MOCK TEST
(New NTA NEET Exam Pattern)

| S.No.	Subject(s)	Section(s)	No. of Questions	Mark(s)* *(Each Question Carries 04 (Four) marks)	Type of Question(s)
1	PHYSICS	SECTION A	35	140	MCQ (Multiple Choice Questions)
		SECTION B	15	40	
2	CHEMISTRY	SECTION A	35	140	
		SECTION B	15	40	
3	BOTANY	SECTION A	35	140	
		SECTION B	15	40	
4	ZOOLOGY	SECTION A	35	140	
		SECTION B	15	40	
		TOTAL MARKS		720	

Note : Correct option marked will be given (4) marks and Incorrect option marked will be minus one (-1) mark. Unattempted / Unanswered Questions will be given no marks.

The Important points to note :

1. Each question carries **04 (four) marks** and, for each correct answer candidate will get **04 (four) marks**.
2. For each incorrect answer, **01 (one) mark** will be deducted from the total score.
3. To answer a question, the candidate has to find, for each question, the correct answer / best option.
4. However, after the process of the challenge of key, if more than one option is found to be correct then all/any one of the multiple correct/best options marked will be given **four marks (+4)**.
    *   Any incorrect option marked will be given minus **one marks (-1)**.
    *   Unanswered/Unattempled questions will be given no marks. In case, a question is dropped/ignored, all candidates will be given **four marks (+4)** irrespective of the fact whether the question has been attempted or not attempted by the candidate.

1. Two thin wire rings, each having a radius R are placed at a distance d apart with their axes coinciding. The charges on the two rings are + q and –q. The potential difference between the centers of the two rings is:

(1) zero

(2) $\dfrac{q}{4\pi\varepsilon_0}\left[\dfrac{1}{R}-\dfrac{1}{\sqrt{R^2+d^2}}\right]$

(3) $\dfrac{qR}{4\pi\varepsilon_0 d^2}$

(4) $\dfrac{q}{2\pi\varepsilon_0}\left[\dfrac{1}{R}-\dfrac{1}{\sqrt{R^2+d^2}}\right]$

2. An electric dipole is placed at the centre of a sphere. Mark the correct options.

(1) The electric field is zero at every point of the sphere.
(2) The flux of the electric field through the sphere is non-zero.
(3) The electric field is zero on a circle on the sphere.
(4) The electic field is not zero anywhere on the sphere.

3. In the adjoining diagram two geometrically identical capacitors A and B are connected to a battery. Air is filled between the plates of C_1 and a dielectric is filled between the plates of C_2, then -

(1) $q_1 < q_2$　　　(2) $q_1 > q_2$　　　(3) $q_1 = q_2$　　　(4) None of these

4. A parallel plate capacitor with pates of area 1 m² each, are at a separation of 0.1 m. If the electric field between the plates is 100 N/C, the magnitude of charge on each plate. (Take $\in_0$ = 8.85 × 10⁻¹² $\dfrac{C^2}{N-m^2}$)

(1) 6.85 × 10⁻¹⁰ C　　　(2) 7.85 × 10⁻¹⁰ C　　　(3) 9.85 × 10⁻¹⁰ C　　　(4) 8.85 × 10⁻¹⁰ C

5. According to maxwell's hypothesis, a changing electric field gives rise to
(1) an e.m.f　　　(2) electric current
(3) magnetic field　　　(4) pressure gradiant

6. If R and H represent the horizontal range and the maximum height achieved by a projectile then which of the relation exists?

(1) $\dfrac{H}{R}=4\cot\theta$　　　(2) $\dfrac{R}{H}=4\cot\theta$　　　(3) $\dfrac{H}{R}=4\tan\theta$　　　(4) $\dfrac{R}{H}=4\tan\theta$

7. A satellite launching station should be
(1) near the equatorial region　　　(2) near the polar region
(3) on the polar axis　　　(4) all locations are equally good

8 A geostationary satellite is orbiting the earth at a height of 5R above that surface of the earth, R being the radius of the earth. The time period of another satellite in hours at a height of 2R from the surface of the earth is :

(1) 5　　　(2) 10　　　(3) $6\sqrt{2}$　　　(4) $\dfrac{6}{\sqrt{2}}$

9. A ray of monochromatic light is incident on one refracting face of a prism of angle 75^0. It passes through the prism and is incident on the other face at the critical angle. If the refractive index of the material of the prism is $\sqrt{2}$, the angle of incidence on the first face of the prism is

(1) 30^0 (2) 45^0 (3) 60^0 (4) 0^0

10. Three rods of Copper, brass and steel are welded together to form a Y-shaped structure. Area of cross-section of each rod = 4 cm². End of copper rod is maintained at 100°C where as ends of brass and steel are kept at 0°C. Lengths of the copper, brass and steel rods are 46, 13 and 12 cms respectively. The rods are thermally insulated from surroundings except at ends. Thermal conductivities of copper, brass and steel are 0.92, 0.26 and 0.12 CGS units respectively. Rate of heat flow through copper rod is

(1) 1.2 cal/s (2) 2.4 cal/s (3) 4.8 cal/s (4) 6.0 cal/s

11. Two bodies M and N of equal masses are suspended from two separate massless spring of force constants k_1 and k_2 respectively. If the two bodies oscillate vertically such that their maximum velocities are equal, the ratio of the amplitude M to to that of N is :

(1) $\dfrac{k_1}{k_2}$ (2) $\sqrt{\dfrac{k_1}{k_2}}$ (3) $\sqrt{\dfrac{k_2}{k_1}}$ (4) $\dfrac{k_2}{k_1}$

12. A weightless spring which has a force constant oscillates with frequency n when a mass m is suspended from it. The spring is cut into two equal halves and a mass 2m is suspended from one part of it. The frequency of oscillation will now become :

(1) n (2) 2n (3) $\dfrac{n}{\sqrt{2}}$ (4) $n(2)^{1/2}$

13. A policemen buzz a whistle of frequency 400 Hz. A car driver is approaching the policemen. The speed of car is 72 kmh^{-1}. Find out the change in frequency experienced by the driver, when driver approaches the policemen and after he crosses the policemen.[Velocity of sound is 350 ms^{-1}].

(1) 45.7 Hz (2) 55.7 Hz (3) 40 Hz (4) 50 Hz

14. If we study the vibration of a pipe open at both ends, then the following statement is **not** true :

(1) Odd harmonics of the fundamental frequency will be generated
(2) All harmonics of the fundamental frequency will be generated
(3*) Pressure change will be maximum at both ends
(4) Open end will be antinode

15. A body is thrown vertically upwards. Which one of the following graphs correctly represent the velocity vs time ?
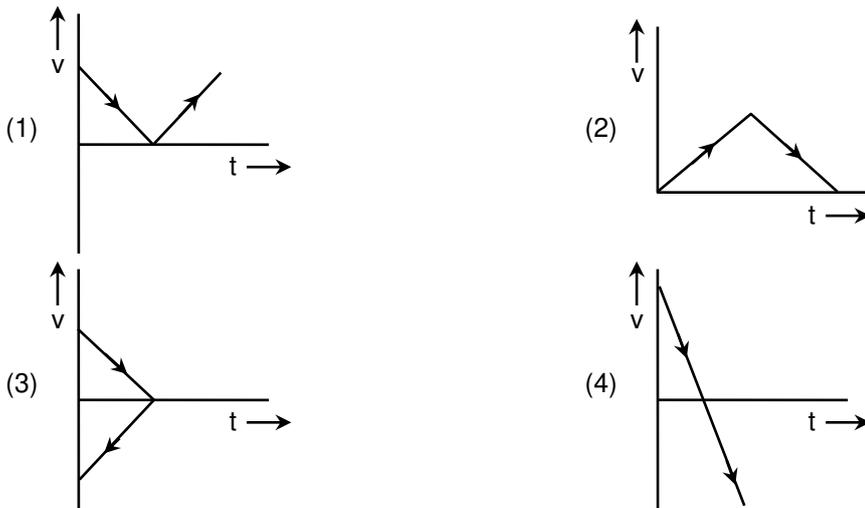

16. If a resistance of 30Ω, a capacitor of reactance 20 Ω, and an inductor of inductive reactance 60Ω are connected in series to a 100 V, 50 Hz power source, then -
(1) A current of 2.0 A flows
(2) A current of 3.33 A flows
(3) Power factor of the circuit is zero
(4) Power factor of the circuit is 2/5

17. A coil of 100 turns having an average area of 100 cm^2 for each turn is held in a uniform field of 50 gauss, the direction of the field being at right angles to the plane of the coil. If the field is removed in 0.01 sec, then average e.m.f induced in coil is -
(1) 0.5 V   (2) 10 V   (3) 20 V   (4) 50 V

