MOCK TEST PAPER 9

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

PHYSICS

Section A

1. The angular speed of an engine wheel making 90 revolutions per minute is:
(a) 1.5π rad/s **(b)** 3π rad/s **(c)** 4.5π rad/s **(d)** 6π rad/s

2. A mark at the bottom of a liquid appears to rise by 0.1 m when viewed from the top. The depth of the liquid is 1 m. The refractive index of the liquid is:
(a) 1.33 **(b)** 9/10 **(c)** 10/9 **(d)** 1.5

3. Two particles of mass M and m are moving in a circle of radii R and *r*. If their time-periods are same, what will be the ratio of their linear velocities?
(a) MR : *mr* **(b)** M : *m* **(c)** R : *r* **(d)** 1 : 1

4. Astronauts in a stable orbit round the Earth are said to be in 'weightless' condition. The reason for that is:
(a) the capsule and its contents are falling at the same rate.
(b) there is no gravitational force acting on them.
(c) the gravitational force of the Earth balances that of the Sun.
(d) there is no atmosphere at the height at which they are orbiting.

5. A battery of 6 volts is connected to the terminals of a three metre long wire of uniform thickness and resistance of the order of 100 Ω. The difference of potential between two points separated by 50 cm on the wire will be:
(a) 1 V **(b)** 1.5 V **(c)** 2 V **(d)** 3 V

6. A P-N junction photodiode is made of a material with a band gap of 2.0 eV. The minimum frequency of radiation that can be absorbed by the material is nearly:
(a) 10×10^{14} Hz **(b)** 5×10^{14} Hz
(c) 1×10^{14} Hz **(d)** 20×10^{14} Hz

7. The potential energy of particle in a force field is $U = A/r^2 - B/r$, where A and B are positive constants and *r* is the distance of the particle from the centre of the field. For stable equilibrium, the distance of the particle is:
(a) $\frac{B}{2A}$ **(b)** $\frac{2A}{B}$ **(c)** $\frac{A}{B}$ **(d)** $\frac{B}{A}$

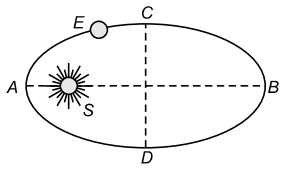
8. A coil of self-inductance L is connected in series with a bulb B and an AC source. Brightness of the bulb decreases when:
(a) an iron rod is inserted in the coil.
(b) frequency of the AC source is decreased.
(c) number of turns in the coil is reduced.
(d) a capacitance of reactance $X_C = X_L$ is included in the same circuit.

9. A block A of mass m_1 rests on a horizontal table. A lights string connected to it passes over a frictionless pulley at the edge of table and from its other end another block B of mass m_2 is suspended. The coefficient of kinetic friction between block A and the table is μ_k. When the block A is sliding on the table, the tension in the string is:
(a) $\frac{m_1 m_2 (1-\mu_k) g}{(m_1 + m_2)}$ **(b)** $\frac{(m_2 + \mu_k m_1) g}{(m_1 + m_2)}$
(c) $\frac{(m_2 - \mu_k m_1) g}{(m_1 + m_2)}$ **(d)** $\frac{m_1 m_2 (1+\mu_k) g}{(m_1 + m_2)}$

10. The electrostatic force between the metal plates of an isolated parallel plate capacitor C having a charge Q and area A, is:
(a) proportional to the square root of the distance between the plates.
(b) linearly proportional to the distance between the plates.
(c) independent of the distance between the plates.
(d) inversely proportional to the distance between the plates.

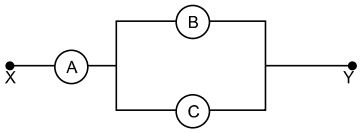
11. Two small bar magnets are placed in a line with like poles facing each other at a certain distance *d* apart. If the length of each magnet is negligible as compared to *d*, the force between them will be inversely proportional to:
(a) *d* **(b)** d^2 **(c)** $1/d^2$ **(d)** d^4

12. The Earth E moves in an elliptical orbit with the Sun S at one of the foci as shown in figure. Its speed of motion will be maximum at the point:



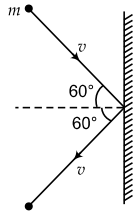
(a) C **(b)** A **(c)** B **(d)** D

13. A, B and C are voltmeters of resistance R, 1.5 R and 3R respectively as shown in the figure. When some potential difference is applied between X and Y, the voltmeter readings are V_A, V_B and V_C respectively.



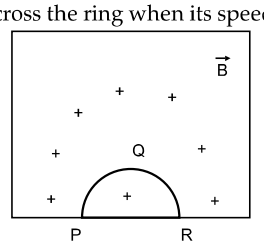
(a) $V_A = V_B = V_C$ **(b)** $V_A \neq V_B = V_C$
(c) $V_A = V_B \neq V_C$ **(d)** $V_A \neq V_B \neq V_C$

14. A rigid ball of mass *m* strikes a rigid wall at 60° and gets reflected without loss of speed as shown in the figure below. The value of impulse imparted by the wall on the ball will be:



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

15. A thin semicircular conducting ring (PQR) of radius 'r' is falling with its plane vertical in a horizontal magnetic field B, as shown in figure. The potential difference developed across the ring when its speed is v, is:

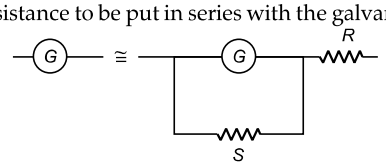


(a) Zero
(b) $Bv\pi r^2/2$ and P is at higher potential
(c) πrBv and R is at higher potential
(d) $2rBv$ and R is at higher potential

16. The ratio of the inertial mass to gravitational mass is equal to
(a) 1/2 **(b)** 1
(c) 2 **(d)** No fixed number

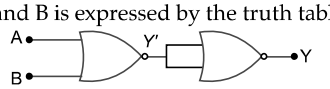
17. If a satellite is orbiting the Earth very close to its surface, then the orbital velocity depends only on the:
(a) mass of the satellite. **(b)** radius of the Earth.
(c) orbital radius. **(d)** mass of the Earth.

18. A galvanometer of resistance, G is shunted by a resistance S ohm. To keep the main current in the circuit unchanged, the resistance to be put in series with the galvanometer is:



(a) $\frac{S^2}{S+G}$ **(b)** $\frac{S\times G}{S+G}$ **(c)** $\frac{G^2}{S+G}$ **(d)** $\frac{G}{S+G}$

19. In the following circuit, the output Y for all possible inputs A and B is expressed by the truth table:



(a)

A	B	Y
0	1	1
0	1	1
1	0	1
1	1	0

(b)

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

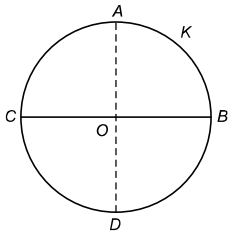
(c)

A	B	Y
0	1	1
1	0	1
0	0	0
1	1	1

(d)

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

20. A thin conducting ring of radius R is given a charge +Q. The electric field at the centre O of the ring due to the charge on the part AKB of the ring is E. The electric field at the centre due to the charge on the part ACDB of the ring is:



