

178. *Spirulina*, an alga belongs to

(A) chlorophyceae
(B) cyanophyceae
(C) xanthophyceae
(D) bacillariophyceae

179. Match the following diseases with their causative organism.

	Column I		**Column II**
(1)	Malaria	(i)	Varicella zoster virus (VZV)
(2)	Chicken pox	(ii)	2019-nCoV
(3)	Pertussis	(iii)	Plasmodium *spe.*
(4)	COVID-19	(iv)	*Bordetella Spe.*

(A) (1) - (iv), (2) - (ii), (3) - (iii), (4) - (i)
(B) (1) - (i), (2) - (iii), (3) - (iv), (4) - (ii)
(C) (1) - (i), (2) - (ii), (3) - (iii), (4) - (iv)
(D) (1) - (iii), (2) - (i), (3) - (iv), (4) - (ii)

Only for reference. Do not copy

180. Identify the wrongly mismatched pair regarding the asexual reproduction.

(A) Water hyacinth - Runner
(B) Bryophyllum - Leaf bud
(C) Agave - Bulbils
(D) Penicillium - Conidia

181. Choose the factor affecting Hardy-Weinberg law.

(A) Genetic Drift
(B) Mutation
(C) Gene Migration
(D) All the above

182. Assertion: Rod cells are for colour vision. Cone cells are for night vision.
Reason: Rod cells are highly sensitive to light & cone cells are insensitive to light.

(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

183. Which phylum follows the process of metagenesis?

(A) Cnidaria
(B) Protozoa
(C) Porifera
(D) Arthropoda

184. Name the ion responsible for unmasking of active sites for myosin to cross bridge activity during muscle contraction.

(A) Calcium
(B) Magnesium
(C) Sodium
(D) Potassium

185. Which one is the most abundant protein in the animal world?

(A) Haemoglobin
(B) Collagen
(C) Insulin
(D) Trypsin

Only for reference. Do not copy

186. An example of edible underground stem is

(A) potato
(B) carrot
(C) groundnut
(D) sweet potato

187. Depletion of which gas in the atmosphere can lead to an increased incidence of skin cancer?

(A) Ozone
(B) Ammonia
(C) Methane
(D) Nitrous oxide

188. *Monascus purpureus* is a yeast used commercially in the production of

(A) streptokinase for removing clots from the blood vessels
(B) citric acid
(C) blood cholesterol lowering statins
(D) ethanol

189. A disease caused by an autosomal primary non-disjunction is

(A) Down's syndrome
(B) Klinefelter's syndrome
(C) Turner's syndrome
(D) Sickle cell anaemia

190. Which one is not a placental hormone?

(A) hcG
(B) hpL
(C) Progesterone
(D) Melatonin

191. Cocci, bacilli, vibrio and spirilla have the structure, respectively, of

(A) spherical, comma, rod, and spiral
(B) comma, spherical, rod, and spiral
(C) spherical, spiral, rod and comma
(D) spherical, rod, comma, and spiral

Only for reference. Do not copy

192. Which of the following organisms exhibit haplo-diplontic and diplontic life cycle respectively?

(A) *Fucus, Pteris*
(B) *Ectocarpus, Fucus*
(C) *Fucus, Ectocarpus*
(D) *Ulothrix* and *Volvox*

193. Which of the following muscles is/are not under the voluntary control of nervous system?

(A) Skeletal muscles
(B) Visceral muscles
(C) Cardiac muscles
(D) Visceral muscles and cardiac muscles

194. Match the column I with column II regarding the name of the scientists who coined the term for the listed plant tissues; and choose the correct answer.

	Column I		**Column II**
(a)	Nageli	(i)	Parenchyma
(b)	Schleiden	(ii)	Collenchyma
(c)	Grew	(iii)	Sclerenchyma
(d)	Mettenius	(iv)	Xylem

(A) (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)
(B) (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)
(C) (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)
(D) (a)-(iv), (b)-(ii), (c)-(iii), (d)-(i)

195. The osmotic potential and pressure potential of four cells, a, b, c and d, are given below. Arrange them in ascending order based on values of their water potential

Cell	Osmotic potential (atm)	Pressure potential (atm)
(a)	–5.8	4.7
(b)	–7.2	6.7
(c)	–6.1	5.8
(d)	–9.3	7.2

(A) (c), (d), (a), (b)
(B) (a), (d), (c), (b)
(C) (c), (b), (a), (d)
(D) (d), (a), (b), (c)

Only for reference. Do not copy

196. Sperms are formed in the

(A) Epididymis
(B) Seminiferous tubules
(C) Prostate gland
(D) Vas deferens

197. Hyposecretion of hormones of adrenal cortex results in

(A) Gull's disease
(B) Graves' disease
(C) Cushing's disease
(D) Addison's disease

198. Most contraceptive pills contain

(A) Oestrogen and Progesterone
(B) Oestrogen and FSH
(C) FSH and LH
(D) Progesterone and LH

199. Match column I with column II regarding developmental events of human embryo and choose the correct answer.

Column I: Development of organs	**Column II: Time**
(a) Limbs and digits	(i) After 4 weeks
(b) Heart	(ii) After 8 weeks
(c) External genital organs	(iii) After 12 weeks
(d) Appearance of hair on the head	(iv) After 16 weeks

(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)

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200. Match column I with column II regarding sexually transmitted diseases and their symptoms; and choose the correct answer.

Column I: STD		**Column II: Symptom**
(a)	Trichomoniasis	(i) Pain and pus discharge in the genital tract
(b)	Gonorrhoea	(ii) Ulcer on genitals
(c)	Syphilis	(iii) Vaginitis associated with yellow vaginal discharge
(d)	Genital herpes	(iv) Painful blisters on prepuse and penile shaft

(A) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
(B) (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)
(C) (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)
(D) (a)-(i), (b)-(ii), (c)-(iv), (d)-(iii)

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FINAL ANSWER KEY

Subject Name: 104 MSc FIVE YEAR INTEGRATED 18-S1

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

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