18. Hydrogen gas is filled in a container of volume 20 litre. Average translational kinetic energy of all its molecules is 1.5 × 10^5 J. Pressure of hydrogen in cylinder is :
(1) 2 × 10^6 N/m^2 (2) 3 × 10^6 N/m^2 (3) 4 × 10^6 N/m^2 (4) 5 × 10^6 N/m^2

19. An ideal gas is taken through the cycle A → B → C → A as shown in the fig. If the net heat supplied to the gas in the cycle is 5 J,the work done by the gas in the process C → A is :
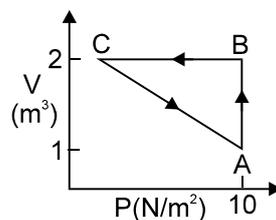
(1) – 5 J   (2) – 10 J   (3) – 15 J   (4) – 20 J

20. The work of 146 kJ is performed in order to compress one kilo mole of a gas adiabatically and in this process the temperature of the gas increases by 7 °C. The gas is
(R = 8.3 J mol^{-1} K^{-1})
(1) diatomic   (2) triatomic
(3) mixture of monoatomic and diatomic   (4) monoatomic

21. A gas has :
(1) one specific heat only
(2) two specific heats only
(3) infinite number of specific heats
(4) no specific heat

22. A metal surface is illuminated by a light of given intensity and frequency to cause photoemission. If the intensity of illumination is reduced to one fourth[keeping frequency constant] of its original value, then the maximum kinetic energy of the emitted photoelectrons would be :
(1*) unchanged
(2) 1/16th of original value
(3) twice the original value
(4) four times the original value

23. The de Broglie wavelength of an electron moving with a velocity 1.5×10^8 ms^{-1} is equal to that of a photon. The ratio of the kinetic energy of the electron to that of the energy of photon is :
1.5×10^8 ms^{-1}

(1) 2
(2) 4
(3) $\dfrac{1}{2}$
(4) $\dfrac{1}{4}$

24. Production of continuous X-rays is caused by
(1) Transition of electrons from higher levels to lower levels in target atoms.
(2) Retardiation of incident electron when it enters the target atom.
(3) Transition of electrons from lower levels to higher levels in target atoms.
(4) Neutralising the incident electron.

25. Energy required for the electron excitation in Li^{++} from the first to the thrid Bohr orbit is :
Li^{++}
(1) 12.1 eV
(2) 36.3 eV
(3) 108.8 eV
(4) 122.4 eV

26. If the series limit frequency of the Lyman series is ν_L, then the series limit frequency of the Pfund series is :
(1) $\nu_L/16$
(2) $\nu_L/25$
(3) $25\nu_L$
(4) $16\nu_L$

27. The graph which depicts the results of Rutherford gold foil experiment with α-particles is:

α-particles is:

Y = Number of scattered α-particles detected

(Plots are schematic and not to scale)

(3) Y

(4) Y

0    $\theta \to \pi$

0    $\theta \to \pi$
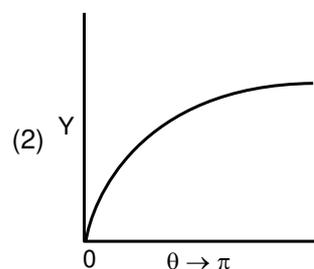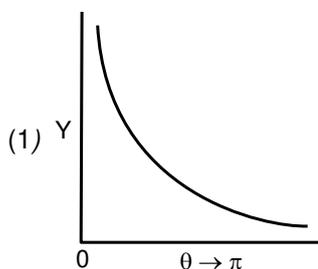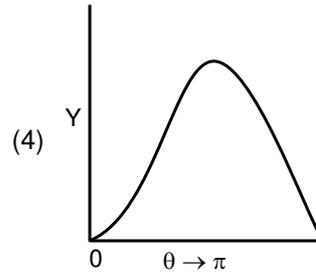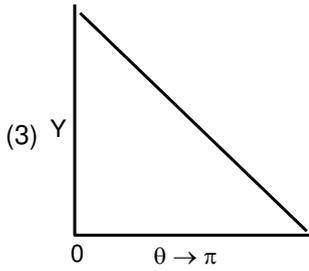
28. Two rigid bodies A and B rotate with rotational kinetic energies E_A and E_B respectively. The moments of inertia of A and B about the axis of rotation are I_A and I_B respectively. If $I_A = I_B/4$ and $E_A = 100 E_B$ the ratio of angular momentum (L_A) of A to the angular momentum (L_B) of B is
(1) 25   (2) 5/4   (3) 5   (4) 1/4

29. A solid sphere rolls down on two different inclined planes of same height, but of different inclinations. In both cases
(1) speed and time of descent will be same
(2) speed will be same but time of descent will be different
(3) speed will be different, but time of descent will be same
(4) speed and time of descent both are different

30. A smooth inclined plane fixed in a car accelerating on a horizontal road is shown in figure. The angle of incline θ is related to the acceleration a of the car as a = g tanθ. If the sphere is set in pure rolling on the incline
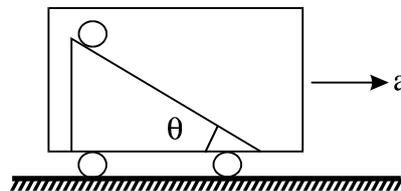
(1) it will continue pure rolling   (2) it will slip up the plane
(3) its angular velocity will increase   (4) its angular velocity will decrease.

31. . A vehicle is moving on a road with an acceleration = 30 m/s² as shown in figure. The frictional coefficient between the block of mass (m) and the vehicle so that block does not fall downward is (g = 10 m/s²)
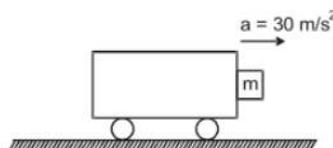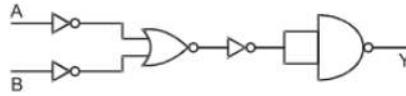

(a) 0.2   (b)0.33   (c)0.5   (d)0.7

32. If initial charge on all the capacitors were zero, work done by the battery in the circuit shown is
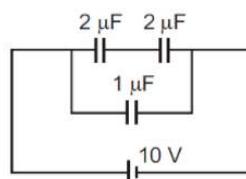
a) 2 mJ   b) 0.2 mJ   c) 0.4 mJ   d) 0.4 mJ

33. The output (Y) for the following system of logic gates if (A = 0 and B = 0) and (A = 1 and B = 0) respectively

   a) 0, 0   b) 0, 1   c) 1, 0   d) 1, 1

34. A uniform thick rope of length 10 m is resting on a horizontal frictionless surface. It is pulled by a force of 5 N at one end. Then what is the tension in the rope at 2 m from the end where the force is applied?

   (a) 6 N   (b) 8 N   c) Zero   (d) 4 N

35. A car of mass (m) accelerates, starting from rest, while the engine supplies constant power P. Then velocity varies with time (t) as

   a) $v \propto t$ b) $v \propto t^{1/2}$ c) $v \propto t^2$ d) $v \propto t^{3/2}$

36. At the centre of a spherical shell of mass M and radius R, a point mass $2M$ is placed. Then, gravitational potential at distance $\dfrac{R}{3}$ from the centre is
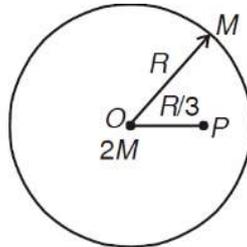
a) $-\dfrac{GM}{R}$ b) $-\dfrac{3GM}{R}$ c) $-\dfrac{7GM}{R}$ d) $+\dfrac{3GM}{R}$

37. A body connected at the end of a spring executes SHM with a time period t_1, while the corresponding period for another spring is t_2. If the period of oscillation with the two spring in series is T, then

(a) $T = t_1 + t_2$ b) $T^2 = t_1^2 + t_2^2$ (c) $\dfrac{1}{T} = \dfrac{1}{t_1} + \dfrac{1}{t_2}$ (d) $\dfrac{1}{T^2} = \dfrac{1}{t_1^2} + \dfrac{1}{t_2^2}$

38. In relation $P = \dfrac{a}{b} e^{-(aE/t)}$, P represents number, E is energy and t is time. The dimension of a and b, is

a) $[ML^2T^3]$, $[MLT^{-1}]$ b) $[M^{-1}L^{-2}T^3]$, $[M^{-1}L^2T^{-3}]$
c) $[M^{-1}L^{-2}T^{-3}]$, $[ML^2T^3]$ d) $[M^{-1}L^{-2}T^3]$, $[M^{-1}L^{-2}T^3]$