(a) 3E along OK **(b)** 3E along KO
(c) E along OK **(d)** E along KO

21. A moving block having mass m, collides with another stationary block having mass $4m$. The lighter block comes to rest after collision. When the initial velocity of the lighter block is v, then the value of coefficient of restitution (e) will be:
(a) 0.8 **(b)** 0.25 **(c)** 0.5 **(d)** 0.4

22. A galvanometer of 50 ohm resistance has 25 divisions. A current of 4×10^{-4} ampere gives a deflection of one division. To convert this galvanometer into a voltmeter having a range of 25 volts, it should be connected with a resistance of:
(a) 2500 Ω as a shunt **(b)** 2450 Ω as a shunt
(c) 2550 Ω in series **(d)** 2450 Ω in series

23. An electron of mass m with an initial velocity $v = v_0\hat{i}(v_0 > 0)$ enters in an electric field $E = -E_0\hat{i}$ (E_0 = constant > 0). If λ_0 is its de-Broglie wavelength initially, then its de-Broglie wavelength at time t is:
(a) $\frac{\lambda_0}{\left[\frac{1+etE_0}{mv_0}\right]}$ **(b)** $\frac{\lambda_0}{\left[\frac{1-eE_0}{mv_0}\right]\times t}$ **(c)** $\lambda_0 t$ **(d)** λ_0

24. The velocity of electromagnetic wave is parallel to
(a) $\vec{E}$ **(b)** $\vec{B}$ **(c)** $\vec{B}\times\vec{E}$ **(d)** $\vec{E}\times\vec{B}$

25. A uniform copper wire of cross-sectional area 2 mm^2 carries a steady current of 10 A. The density of free electrons in copper is 8×10 28 m^{-3}. The drift velocity of electrons is nearly
(a) 4×10^{-4} ms^{-1} **(b)** 2×10^{-4} ms^{-1}
(c) 4×10^{-2} ms^{-1} **(d)** 2×10^{-2} ms^{-1}

26. Which of the following sets share different dimensions?
(a) Pressure , Young's Modulus, stress
(b) Emf, Potential Difference, Electric potential
(c) Heat, Work done, Energy
(d) Dipole moment , Electric flux, electric field

27. If the focal length of a convex lens is reduced to half its original value, its power will:
(a) increase by ½. **(b)** decrease by ½.
(c) increase 2 times. **(d)** decrease 2 times.

28. If in adiabatic change, the pressure P and temperature T of a monoatomic gas are related by the relation $P \propto Tc$, where c is equal to
(a) 5/2 **(b)** 5/3 **(c)** 2/5 **(d)** 3/5

29. A carpet is to be installed in a room whose dimensions are measured to be 12.71 m by 3.46 m.
Find the area of the room in significant digits.
(a) 43.97 m^2 **(b)** 43.9766 m^2
(c) 43.98 m^2 **(d)** 44.0 m^2

30. In a particular system, the unit of length, mass and time are chosen to be 10 cm, 10 g and 0.1 s respectively. The unit of force in this system will be equivalent to:
(a) 0.1 N **(b)** 1 N **(c)** 10 N **(d)** 100 N

31. Which of the following parameters does not characterize the thermodynamic state of matter?
(a) Volume **(b)** Temperature
(c) Pressure **(d)** Work

32. A research satellite of mass 200 kg circles the Earth in an orbit of average radius $\frac{3R}{2}$, where, R is the radius of Earth.
Assuming the gravitational pull on a mass of 1 kg on the Earth's surface to be 10 N, the pull on the satellite will be:
(a) 880 N **(b)** 889 N **(c)** 885 N **(d)** 892 N

33. When a ball is whirled in a circle and the string supporting the ball is released, the ball flies off tangentially. This is due to:
(a) the action of centrifugal force.
(b) inertia for linear motion.
(c) the centripetal force.
(d) some unknown cause.

34. A material whose K absorption edge is 0.15 Å is irradiated with 0.1 Å X-rays. The maximum kinetic energy of photoelectrons that are emitted from K-shell is:
(a) 41 keV **(b)** 51 keV **(c)** 61 keV **(d)** 71 keV

35. Supposing the gravitational field varies inversely as the 4^{th} power of distance. Then the time period of a planet in circular orbit of radius R around the Sun will be proportional to R^n where n is
(a) 2 **(b)** 5 **(c)** 5/2 **(d)** 3/2

Section B

36. The angular velocity and the amplitude of a simple pendulum is ω and a respectively. At a displacement x from the mean position if its kinetic energy is T and potential energy is V, then the ratio of T to V is:
(a) $(a^2 - x^2\omega^2)/x^2\omega^2$ **(b)** $x^2\omega^2/(a^2 - x^2\omega^2)$
(c) $(a^2 - x^2)/x^2$ **(d)** $x^2/(a^2 - x^2)$

37. The susceptibility of a paramagnetic substance is χ_1 at 27°C and χ_2 at 127°C. The ratio $\chi_1 : \chi_2$ is
(a) 3/4 **(b)** 4/3 **(c)** 27/127 **(d)** 127/27

38. Specific heat of a substance is a function of its
(a) mass **(b)** weight
(c) volume **(d)** molecular structure

39. The change in internal energy, when a gas is cooled from 927° to 27°, is
(a) 100% **(b)** 300% **(c)** 200% **(d)** 75%

40. The velocity of electromagnetic radiation in a medium of permittivity ε_0 and permeability μ_0 is given by:
(a) $\sqrt{\mu_0/\varepsilon_0}$ **(b)** $\sqrt{\varepsilon_0/\mu_0}$ **(c)** $\sqrt{\mu_0\varepsilon_0}$ **(d)** $1/\sqrt{\mu_0\varepsilon_0}$

41. A particle is projected with a velocity v so that its horizontal range is twice the greatest height attained. The horizontal range is:
(a) $\frac{4u^2}{5g}$ **(b)** $\frac{u^2}{g}$ **(c)** $\frac{u^2}{2g}$ **(d)** $\frac{2u^2}{3g}$

42. A stone falls freely under gravity. The total distance covered by it in the last second of its journey equals the distance covered by it in the first three seconds of its motion. Find the time for which the stone is in air?
(a) 5 s **(b)** 8 s **(c)** 15 s **(d)** 12 s

43. The density of a material at normal pressure is ρ. Its density when it is subjected to an excess pressure P is ρ′. If B is bulk modulus of the metal, the ratio $\frac{\rho'}{\rho}$ is
(a) $\frac{1}{1-\frac{P}{B}}$ **(b)** $1+\frac{B}{P}$ **(c)** $1+\frac{P}{B}$ **(d)** $\frac{1}{1-\frac{B}{P}}$

44. A raft of wood of mass 120 kg floats in water. The weight that can be put on raft to make it just sink should be (d_{raft} = 600 kg/m^3, d_{water} = 1000 kg/m^3)
(a) 80 kg **(b)** 40 kg **(c)** 50 kg **(d)** 60 kg

45. A pipe closed at one end has a frequency of 1000 Hz. It is cut into two equal pieces. The fundamental frequency of the two pieces in hertz are
(a) 2000, 4000 **(b)** 1000, 2000 **(c)** 500, 2000 **(d)** 1000, 500

46. In an ac circuit the current changes with time according to relation $i = 2\sqrt{t}$ A. Find the *rms* value of current between $t = 2$ and $t = 4$ s.
(a) $3\sqrt{3}$ A **(b)** $2\sqrt{3}$ A **(c)** $\sqrt{3}$ A **(d)** $\frac{1}{\sqrt{3}}$ A

