MOCK TEST PAPER 6

General Instructions: **Same as Mock Test Paper 1**

PHYSICS

Section A

1. Two identical balls A and B having velocities of 0.5 m/s and –0.3 m/s respectively collide elastically in one dimension. The velocities of B and A after the collision respectively will be:
(a) –0.5 m/s and 0.3 m/s **(b)** 0.5 m/s and –0.3 m/s
(c) –0.3 m/s and 0.5 m/s **(d)** 0.3 m/s and 0.5 m/s

2. Two straight horizontal parallel wires are carrying the same current in the same direction; d is the distance between the wires. You are provided with a small freely suspended magnetic needle. At which of the following positions will the orientation of the needle be independent of the magnitude of the current in the wires
(a) At a distance $d/2$ from any of the wires
(b) At a distance $d/2$ from any of the wires in the horizontal plane
(c) Anywhere on the circumference of a vertical circle of radius d and centre halfway between the wires
(d) At points halfway between the wires in the horizontal plane

3. A magnetic field of 2×10^{-2} T acts at right angles to a coil of area 100 cm^2 with 50 turns. The average emf induced in the coil is 0.1 V, when it is removed from the field in time t. The value of t is:
(a) 0.1 s **(b)** 0.01 s **(c)** 1 s **(d)** 20 s

4. A couple produces:
(a) no motion
(b) purely linear motion
(c) purely rotational motion
(d) linear and rotational motion

5. The capacity of a parallel plate condenser is 10 μF, when the distance between its plates is 8 cm. If the distance between the plates is reduced to 4 cm, then the capacity of this parallel plate condenser will be:
(a) 5 μF **(b)** 10 μF **(c)** 20 μF **(d)** 40 μF

6. When the light of frequency $2\nu_0$ (where ν_0 is threshold frequency), is incident on a metal plate, the maximum velocity of electrons emitted is v_1. When the frequency of the incident radiation is increased to $5\nu_0$, the maximum velocity of electrons emitted from the same plate is v_2. The ratio of v_1 to v_2 is:
(a) 1 : 2 **(b)** 1 : 4 **(c)** 4 : 1 **(d)** 2 : 1

7. The speed of a homogenous solid sphere after rolling down an inclined plane of vertical height h from rest without sliding is:
(a) $\sqrt{10gh/7}$ **(b)** $\sqrt{gh}$ **(c)** $\sqrt{6gh/5}$ **(d)** $\sqrt{4gh/3}$

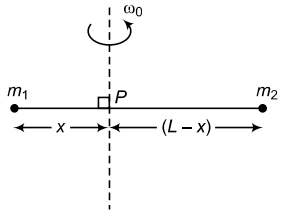
8. A wire of a certain material is stretched slowly by ten percent. Its new resistance and specific resistance become respectively:
(a) 1.1 times, 1.1 times **(b)** 1.2 times, 1.1 times
(c) 1.21 times, same **(d)** Both remain the same

9. The mass of proton is 1.0073 u and that of neutron is 1.0087 u (u = atomic mass unit). The binding energy of $^4_2$He is:
(a) 0.0305 J **(b)** 0.0305 erg **(c)** 28.4 MeV **(d)** 0.061 u
[Given helium nucleus mass ≈4.0015 u.]

10. The speed of a wave in a certain medium is 960 m/sec. If 3600 waves pass over a certain point of the medium in 1 minute, the wavelength is:
(a) 2 metres **(b)** 4 metres **(c)** 8 metres **(d)** 16 metres

11. Which of the following statement is false for the properties of electromagnetic waves?
(a) both electric and magnetic field vectors attain the maxima and minima at the same place and same time.
(b) The energy in electromagnetic wave is divided equally between electric and magnetic vectors.
(c) Both electric and magnetic field vectors are parallel to each other and perpendicular to the direction of propagation of wave.
(d) These waves do not require any material medium for propagation.

12. Point masses m_1 and m_2 are placed at the opposite ends of a rigid rod of length L, and negligible mass. The rod is to be set rotating about an axis perpendicular to it. The position of point P on this rod through which the axis should pass so that the work required to set the rod rotating with angular velocity ω_0 is minimum is given by:



(a) $x = \dfrac{m_2 L}{m_1}$ **(b)** $x = \dfrac{m_2 L}{(m_1 + m_2)}$

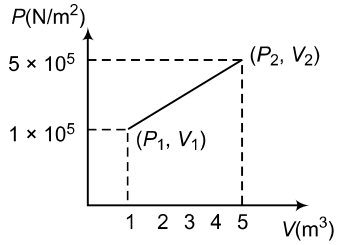
(c) $x = \dfrac{m_1 L}{m_1 + m_2}$ **(d)** $x = \dfrac{m_1}{m_2 L}$

13. A parallel plate air capacitor of capacitance C is connected to a cell of emf V and then disconnected from it. A dielectric slab of dielectric constant K, which can just fill the air gap of the capacitor, is now inserted in it. Which of the following is incorrect?
(a) The change in energy stored is $\frac{1}{2}CV^2\left(\frac{1}{K} - 1\right)$
(b) The charge on the capacitor is not conserved

(c) The potential difference between the plates decreases K times.
(d) The energy stored in the capacitor decreases K times.

14. Joule × s is the unit of:
(a) Momentum **(b)** Energy
(c) Angular Velocity **(d)** Plank's constant

15. A system changes from the state (P_1, V_1) to (P_2, V_2) as shown in the figure. What is the work done by the system?



(a) 7.5×10^5 joule **(b)** 7.5×10^5 erg
(c) 12×10^5 joule **(d)** 6×10^5 joule

16. Two discs of same moment of inertia rotating about their regular axis passing through centre and perpendicular to the plane of disc with angular velocities ω_1 and ω_2. They are brought into contact face to face coinciding the axis of rotation. The expression for loss of energy during this process is:

(a) $\frac{1}{4}\,I(\omega_1-\omega_2)^2$ **(b)** $I(\omega_1-\omega_2)^2$

(c) $\frac{1}{8}(\omega_1-\omega_2)^2$ **(d)** $\frac{1}{2}\,I(\omega_1+\omega_2)^2$

17. Two particles of masses m_1, m_2 move with initial velocities u_1 and u_2. On collision, one of the particles get excited to higher level, after absorbing energy ε. If final velocities of particles be v_1 and v_2 then we must have:

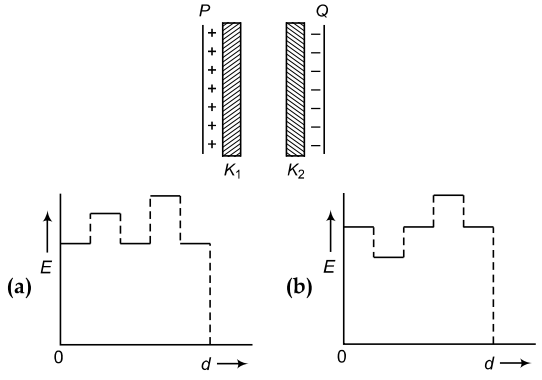
(a) $\frac{1}{2}m_1u_1^2+\frac{1}{2}m_2u_2^2-\varepsilon=\frac{1}{2}m_1v_1^2+\frac{1}{2}m_2v_2^2$

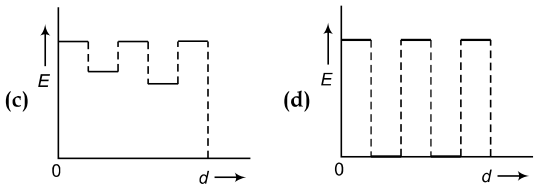
(b) $\frac{1}{2}m_1^2u_1^2+\frac{1}{2}m_2^2u_2^2+\varepsilon=\frac{1}{2}m_1^2v_1^2+\frac{1}{2}m_2^2v_2^2$