39. P is the point of contact of a wheel on the ground. The radius of wheel is 1m. The wheel rolls on the ground without slipping. The displacement of point P when wheel completes half rotation is :-
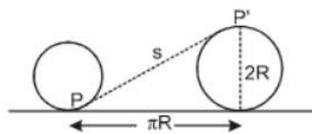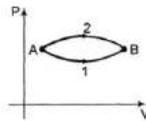

(a) 2 m   b) $\sqrt{\pi^2 + 4}\, m$ c) π^m d) $\sqrt{\pi^2 + 2m}$

40. Acceleration-displacement graph of a particle executing SHM is as shown in given figure. The time period of its oscillation is (in s)
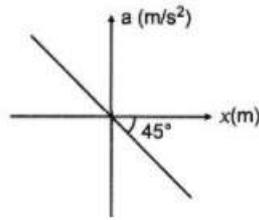
(a) $\frac{\pi}{2}$ (b)2π (c) π (d) $\frac{\pi}{4}$

41. The figure shows two paths for the change of state of a gas from A to B. The ratio of molar heat capacities in path 1 and path 2 is

(a) >1   (b) < 1   (c) 1   (d) Data insufficient

42. In photoelectric emission process from a metal of work function 1.8 eV, the kinetic energy of most energetic electrons is 0.5 eV. The corresponding stopping potential is

(a) 1.8 V   (b) 1.2 V   (c) 0.5 V   (d) 2.3 V

43. Friction coefficient between block and a rough surface is μ. If surface area of block is doubled then new friction coefficient between block and surface will be

(a) 2μ (b) $\frac{\mu}{2}$ (c) $\frac{\mu}{4}$ (d) μ

44. A bar magnet of dipole moment M is suspended at its mid-point by a thread in an external magnetic field B as shown in the figure. Find the potential energy possessed by it.

(a) +MB   b) 0   (c) –MB   (d) $\frac{-MB}{2}$

45. A motor car is travelling at 30 m/s on a circular road of radius 500 m. Its total acceleration is 2.7 m/s². At what speed its speed is increasing?

(a) 1.8 m/s²   (b) 2 m/s²   (c) 2.7 m/s²   (d) Zero

46. A bullet of mass m with velocity u strikes a simple pendulum of mass 3m and embedded in it. The maximum height attained by the pendulum will be

(a)$\frac{u^2}{32\,g}$ (b) $\frac{u^2}{16\,g}$ (c)$\frac{u^2}{8\,g}$ (d)$\frac{u^2}{4\,g}$

47. A coil is taken out completely from a magnetic field in two different process A and B. Process A is slow and B is fast. Which of the following remains same in A as well as B?

(a) Induced emf   (b) Induced current   (c) Induced charge   (d) All of these

48. An object is placed at 24 cm distance above the surface of a lake. If water has refractive index of 4/3, then at what distance from lake surface, a fish will sight the object-

(a) 32 cm above the surface of water   (b) 18 cm over the surface of water

(c) 6 cm over the surface of water   (d) 6 cm below the surface of water

49. A body of mass 500 g is thrown upwards with a velocity 20 m/s. It momentarily comes to rest after attaining height of 16 m. How much energy is lost due to air friction?

(a) 20 J   (b) 10 J   (c) 30 J   (d) 40 J

50. The heat energy absorbed by a system in going through a cyclic process shown in figure is

(a) $10^3\pi$ J   (b) 100π J   (c) 10π J   (d) $10^4\pi$ J
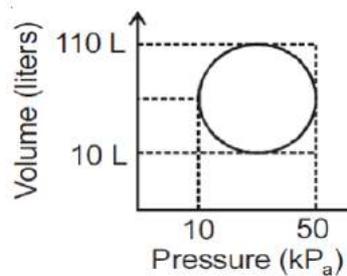
51. Which of the subshell has double dumb-bell shape?
    (a) s　　　　　　　　(b) p　　　　　　　　(c) d　　　　　　　　(d) f

52. A mixture of helium and argon contains 3 mole of He for every 2 mole of Ar. The partial pressure of argon is:
    (a) 2/3the total pressure　　　　(b) 1/3the total pressure
    (c) 2/5the total pressure　　　　(d) 1/5 the total pressure

53. The work done during the process when 1 mole of gas is allowed to expand freely into vacuum is:
    (a) Zero　　　　　　(b)+ve　　　　　　(c)-ve　　　　　　(d) Either of these

54. What is the equilibrium expression for the reaction, $P_4(s)+5O_2(g)\rightleftharpoons P_4O_{10}(s)$?

    (a) $K_c=\dfrac{1}{[O_2]^5}$　　(b) $K_c=[O_2]^5$　　(c) $K_c=\dfrac{[P_4O_{10}]}{5[P_4][O_2]}$　　(d) $K_c=\dfrac{[P_4O_{10}]}{[P_4][O_2]^5}$

55. Water gas is
    (a) $CO+N_2$　　　(b) $CO+CO_2+CH_4$　　　(c) $CO_2 + N_2$　　　(d) $CO+H_2$

56. Insulin contains 3.4% Sulphur. The minimum mol. weight of insulin is:
    a) 941.176　　　b) 944　　　c) 945.27　　　d) None of these

57. The value of n in $MnO_4^- + 8H^+ + ne^- \rightarrow Mn^{2+} + 4H_2O$ is
    (a) 5　　　　　　　(b) 4　　　　　　　(c) 2　　　　　　　(d) 3

58. The bond that undergoes heterolytic cleavage most easily is
    (a) C-O　　　　　　(b) C-C　　　　　　(c) C-H　　　　　　(d) O-H

59. Phosphorus is estimated as
    (a) Na_3PO_4　　　(b) P_2O_5　　　(c) P_2O_3　　　(d) $Mg_2P_2O_7$

60. Higher concentration of nitrogen dioxide in atmosphere air causes:
    (a) Cancer　　　　(b) Bronchitis　　　　(c) Asphyxiation　　　　(d) Corrosion

61. Greater the dipole moment:
    (a) Greater is the ionic nature　　　　(b) Lesser the polarity
    (c) Smaller the ionic nature　　　　　(d) None of these

62. Which among the following molecules/ ions is diamagnetic?
    (a) Super oxide ion　　　　　　(b) Oxygen
    (c) Carbon molecule　　　　　　(d) Unipositive ion of N_2 molecule

63. Pearl ash and caustic potash are chemically:
    (a) K_2CO_3 and KOH　　　　　(b) KOH and K_2CO_3
    (c) Na_2CO_3 and KOH　　　　　(d) Na_2CO_3 and NaOH

64. The hardness of water is due to .... Metal ions
    (a) Ca^{2+} and Na^+　　　　　(b) Mg^{2+} and K^+
    (c) Ca^{2+} and Mg^{2+}　　　　d) Zn^{2+} and Ba^{2+}

65. Alkynes can be reduced to alkenes by hydrogenation in presence of:
(a) Raney Ni   (b) Anhy AlCl₃   (c) Pd   (d) Lindlar's catalyst

66. Heroin is a derivative of:
(a) Cocaine   (b) Morphine   (c) Caffeine   (d) Nicotine

67. Natural rubber is which type of polymer?
(a) Condensation polymer   (b) Addition polymer
(c) Coordination polymer   (d) None of these

68. The S in Buna-S refers to
(a) Sulphur   (b) Styrene   (c) Sodium   (d) Just a trade name

69. Which forms interstitial compounds?
(a) Fe   (b) Ni   (c) Co   (d) All of these

70. The elements commonly used for making transistors are
(a) C and Si   (b) Ga and In   (c) P and As   (d) Si and Ge

71. Which is not correct for catalyst? It :
(a) Enhances the rate of reaction in both directions
(b) Changes enthalpy of reaction
(c) Reduces activation energy of reaction
(d) Specific in nature

72. Van't Hoff factor more than unity indicates that the solute in solution has
(a) Dissociated   (b) Associated
(c) Both (a) and (b)   (d) Cannot say anything

73. Cell constant has the unit:
(a) cm   (b) cm⁻¹   (c) cm²   (d) cm sec⁻¹

73. Cell constant has the unit:
(a) cm   (b) cm^{-1} (c) cm^2 (d) $cm\ sec^{-1}$

74. The highest electrical conductivity of the following aqueous solutions is of
(a) 0.1 M difluoroacetic acid   (b) 0.1 M fluoroacetic acid
(c) 0.1 M chloroacetic acid   (d) 0.1 M acetic acid

75. Temperature coefficient of a reaction is 2. When temperature is increased from $30°C$ to $100°C$, rate of the reaction increases by
(a) 128 times   (b) 100 times   (c) 500 times   (d) 250 times

76. What fraction of a reactant showing first order remains after 40 minute if $t_{1/2}$ is 20 minute?
(a)1/4   (b)1/2   (c)1/8   (d)1/6