47. Two coherent sources of intensity ratio α interfere. In the interference pattern, $\frac{I_{max} - I_{min}}{I_{max} + I_{min}}$ is equal to.
(a) $\frac{2\alpha}{1+\alpha}$ **(b)** $\frac{2\sqrt{\alpha}}{1+\alpha}$ **(c)** $\frac{2\alpha}{1+\sqrt{\alpha}}$ **(d)** $\frac{1+\alpha}{2\alpha}$

48. An electron is moving round the nucleus of a hydrogen atom in a circular orbit of radius. The Coulomb force $\vec{F}$ between the two is
(a) $k\frac{e^2}{r^2}\hat{r}$ **(b)** $-k\frac{e^2}{r^3}\hat{r}$ **(c)** $k\frac{e^2}{r^3}\vec{r}$ **(d)** $-k\frac{e^2}{r^3}\vec{r}$

49. Hydrogen atom in ground state is excited to higher energy state. It emits six different wavelengths while coming back to ground state. The principle quantum number of excited state is:
(a) 3 **(b)** 4 **(c)** 5 **(d)** 6

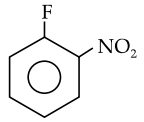
50. The de Broglie wavelength of a neutron at 27°C is λ. What will be its wavelength at 927°C?
(a) $\frac{\lambda}{2}$ **(b)** $\frac{\lambda}{3}$ **(c)** $\frac{\lambda}{4}$ **(d)** $\frac{\lambda}{9}$

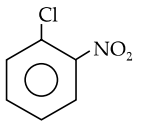
CHEMISTRY

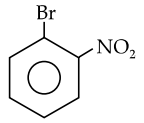
Section A

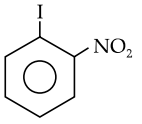
51. Which one of the following pairs of species have the same bond order?
(a) CO, NO **(b)** O_2, NO^+ **(c)** CN^-, CO **(d)** N_2, O_2^-

52. Which of the following is least reactive towards nucleophilic substitution?

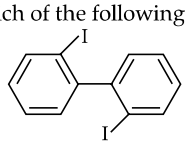
(a) 

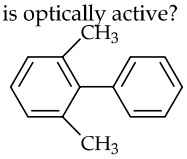
(b) 

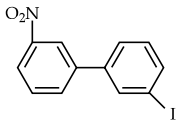
(c) 

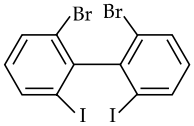
(d) 

53. Which of the following biphenyl is optically active?

(a) 

(b) 

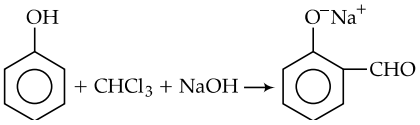
(c) 

(d) 

54. A 20 litre container at 400 K contains $CO_2(g)$ at pressure 0.4 atm and excess of SrO (neglect the volume of solid SrO). The volume of the container is now decreased by moving the movable piston fitted in the container. The maximum volume of the container, when pressure of CO_2 attains its maximum value is
[Given that: $SrCO_3(s) \rightarrow SrO(s) + CO_2(g)$, ($K_p$ = 1.6 atm)]
(a) 5 L **(b)** 10 L **(c)** 4 L **(d)** 2 L

55. If the E°_{cell} for a given reaction has a negative value, which of the following gives the correct relationships for the values of ΔG° and K_{eq}?
(a) $\Delta G^\circ > 0$, $K_{eq} < 1$ **(b)** $\Delta G^\circ > 0$, $K_{eq} > 1$
(c) $\Delta G^\circ < 0$, $K_{eq} > 1$ **(d)** $\Delta G^\circ < 0$, $K_{eq} < 1$

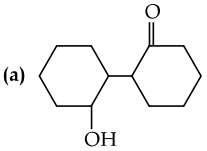
56. In the reaction,

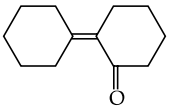


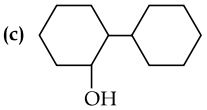
the electrophile involved is:
(a) dichloromethyl cation $(\overset{\oplus}{C}HCl_2)$
(b) formyl cation $(\overset{\oplus}{C}HO)$
(c) dichloromethyl anion $\overset{\ominus}{C}HCl_2$
(d) dichlorocarbene (: CCl_2)

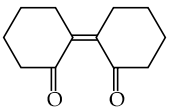
57. A reaction having equal energies of activation for forward and reverse reactions has:
(a) $\Delta S = 0$ **(b)** $\Delta G = 0$
(c) $\Delta H = 0$ **(d)** $\Delta H = \Delta G = \Delta S = 0$

58. Out of the following which is the product formed when cyclohexanone undergoes aldol condensation followed by heating?

(a) 

(b) 

(c) 

(d) 

59. Calculate the energy in joule corresponding to light of wavelength 45 nm: [Planck's constant, $h = 6.63 \times 10^{-34}$ Js, speed of light, $c = 3 \times 10^8$ ms^{-1}.]
(a) 6.67×10^{15} **(b)** 6.67×10^{11}
(c) 4.42×10^{-15} **(d)** 4.42×10^{-18}

60. The compound that will react most readily with gaseous bromine has the formula:
(a) C_3H_6 **(b)** C_2H_6 **(c)** C_4H_{10} **(d)** C_2H_4

61. Which one of the following molecules contain no π-bond?
(a) CO_2 **(b)** H_2O **(c)** SO_2 **(d)** NO_2

62. Among the following four compounds which is the correct acidity order?
(1) Phenol **(2)** Methyl phenol
(3) Meta nitrophenol **(4)** Para nitrophenol
(a) 4 > 3 > 1 > 2 **(b)** 3 > 4 > 1 > 2
(c) 1 > 4 > 3 > 2 **(d)** 2 > 1 > 3 > 4

63. Which of the following will not be soluble in sodium hydrogen carbonate?
(a) 2, 4, 6-trinitrophenol **(b)** Benzoic acid
(c) *o*-Nitrophenol **(d)** Benzene sulphonic acid

64. What is Z in following sequence of reactions?

$$\text{Phenol} \xrightarrow[\text{dust}]{\text{Zn}} X \xrightarrow[\text{anhydrous } AlCl_3]{CH_3Cl} Y \xrightarrow[KMnO_4]{\text{alkaline}} Z$$

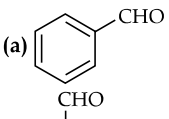
(a) Benzene **(b)** Toluene
(c) Benzaldehyde **(d)** Benzoic acid

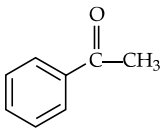
65. An unknown alcohol is treated with the "Lucas Reagent" to determine whether the alcohol is primary, secondary or tertiary. Which alcohol reacts fastest and by what mechanism?
(a) Secondary alcohol by S_N1
(b) Tertiary alcohol by S_N1
(c) Secondary alcohol by S_N2
(d) Tertiary alcohol by S_N2

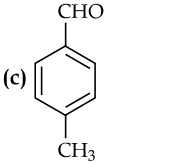
66. Molecular mass of ozone molecule will be?
(a) 48 g **(b)** 48 N_A g **(c)** 48/N_A g **(d)** 16 g

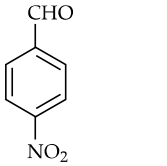
67. Assume each reaction is carried out in an open container. For which reaction will $\Delta H = \Delta E$?
(a) $H_2(g) + Br_2(g) \rightarrow 2HBr(g)$
(b) $C(s) + 2H_2O(g) \rightarrow 2H_2(g) + CO_2(g)$
(c) $PCl_5(g) \rightarrow PCl_3(g) + Cl_2(g)$
(d) $2CO(g) + O_2(g) \rightarrow 2CO_2(g)$

68. Which is the most reactive towards nucleophilic addition reactions?

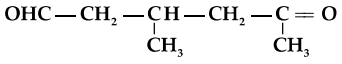
(a) 

(b) 

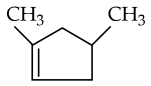
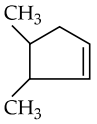
(c) 

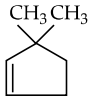
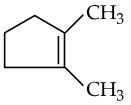
(d) 

69. A single compound of the structure



is obtainable from ozonolysis of which of the following cyclic compounds?