(c) $m_1^2u_1+m_2^2u_2-\varepsilon=m_1^2v_1+m_2^2v_2$

(d) $\frac{1}{2}m_1u_1^2+\frac{1}{2}m_2u_2^2=\frac{1}{2}m_1v_1^2+\frac{1}{2}m_2v_2^2-\varepsilon$

18. Two thin dielectric slabs of dielectric constants K_1 and K_2 ($K_1 < K_2$) are inserted between plates of a parallel plate capacitor, as shown in the figure. The variation of electric field 'E' between the plates with distance 'd' as measured from plate P is correctly shown by:





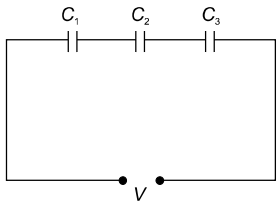
19. Which of the following statements does not form part of Bohr's model of the hydrogen atom:
(a) Energy of the electrons in the orbit is quantized
(b) The electron in the orbit nearest the nucleus has the lowest energy
(c) Electrons revolve in different orbits around the nucleus
(d) The position and velocity of the electrons in the orbit cannot be determined simultaneously

20. If we study the vibration of a pipe open at both ends, then the following statement is not true:
(a) Pressure change will be maximum at both ends
(b) Open ends will be antinode
(c) Odd harmonics of the fundamental frequency will be generated
(d) All harmonics of the fundamental frequency will be generated

21. The bulk modulus of a spherical object is 'B'. If it is subjected to uniform pressure 'p', the fractional decrease in radius is:
(a) $\frac{B}{3p}$ **(b)** $\frac{3p}{B}$ **(c)** $\frac{p}{3B}$ **(d)** $\frac{p}{B}$

22. An air bubble in a glass slab with refractive index 1.5 (near normal incidence) is 5 cm deep when viewed from one surface and 3 cm deep when viewed from the opposite face. The thickness (in cm) of the slab is:
(a) 8 **(b)** 10 **(c)** 12 **(d)** 16

23. In the figure, three capacitors each of capacitance 6 pF are connected in series. The total capacitance of the combination will be:



(a) 9×10^{-12} F **(b)** 6×10^{-12} F
(c) 3×10^{-12} F **(d)** 2×10^{-12} F

24. Linear acceleration of a uniform disc rolling down without slipping on a fixed inclined plane of inclination 30 degrees with horizontal is [g=acceleration due to gravity]

(a) g **(b)** $\frac{2g}{3}$ **(c)** $\frac{g}{2}$ **(d)** $\frac{g}{3}$

25. A gas is suddenly compressed to 1/4 th of its original volume at normal temperature. The increase in its temperature ($\gamma = 1.5$) is:
(a) 273 K **(b)** 573 K **(c)** 373 K **(d)** 473 K

26. In p-n junction:
(a) The potential of the p and n side becomes higher alternately.
(b) The p-side is at higher electrical potential than the n-side.
(c) The n-side is at higher electrical potential than the p-side.
(d) Both the p and n sides are at the same potential.

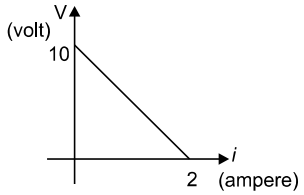
27. If an H-nucleus is completely converted into energy, the energy produced will be around.
(a) 1 MeV **(b)** 939 MeV **(c)** 9.39 MeV **(d)** 238 MeV

28. A gas undergoes a process in which the pressure and volume are related by VP^n = constant. The bulk modulus of the gas is:
(a) nP **(b)** $P^{1/n}$ **(c)** P/n **(d)** P^n

29. **Statement I:** The rocket works on the principle of conservation of linear momentum.
Statement II: Whenever there is the change in momentum of one body, the same change occurs in the momentum of the second body of the same system (having two bodies only) but in opposite direction.
Select the correct option.
(a) Both the statements are correct and statement II correctly explains statement I
(b) Statement I is wrong
(c) Statement II is wrong
(d) Both the statements are correct but Statement II does not correctly explains statement I.

30. If the velocity of a particle is $v = At + Bt^2$, where A and B are constants, then the distance travelled by it between 1 s and 2 s:
(a) A/2+B/3 **(b)** 3/2 A+4 B
(c) 3A + 7B **(d)** 3/2 A+7/3 B

31. A battery of emf E and internal resistance r is connected across a resistance R. Resistance R can be adjusted to any value greater than or equal to zero. A graph is plotted between the current (i) passing through the resistance and potential difference (V) across it. Select the correct alternative(s):



(a) internal resistance of battery is 5Ω
(b) emf of the battery is 20V
(c) maximum current which can be taken from the battery is 4A
(d) V-i graph can never be a straight line as shown in figure

32. This question has Statement I and Statement II. Of the four choices given after the statement, choose the one that best describes the two statements.
Statement I: Total torque on a system is independent of the origin if the total external force is zero.
Statement II: Torque due to couples is independent of the origin.
(a) Statement I is true, Statement II is true and Statement II is the correct explanation of Statement I
(b) Statement I is true, Statement II is true, but Statement II is not the correct explanation of Statement I
(c) Statement I is true, Statement II is false
(d) Statement I is false, Statement II is true

33. The momentum of the photon of wavelength 5000 will be:
(a) 1.3×10^{-27} kg-m/s **(b)** 1.3×10^{-28} kg-m/s
(c) 4×10^{29} kg-m/s **(d)** 4×10^{-18} kg-m/s

34. A person standing in a stationary lift drops a coin from a certain height h. It takes a time of t seconds to reach the floor of the lift. If the lift is rising up with a uniform acceleration 'a', the the time taken by the coin dropped from the same height 'h' to reach the floor will be
(a) t **(b)** $t\left(1+\frac{a}{g}\right)^{\frac{1}{2}}$
(c) $t\left(1+\frac{a}{g}\right)^{-\frac{1}{2}}$ **(d)** $t\left(1-\frac{a}{g}\right)^{\frac{1}{2}}$

35. Magnifying power of a simple microscope is 3 when the image is formed at the least distance of distinct vision (25 cm). The focal length f of lens is (in cm)
(a) 12.5 **(b)** 25
(c) 50 **(d)** $25 < f < 50$

Section B

36. Two wires are made of the same material and have the same volume. The first wire has cross-sectional area A and the second wire has cross-sectional area 3A. If the length of the first wire is increased by Δx on applying a force F, how much force is needed to stretch the second wire by the same amount?
(a) 9 F **(b)** 6 F **(c)** 4 F **(d)** F

37. The mass of α-particle is:
(a) less than the sum of masses of two protons and two neutrons.
(b) equal to mass of four protons.
(c) equal to mass of four neutrons.
(d) equal to sum of masses of two protons and two neutrons.

38. Surface tension of water at its boiling point is:
(a) Infinity
(b) Zero
(c) Same as at room temperature
(d) Large and finite value

39. If 10 g of ice is added to 40 g of water at 45°C then temperature of the mixture (specific heat of water $=4.2 \times 10^3$ Jkg^{-1} K^{-1}, latent heat of water = 3.36 × 105 J kg^{-1}) is:
(a) 15°C **(b)** 12°C **(c)** 10°C **(d)** 0°C

40. Magnetic field due to 0.1 A current flowing through a circular coil of radius 0.1 m and 1000 turns at the centre of the coil is:
(a) 0.2 T **(b)** 2×10^{-4} T
(c) 6.28×10^{-4} T **(d)** 9.8×10^{-4} T

41. A stone is projected in air. Its time of flight is 3 s and its range is 150 m. Maximum height attained by the stone is (Take $g = 10$ m/s^2)
(a) 37.5 m **(b)** 22.5 m **(c)** 50 m **(d)** 11.25 m

42. A pendulum bob on a 2 m string is displaced 60° from vertical and then released. What is the speed of the bob as it passes through the lowest position.
(a) $\sqrt{2}$ m/s **(b)** $\sqrt{9.8}$ m/s
(c) 4.43 m/s **(d)** $\frac{1}{\sqrt{2}}$ m/s

43. The escape velocity on a planet is 10 m/s. If a body is projected from the surface of planet with twice the escape speed then the speed of body far away from the planet is
(a) 10 m/s **(b)** 12.5 m/s **(c)** 15 m/s **(d)** 17.5 m/s

44. A particle executes S.H.M. with an amplitude of 2 cm. When the particle is at 1 cm from mean position, the magnitude of its velocity is equal to that of its acceleration. Then its time period in seconds is.