77. The rate of a reaction is expressed in different ways as follows
+12d[C]dt=-15d[D]dt=+13d[A]dt=-d[B]dt

The reaction is
(a) 4 A+B → 2C + 3D   (b) B+5D → 3A + 2C

(c) 4A + 2B → 2C + 3D   (d) $B + \dfrac{1}{2} \rightarrow 4A + 2C$

78. Type of isomerism shown by $\left[Cr(NH_3)_5 NO_2 \right] Cl_2$ is
(a) Optical   (b) Hydrates   (c) Geometrical   (d) Linkage

79. The products obtained when anisole is heated in a sealed tube with HI are

(a) + CH₃I

(b) + CH₃OH

(c)

(d) $CH_3OH + CH_3I$
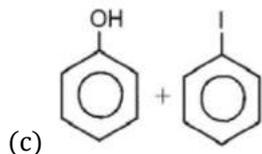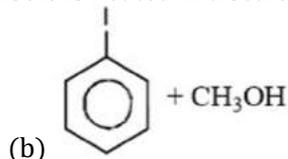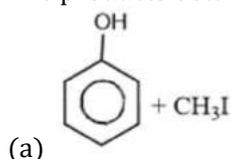
80. What is the hybridisation of carbon and oxygen in electronic structure of ether?
    (a) sp^3 and sp^2 (b) sp^3 and sp^2 (c) sp and sp   (d) sp^2 and sp^2

81. The conversion of ethyl chloride into diethyl ether takes place by
    (a) Williamson's synthesis   (b) Perkin's reaction
    (c) Wurtz reaction   (d) Grignard reaction

82. Hofmann bromamide reaction is used to prepare
    (a) 1° amine   (b) 2° amine   (c) 3° amine   (d) All of these

83. The reaction, $CH_3CHO + H_2N-NH_2 \rightarrow CH_3CH=N\cdot NH_2$ is :
    (a) Elimination   (b) Addition
    (c) Addition-elimination   (d) None of these

84. What is obtained what acetyl chloride is heated with benzene in presence of anhydrous $AlCl_3$
    (a) Acetyl benzoic acid   (b) Anisol
    (c) Acetonephenone   (d) Chlolorobenzene

85. An acyl halide is formed when PCI₅ reacts with an:
    (a) Acid   (b) Alcohol   (c) Amine   (d) Ester

86. The ratio of rate of diffusion of helium and methane under identical conditions of pressure 6 and temperature is:
    (a) 4   (b) 2   (c) 1   (d) 0.5

87. Which of the following molecules acts as a Lewis acid?
    (a) $(CH_3)_3N$ (b) $(CH_3)_3B$ (c) $(CH_3)_2O$ (d) $(CH_3)_3P$

88. Which of the following transitions involves maximum amount of energy?
    (a) $M^-(g) \rightarrow M(g)$ (b) $M(g) \rightarrow M^+(g)$ (c) $M^+(g) \rightarrow M2^+(g)$ (d) $M2^+(g) \rightarrow M3^+(g)$

89. If two compounds have the same empirical formula but different molecular formulae, they must have
    (a) Different percentage composition   (b) Different molecular weights
    (c) Same viscosity   (d) Same vapour density

90. The gravimetric composition of water as H : O is:
    (a) 1 : 1   (b) 1 : 2   (c) 1 : 8   (d) 1 : 16

91. Which of the following is paramagnetic with bond order 0.5?
    (a) F_2 (b) H_2^+ (c) N_2 (d) O_2^-

92. Which of the following will react with sodium metal?
    (a) Ethene   (b) Propyne   (c) But-2-yne   (d) Ethane

93. Chloroquine is an example of:
    (a) Antipyretic   (b) Antimalarial
    (c) Antibacterial   (d) Antitubercular drug

94. Cellulose is a linear polymer of:
    (a) α-glucose   (b) β-glucose   (c) α-fructose   (d) None of these

95. A sequence of how many nucleotides in messenger RNA makes a codon for an amino acid?
    (a) Three   (b) Four   (c) One   (d) Two

96. Which of the following compounds has colour but no unpaired electrons?
    (a) $KMnO_4$ (b) K_2MnO_4 (c) $MnSO_4$ (d) $MnCl_2$

97. Edge length of a cube is 400 pm. Its body diagonal would be :
    (a) 600 pm   (b) 566 pm   (c) 693 pm   (d) 500 pm

98. If for a sucrose solution elevation in boiling point is $0.1°C$ then what will be boiling point of NaCl solution for the same molal concentration?
    (a) 0.1   (b) 0.2   (c) 0.16   (d) 0.26

99. The metal that cannot be produced on reduction of its oxide by aluminium is :

(a) K   (b) Mn   (c) Cr   (d) Fe

100. $\left[Co(NH_3)_6 \right] Cl_3$ is called :

(a) Hexaammine cobalt (III) chloride   (b) Amino cobalt chloride (III)

(c) Cobalt chloride hexaammine   (d) Hexaamminetricobalt chloride

101. Select the correct statement.
     (a) Birds are poikilothermic   (b) Flatworms are coelomic animals.
     (c) Earthworm is metamerically segmented.
     (d) Fishes are radially symmetrical.

102. Plasmids are autonomously replicating circular extra chromosomal DNA, that act as important tool of
     (a) Ecology   (b) Biotechnology   (c) Taxonomy   (d) Physiology

103. Succus entericus is
     (a) Intestinal juice   (b) Gastric juice   (c) Bile juice   (d) Pancreatic juice

104. When the oxygen supply to the tissue is inadequate, the condition is
     (a) Dyspnea   (b) Hypoxia   (c) Asphyxia   (d) Apnea

105. An Additional muscles in the …… impacts the ability of humans to increase the strength of inspiration and expiration. Complete the given NCERT statement with an appropriate option
     (a) Chest   (b) Diaphragm   (c) Abdomen   (d) Lungs

106. Glomerular area of adrenal cortex is responsible for
     (a) Water and electrolyte balance
     (b) Carbohydrate metabolism
     (c) Steroid and hormone secretion
     (d) Blood pressure

107. The number of occipital condyles in man is/are
     (a) One   (b) Two   (c) Three   (d) Four

108. Neuromuscular junction is a junction between
     (a) Two neurons and muscles
     (b) Sensory neurons and muscles
     (c) Motor neurons and sarcolemma of muscles
     (d) Sensory neurons and sarcolemma of muscles

109. In humans, gustato receptors are found in
     (a) Eyes   (b) Ears   (c) Tongue   (d) Stomach

110. Parturition is the process of
     (a) Child birth   (b) Fusion of gametes
     (c) Organogenesis   (d)Releasing of gametes

111. Ovulation do not occur in lactational period because of
     (a) Inhibin   (b) Prolactin   (c) Prostaglandin   (d) Oxytocin

112. *'Ontogeny Recapitulates Phylogeny'* is narrated in which of the evidences for organic evolution?
     (a) Palaeontological evidence   (b) Physiological evidence
     (c) Embryological evidence   (d) Anatomical evidence

113. Rhinovirus causes
     (a) Common cold   (b) Malaria   (c) AIDS   (d) Pneumonia

114. Which is produced during anaerobic fermentation of agricultural wastes?
(a) LPG   (b) CO_2 (c) Carbon monoxide   (d)Biogas

115. Which one of the following bacterium is used for production of transgenic plants?
(a) Escherichia coli   (b) Clostridium butylicum
(c) Staphylococcus aureus   (d) Agrobacterium tumefaciens

116. Murrah is a breed of:
(a) Cow   (b) Sheep   (c) Buffaloes   (d) Goat

117. As the blood passes through the capillaries some water along with small water soluble substances move out into the spaces between the cells of the tissues. This fluid released out is called the
(a) Intrastitial fluid   (b) Interstitial fluid   (c) Nutritional fluid   (d) Vital fluid

118. Amniocentesis is a technique to:
(a) Estimate essential amino acids in the body
(b) Detect chromosomal anomalies in the foetus
(c) Reverse sex of the foetus
(d) Correct genetic disorders of the foetus

119. Cancer causing viruses are called
(a) Oncogenic viruses   (b) Retroviruses
(c) Adenoviruses   (d) Poxviruses

120. Which of the following statements about mutation are true?
I. Mutations are the source of new alleles for genes
II. Organisms are able to create mutations to meet their specific needs
III. Mutations are random events and can happen in any cell at any time
IV. Most mutations tend to be harmful or have no effect on an organism

(a) I, II and III   (b) I, II, III and IV   (c) I, III and IV   (d) I and III

121. Which of the following statements are incorrect?
I. Left end of a polysaccharide is called nonreducing end while right end is called reducing end
II. Starch and glycogen are branched molecules
III. Starch and glycogen are the reserve food materials of plants and animals, respectively
IV. Starch can hold iodine molecules in its helical secondary structure but cellulose being non-helical, cannot hold iodine