(a)  **(b)** 

(c)  **(d)** 

70. Which one of the following sets of monosaccharides forms sucrose?
(a) α-D-galactopyranose and α-D-glucopyranose
(b) α-D-glucopyranose and β-D-fructofuranose
(c) β-D-glucopyranose and α-D-fructofuranose
(d) α-D-glucopyranose and β-D-fructopyranose

71. Which one of the following statements is incorrect about enzyme catalysis?
(a) Enzymes are mostly proteinous in nature.
(b) Enzyme action is specific.
(c) Enzymes are denaturated by UV-rays and at high temperature.
(d) Enzymes are least reactive at optimum temperature.

72. Oxidation number of P in PO_4^{3-}, of S in SO_4^{2-} and that of Cr in $Cr_2O_7^{2-}$ are respectively:
(a) +3, +6 and +5 **(b)** +5, +3 and +6
(c) –3, +6 and +6 **(d)** +5, +6 and +6

73. The variation of the boiling point of the hydrogen halides is in the order: HF > Hl > HBr > HCl.
Why do HF shows exceptionally high boiling point?
(a) There is strong hydrogen bonding between HF molecules.
(b) The bond energy of HF molecules is greater than in other hydrogen halides.
(c) The effect of nuclear shielding is much reduced in fluorine which polarizes the HF molecule.
(d) The electronegativity of fluorine is much higher than for other elements in the group.

74. In the reaction,

$$BrO_3^-(aq) + 5Br^-(aq) + 6H^+ \longrightarrow 3Br_2 + 3H_2O(l)$$

the rate of appearance of bromine (Br_2) is related to rate of disappearance of bromide ions as following :

(a) $\frac{d[Br_2]}{dt} = -\frac{3}{5}\frac{d[Br^-]}{dt}$ **(b)** $\frac{d[Br_2]}{dt} = -\frac{5}{3}\frac{d[Br^-]}{dt}$

(c) $\frac{d[Br_2]}{dt} = \frac{5}{3}\frac{d[Br^-]}{dt}$ **(d)** $\frac{d[Br_2]}{dt} = \frac{3}{5}\frac{d[Br^-]}{dt}$

75. The correct order of decreasing second ionization enthalpy of Ti (22), V (23), Cr (24) and Mn (25) is:
(a) Cr > Mn > V > Ti **(b)** V > Mn > Cr > Ti
(c) Mn > Cr > Ti > V **(d)** Ti > V > Cr > Mn

76. Which of the following has the minimum bond length?
(a) O_2^{2-} **(b)** O_2^- **(c)** O_2 **(d)** O_2^+

77. For the reaction, $X_2O_4(l) \rightarrow 2XO_2(g)$, ΔU = 2.1 kcal, ΔS = 20 cal K^{-1} at 300 K. Hence, ΔG is:
(a) 2.7 kcal **(b)** –2.7 kcal **(c)** 9.3 kcal **(d)** –9.3 kcal

78. A weak acid, HA, has a K_a of 1.00×10^{-5}. If 0.100 mole of this acid is dissolved in one litre of water, the percentage of acid dissociated at equilibrium is closest to:
(a) 99.0% **(b)** 1.00% **(c)** 99.9% **(d)** 0.100%

79. A mixture of 2 mole of CO and 1 mol of O_2 is ignited. Correct relationship is
(a) $\Delta H = \Delta U$ **(b)** $\Delta H > \Delta U$
(c) $\Delta H < \Delta U$
(d) The relationship depends upon the capacity of vessel Answer

80. Which one of the following anions is present in the chain structure of silicates?
(a) $Si_2O_7^{6-}$ **(b)** $(SiO_5^{2-})_n$ **(c)** $(SiO_3^{2-})_n$ **(d)** SiO_4^{4-}

81. Which of the following statements is not valid for oxoacids of phosphorus?
(a) Orthophosphoric acid is used in the manufacture of triple superphosphate.
(b) Hypophosphorous acid is a diprotic acid.
(c) All oxoacids contain tetrahedral four coordinated phosphorus.
(d) All oxoacids contain at least one P=O unit and one P—OH group.

82. The coordination complex ion that will not absorb visible light is:
(a) $[Ni(CN)_4]^{2-}$ **(b)** $[Ni(H_2O)_6]^{2+}$
(c) $[Cr(NH_3)_6]^{3+}$ **(d)** $[Fe(H_2O)_6]^{2+}$

83. A chemical reaction is taking place with constant rate with time, what will be the order of reaction.
(a) 1 **(b)** zero
(c) 2 **(d)** none of these

84. A solution of urea (molecular mass 60 g mol^{-1}) boils at 100.18°C at the atmospheric pressure. If K_f and K_b for water are 1.86 and 0.512 K kg mol^{-1} respectively, the above solution will freeze at:
(a) –6.54°C **(b)** 6.54°C **(c)** 0.654°C **(d)** –0.654°C

85. Which substance is serving as a reducing agent in the following reaction?

$$14H^+ + Cr_2O_7^{2-} + 3Ni \rightarrow 7H_2O + 3Ni^{2+} + 2Cr^{3+}$$

(a) H^+ **(b)** $Cr_2O_7^{2-}$ **(c)** H_2O **(d)** Ni

Section B

86. The wavelengths of radiation emitted when in He^+ electron falls from infinity to stationary state would be ($R = 1.097 \times 10^7\ m^{-1}$)
(a) 2.2×10^8 m **(b)** 22×10^{-9} m
(c) 120 m **(d)** 22×10^7 m

87. The energy required to convert all atoms present in 1.2 g magnesium to Mg^{2+} ions if IE, and IE_2 of magnesium are 120 kJ mol^{-1} and 240 kJ mol^{-1} respectively
(a) 18 W **(b)** 36 kJ **(c)** 360 kJ **(d)** 24 kJ

88. The correct geometry and hybridization for XeF4 are
(a) Octahedral, sp^3d^2
(b) Trigonal bipyramidal, sp^3d
(c) Planar triangle, sp^3d^3
(d) Square planar, sp^3d^2

89. Which of the following statements is correct for silicon?
(a) It forms molecular halides that are not hydrolysed.
(b) It forms strong but unconjugated multiple bonds of the $p\pi$-$d\pi$ variety especially with O and N.
(c) It does not undergo coordination number expansion.
(d) It forms an oxide (SiO_2) that is amphoteric.