(a) $\frac{1}{2\pi\sqrt{3}}$ (b) $2\pi\sqrt{3}$ (c) $\frac{2\pi}{\sqrt{3}}$ (d) $\frac{\sqrt{3}}{2\pi}$

45. A horizontal platform with an object placed on it is performing S.H.M. in vertical direction. The amplitude of oscillation is 4×10^{-3} m. What must be the least period of those oscillations so that the object is not detached from the platform?

(a) $\frac{\pi}{25}s$ (b) $\frac{\pi}{}s$ (c) $\frac{\pi}{10}s$ (d) $\frac{\pi}{50}s$

46. Equal charge q each are placed at the vertices A and B of an equilateral triangle of side 'a'. The magnitude of electric field at point C is.

(a) $\frac{q}{4\pi\varepsilon_0 a^2}$ (b) $\frac{\sqrt{2}q}{4\pi\varepsilon_0 a^2}$ (c) $\frac{\sqrt{3}q}{4\pi\varepsilon_0 a^2}$ (d) $\frac{q}{\pi\varepsilon\ a}$

47. If a magnet of length L and magnetic moment M is bent in form of a semicircle, then the magnetic moment will become.

(a) $\frac{M}{2}$ (b) 2 M (c) $\frac{M}{\pi}$ (d) $\frac{2M}{\pi}$

48. In a series L-C-R circuit the voltage across resistance, capacitance and inductance is 10 V each. If the capacitance is short circuited, the voltage across inductance will be

(a) 10 V (b) $10\sqrt{2}$ V (c) $\frac{10}{\sqrt{2}}$ V (d) $\frac{5}{\sqrt{2}}$ V

49. In Young's experiment one of the slits is covered with a transparent sheet of thickness 3.6×10^{-3} cm due to which position of central bright fringe shifts to a position occupied by 30th bright fringe. If $\lambda = 6000$ Å , find refractive index of sheet

(a) 1.5 (b) 1.2 (c) 1.4 (d) 1.6

50. In Young's double slit experiment the ratio of maximum and minimum intensities in the fringe system is 9 : 1. The ratio of amplitude of coherent sources is

(a) 9 : 1 (b) 3 : 1 (c) 2 : 1 (d) 1 : 1

CHEMISTRY

Section A

51. Which of the following pairs of d-orbitals will have electron density along the axes?

(a) d_{z^2}, d_{xz} (b) d_{xz}, d_{yz}
(c) d_{z^2}, $d_{x^2-y^2}$ (d) d_{xy}, $d_{x^2-y^2}$

52. In the reaction,

$$H{-}C{\equiv}CH \xrightarrow[(ii)\ CH_3CH_2Br]{(i)\ NaNH_2/liq.\ NH_3} X \xrightarrow[(ii)\ CH_3CH_2Br]{(i)\ NaNH_2/liq.\ NH_3} Y$$

X and Y are:

(a) X = 2-butyne, Y = 2-hexyne
(b) X = 1-butyne, Y = 2-hexyne
(c) X = 1-butyne, Y = 3-hexyne
(d) X = 2-butyne, Y = 3-hexyne

53. The type of isomerism shown by the complex $[CoCl_2(en)_2]$ is:

(a) Ionization isomerism (b) Coordination isomerism
(c) Geometrical isomerism (d) Linkage isomerism

54. Identify the correct order of solubility in aqueous medium.

(a) CuS > ZnS > Na_2S (b) ZnS > Na_2S > CuS
(c) Na_2S > CuS > ZnS (d) Na_2S > ZnS > CuS

55. What about degeneracy of 2p orbitals in a magnetic field?

(a) No degenerate orbital
(b) Three degenerate orbital
(c) Two degenerate orbital
(d) Cannot be stated any thing about degeneracy

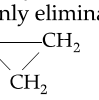
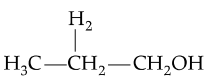
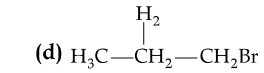
56. An example of a sigma bonded organometallic compound is:

(a) Ruthenocene (b) Grignard's reagent
(c) Ferrocene (d) Cobaltocene

57. If Avogadro number N_A is changed from 6.022×10^{23} mol^{-1} to 6.022×10^{20} mol^{-1}, this would change:

(a) the mass of one mole of carbon.
(b) the ratio of chemical species to each other in a balanced equation.
(c) the ratio of elements to each other in a compound.
(d) the definition of mass in units of grams.

58. Which of the following compounds shall not produce propene by reaction with HBr followed by elimination or direct only elimination reaction?

(a) 
(b) 
(c) $H_2C{=}C{=}O$ (d) 

59. The reason for greater range of oxidation states in actinoids is attributed to:

(a) The radioactive nature of actinoids.
(b) Actinoid contraction.
(c) 5f, 6d and 7s levels having comparable energies.
(d) 4f and 5d levels being close in energies.

60. A metal carbonate (0.5 kg) gives 0.28 kg of its oxide on heating. Hence, the equivalent weight of metal is:

(a) 20 g eq^{-1} (b) 40 g eq^{-1} (c) 25 g eq^{-1} (d) 30 g eq^{-1}

61. The metal used for making X-ray tube window is:

(a) Na (b) Be (c) Mg (d) Ca

62. The electronic configurations of Eu (Atomic No. 63), Gd (Atomic No. 64) and Tb (Atomic No. 65) are :

(a) [Xe] $4f^6\ 5d^1\ 6s^2$, [Xe] $4f^7\ 5d^1\ 6s^2$ and [Xe] $4f^8\ 5d^1\ 6s^2$
(b) [Xe] $4f^7\ 6s^2$, [Xe] $4f^7\ 5d^1\ 6s^2$ and [Xe] $4f^9\ 6s^2$
(c) [Xe] $4f^7\ 6s^2$, [Xe] $4f^8\ 6s^2$ and [Xe] $4f^8\ 5d^1\ 6s^2$
(d) [Xe] $4f^6\ 5d^1\ 6s^2$, [Xe] $4f^7\ 5d^1\ 6s^2$ and [Xe] $4f^9\ 6s^2$

63. The atomic number of some elements are given. Mark an element that belongs to d-block and have maximum 24 electrons with same spin.

(a) 38 (b) 41 (c) 47 (d) 51

64. The correct statement regarding the comparison of staggered and eclipsed conformations of ethane is :

(a) the eclipsed conformation of ethane is more stable than staggered conformation even though the eclipsed conformation has torsional strain.
(b) the staggered conformation of ethane is more stable than eclipsed conformation, because staggered conformation has no torsional strain.
(c) the staggered conformation of ethane is less stable than eclipsed conformation, because staggered conformation has torsional strain.
(d) the eclipsed conformation of ethane is more stable than staggered conformation, because eclipsed conformation has no torsional strain.

65. Assuming complete ionization, same moles of which of the following compounds will require the least amount of acidified $KMnO_4$ for complete oxidation?