(a) Statements I and II are incorrect   (b) All statement are incorrect
(c) Only statement IV is incorrect   (d) None of these

122. Bile salts act as activator of which enzyme?
(a) Pepsinogen   (b) Trypsinogen   (c) Lipase   (d) Pancreatic amylase

123. Cerebellum and medulla together constitutes
(a) Hindbrain   (b) Midbrain   (c) Forebrain   (d) Telencephalon

124. In micturition,
(a) Urethra relaxes   (b) Ureter relaxes
(c) Ureter contracts   (d) Urethra contracts

125. Glucocorticoids are the corticoids which
(a) Are involved in protein metabolism   (b) Are involved in fat metabolism
(c) Are involved in glucose metabolism   (d) All of the above

126. A student brought home a strange animal which he found outside under a rock. It had moist skin, a complete digestive tract, a ventral nerve cord, and had gone through torsion. Identify the phylum of the animal.
(a) Porifera   (b) Annelida   (c) Mollusca   (d) Echinodermata

127. In which of the following preparations are you likely to come across cell junctions most frequently ?
(a) Ciliated epithelium   (b) Tendon
(c) Hyaline cartilage   (d) Blood

128. Match the column
Column – I   **Column – II**
A. Hyaline cartilage   (i) Intervertebral disc
B. White fibrous cartilage   (ii) Tip of nose
C. Elastic cartilage   (iii) Ribs
D. Calcified cartilage   (iv) Supa scapula of frog

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

129. Read the following statements w.r.t. Periplaneta :
(i) The abdomen in both males and females consists of ten segments
(ii) Anal styles are absent in females
(iii) Anal cerci is found only in females
(iv) Forewings are called tegmina which are transparent and membranous
(v) Hind wings are used in flight
Which of the above statements are correct ?
(a) (i), (ii), (v)   (b) (iii), (iv)   (c) (iii), (iv), (v)   (d) (i), (iii)

130. Choose the correct option w.r.t.X and Y axis for enzyme activity shown graphically below :
(a) X-axis   (b) X-axis
Enzymatic activity   Temperature/pH
Y-axis   Y-axis
Temperature/pH   Enzymatic activity

(c) X-axis   (d) X-axis
Rate of reaction   Enzymatic activity
Y-axis   Y-axis
Enzymatic activity   Rate of reaction

131. Brunner's glands are located in which layer of gut?
(a) Mucosa   (b) Submucosa   (c) Muscularis mucosa   (d) Serosa

132. During the propagation of a nerve impulse, the action potential results from the movement of
(a) Na+ ions from intracellular fluid to extracellular fluid
(b) K+ ions from intracellular fluid to extracellular fluid
(c) Na+ ions from extracellular fluid to intracellular fluid
(d) K+ ions from extracellular fluid to intracellular fluid

133. Secondary massenger is
(a) A cytoplasmic receptor   (b) Cyclic AMP
(c) ATP   (d) Epinephrine

134. Which segment of nephron allows passage of small amount of urea into the medullary interstitium
    (a) PCT   (b) DCT   (c) Loop Of Henle   (d) Collecting Duct

135. Differentiation of recombinants from non-recombinants on the basis of their ability to produce colour in the presence of chromogenic substance it is based on
    (a) Insertional inactivation   (b) RNA interference
    (c) Down stream processing   (d) Molecular diagnosis

136. In which of the following, metabolic reactions take place?
    (a) In living organism only
    (b) Both in living and non-living organism
    (c) In isolated cell free systems
    (d) Both (a) and (c)

137. The following diagrams represent the nitrogenous bases of nucleic acid molecules. Identify the correct combination.
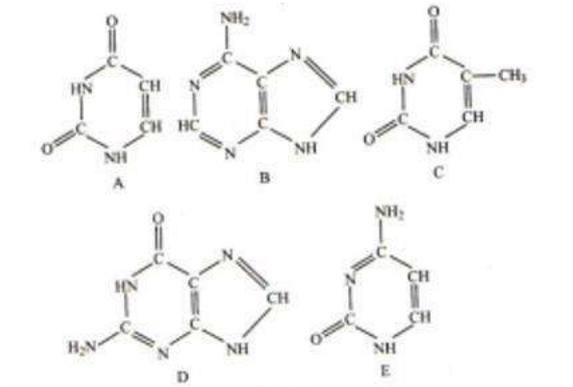
    (a) A- Uracil, B- Adenine, C- Thymine, D- Guanine, E- Cytosine
    (b) A- Uracil, B- Guanine, C- Cytosine, D- Adenine, E- Thymine
    (c) A - Thymine, B- Adenine, C- Cytosine, D- Guanine, E- Uracil
    (d) A-Uracil, B- Guanine, C- Uracil, D- Adenine, E- Cytosine

138. Chordae tendinae
    (a) Are present close to AV valves
    (b) Open semilunar valves
    (c) Prevent the AV valves flaps from everting
    (d) Are present in auricle

139. Which is common to kidney and skeleton in mammals?
    (a) Cortex   (b) Medulla   (c) Pelvis   (d) Radius

140. Which of the following is an accumulation and release centre of neurohormones?
    (a) Posterior pituitary lobe
    (b) Intermediate lobe of the pituitary
    (c) Hypothalamus
    (d) Anterior pituitary lobe

141. The figure given below illustrates the changes taking place during the human menstruation cycle
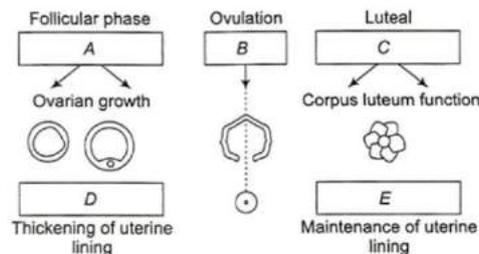
Identify hormones $A,,,D$ and E from the figures In the boxes shown in the figure write the name of the hormone (or hormones) controlling the stage in the human menstrual cycle
    (a) A-FSH, B-LH, C-LH, D-Oestrogen, E-Progesterone
    (b) A- LH, B- FSH, C-LH, D-Oestrogen, E-Progesterone

(c) A-FSH, B-LH, C- FSH, D-Oestrogen, E-Progesterone
(d) A-FSH, B-LH, C-LH, D- Progesterone, E- Oestrogen

142. Which of the following is/are correct about Adenosine Deaminase (ADA) deficiency?
I. In the absence of adenosine deaminase enzyme, purine metabolism is disturbed and T-lymphocytes fails to function
II. ADA deficiency is caused by the deletion of the gene for ADA
III. In some cases, it can be cured by bone marrow transplantation and enzyme replacement therapy. But in both approaches, the patients are not completely cured
IV. For permanent cure, genes isolated from the bone marrow cells producing ADA at early embryonic stages can be a possible cure

Which of the above statements are correct?
(a) I, II and III   (b) II, III and IV   (c) I, III and IV   (d) I, II, III and IV

143. Which hormone causes dilation of blood vessels, increased oxygen consumption and glycogenolysis?
(a) ACTH   (b) Insulin   (c) Adrenaline   (d) Glucagon

144. The plasmid DNA confers certain unique characters to bacteria in which they are found. This include
I. resistance to antibiotics
II. no resistance to antibiotics
III. monitor bacterial transformation with foreign DNA

The correct option is
(a) Only I   (b) Only II   (c) I and III   (d) II and III

145. Consider the following four statements (I-IV) regarding kidney transplant and select the two correct ones out of these.
I. Even if a kidney transplant is proper the recipient may need to take immunosuppressants for a long time.
I. The cell-mediated immune response is responsible for the graft rejection.
II. The B-lymphocytes are responsible for rejection of the graft.
III. The acceptance or rejection of a kidney transplant depends on specific interferons.