90. Which of the following statements is correct for a binary solution?
(a) A solution in which heat is absorbed shows negative deviations from Raoult's law.
(b) A solution in which heat is evolved exhibits positive deviations from Raoult's law.

(c) When one component in solution show negative deviations from Raoult's law, the other exhibits positive deviation.
(d) When one component in solution shows positive deviation from Raoult's law, so does the other.

91. Match List I with List II.

List I	List II
(A) Radioactive element	**(i)** Sc
(B) Highest heat of atomisation	(ii) Mn
(C) Shows only +3 oxidation states	(iii) Gd
(D) Element that has $4f^7$ configuration in +3 oxidation state	(iv) Pm

Choose the correct answer from the given options.
(a) **(A)** - (iii), **(B)** - **(i)**, **(C)** - (ii), **(D)** - (iv)
(b) **(A)** - (iii), **(B)** - (ii), **(C)** - **(i)**, **(D)** - (iv)
(c) **(A)** - (iv), **(B)** - (ii), **(C)** - **(i)**, **(D)** - (iii)
(d) **(A)** - (iv), **(B)** - (iii), **(C)** - (ii), **(D)** - **(i)**

92. Chromium metal can be plated out from an acidic solution containing CrO_3 according to the following equation (Atonic weight of Cr = 52 g)
$CrO_3(g) + 6H^+ + 6e^- \rightarrow Cr(s) + 3H_2O$
How many grams of chromium will be plated by 22400C?
(a) 2.96 **(b)** 2.16 **(c)** 21.6 **(d)** 23.2

93. What kind of isomerism is exhibited by penta-amminenitrito-o-chromium (III) chloride?
(a) Linkage isomerism **(b)** Optical isomerism
(c) Coordination isomerism **(d)** Ionisation isomerism

94. Ethyl benzoate can be prepared from benzoic acid by using
(a) Ethyl alconol **(b)** Etiyl alcohol and dry HCl
(c) Ethyl chloride **(d)** Sodium ethoxide

95. Which among the following will be the correct formula for dibromidobis-(ethylene diamine) chromium (III) bromide.
(a) $[Cr(en)_3]Br_3$ **(b)** $[Cr(en)_2Br_2]Br$
(c) $[Cr(en)Br_4]^-$ **(d)** $[Cr(en)Br_2]Br$

96. 4-Nitro-N, N-dimethyl benzenamine is
(a) **(b)** **(c)** **(d)**

97. Which of the following reagent can be used 2-phenyl propanamide into 2-phenyl propanamine?
(a) $LiAlH_4$ in ether.
(b) Iodine in the pressure of red phosphorous.
(c) Br_2 in aqueous NaOH.
(d) excess H_2.

98. Given two statements
Statement I: Smaller the size of an atom greater is the electronegativity.
Statement II: Electronegativity refers to the tendency of atom to share electrons with other atom.
Choose the correct answer from given options.
(a) Statement I is incorrect but statement II is correct.
(b) Both statement I and statement II are correct.
(c) Both statement I and statement II are incorrect.
(d) Statement I is correct but statement II is incorrect.

99. The sum of oxidation states of two silver ions in $[Ag(NH_3)_2][Ag(CN)_2]$ complex is:
(a) 2 **(b)** 3 **(c)** 6 **(d)** 4

100. **Statement I:** ΔH is positive for endothermic reaction
Statement II: For endothermic reaction $H_P > H_R$.
Choose the correct answer from given options.
(a) Statement I is incorrect but statement II is correct.
(b) Both statement I and statement II are correct.
(c) Both statement I and statement II are incorrect.
(d) Statement I is correct but statement II is incorrect.

BOTANY

Section A

101. *Cycas* possesses two cotyledons but it is not dicot because of:
(a) Compound leaves **(b)** Naked seeds
(c) Circinate ptyxis **(d)** Monocot like stem

102. An example of endomycorrhiza is:
(a) *Glomus* **(b)** *Agaricus* **(c)** *Nostoc* **(d)** *Rhizobium*

103. Endogenously formed thin-walled, non-motile asexual spores are characteristic of fungal group related with:
(i) Septate mycelium.
(ii) Chitinous cell wall.
(iii) Aseptate and coenocytic mycelium.
(iv) An intervening dikaryotic stage.
(v) Absence of fruiting bodies.
(a) (ii), (iii) & **(v)** **(b)** **(i)**, (iv) & **(v)**
(c) (ii) & (iv) **(d)** (iii) & (iv)

104. The C_4 plants are photosynthetically more efficient than C_3 plants because:
(a) They have more chloroplasts.
(b) The CO_2 compensation point is more.
(c) CO_2 generated during photorespiration is trapped and recycled through PEP carboxylase.
(d) The CO_2 efflux is not prevented.

105. Enzymes catalyse biochemical reactions by:
(a) Lowering activation energy.
(b) Increasing activation energy.
(c) Establishing stable bonds with substrate.
(d) Increasing temperature.

106. Which of the following plant groups show(s) external fertilization?
(1) Algae **(2)** Bryophytes
(3) Pteridophytes **(4)** Gymnosperms
(a) (1) only **(b)** (1) and (2) only
(c) (2) and (3) only **(d)** (3) and (4) only

107. The structure that help some bacteria to attach to rocks and for host tissues are:
(a) Holdfast **(b)** Rhizoids
(c) Fimbriae **(d)** Mesosomes

108. Genetically modified plants:
(a) Are less tolerant to abiotic stresses.
(b) Show reduced reliance on chemical pesticides.
(c) Exhibit decreased efficiency of mineral usage.
(d) Have diminished nutritional content.

109. Plant families are characterised on the basis of:
(a) Floral characters only.
(b) Morphological characters only.
(c) Stamen characters only.
(d) Both vegetative and reproductive characters.

110. Organic material, resistant to physical and biological decomposition and forms the outer layer of pollen is:
(a) Sporopollenin **(b)** Callose
(c) α-cellulosic fibres **(d)** Pectin

111. For fixation of 6 molecules of CO_2 and formation of one molecule of glucose in Calvin cycle, requires
(a) 3ATP and $2NADPH_2$ **(b)** 18ATP and $12NADPH_2$
(c) 30ATP and $18NADPH_2$ **(d)** 6ATP and $6NADPH_2$

112. Dehydrogenation occurs In which of the following steps in glycolysis?
(a) Glucose to glucose-6-phosphate
(b) 3-PGA to 2-PGA
(c) PEPA to pyruvate
(d) PGAL to 1,3 diPGA

113. Which of the following is not a component of downstream processing?
(a) Separation **(b)** Purification
(c) Preservation **(d)** Expression

114. Double fertilisation is seen in:
(a) *Pinus* **(b)** *Cycas* **(c)** *Lycopodium* **(d)** *Wolffia*

115. Which metabolite is common in respiration mediated breakdown of fats, carbohydrates and proteins?
(a) Acetyl CoA **(b)** Glucose 6-phosphate
(c) Fructose 1,6-biphosphate **(d)** Pyruvic acid

116. Which biomolecule is correctly characterised?
(a) Lecithin – phosphorylated glyceride found in cell membrane.
(b) Palmitic acid – unsaturated fatty acid with 18 carbon atoms.
(c) Adenylic acid – adenosine with glucose phosphate molecule.
(d) Alanine amino acid – contains an amino acid and an acidic group anywhere in the molecule.