(a) $FeSO_4$ (b) $FeSO_3$ (c) FeC_2O_4 (d) $Fe(NO_2)_2$

66. If the equilibrium constant for:
$N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$ is K,
the equilibrium constant for:
$\frac{1}{2}N_2(g) + \frac{1}{2}O_2(g) \rightleftharpoons NO(g)$ will be:
(a) $\frac{1}{2}K$ **(b)** K **(c)** K^2 **(d)** $K^{1/2}$

67. In which of the following reactions hybridisation of underlined species is not changing?
(a) $NH_3 + H^+ \rightarrow NH_4^+$ **(b)** $BF_3 + F^- \rightarrow BF_4^-$
(c) $C_2H_2 + H_2 \rightarrow C_2H_6$ **(d)** All of these

68. The correct statement regarding a carbonyl compound with a hydrogen atom on its alpha-carbon, is:
(a) a carbonyl compound with a hydrogen atom on its alpha carbon rapidly equilibrates with its corresponding enol and this process is known as carbonylation.
(b) a carbonyl compound with a hydrogen atom on its alpha carbon rapidly equilibrates with its corresponding enol and this process is known as *keto-enol* tautomerism.
(c) a carbonyl compound with a hydrogen atom on its alpha-carbon never equilibrates with its corresponding enol.
(d) a carbonyl compound with a hydrogen atom on its *alpha*-carbon rapidly equilibrates with tis corresponding enol and this process is known as aldehyde-ketone equilibration.

69. Bond dissociation enthalpy of H_2, Cl_2 and HCl are 434, 242 and 431 kJ mol^{-1} respectively. Enthalpy of formation of HCl is:
(a) 93 kJ mol^{-1} **(b)** –245 kJ mol^{-1}
(c) –93 kJ mol^{-1} **(d)** 245 kJ mol^{-1}

70. Base strength of:
(i) $H_3C—\bar{C}H_2$ (ii) $CH_2{=}{=}\bar{C}H$ (iii) $H—C{\equiv}\bar{C}$
is in the order of:
(a) (ii) > **(i)** > (iii) **(b)** (iii) > (ii) > **(i)**
(c) **(i)** > (iii) > (ii) **(d)** **(i)** > (ii) > (iii)

71. Two possible stereo-isomers of $CH_3CHOHCOOH$, which are optically active, are called:
(a) atropoisomers **(b)** enantiomers
(c) mesomers **(d)** diastereomers

72. Number of possible isomers for the complex $[Co(en)_2Cl_2]Cl$ will be (en = ethylene diamine):
(a) 2 **(b)** 1 **(c)** 3 **(d)** 4

73. The temperature dependence of rate constant (k) of a chemical reaction is written in terms of Arrhenius equation, $k = Ae^{-Ea^*/RT}$. Activation energy (E*) of the reaction can be calculated by plotting:
(a) $\log k$ vs $\frac{1}{T}$ **(b)** $\log k$ vs $\frac{1}{\log T}$
(c) k vs T **(d)** k vs $\frac{1}{\log T}$

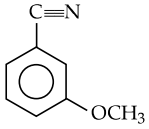
74. Name the type of the structure of silicate in which one oxygen atom of $[SiO_4]^{4-}$ is shared?
(a) Sheet silicate
(b) Pyrosilicate
(c) Three dimensional silicate
(d) Linear chain silicate

75. The energy of second Bohr orbit of the hydrogen atom is –328 kJ mol^{-1}, hence the energy of fourth Bohr orbit would be:
(a) –41 kJ mol^{-1} **(b)** –1312 kJ mol^{-1}
(c) –164 kJ mol^{-1} **(d)** –82 kJ mol^{-1}

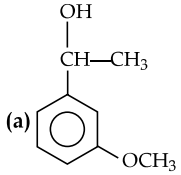
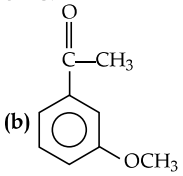
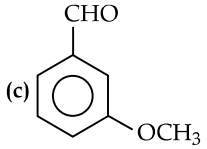
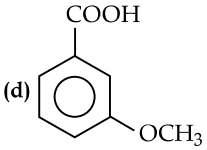
76. The dissociation equilibrium of a gas AB_2 can be represented as $2AB_2(g) \rightleftharpoons 2AB(g) + B_2(g)$
The degree of dissociation is x and is small compared to 1. The expression relating the degree of dissociation (x) with equilibrium constant K_P and total pressure P is:
(a) $(2K_p/P)$ **(b)** $(2K_p/P)^{1/3}$ **(c)** $(2K_p/P)^{1/2}$ **(d)** (K_p/P)

77. Standard electrode potential for Sn^{4+}/Sn^{2+} couple is +0.15 V and that for the Cr^{3+}/Cr couple is –0.74. These two couples in their standard state are connected to make a cell. The cell potential will be:
(a) +0.89 V **(b)** +0.18 V **(c)** +1.83 V **(d)** +1.199 V

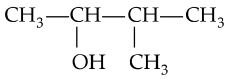
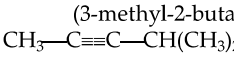
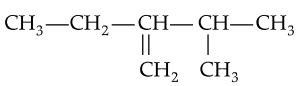
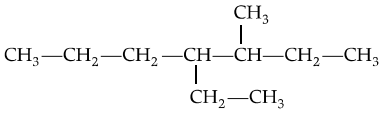
78. For the reaction,
$C_7H_8(l) + 9O_2(g) \rightarrow 7CO_2(g) + 4H_2O(l)$
the calculated heat of reaction is 232 kJ mol^{-1} and observed heat of reaction is 50.4 kJ mol^{-1}, then the resonance energy is:
(a) –181.6 kJ mol^{-1} **(b)** +181.6 kJ mol^{-1}
(c) 172 kJ mol^{-1} **(d)** –172 kJ mol^{-1}

79.  + $CH_3MgBr/H_3O^+ \rightarrow P$

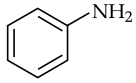
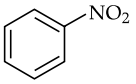
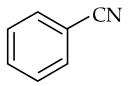
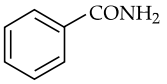
Product P in the above reaction is:

(a) 
(b) 
(c) 
(d) 

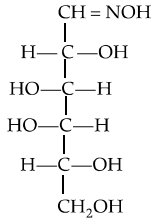
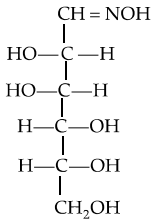
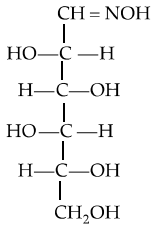
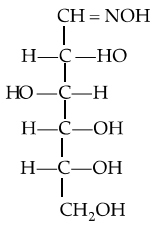
80. A solution of acetone in ethanol:
(a) shows a negative deviation from Raoult's law.
(b) shows a positive deviation from Raoult's law.
(c) behaves like a near ideal solution.
(d) obeys Raoult's law.

81. Names of some compounds are given, which one is not the correct naming in IUPAC system?
(a) 
(3-methyl-2-butanol)
(b) 
(4-methyl -2-pentyne)
(c) 
(2-ethyl-3-methyl but-1-ene)
(d) 
(3-methyl-4-ethyl heptane)

82. A given nitrogen-containing aromatic compound 'A' reacts with Sn/HCl, followed by HNO_2 to give an unstable compound 'B'. 'B', on treatment with phenol, forms a beautiful coloured compound 'C' with the molecular formula $C_{12}H_{10}N_2O$. The structure of compound 'A' is:

(a) 
(b) 
(c) 
(d) 

83. D-(+)-glucose reacts with hydroxylamine and yields an oxime. The structure of the oxime would be:

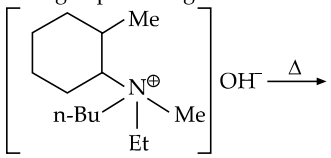
(a) 
(b) 
(c) 
(d) 

84. The equilibrium constant (Kp) for the reaction,
$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$ at 1000 K is 3.5 atm^{-1}
What would be the partial pressure of oxygen gas, if the equilibrium is found to have equal moles of SO_2 and SO_3?
(a) 0.35 atm **(b)** 3.5 atm **(c)** 2.85 atm **(d)** 0.285 atm

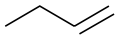
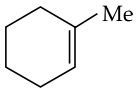
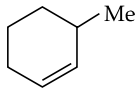
85. The plot of concentration of the reactant versus time for a reaction is a straight line with a negative slope. This reaction follows:
(a) zero order rate equation.
(b) first order rate equation.
(c) second order rate equation.
(d) third order rate equation.