The two correct statements are

(a) II and III   (b) III and IV   (c) I and III   (d) I and II

146. Transport of CO_2 by the blood is primarily dependent upon
(a) Solubility of CO_2 in blood   (b) Carbonic anhydrase
(c) Binding of haemoglobin to CO_2 (d)Binding of haemoglobin to CO_2

147. Find out the correct order of number of bones in the parts of skull such as cranial bone, facial bone, hyoid bone and middle ear bone respectively
(a) 14, 8, 1 and 3   (b) 3, 8, 14 and 1
(c) 14, 8, 3 and 1   (d) 8, 14 ,1 and 3

148. I. ADH
II. Renin
III. ANF
IV. Angiotensin

Choose the option containing factors, which increase the blood pressure
(a) I, II and III   (b) II, III and IV   (c) I, II and IV   (d) I, III and IV

149. Choose the correct ones
    I. Vasa recta is lacking in cortical nephrons
    II. Maximum number of nephrons in kidney are juxta-medullary type
    III. DCT of many nephorns open into collecting tubule
    IV. During summer when body loses lot of water by evaporation, the release of ADH is suppressed
    V. When someone drinks lot of water, ADH release is suppressed
    VI. Exposure to cold temperature stimulates ADH release
    VII. An increase in glomerular blood flow stimulates formation of angiotensin II

The correct option is
    (a) All except I and IV   (b) All except V and VII
    (c) All except I and V   (d) All except II and VI

150. In DNA fingerprinting:
    (a) A positive identification can be made
    (b) Multiple restriction enzyme digests/generate unique fragments
    (c) The polymerase chain reaction amplifies fewer DNA
    (d) The variability of repeated sequences between two restriction sites is evaluated

151. … is a book (taxonomic acid) which contain information about habitat, distribution, climate description and index of plant found in a particular area
(A) Manual   (b) Flora   (c) Monograph   (d) Key

152. Out of the following choose the post fertilisation events
(a) Endosperm development   (b) Embryonic development
(c) Both (a) and (b)   (d) Gamete formation

153. Mushroom belongs to
(a) Ascomycetes   (b) Basidiomycetes
(c) Phycomycetes   (d) Zygomycetes

154. When moss spores germinate, the form
(a) Leafy gametophyte   (b) Capsule   (c) Protonema   (d) Rhizoids

155. Leaf having completely divided lamina broken up into direct segment or leaflets is called
(a) Petiole   (b) Phyllotaxy   (c) Compound leaf   (d) Simple leaf

156. The below mentioned floral formula belongs to plant

$$Ebr \oplus \male\female \; K_{2+2} \; C_4 \; A_{2+4} \; G_{\underline{(2)}}$$

(a) Tulip   (b) Sunflower   (c) Chilli   (d) Mustard

157. The reticulate venation is commonly found in the leaves of
(a) Monocot plants   (b) Dicot plants   (c) Bryophytes   (d) Thallophytes

158. Plant cell lack
(a) Plastids   (b) Vacuoles   (c) Centrioles   (d) Cell wall

159. During cell division, chromosome attaches with spindles at
(a) Kinetochore   (b) Centrosome   (c) Centriole   (d) Secondary constriction

160. Photochemical reactions in the chloroplast are directly involved in
(a) Photolysis of water and formation of ATP
(b) Formation of PGA
(c) Synthesis of starch and lipid
(d) Fixation of PEP

161. Fruit elongation and improvement of its shape is performed by
(a) Auxin   (b) Ethylene   (c) C_2H_2 (d) GA

162. Vegetatively propagated plants:
(a) Clone of their parent   (b) Show adaptive variations
(c) Better fitted for struggle for existence
(d) Stouter than parents

163. The function innermost layer of pollen sac, tapetum is
(a) Dehiscence   (b) Nutritive   (c) Mechanical   (d) Protective

164. In a family, man have blood group-A and women have blood group-B. Blood group of their children will be
(a) Only A   (b) A or B or AB or O

(c) Only O   (d) Only B

165. Arginine and lysine are …A…amino acids and found abundantly in …B… Choose the correct option for A and B
(a) A-acidic; B-protamine
(b) A-basic; B-histone proteins
(c) A-acidic; B-histone proteins
(d) A-neutral; B-histone proteins

166. How many varieties of rice has been estimated to be present in India?
(a) 500   (b) 5000   (c) 50000   (d) 500000

167. Another name of nutrient cycling is
(a) Gaseous cycle
(b) Sedimentary cycle
(c) Biogeochemical cycle
(d) Carbon cycle

168. Which of the following is an/are exotic species leading to loss of biodiversity?
(a) Parthenium   (b) Lantana   (c) Eichhornia   (d) All of these

169. The frogs have the ability to change its colour to hide them from their enemies. This protective colouration is called
(a) Hibernation   (b) Aestivation   (c) Mimicry   (d) Camouflage.

170. Given below are pie diagrams I, II and III related to the proportionate number of species of major taxa of invertebrates, vertebrates and plants respectively. Critically study and fill in the blanks A,,C and D

I. Invertebrates   II. Vertebrates   III. Plants
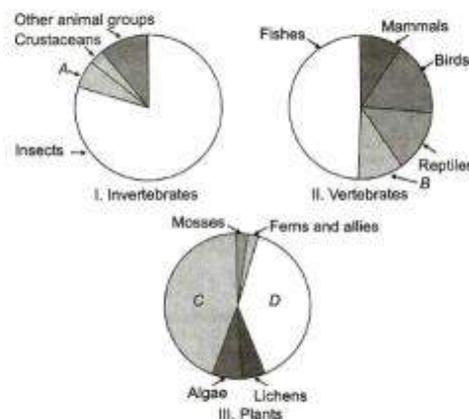
(a) A-Molluscs, B-Amphibians, C-Angiosperms, D-Gymnosperms
(b) A-Molluscs, B-Amphibians, C-Fungi, DAngiosperms
(c) A-Turtles, B-Amphibians, C-Fungi, DAngiosperms
(d) A-Hexapoda, B-Amphibians, C-Fungi, DAngiosperms

171. In roots the
(a) Protoxylem lies towards the periphery
(b) Metaxylem lies towards the periphery
(c) Protoxylem lies towards the pith
(d) Endarch condition is found

172. Fruitfly is excellent model for genetics because of
I. Small life cycle (two week)
II. Can be feed on simple synthesis medium
III. Single mating produce large number of progeny
IV. Clear differentiation of sexes
V. Many heredity variation can be seen with low power microscopes

Choose the correct option
(a) I, II and III   (b) III, IV and V   (c) I, IV and V   (d) All of these

173. In scrubber, the exhaust is passed through a
(a) Spray of ozone (b) Spray of Lime water
(c) Spray of electrons (d) Spray of hot water

174. In which of the following wavelengths, photosystem-I is active?
(a) 780 nm (b)700 nm (c)680 nm (d)550 nm

175. Which of the following have haploid plant body in most of organisms?
(a)Monera (b)Bryophytes (c)Algae (d)All of above

176. Life span of Cow is 20-25 years. What is the life span of horse?
(a) 140 years (b) 20-30 years (c) 100-150 years (d) 60 years

177. 'Himgiri' developed by hybridization and selection for disease resistance against rust pathogens is a variety of
(a) Maize (b) Sugarcane (c) Wheat (d) Chilli

178. Those nucleic acids which behave like enzymes are known as
(a) Ribozymes (b) Pepzymes (c) Proenzymes (d) Ribose

179. DNA has equal number of adenine and thymine residues (A=T) and equal number of guanine and cytosine (G=C). These relationships are known as
(a) Chargaff's rule (b) Coulomb's law
(c) Le-Chatelier's principle (d) Van't Hoff plot

180. Phloem sap is mainly ….. and ….. . Choose the correct pair of options?
(a) Water, sucrose (b) Glucose, water
(c) Sucrose, Glucose (d) Amino acids, sugars

181. Which of the following is a bacterial disease?
(a) Rust of wheat (b) Smut of rice
(c) Yellow mosaic of potato (d) Citrus Canker

182. The process of decay of dead organic matter is known as
(a) Denitrification (b) Nitrification
(c) Nitrogen fixation (d) Ammonification

183. After fertilisation the ovules develop into
(a) Fruit (b) Seed coats (c)Seed (d) Integuments

184. Select the incorrect match :
(a) Dodo - Mauritius
(b) Paul Ehrlich - Rivet Popper Hypothesis
(c) Von Helmont - Term Biodiversity
(d) Amazonian rain forests - Lungs of earth

185. If 20 J of energy is trapped at producer level, then how much energy will be available to peacock as food in the following chain
Plant → Mice →Snake→ Peacock :

(a) 0.00 2 J (b) 0.2 J (c) 0.0002 J (d) 0.02 J

SECTION - 8 : BIOLOGY SEC B - 15 QUESTIONS

186. The positive evidence of aquatic ancestory of bryophytes is indicated by
(a) Ciliated sperms
(b) Gametophytic body
(c) Biflagellate gametes
(d) Peristomial teeth

187. Regarding root pressure, which one is not correct?
(a) It is sufficient to rise water above ground level
(b) It is positive in all except the tallest trees
(c) It does not act as driving force for the mass flow of sugar
(d) It is not able to push water up to small height in the stem

188. Inheritance of characters not located in the gene but the young one resembling only the female part is due to
(a) Cytoplasmic inheritance
(b) Chromosomal inheritance
(c) Plastid inheritance
(d) Pleiotropy