117. Single-celled eukaryotes are included in:
(a) Monera **(b)** Protista **(c)** Fungi **(d)** Archaea

118. All of the following are part of an operon except:
(a) An enhancer **(b)** Structural genes
(c) An operator **(d)** A promoter

119. All genes located on the same chromosome:
(a) Form different groups depending upon their relative distance.
(b) Form one linkage group.
(c) Will not form any linkage group.
(d) Form interactive groups that affect the Phenotype.

120. Indicate the stage where meiosis occurs (1, 2 or 3) in the flow chart:

Megaspore mother cell $\xrightarrow{1}$ Megaspores $\xrightarrow{2}$ Embryosac $\xrightarrow{3}$ Egg

(a) Only during stage 2. **(b)** Only during stage 1.
(c) Both in stage 1 and 2. **(d)** In all stages 1, 2 and 3.

121. Select the incorrect statement:
(a) Thylakoids are arranged one above the other like stack of coins forming a granum.
(b) The building blocks of lipids are amino acids.
(c) Steroids are complex compounds in the cell membranes and animal hormones.
(d) Majority of enzymes contain a non-protein part called as prosthetic group.

122. The highest number of genes and least number of genes is found respectively, in:
(a) Chromosome 21 and Y **(b)** Chromosome 1 and X
(c) Chromosome 1 and Y **(d)** Chromosome X and Y

123. Select the correct statement regarding cell membrane of eukaryotes:
(a) Na^+ and K^+ ions are passively transported across the cell membrane.
(b) Cell membrane can not have glycolipids and cholestrol.
(c) Lipids are arranged in a bilayer with polar heads towards the inner side.
(d) Transmembrane proteins are present in lipid bilayer.

124. Match column A and B and choose the correct option:

Column A	Column B
(i) Rosie	1. Vitamin A
(ii) Flavr savr	2. Human milk protein
(iii) Gloden rice	3. Hirudin
(iv) Brassica	4. Late ripening

(a) **(i)** - 3, (ii) - 1, (iii) - 2, (iv) - 4
(b) **(i)** - 2, (ii) - 4, (iii) - 1, (iv) - 3
(c) **(i)** - 2, (ii) - 4, (iii) - 3, (iv) - 1
(d) **(i)** - 3, (ii) - 4, (iii) - 2, (iv) – 1

125. The bouquet stage inside the nucleus is observed during which phase of meiosis?
(a) pachytene **(b)** zygotene **(c)** diplotene **(d)** leptotene

126. Which of the following cross determines heterozygosity or homozygosity:
(a) Monohybrid cross **(b)** Dihybrid cross
(c) Out cross **(d)** Test cross

127. Which of these statements are incorrect according to charagaff's rules:
(a) The % C+G ≠ % A+T
(b) The sum of purine = sum of pyrimidine
(c) The composition of DNA remains the same in all the species.
(d) The molar ratio of A to T or C to G = 1

128. Read the names of the plants given in the box.

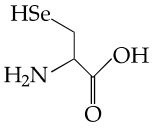
Potato, Tomato, Sweet Potato, Egg plant, Tobacco, Morning glory, Bell Pepper, Thorn apple.

How many of the above belongs to family solanaceae?
(a) 3 **(b)** 5 **(c)** 6 **(d)** 7

129. On the basis of given comparison of *cis* and *trans* face of golgi apparatus, select the incorrect one.

	***Cis* face**	***Trans* face**
(a)	Receiving face of the golgi apparatus	Exit face of the golgi apparatus
(b)	Convex in shape	Concave in shape
(c)	Faces the endoplasmic reticulum	Faces the cytoplasm
(d)	Receives mature or modified proteins	Modified proteins leave the golgi apparatus

130. Identify the structure given below and choose the correct option.



(a) Cysteine **(b)** Selenocysteine
(c) Serine **(d)** Selenium

131. From the given variety of alcoholic drinks, which are produced by distillation?
(i) Whisky **(ii)** Vodka **(iii)** Beer **(iv)** Brandy

(a) **(i)** only **(b)** (ii) and (iii) only
(c) **(i)**, (ii) and (iv) only **(d)** (ii), (iii) and (iv) only

132. Which of the following trait is recessive in *Pisum sativum*?
(a) White flowers **(b)** Green seeds
(c) Yellow pods **(d)** Inflated pods

133. The dominant phase in Pteridophytes is:
(a) Capsule **(b)** Gametophyte
(c) Sporophyte **(d)** Embryo

134. Match the following and choose the correct answer

Biomolecules	Chemical bonds
A. Fat	**(i)** Glycosidic bond
B. Protein	(ii) Phosphodiester bond
C. Polysaccharide	(iii) Peptide bond
D. Nucleic acids	(iv) Ester bond

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

135. The allele that encodes the phenotype most common in a particular natural population is known as _____.
(a) Mutant allele **(b)** Recessive allele
(c) Wild allele **(d)** Null allele

Section B

136. Water vapour comes out from the plant leaf through the stomatal opening. Through the same stomatal opening carbon dioxide diffuses into the plant during photosynthesis. Reason out the above statement using one of the following options.
(a) One process occurs during day time and the other at night.
(b) Both processes cannot happen simultaneously.
(c) Both processes can happen together because the diffusion coefficient of water and CO_2 is different.
(d) The above process happen only during night time.

137. Read the statements (A – B) and select the correct option.
Statement A: Bulliform cells are absent in dicot leaf.
Statement B: The spring wood is lighter in colour and has a lower density.
(a) Only statement A is correct.
(b) Only statement B is correct.
(c) Both A and B are correct.
(d) Both A and B are incorrect.

138. Log S = log C + Z log A is the equation that depicts relation between
(a) population density and time
(b) population growth and time
(c) species richness and area
(d) area and species migrations

139. Which compound is produced in Krebs cycle by oxidative decarboxylation?
(a) citrate **(b)** α-ketoglutarate
(c) succinate **(d)** oxaloacetate

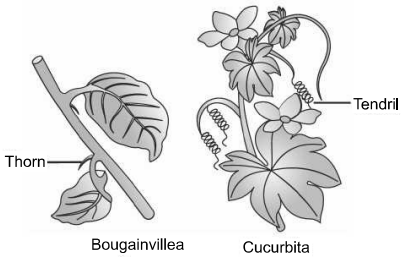
140. The two functional groups characteristics of sugars are
(a) hydroxyl and methyl **(b)** carbonyl and hydroxyl
(c) carbonyl and phosphate **(d)** carbonyl and methyl

141. All of the following are functional aspects of ecosystem, except:
(a) Productivity **(b)** Energy flow
(c) Decomposition **(d)** Stratification

142. Tracheids differ from other tracheary elements in:
(a) Having casparian strips. **(b)** Being imperforate.
(c) Lacking nucleus. **(d)** Being lignified.

143. The mesosome is produced by the infoldings of
(a) mitochondria **(b)** chloroplast
(c) Golgi complex **(d)** cell membrane

144.



Choose the incorrect statement regarding thorn and tendrils present in above diagrams.
(a) They exhibit homology based on convergent evolution.
(b) They are modifications of stem.
(c) They have different functions.
(d) They are based on the concept of divergence from their ancestors.