Section B

86. Which of these statements about $[Co(CN)_6]^{3-}$ is true?
(a) $[Co(CN)_6]^{3-}$ has no unpaired electrons and will be in a low spin configuration.
(b) $[Co(CN)_6]^{3-}$ has four unpaired electrons and will be in a low spin configuration.
(c) $[Co(CN)_6]^{3-}$ has four unpaired electrons and will be in a high spin configuration.
(d) $[Co(CN)_6]^{3-}$ has no unpaired electrons and will be in a high-spin configuration.

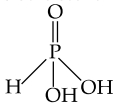
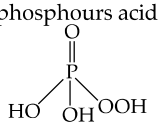
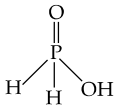
87. 

The alkene formed as a major product in the above elimination reaction is:

(a) 
(b) 
(c) 
(d) 

88. Which of the following is not iso-structural with $SiCl_4$?
(a) SCl_4 **(b)** SO_4^{2-} **(c)** PO_4^{3-} **(d)** NH_4^+

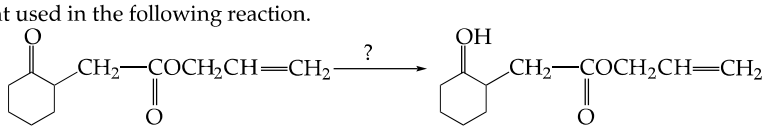
89. The structural formula of hypophosphours acid is:

(a) 
(b) 
(c) 
(d) None of these

90. The intermediate during the addition of HCI to propene in the presence of peroxide is:
(a) $CH_3 - \dot{C}H - CH_2Cl$ **(b)** $CH_3 - \overset{\oplus}{C}H - CH_3$
(c) $CH_3 - CH_2 - \overset{\oplus}{C}H_2$ **(d)** $CH_3 - CH_2 - \dot{C}H_2$

91. The quantity of electricity required to reduce 12.3 g of nitro benzene to aniline assuming 50% current efficiency is:
(a) 115800 C **(b)** 57900 C **(c)** 231600 C **(d)** 28950 C

92. Identify the reagent used in the following reaction.

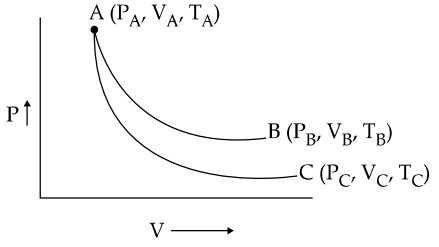


(a) $NaBH_4$ **(b)** $LiAlH_4$ **(c)** DIBAL-H **(d)** H_2/Raney Ni

93. Choose the incorrect statement among the given options.
(a) Ammonia acts as a mild reducing agent while BiH_3 acts as a strongest reducing agent among all the hydrides of group 15.
(b) Nitrogen can't form $p\pi$-$p\pi$ bond but can form $d\pi$-$p\pi$ bond.
(c) Pentahalides of group 15 elements are more covalent than trihalides.
(d) Nitrogen can maximum expands its covalency upto 4 while all other elements can expand to 5.

94. What will be the hydroxide ion concentration when equal volumes of 0.1 M NaOH and 0.01 M HCl are mixed together.
(a) 12.65 **(b)** 7.0 **(c)** 1.04 **(d)** 2.0

95. Following figure shows reversible expansion of an ideal gas under isothermal and adiabatic conditions are as shown in the figure.



AB → Isothermal expansion

AC → Adiabatic expansion

Which of the following statement is not correct?

(a) $\Delta S_{isothermal} > \Delta S_{adiabatic}$ **(b)** $T_A = T_B$

(c) $W_{isothermal} > W_{adiabatic}$ **(d)** $T_C > T_A$

96. Choose the correct order of M—H bond dissociation enthalpy of group 16 members.

(a) $H_2Se > H_2Te > H_2S > H_2O$

(b) $H_2S > H_2O > H_2Te > H_2Se$

(c) $H_2S > H_2O > H_2Te > H_2Se$

(d) $H_2O > H_2S > H_2Se > H_2Te$

97. Standard cell voltage for the cell $Pb/Pb^{2+}||Sn^{2+}/Sn$ is –0.01 V If the cell is to exhibit $E_{cell} = 0$, the value of log $[Sn^{2+}]/[Pb^{2+}]$ should be:

(a) 0.33 **(b)** 0.5 **(c)** 1.5 **(d)** –05

98. Given two statements.

Statement 1: In the hydrolysis of tertiary butyl chloride by S_N1 mechanism, the rate determining step is the ionisation of tertiary butyl chloride leading to the formation of carbocation.

Statement 2: S_N1 reaction is the first order reaction whose rate is independent of the concentration of nucleophile.

Choose the correct answer from the options given below.

(a) Statement 1 is incorrect but statement 2 is true.

(b) Both statement 1 and statement 2 are true.

(c) Both statement 1 and statement 2 are false.

(d) Statement 1 is correct but statement 2 is false.

99. What will be the emf of the given cell?

$$Pt\,|\,H_{2(P1)}\,|\,H^+_{(aq)}\,|\,H_{2(P2)}\,|\,Pt$$

(a) $\frac{RT}{F}\ln\frac{P_1}{P_2}$ **(b)** $\frac{RT}{2F}\ln\frac{P_1}{P_2}$ **(c)** $\frac{RT}{F}\ln\frac{P_2}{P_1}$ **(d)** $\frac{RT}{2F}\ln\frac{P_2}{P_1}$

100. Which of the following order is not in accordance with property stated against it.

(a) $F_2 > Cl_2 > Br_2 > I_2$ (Oxidising power)

(b) HI > HBr> HCl> HF (acidic property in water)

(c) $F_2 > Cl_2 > Br_2 > I_2$ (electronegativity)

(d) $F_2 > Cl_2 > Br_2 > I_2$ (Bond dissociation energy)

BOTANY

Section A

101. The alga which can be employed as food for human beings is:

(a) *Chlorella* **(b)** *Spirogyra*

(c) *Polysiphonia* **(d)** *Ulothrix*

102. Spindle fibres attach on to:

(a) Kinetosome of the chromosome.

(b) Telomere of the chromosome.

(c) Kinetochore of the chromosome.

(d) Centromere of the chromosome.

103. Which one of the following is considered important in the development of seed habit?

(a) Heterospory **(b)** Halplontic life cycle

(c) Free-living gametophyte **(d)** Dependent sporophyte

104. A free living nitrogen fixing cyanobacterium which also form symbiotic association with the water fern *Azolla* is:

(a) *Tolypothrix* **(b)** *Chlorella*

(c) *Nostoc* **(d)** *Anabaena*

105. Which of the following is true regarding DNA fragments during gel electrophoresis?

(a) Larger the fragment size, the farther it moves.

(b) Osmium chloride can be used for visualization during gel electrophoresis.

(c) DNA fragments migrate towards the anode.

(d) Bees wax can be used as matrix.

106. During replication, Okazaki fragments elongate:

(a) leading strand towards the replication fork.

(b) lagging strand towards the replication fork.

(c) leading strand away from the replication fork.

(d) lagging strand away from the replication fork.

107. It takes very long time for pineapple plant to produce flowers. Which combination of hormones can be applied to artificially induce flowering in pineapple plants throughout the year to increase yield?

(a) Gibberellin and Cytokinin.