189. Two pea plants were subjected for cross pollination. Of the 187 plants produced in the next generation,93 plants were found to be tall and 94 plants were found to be dwarf. The genotypes of the two parental plants are likely to be
(a) TT and tt
(b) Tt and Tt
(c)Tt and tt
(d) TT and TT

190. Earth's climate
(a) Has been stable over the history of the planet
(b) Is changing as a result of natural and human processes
(c) Will stabilize over the next century, according to the predictions of most scientists
(d)Has been documented to have changed once due to the evolution of green photosynthesizing plants

191. The conventional method of breeding for resistance includes
I. Testing and release of new varieties
II. Screening the germplasm for resistant sources
III. Selection and evaluation of the hybrids
IV. Hybridization of selected parents

Choose the correct sequence
(a) I, II, III and IV
(b) I, III, II and IV
(c) II, III, I and IV
(d) II, IV, III and I

192. In the most situation, ABA acts as the
(a) Agonist for auxin
(b) Antagonist to gibberellin
(c) Antagonist of auxin
(d) Agonist to gibberellin

193. How many binding sites does ribosome have for tRNA molecules?
(a)Two
(b)Three
(c)Four
(d)Four

194. Linkage group is
(a) Linearly arranged group of linked gene
(b) Non-linearly arranged group of linked gene
(c) Non-linearly arranged group of unlinked gene
(d) Non-linearly arranged group of single gene

195. Protonema is the juvenile filamentous state in the life cycle of
(a) *Funaria*
(b) *Riccia*
(c) *Marchantia*
(d)Salvia

196. What is the net ATP molecules gain, when 4 molecules of glucose undergo anaerobic respiration in plant?
(a) 8 ATP (b) 20 ATP (c)14 4 ATP (d) 16 ATP

197. If an organism is in the same class but not in the same family then it may belong to same
(a) genus (b) species (c) variety (d) order

198. Cycas and Adiantum resemble each other in having
(a) seeds (b) Motile sperms (c) cambium (d) vessels

199. Pick up correct statement.
(a) Meiocytes undergo mitosis
(b) Position wise, male sex organ of chara lies above female sex organ.
(c) Different male and female thali are present in Marchantia.
(d) Garden pea bears pistillate flower.

200. The inheritance of a given disorder is recorded in three small families shown below

Family 1   Family 2   Family 3
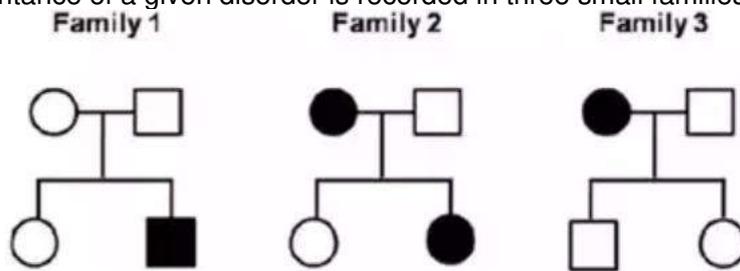
Based on the above limited information, which one of the following inheritance pattern best explains the observation.

(a) X- linked Recessive   (b) X- linked Dominant
(c) Autosomal recessive   (d) Autosomal Dominant

SOLUTIONS

1.
Sol.(4) V_A = (potential due to charge +q on ring A) + (potential due to charge – q on ring B)

$$= \frac{1}{4\pi\varepsilon_0}\left(\frac{q}{R} - \frac{q}{d_1}\right) ; \qquad d_1 = \sqrt{R^2 + d^2}$$

$$= \frac{1}{4\pi\varepsilon_0}\left(\frac{q}{R} - \frac{q}{\sqrt{R^2 + d^2}}\right) \qquad\qquad .... (i)$$
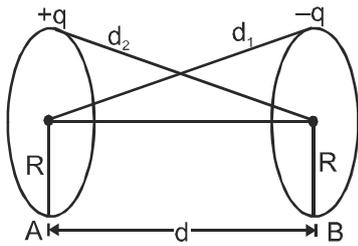
Similarly,

$$V_B = \frac{1}{4\pi\varepsilon_0}\left(-\frac{q}{R} + \frac{q}{\sqrt{R^2 + d^2}}\right)$$

Potential difference $V_A - V_B$

$$= \frac{1}{4\pi\varepsilon_0}\frac{q}{R} + \frac{1}{4\pi\varepsilon_0}\frac{q}{R} - \frac{1}{4\pi\varepsilon_0}\frac{q}{\sqrt{R^2 + d^2}} - \frac{1}{4\pi\varepsilon_0}\frac{q}{\sqrt{R^2 + d^2}}$$

$$= \frac{1}{2\pi\varepsilon_0}\left(\frac{q}{R} - \frac{q}{\sqrt{R^2 + d^2}}\right)$$

2.
Sol.(4) Since, dipole has net charge zero, so flux through sphere is zero with non-zero electric field at each point of sphere.

3.
Sol. (1) $\qquad V_{C_2} = V_{C_2} = V$

$\qquad C_1 = C$

$\qquad C_2 = KC$

$\qquad q_1 = C_1 V_{C_1} = CV$

$\qquad q_2 = C_2 V_{C_2} = KCV$

$\qquad q_1 < q_2$.

4.
Ans. (4)

Sol. $\quad E = \dfrac{\sigma}{\varepsilon_0} = \dfrac{Q}{A\varepsilon_0} = 100V/m$

$\qquad Q = 100 \times A\, \varepsilon_0$

$\qquad\square \qquad Q = 100 \times 1 \times 8.85 \times 10^{-12}\ C$

$\qquad\qquad = 8.85 \times 10^{-10}\ C$

5.
Sol.(3)

6.
Sol.(2) $R = \dfrac{u^2 \sin 2\theta}{g} = \dfrac{2u^2 \sin\theta.\cos\theta}{g}$

$H = \dfrac{u^2 \sin^2 \theta}{2g}$

$\therefore \dfrac{H}{R} = \dfrac{u^2 \sin^2\theta}{2g} \times \dfrac{g}{2u^2 \sin\theta.\cos\theta} = \dfrac{\sin\theta}{4\cos\theta}$

$\square \qquad \dfrac{R}{H} = \dfrac{4\cos\theta}{\sin\theta}$ or, $\dfrac{R}{H} = 4\cot\theta$

7.
Sol. (1)

8
Sol. (3) $\qquad \dfrac{T_1^2}{T_2^2} = \dfrac{R_1^3}{R_2^3} = \dfrac{(6R)^3}{(3R)^3} = 8$

$\dfrac{24 \times 24}{T_2^2} = 8$

$T_2^2 = \dfrac{24 \times 24}{8}$

$T_2{}^2 = 72$

$T_2{}^2 = 36 \times 2$

$T_2 = 6\sqrt{2}$

9.
Sol.(2) $r_2 = \sin^{-1}\left(\dfrac{1}{\mu}\right) = 45^\circ$

$r_1 = A - r_2 = 75^\circ - 45^\circ = 30^\circ$

$\dfrac{\sin\ i}{\sin\ r_1} = \sqrt{2} \quad \square \qquad \sin i = \sqrt{2}\ \sin 30 = \sqrt{2}\ \times\ \dfrac{1}{2} \qquad \square \qquad i = 45^\circ.$

10.
Sol. (3)
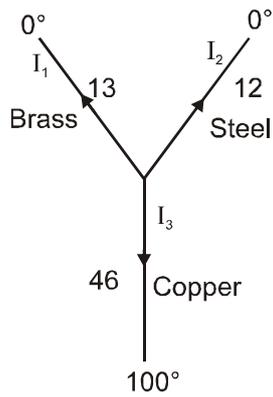
$$\frac{K_1(T-0)}{\ell_1} + \frac{K_2(T-0)}{\ell_2} + \frac{K_3(T-100)}{\ell_3} = 0$$

$$\frac{0.12}{12}T + \frac{0.26}{13}T + \frac{0.92}{46}(T-100) = 0$$

T = 40°C

$\dfrac{dQ}{dt}$ through copper $= \dfrac{0.92 \times 4}{46}(100-40)$

= 4.8 cal/sec.

11.

Sol. (3) Maximum velocity $= a\omega = a\sqrt{\dfrac{k}{m}}$

Given that $a_1\sqrt{\dfrac{K_1}{m}} = a_2 = \sqrt{\dfrac{K_2}{m}} \Rightarrow \dfrac{a_1}{a_2} = \sqrt{\dfrac{K_2}{K_1}}$

12.

Sol. (1) $n = \dfrac{1}{2\pi}\sqrt{\dfrac{k}{m}} \Rightarrow \dfrac{n}{n'} = \sqrt{\dfrac{k}{m} \times \dfrac{m'}{K'}} = \sqrt{\dfrac{k}{m} \times \dfrac{2m}{2k}} = 1 \Rightarrow n' = n$

13.