145. Which of the following reasons are responsible for the shorter or limited height of Bryophytes?
(1) Absence of vascular tissues.
(2) Absence of meristem.
(3) Absence of true roots.
(4) Absence of mechanical tissues.
(a) (1), (2) and (3) **(b)** (1), (2) and (4)
(c) (2), (3) and (4) **(d)** (1), (3) and (4)

146. Arborescent lycopods belonged to which ancestral chain?
(a) Tracheophyte **(b)** Qudruphyte
(c) Cryptophyte **(d)** Diphyte

147. Which of the following shows single stranded RNA and lacks protein coat?
(a) Bacteriophage **(b)** Plant virus
(c) Viroid **(d)** Animal virus

148. Given below are two statements:
Statement A: Haemophilia and Sickle cell anaemia are autosomal dominant traits.
Statement B: Haemophilia and Sickle cell anaemia are disorders of the blood.
With respect to the above statements, choose the correct answer from the options given below:
(a) Statement A is incorrect but Statement B is correct
(b) Both Statement A and Statement B are correct
(c) Both Statement A and Statement B are incorrect
(d) Statement A is correct but Statement B is incorrect

149. Select the incorrect one:
(a) *Equisetum* stems – Scrubbing and Polishing.
(b) *Marsilea* sporocarps – As foods.
(c) *Adiantum* roots – Scouring metals.
(d) *Lycopodium* – Medicinal value.

150. The total self-replicating hereditary material of cytoplasm is called as _____.
(a) Plasmid **(b)** Plasmon
(c) Protoplasm **(d)** Proteome

ZOOLOGY

Section A

151. How much blood will transport 10 ml of O_2 to tissues under normal physiological conditions?
(a) 100 ml **(b)** 200 ml **(c)** 1000 ml **(d)** 2000 ml

152. What is the correct sequence of sperm formation?
(a) Spermatogonia, spermatozoa, spermatocyte, spermatid.
(b) Spermatogonia, spermatocyte, spermatid, spermatozoa.
(c) Spermatid, spermatocyte, spermatogonia, spermatozoa.
(d) Spermatogonia, spermatocyte, spermatozoa, spermatid.

153. In male cockroaches, sperms are stored in which part of the reproductive system?
(a) Seminal vesicles **(b)** Mushroom glands
(c) Testes **(d)** Vas deferens

154. The shared terminal duct of the reproductive and urinary system in the human male is:
(a) Urethra **(b)** Ureter
(c) Vas deferens **(d)** Vasa efferentia

155. Consider the following four statements about certain desert animals such as kangaroo rat:
(i) They have dark colour and high rate of reproduction and excrete solid urine.
(ii) They do not drink water, breathe at a low rate to conserve water and have their body covered with thick hair.
(iii) They feed on dry seeds and do not require drinking water.
(iv) They excrete very concentrated urine and do not use water to regulate body temperature.
Which two of the above statements for such animals are true?
(a) **(i)** and (ii) **(b)** (iii) and (iv)
(c) (ii) and (iii) **(d)** (iii) and **(i)**

156. Human urine is usually acidic because:
(a) The sodium transport exchanges one hydrogen ion for each sodium ion in peritubular capillaries.
(b) Excreted plasma proteins are acidic.
(c) Potassium and sodium exchange generates acidity.
(d) Hydrogen ions are actively secreted into the filtrate.

157. Which of the following depicts the correct pathway of transport of sperms?
(a) Rete testis → efferent ducts → Epididymis → Vas deferens.
(b) Rete testis → Epididymis → efferent ducts → Vas deferens.
(c) Rete testis → Vas deferens → efferent ducts → Epididymis.
(d) Efferent ducts → Rete testis → Vas deferens → Epididymis.

158. When the doctor taps the patella with the rubber headed hammer, simple knee jerk reflex occurs. Which of the following is not involved in this reflex?
(a) Stretching of the quadriceps muscles
(b) Motor neuron
(c) Interneuron
(d) Muscle spindle

159. Read statements 'A' and 'B' carefully and choose the correct option.
Statement A: All eucoelomates are triploblastic but all triploblastic animals are not eucoelomates.
Statement B: All vertebrates are chordates but all chordates are not vertebrates.
(a) Both A and B are incorrect.
(b) Both A and B are correct.
(c) Only A is correct.
(d) Only B is correct.

160. H_2L_2 represents –
(a) Heavy chains and light chains in antibody.
(b) Heavy meromyosin and light meromyosin.
(c) Higher and lower parts of antibody.
(d) Heavy domains and light domains within antigens.

161. Which one of the following hormones does not work through a single definite target organ?
(a) LH **(b)** GH **(c)** Glucagon **(d)** PRL

162. Select the correct statement with respect to specific muscular/skeletal disorders.
(a) Myasthenia gravis - A genetic disease causing weakness of muscles.
(b) Tetany - Characterised by muscle spasms due to hypercalcemia.
(c) Muscular dystrophy - An autoimmune disease causing weakness and degeneration of skeletal muscle.
(d) Rickets - Bones fail to calcify leading to bowed legs in children in vitamin-D deficiency.

163. Which of the following biomolecules have phosphodiester bonds?
(a) Fatty acids in diglyceride.
(b) Monosaccharides in a polysaccharide.
(c) Amino acid in a polypeptide.
(d) Nucleotides in a nucleic acid.

164. Smooth muscle fibres differ from skeletal muscle fibres as they:
(a) Are unbranched.
(b) Lack intercalated discs.
(c) Have actin and myosin filaments.
(d) Are non-striated in appearance.

165. The first heart sound is associated with:
(a) Closure of semilunar valves.
(b) Opening of mitral valves.
(c) Opening of tricuspid valves.
(d) Closure of atrioventricular valves.

166. The hormone that is given to induce labour by the doctors is:
(a) Prolactin **(b)** Progestin
(c) Pitocin **(d)** Vasopressin

167. Action of parathormone in the human body:
(a) Increases blood calcium level.
(b) Decreases blood calcium level.
(c) Increases blood sodium level.
(d) Decreases blood sodium level.

168. Which respiratory centres work against each other and together control the rate of respiration?
(a) Pneumotaxic centre and Apneustic centre.
(b) Apneustic centre and Rhythm centre.
(c) Pneumotaxic centre and Rhythm centre.
(d) Chemosensitive area and Apneustic centre.

169. Which of the following is incorrect regarding vasectomy?
(a) No sperm occurs in seminal fluid.
(b) No sperm occurs in epididymis.
(c) Vasa deferentia is cut and tied.
(d) Irreversible sterility.

170. When a stimulus is applied at a site on the polarised axolemma, the membrane at the site becomes freely permeable to:
(a) K^+ ions **(b)** Cl^- ions
(c) Na^+ ions **(d)** Phosphate ions

171. When two closely related species competing for the same resource, cannot co-exist indefinitely and the competitively inferior one is eventually eliminated, then the interaction is known as:
(a) Competition release **(b)** Interference competition
(c) Competitive exclusion **(d)** Camouflage

172. Select the mismatch:
(a) Rosie – Transgenic cow
(b) Emphysema – Alpha-1- antitrypsin
(c) Dolly – Transgenic sheep
(d) ANDi – Transgenic monkey

173. A large proportion of oxygen is left unused in the human blood even after its uptake by the body tissues. This O_2:
(a) Helps in releasing more O_2 to the epithelium tissues.
(b) Acts as a reserve during muscular exercise.
(c) Raises the pCO_2 of blood to 75 mm of Hg.
(d) Is enough to keep oxyhaemoglobin saturation at 90%.