(b) Gibberellin and Abscisic acid.

(c) Cytokinin and Abscisic acid.

(d) Auxin and Ethylene.

108. T.O. Diener discovered:

(a) Free infectious protein **(b)** Free infectious DNA

(c) Free infectious RNA **(d)** Bacteriophage

109. Pollen tablets available in the markets are for:

(a) Breeding programme **(b)** Supplementary food

(c) *Ex situ* conservation **(d)** *In vitro* fertilization

110. Perigynous flowers are found in:

(a) Rose **(b)** Guava

(c) Cucumber **(d)** China rose

111. Which of the following statements are correct with respect to mitochonodrial matrix?

I. It possesses single circular DNA molecule.

II. It possesses few RNA molecules.

III. It possesses ribosomes (70S).

IV. It possesses 80S ribosomes.

Choose the correct option.

(a) I and III are correct **(b)** II and IV are correct

(c) III and IV are correct **(d)** I, II and III are correct

112. Choose the correctly written scientific name of Mango which was first described by Carolus Linnaeus

(a) *Mangifera Indica*

(b) *Mangifera indica* Car. Linn.

(c) *Mangifera indica* Linn.

(d) *Mangifera indica*

113. Which of the following is not common in C_3 and C_4 plants?

(a) Calvin cycle **(b)** Carbon fixation

(c) Krebs' cycle **(d)** Photorespiration

114. Which of the given hormone is an adenine derivative?

(a) IAA **(b)** GA_3 **(c)** Zeatin **(d)** ABA

115. If *E. coli* growing medium has lactose, then:

(a) Repressor will bind to inducer.

(b) There will be no synthesis of repressor protein.

(c) There will be no synthesis of enzymes of structural genes.

(d) Repressor will bind to operator.

116. Radial symmetry is found in the flowers of:

(a) *Cassia* **(b)** *Brassica* **(c)** *Trifolium* **(d)** *Pisum*

117. In S-phase of cell cycle:

(a) Amount of DNA remains same in each cell.

(b) Chromosome number is increased.

(c) Amount of DNA is reduced to half in each cell.

(d) Amount of DNA doubles in each cell.

118. Choose the odd one out with respect to method of gene transfer:
(a) DNA microinjection
(b) RNA interference
(c) Retrovirus mediated gene transfer
(d) Gene gun

119. Pellicle in Euglenoids is:
(a) Rigid proteinaceous bilayer.
(b) Proteinaceous, layer present outside the cell wall.
(c) Found inside the cell membrane, unstriped, flexible.
(d) Proteinaceous and flexible.

120. Which of the following features is not associated with centrioles?
(a) Helps in formation of basal body.
(b) Helps in spindle formation.
(c) '9 + 0' arrangement of microtubules.
(d) Surrounded by membrane.

121. Moss peat is used as a packing material for sending flowers and live plants to distant places because:
(a) It is easily available.
(b) It is hygrospcopic.
(c) It reduces transpiration.
(d) It serves as a disinfectant.

122. Select the correct option with respect to mitosis:
(a) Chromosomes move to the spindle equator and get aligned along the equatorial plate in metaphase.
(b) Chromatids separate but remain in the centre of the cell in anaphase.
(c) Chromatids start moving towards opposite poles in telophase.
(d) Golgi complex and endoplasmic reticulum are still visible at the end of prophase.

123. The historic convention on Biological Diversity held in Rio de Janerio in 1992 is known as:
(a) CITES
(b) The Earth Summit
(c) Biosphere Reserve Programme
(d) MAB programme

124. Energy required for ATP synthesis in PS II comes from:
(a) Proton gradient **(b)** Electron gradient
(c) Reduction of glucose **(d)** Oxidation of glucose

125. A dioecious flowering plant prevents:
(a) Autogamy and geitonogamy
(b) Geitonogamy and xenogamy
(c) Cleistogamy and xenogamy
(d) Autogamy and xenogamy

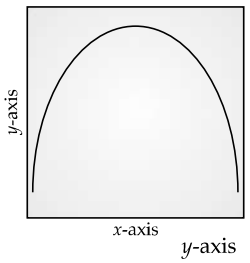
126. Which of the following would be necessary to decrease the density of a population in a habitat?
(a) Natality > Mortality
(b) Immigration > Emigration
(c) Mortality and Emigration
(d) Natality and Immigration

127. The guts of cow and buffalo possess:
(a) *Cyanobacteria* **(b)** *Fucus* spp.
(c) *Chlorella* spp. **(d)** Methanogens

128. DNA dependent RNA polymerase catalyses transcription on one strand of DNA which is called the:
(a) Antistrand **(b)** Template strand
(c) Coding strand **(d)** Alpha strand

129. Which of the following cell organelles are present in the highest number in secretory cells?
(a) Mitochondria **(b)** Golgi complex
(c) Chloroplast **(d)** Lysosomes

130. The curve given below show enzymatic activity with relation to three conditions (pH, temperature and substrate concentration). What do the two axes (x and y) represent?



x-axis	y-axis
(a) Enzymatic activity	Temperature
(b) Enzymatic activity	pH
(c) Temperature	Enzyme activity
(d) Substrate Concentration	Enzymatic activity

131. Apomictic embryos is *Citrus* arise from:
(a) Diploid egg
(b) Synergids
(c) Maternal Sporophytic tissues in ovule
(d) Antipodal cells

132. In the enveloped virus like HIV, the envelope is made up of lipid, protein and carbohydrates which are derived from:
(a) Host cell, Host cell, virus respectively.
(b) Virus, Host cell, virus respectively.
(c) Virus, Host cell, Host cell respectively.
(d) Host cell, Virus, Host cell respectively.

133. Which of the following organism is correctly matched with its particular category?
(a) *Trichoderma* – Biocontrol agent
(b) *Baculovirus* – Bioherbicide
(c) *Rotenone* – Biofertiliser
(d) *Bacillus thuringiensis* – Biofungicide

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

Statement A: On the chromosomal linkage map of pea plant, two genes A and B are located far from each other. When AABB and aabb genotypes are hybridised then F_2 - generation will show higher number of recombinant types.

Statement B: When the genes are loosely linked or the distance between them is considerable, then there are higher chances of recombination or non-parental features.

(a) Only statement A is incorrect.
(b) Only statement B is incorrect.
(c) Both statements A and B are correct.
(d) Both statements A and B are incorrect.

135. The main arena of various types of activities of a cell is:
(a) Nucleus
(b) Plasma membrane
(c) Mitochondrion
(d) Cytoplasm

Section B

136. In an ecosystem, the rate of production of organic matter during photosynthesis is termed as:
(a) Net primary productivity
(b) Gross primary productivity
(c) Secondary productivity
(d) Net Productivity

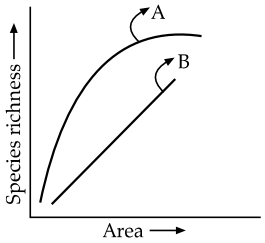
137. In presence of high concentration of oxygen, RuBP carboxylase converts RuBP to ……
(a) Malic acid and PEP
(b) PGA and PEP
(c) PGA and malic acid
(d) PGA and phosphoglycolate

138. Which of the following is one of the most problematic aquatic weed of India?
(a) *Parthenium* **(b)** *Azolla* **(c)** *Eichhornia* **(d)** *Rauwolfia*

139. The dead component of phloem is:
(a) Phloem parenchyma **(b)** Phloem fibres
(c) Sieve tube elements **(d)** Companion cells

140. The removal of large pieces of floating debris, oily substances, etc. during sewage treatment is called:
(a) primary treatment
(b) secondary treatment
(c) final treatment
(d) amplification

141. Observe the graph and select correct option.



(a) Line A represents, S = CA2
(b) Line B represents, log C = log A + Z log S
(c) Line A represents, S = CAZ
(d) Line B represents, log S = log Z + C log A

142. Radial vascular bundles are seen in:
(a) root **(b)** stem **(c)** leaf **(d)** flower

143. Which of the following features is shown by insect pollinated flowers?
(a) Sticky pollens with rough surface
(b) Large quantities of pollens
(c) Dry pollens with smooth surface
(d) Light coloured pollens

144. Which of the following events does not occur in rough endoplasmic reticulum?
(a) Protein folding
(b) Phospholipid synthesis
(c) Cleavage of signal peptide
(d) Protein glycosylation

145. _____ are known as jumping genes or movable genetic elements. These were first discovered in _____ during the 1940s by an American scientist _____
(a) Transposable element, Pea, Hugo de Vries.
(b) Transposons, Corn, Barbara McClintock.
(c) Mutagens, Wheat, Landsteiner.
(d) Mobile elements, Rice, Erich von Tschermak.

146. Read the following given in the box.

Guanosine, Cytosine, Deoxycytidine, Guanylic acid, Uracil, Adenosine, Adenylic acid

How many of the above are nucleoside and nucleotide, respectively.
(a) 3, 2 **(b)** 3, 1 **(c)** 4, 2 **(d)** 5, 2

147. Progymnosperms were originated in which period of Paleozoic era?
(a) Cambrian **(b)** Ordovician
(c) Silurian **(d)** Devonian

148. Select the incorrect match:
(a) Father of Systematics – R.H Whittaker
(b) Father of Zoology – Aristotle
(c) Father of Botany – Theophrastus
(d) Father of Taxonomy – Carolus Linnaeus

149. Given below are two statements:

Statement I: The disease phenylketonuria caused in humans is an example of pleiotropy.

Statement II: The disease is caused by mutation in the gene that codes for the enzyme phenyl alanine hydroxylase (frame-shift mutation).

In the light of the above statements, choose the correct answer from the options given below:
(a) Both Statement I and Statement II are incorrect.
(b) Statement I is correct but Statement II is incorrect.
(c) Statement I is incorrect but Statement II is correct.
(d) Both Statement I and Statement II are correct.

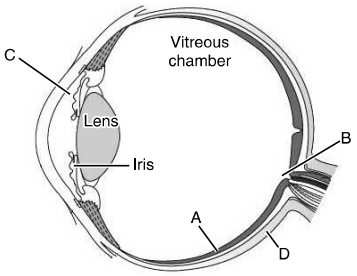
150. Which of the following is correct?
(a) Amla – *Phyllanthus emblica*
(b) Mango – *Musa paradisiaca*
(c) Tomato – *Solanum tuberosum*
(d) Jute – *Cicer arietinum*

ZOOLOGY

Section A

151. All are key evolutionary advances of flatworms, except:
(a) Bilateral symmetry
(b) Organ level body organization
(c) Cephalization
(d) One way digestive tract

152. Parts A, B, C and D of the human eye are shown in the diagram. Select the option which gives correct identification along with its functions/characteristics.



(a) A – Retina – contains photoreceptors – rods and cones.
(b) B – Blind spot – has only few rods and cones.
(c) C – Aqueous chamber – reflects the light which does not pass through the lens.
(d) D – Choroid – its anterior part forms ciliary body.

153. Smooth muscles are:
(a) Involuntary, fusiform, non-striated
(b) Voluntary, multinucleate, cylindrical
(c) Involuntary, cylindrical, striated
(d) Voluntary, spindle-shaped, uninucleate

154. Name the pulmonary disease in which the alveolar surface area involved in gas exchange is drastically reduced due to damage in the alveolar walls:
(a) Pleurisy **(b)** Emphysema
(c) Pneumonia **(d)** Asthma

155. Which one of the following is the correct statement regarding the particular psychotropic drug specified?
(a) Barbiturates cause relaxation and temporary euphoria.
(b) Hashish causes after thought perceptions and hallucinations.
(c) Opium stimulates nervous system and causes hallucinations.
(d) Morphine leads to delusions and disturbed emotions.

156. Choose the odd one regarding chordates:
(a) A post anal tail is present.
(b) Pharynx perforated by gill slits.
(c) Central nervous system is ventral, solid and double.
(d) Heart is ventral.

157. Select the incorrect statement regarding blood vessels:
(a) Arteries have no valves.
(b) Veins are collapsible because they have thin walls.
(c) Tunica interna of artery has simple, elastic membrane with elongated endothelial cells.
(d) Arteries are not collapsible as they have thick walls.

158. Choose the correct match with respect to disease and its causative agent.
(a) Genital herpes – *Human papilloma virus*
(b) Genital warts – *Herpes simplex virus*
(c) Trichomoniasis – *Chlamydia trachomatis*
(d) Syphilis – *Treponema pallidum*

159. Name a peptide hormone which acts mainly on hepatocytes, adipocytes and enhances cellular glucose uptake and utilisation.
(a) Insulin **(b)** Glucagon
(c) Secretin **(d)** Gastrin

160. Read the following statements carefully:

Statement A: Age related disorder characterised by decreased bone mass and increased chances of fracture.

Statement B: Its causative factors include deficiency of calcium, vitamin D and imbalance of hormones like calcitonin, PTH and sex steroids.

These above characters are associated with which disease?
(a) Gout
(b) Osteoporosis
(c) Arthritis
(d) Muscular dystrophy

161. Select the incorrect match regarding to humans.

	Cell	Chromosome number per cell
(a)	Secondary spermatocyte	23
(b)	Spermatozoa	23
(c)	Ootid	46
(d)	Primary oocyte	46

162. Multiple alleles are present:
(a) On different chromosomes.
(b) At different loci on the same chromosome.
(c) At the same loci of the chromosome.
(d) On non-sister chromatids.

163. The cattle egret and grazing cattle in close association, is an example of:
(a) Competition **(b)** Commensalism
(c) Predation **(d)** Amensalism

164. Which of the following part of nephron is not situated in the cortical region of the kidney?
(a) Malpighian corpuscle **(b)** PCT
(c) DCT **(d)** Loop of Henle

165. In which of the following options, characteristic features hold false for the corresponding group of animals?

(a)	Reptilia	Body is covered by dry and cornified skin.
(b)	Aves	Hindlimbs always modified into functional wings for flight.
(c)	Mammalia	Presence of milk producing glands.
(d)	Amphibia	Poikilotherms with 3-chambered heart.

166. Select the incorrect match.
(a) FRC = ERV + RV **(b)** TV = EC – ERV
(c) TV = VC – IRV **(d)** TV = IC – IRV

167. Which kind of therapy was given in 1990 to a four year old girl with Adenosine Deaminase deficiency (ADA)?
(a) Gene therapy **(b)** Chemo therapy
(c) Immunotherapy **(d)** Radiation therapy

168. Cyclosporin A, a bioactive molecule is used as:
(a) Clot buster.
(b) Immunosuppressive agent.
(c) Cholesterol lowering agent.
(d) An enzyme for clearing of juices.

169. Fertilisation in humans is practically feasible only if:
(a) The ovum and sperms are transported simultaneously to ampulla of the fallopian tube.
(b) The ovum and sperms are transported simultaneously to ampullary – isthmic junction of the cervix.
(c) The sperms are transported into cervix within 48 hours of release to ovum in uterus.
(d) The sperms are transported into vagina just after the release of ovum in fallopian tube.

170. Genetic engineering has been successfully used for producing:
(a) Transgenic mice for testing safety of polio vaccine before use in humans.
(b) Transgenic models for studying new treatments for certain cardiac diseases.

(c) Transgenic cow – Rosie which produces high fat milk for making ghee.
(d) Animals like bulls for farm work as they have super power.

171. Which of the following part of brain is correctly paired with its function?
(a) Cerebellum – Converts information from short term to long term memory.
(b) Pons – link between cerebral cortex and Cerebellum.
(c) Amygdala – planning and execution of stereotyped movements.
(d) Hypothalamus – Rapid muscular activities.