174. Fight –or-flight reactions cause activation of:
(a) The parathyroid gland, leading to increased metabolic rate.
(b) The kidney, leading to the suppression of renin angiotensin-aldosterone pathway.
(c) The adrenal medulla, leading to increased secretion of epinephrine and norepinephrine.
(d) The pancreas, leading to a reduction in the blood sugar levels.

175. In human body, natural anticoagulant is released from:
(a) RBCs **(b)** Some granulocytes
(c) Wall of veins **(d)** Platelets

176. Malaria characterised by fever that occurs every third day and in which *Plasmodium vivax* is the causative agent is:
(a) Mild tertian malaria **(b)** Subtertian malaria
(c) Benign tertian malaria **(d)** Cerebral malaria

177. ATPase enzyme required for muscle contraction is located in:
(a) Tropomyosin **(b)** Myosin
(c) Calmodulin **(d)** Troponin

178. *Ascaris* is characterised by:
(a) Presence of true coelom and metamerism.
(b) Absence of true coelom but presence of metamerism.
(c) Presence of neither true coelom nor metamerism.
(d) Presence of true coelum but absence of metamerism.

179. Which one of the following pairs is incorrectly matched?
(a) Corpus luteum-Relaxin (Secretion)
(b) Insulin-Diabetes mellitus (disease)
(c) Glucagon-Beta cells (source)
(d) Somatostatin-Delta cells (Source)

180. *Monascus purpureus* is a yeast used commercially in the production of:
(a) Citric acid.
(b) Blood cholesterol lowering statins.
(c) Ethanol.
(d) Streptokinase for removing clots from the blood vessel.

181. Match the column and choose the correct option:

Column A	Column B
i. Annelida	1. Calcareous exoskeleton
ii. Arthropoda	2. Parapodia
iii. Mollusca	3. Anus dorsally located
iv. Echinodermata	4. Ambulacral system
	5. Book gills, book lungs
	6. Radula

(a) i - 1; ii - 2; iii - 5; iv - 3, 4
(b) i - 2; ii - 5; iii - 1, 6; iv - 3, 4
(c) i - 2; ii - 5; iii - 1, 3; iv - 4
(d) i - 2; ii - 1; iii - 3,4; iv – 5

182. Postganglionic fibre of parasympathetic neurons releases:
(a) Acetylcholine **(b)** Epinephrine
(c) Norepinephrine **(d)** Dopamine

183. Match the following and choose the correct answer.

Cells of Islets of Langerhans	Hormones
(i) β-cells	A. Pancreatic polypeptide
(ii) α-cells	B. Insulin
(iii) pp-cells	C. Glucagon
(iv) Δ-cells	D. Somatostatin

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

184. In bees the males are produced by _____:
(a) Mitosis but no fertilization.
(b) Mitosis and then fertilization.
(c) Meiosis and then fertilization.
(d) Meiosis but no fertilization.

185. The chitinous exoskeleton of arthropods is formed by the polymerisation of:
(a) Lipoglycans.
(b) Keratin sulphate and Chondroitin glucosamine.
(c) D-glucosamine.
(d) N-acetyl glucosamine.

Section B

186. The extinct human who lived 1,00,000 to 40,000 years ago, in Europe, Asia and parts of Africa with short stature, heavy eyebrows, retreating fore heads, large jaws with heavy teeth, stocky bodies, a lumbering gait and stooped posture was:
(a) *Homo habilis* **(b)** Cro-magnon humans
(c) Neanderthal human **(d)** *Ramapithecus*

187. Secondary productivity is the rate of formation of new organic matter by:
(a) Decomposers **(b)** Producers
(c) Parasite **(d)** Consumer

188. Which of the followings are correct regarding Galactosemia?
(A) Absence of Uridyl transferase enzyme
(B) Deficiency of Galactose
(C) Lactose intolerance
(D) Mental retardation
(a) A & B only **(b)** A, B & C
(c) A, C & D **(d)** B & C only

189. Lederberg's replica plating experiment explains all except:
(a) Mutation is pre-adaptive.
(b) Change in environment selects mutation that had occurred earlier.
(c) Change in environment does not produce the mutation that get selected at that time.
(d) Change in environment produces mutation that gets selected at that time.

190. In earthworm, 10th and 11th segments bear loop-like broad vessels without valves, such vessels are known as
(a) Lateral hearts
(b) Latero-oesophageal hearts
(c) Anterior loops
(d) Dorsal-blood vessel

191. Regression coefficient is shown by in the German naturalist and geographer Alexander von Humboldt's equation: log S = log C + Z log A.
(a) S **(b)** Z **(c)** A **(d)** C

192. The process by which organisms with different evolutionary history evolve similar phenotypic adaptations in response to a common environmental challenge is called:
(a) Natural selection **(b)** Convergent evolution
(c) Non-random evolution **(d)** Adaptive radiation

193. Which disease out of the following is an auto-immune disorder?
(a) Gout **(b)** Osteoarthritis
(c) Mysthenia gravis **(d)** Tetany

194. Which of the following statements are incorrect with respect to vital capacity?
(1) It includes ERV, TV and IRV
(2) Total volume of air a person can inspire after a normal expiration.
(3) The maximum volume of air a person can breathe in after forced expiration.
(4) It includes ERV, RV and IRV.
(5) The maximum volume of air a person can breathe out after a forced inspiration.
Choose the most appropriate answer from the options given below :
(a) (1) and (5) **(b)** (2) and (4)
(c) (1), (3) and (4) **(d)** (1), (3) and (5)

195. Inhibin from sertoli cells inhibits:
(a) Hypothalamus **(b)** Posterior pituitary
(c) Anterior pituitary **(d)** Testis

196. Name the type of fertilization where placenta formation does not occur:
(a) Segmentation **(b)** Viviparous
(c) Oviparous **(d)** Ovoviviparous

197. Good vision depends on adequate intake of carotene rich food.
Select the best option from the following statements.
(i) Vitamin A derivatives are formed from carotene.
(ii) The photopigments are embedded in the membrane discs of the inner segment.
(iii) Retinal is a derivative of Vitamin A.
(iv) Retinal is a light absorbing part of all the visual photopigments.
Options:
(a) (i) and (ii) **(b)** (i), (iii) and (iv)
(c) (i) and (iv) **(d)** (ii), (iii) and (iv)

198. Which among the following is not as application of DNA fingerprinting?
(a) It is a highly reliable method for identification of individuals.
(b) It is useful in guiding breeding programme for endangered animals.
(c) It provides information about human image and relationship with great apes.
(d) Production of organism which are genetically identical to their parents.

199. What happens to the diaphragm during inspiration?
(a) relaxes **(b)** contracts
(c) expands **(d)** shows no change

200. Select the incorrect match regarding coagulation factor, its function and associated genetic disorders.

	Coagulation factor	**Function**	**Associated Genetic disorders**
(a)	I (Fibrinogen)	Forms clot (fibrin)	Congenital afibrinogenemia
(b)	II (Prothrombin)	Its active form activates I, V, VII, VIII, XI, XIII	Thrombophilia
(c)	III (Stable factor)	Co-factor of IX	Haemophilia A
(d)	IV (Calcium)	Required for oagulation factors to bind to phospholipids	