172. Erythroblastosis foetalis occurs in:
(a) First pregnancy of R*h* +ve mother.
(b) Subsequent pregnancies of R*h* +ve mother.
(c) First pregnancy of R*h* –ve mother.
(d) Subsequent pregnancies of R*h* –ve mother with R*h* (+ve) fetuses.

173. An individual has genotype AaBbCcDd, how many types of gametes can be produced by him?
(a) 16 **(b)** 8 **(c)** 32 **(d)** 1

174. Which type of white blood cells are concerned with the release of histamine and natural anticoagulant heparin?
(a) Monocytes **(b)** Neutrophils
(c) Basophils **(d)** Eosinophils

175. Which of the following is not uricotelic?
(a) Land snail **(b)** Snake
(c) Aquatic insect **(d)** Penguin

176. Choose the incorrect match:
(a) IgA – Crosses placenta
(b) IgG – Most abundant antibody
(c) IgM – Mediates compliment system
(d) IgD – Found on surface of cell

177. The organ which is endodermal in origin is
(a) Pancreas **(b)** Kidney **(c)** Heart **(d)** Ovary

178. Which is wrongly matched?
(a) *Clostridium butylicum* – Lactic acid
(b) *Aspergillus niger* – Citric acid
(c) Yeast – Statins
(d) *Acetobacter acetii* – Acetic acid

179. Which of the following statements is true for sickle cell anaemia?
(a) It cannot inherited from mother to progenies.
(b) It is a quantitive disorder.
(c) It is seen in males only.
(d) It is an autosomal recessive disorder.

180. Select the correct matching of the type of the joint with the example in human skeletal system.

	Type of joints	Examples
(a)	Cartilaginous joints	Between frontal and parietal
(b)	Pivot joint	Between third and fourth cervical vertebrae
(c)	Hinge joint	Between humerus and pectoral girdle
(d)	Gliding joint	Between carpals

181. Tubectomy is a method of sterilization in which:
(a) Small part of vas deferens is removed or tied up.
(b) Uterus is removed surgically.
(c) Small part of the fallopian tube is removed and tied up.
(d) Ovaries are removed surgically.

182. Oral polio vaccine is associated with:
(a) Natural active immunization
(b) Artificial active immunization
(c) Natural passive immunization
(d) Artificial passive immunization

183. Which of the following most appropriately describe haemophilia?
(a) Dominant gene disorder
(b) Recessive gene disorder
(c) X-linked recessive gene disorder
(d) Chromosomal disorder

184. Choose incorrect statement regarding structure of DNA:
(a) Bond between phosphate and hydroxyl group of sugar is an ester bond.
(b) Backbone is formed by sugar-phosphate-sugar chain.
(c) The nitrogen bases are projected perpendicular to the backbone.
(d) At each base pair the strand turns 360°.

185. Choose incorrect statement regarding girdles:
(a) Scapula is situated between second and seventh ribs.
(b) Clavicle has two curvatures.
(c) Pelvic girdle consists of two coxal bones.
(d) Below acromion process there is a depression called acetabulum.

Section B

186. Substrate level phosphorylation occurs during which step of Krebs' cycle?
(a) α-ketoglutarate → succinyl CoA
(b) Fumarate → malate
(c) Succinate → fumarate
(d) Succinyl CoA → succinate

187. Which of the following represents Ventricular depolarisation?
(a) P wave **(b)** QRS complex
(c) T wave **(d)** P and T waves

188. In the peripheral neural system, which supporting cells produce myelin sheath?
(a) Oligodendrocytes **(b)** Satellite cells
(c) Astrocytes **(d)** Schwann cells

189. Choose the incorrect match regarding placental mammals and Australian marsupials.

	Placental mammals	Australian marsupials
(a)	Anteater	Marsupial mouse
(b)	Bobcat	Tasmanian tiger cat
(c)	Lemur	Spotted cuscus
(d)	Flying squirrel	Flying phalanger

190. Test tube baby technique is also known as:
(a) In vivo fertilisation **(b)** In situ fertilisation
(c) In vitro fertilisation **(d)** Artificial Insemination

191. The number of times a particular mutation occurs in a population of cells or individuals is known as _____:
(a) Mutation frequency **(b)** Mutation rate
(c) Mutation efficiency **(d)** Mutation count

192. Given below are four statements (A–D). Select the option which represents only correct statements:
A. Total five (2 + 3) punctuation codons are present in genetic code.

B. AUG and GUG are considered as start punctuation codons while UAA, UAG and UGA are stop punctuation codons.
C. In vertebrate mitochondria, stop codon UGA has been reassigned to encode arginine.
D. Two arginine codons, AGA and AGG reassigned as stop codons in vertebrate mitochondria.
(a) A and B **(b)** A, B and D
(c) B, C and D **(d)** A and C

193. Why is the milk of transgenic 'Cow Rosie' nutritionally more balanced product for human babies than natural cow milk?
(a) Human enzyme Adenosine Deaminase (ADA)
(b) Human protein α-1-antitrypsin
(c) Human alpha-lactalbumin
(d) Human insulin-like growth factor

194. Select the incorrect statement with respect to different types of glands.
(a) Holocrine glands secretions are produced in the cell's cytoplasm and released by the rupture of the plasma membrane.
(b) Merocrine is a term used to classify endocrine glands and their secretions in the study of histology.
(c) Apocrine glands are those which bud their secretions off through the plasma membrane producing extracellular membrane-bound vesicles.
(d) Holocrine gland secretion is the most damaging to the cell itself and merocrine gland secretion is the least damaging.

195. A woman is diagnosed with a specific type of disease known as Cushing's syndrome. This is caused by a pituitary tumor leading to excessive production of _____ hormone which further stimulates the synthesis and secretion of _____ hormone from the adrenal cortex.
(a) Adrenocorticotropic hormone, cortisol.
(b) Thyroid stimulating hormone, glucocorticoids.
(c) Prolactin, mineralocorticoids.
(d) Melanocyte stimulating hormone, aldosterone.

196. How many of the events listed below characterize the Ordovician period of Paleozoic era?
(i) Origination of first land plants.
(ii) Appearance of world's first true vertebrates.
(iii) A huge diversification of fish.
(iv) Major mass extinction at the end of the period.
(a) 2 **(b)** 3 **(c)** 4 **(d)** 1

197. Which of the following structures of regions is incorrectly paired with its function?
(a) Medulla oblongata: controls respiration and cardiovascular reflexes.
(b) Corpus callosum: band of fibers connecting left and right cerebral hemispheres.
(c) Cerebral cortex: production of releasing hormones and regulation of temperature, hunger and thirst.
(d) Limbic system: regulation of sexual behaviour and expression of emotional reactions.

198.

Organisms	Number of base pairs	Number of genes
Human	X	30,000
Caenorhabditis elegans	97 million	Y
Drosophila melanogaster	180 million	14,000

Choose the correct option for X and Y.
(a) X - 3 billion, Y - 18,000 **(b)** X - 3 million, Y - 18,000
(c) X - 4.7 million, Y - 4,000 **(d)** X - 4.7 billion, Y - 6,000

199. Which of the following list of characteristics shown by red muscle fibres?
(a) Perform aerobic oxidation, slow-twitch, contract for longer duration.
(b) Rich in myoglobin, lesser mitochondria, less sarcoplasmic reticulum.
(c) More sarcoplasmic reticulum, perform aerobic oxidation, fast-twitch.
(d) More number of mitochondria, more sarcoplasmic reticulum, perform aerobic oxidation.

200. Which one of the following about the minor calyx in the nephron is correct?
(a) It collects urine
(b) It connects pelvis to ureter
(c) It is present in the cortex
(d) It receives column of Bertini