Sol.(1) (a) Given, n = 400 Hz

$v_0 = 72\ \text{kmh}^{-1} = 72 \times \dfrac{5}{18} = 20\ \text{ms}^{-1}$

$v = 350\ \text{ms}^{-1}$

Apparent frequency of a sound heard by policeman when he is moving towards stationary source of sound.

$$n' = \left[\frac{v+v_o}{v}\right]n$$

Now, the apparent frequency when policeman is moving way from stationary source of sound

$$n' = \left[\frac{v-v_o}{v}\right]n$$

Hence, the change in frequency

$$\Delta n = n' - n'' = n\left[\frac{v + v_o}{v}\right] - n\left[\frac{v - v_o}{v}\right] = \frac{2nv_o}{v}$$

$$= \frac{2 \times 400 \times 20}{350} = 45.7 \text{ Hz}$$

14.

Sol.(3) Pressure change will be minimum at both ends

15.
Sol:(4)
$a = -g = $ constant

$\dfrac{dv}{dt} = $ constant

slop of V – t curve is
constant & –ve
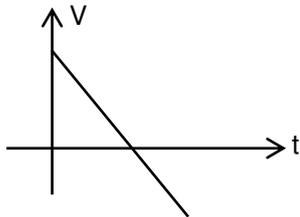
16.
Sol. (1)

Power factor $= \dfrac{R}{Z} = \dfrac{30}{50} = \dfrac{3}{5}$

here $Z = \sqrt{R^2 + (x_L - y_c)^2} = \sqrt{(30)^2 + (60-20)^2}$

$Z = 50$

$I = \dfrac{V}{Z} = \dfrac{100}{50} = $ **2 Amp.**

17.

Sol. (1)

$N = 100$, $A = 100 \times 10^{-4} \text{ m}^2$,
$B = 50$ gauss.

$\varepsilon = \dfrac{d(N\phi)}{dt} = \dfrac{N.\Delta\phi}{\Delta t} = \dfrac{100 \times 100 \times 10^{-4} \times 50 \times 10^{-4}}{0.01}$

$= 50 \times 100 \times 10^{-4} = 0.5$ volt

18.

Sol.(4) Kinetic energy of gas molecules

$E = \dfrac{3}{2}pV$

$p = \dfrac{2E}{3V} = \dfrac{2}{3} \times \dfrac{1.52 \times 10^5}{20 \times 10^{-3}}$

$$= \frac{10^5}{20 \times 10^{-3}} = 5 \times 10^6 \quad \text{N.m}^{-2}$$

19.

Sol.(1) $\Delta Q = \Delta U + \Delta W$

Process ABCA is cyclic , $\Delta U = 0$

ABCA , $\Delta U = 0$

$\Delta Q = \Delta W$

$\Rightarrow \qquad \Delta Q = \Delta W_{AB} + \Delta W_{BC} + \sigma W_{CA}$

$\Rightarrow \qquad 5 = 10 (2 - 1) + 0 + \Delta W_{CA}$

$\Rightarrow \qquad \Delta W_{CA} = - 5J$

20.

Sol.(1) For adiabatic , , $W = \dfrac{P_1 V_1 - P_2 V_2}{\gamma - 1} = \dfrac{nR(T_1 - T_2)}{\gamma - 1}$

Putting values, we get $\square = 1.4$, hence diatomic.

$\gamma = 1.4$

21.

Sol.(3) Gas has different specific heat for different processes

∴ gas has infinite number of specific heats.

22.

Sol. (1) As the maximum kinetic energy depend on the wave length/frequency but not on intensity.

23.

Sol.(4) $\lambda_d = \dfrac{h}{mv}$

E_λ = energy of photon $= \dfrac{hc}{\lambda} = mvc$

Energy of electron $= \dfrac{1}{2} mv^2$

The required ratio $= \dfrac{\dfrac{1}{2}mv^2}{mvc} = \dfrac{1}{2} \dfrac{v}{c} = \dfrac{1}{4}.$

24.
Sol.(2)

25.

Sol.(3) $E_1 = -\dfrac{13.6(3)^2}{(1)^2}$

$$E_3 = -\frac{13.6(3)^2}{(3)^2}$$

$$\therefore \quad \Delta E = E_3 - E_1$$

$$= 13.6(3)^2\left[1-\frac{1}{9}\right]$$

$$= \frac{13.6\times 9\times 8}{9}$$

$$\Delta E = 108.8 \text{ eV.}$$

26.

Sol.(2) $h\nu_L = 13.6$ ev

$$h\nu_p = \frac{13.6}{25} \text{ ev}$$

$$\frac{\nu_L}{\nu_P} = 25 \quad \Rightarrow \quad \nu_P = \frac{\nu_L}{25}$$

27.

Ans. (1)

Sol. $N \propto \dfrac{1}{\sin^4\left(\dfrac{\theta}{2}\right)}$

28.

Sol.(3) $\dfrac{E_A}{E_B} = \dfrac{\frac{1}{2}I_A\omega_A^2}{\frac{1}{2}I_B\omega_B^2} = \dfrac{L_A^2}{I_A}\dfrac{I_B}{L_B^2} \quad \Rightarrow \quad \dfrac{L_A}{L_B} = 5$

29.

Sol.(2) In pure rolling, mechannical energy remains conserved. Therefore, when heights of inclines are equal, speed of sphere will be same in both the cases. But as acceleration down the plane, a $\propto \sin\theta$ therefore, acceleration and time of descent will be different.

30.

Sol.(1) a = (g tan θ) so net force along the indined plane is zero so it will continue in pure rolling with constant angular velocity.

31.

Solution: (2)

With the reference frame of trolley, a Pseudo force will be applied on the block in left direction.

$mg = \mu N$
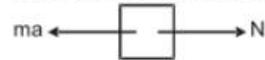
$mg = \mu(ma)$

$\mu = \dfrac{9}{a} = \dfrac{10}{30} = 0.33$

32.

Solution: (2)

$Q = C_{eq}V$

$C_{eq} = \left(\dfrac{1}{2} + \dfrac{1}{2}\right) + 1$

Charge flown through battery = $2 \times 10 \times 10^{-6}$

$= 2 \times 10^{-5}$ C

Work done by battery = $QV = 2 \times 10^{-5} \times 10$

$= 2 \times 10^{-4} = 0.2$ mJ

33.
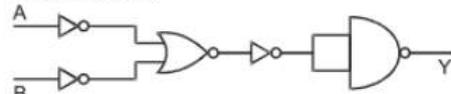
Solution: (1)

A	B	$\bar{A}$	$\bar{B}$	$\overline{A+B}$	$\overline{\overline{A+B}}$	$\overline{\overline{\overline{A+B}}}$
0	0	1	1	0	1	0
1	0	0	1	0	1	0

34.

Solution: (4)
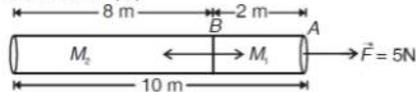
$T = M_2 a$

$= \left[\dfrac{M}{10} \times 8\right]\left[\dfrac{5}{M}\right]$

$T = 4$N

35.

Solution: (2)

(constant) $P = \dfrac{w}{\Delta t}$

$p = \dfrac{\Delta k}{\Delta t}$ (change in kinetic energy)

$P = \dfrac{\frac{1}{2}mv^2 - 0}{t - 0}$

$\Rightarrow v^2 = \dfrac{2pt}{m}$

$\Rightarrow v \propto t^{1/2}$

36.

Solution: (3)

$$v_p = \frac{-G(2M)}{\frac{R}{3}} + \left(-\frac{GM}{R}\right)$$

$$= -7\frac{GM}{R}$$

37.

Solution: (2)

In series

$$\frac{1}{K} = \frac{1}{K_1} + \frac{1}{K_2} \quad K = \frac{4\pi^2 m}{T^2}$$

$$T^2 = T_1^2 + T_2^2 \quad K \propto \frac{1}{T^2}$$

38.

Solution: (4)

$$\frac{aE}{t} = M^0 L^0 T^0$$

$$\frac{a(ML^2 T^{-2})}{T} = M^0 L^0 T^0$$

$$a = (M^{-1}L^{-2}T^3) = b$$

39.

Sol.(2) When the wheel rolls on the ground without slipping and completes half rotation, point P takes new position as P' as shown in figure. Horizontal displacement, $x = \pi R$
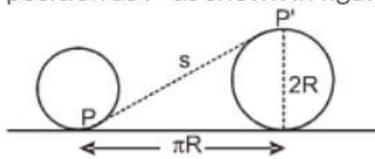
Vertical displacement, y= 2R

Thus, displacement of the point P when wheel completes half rotation,

$$s = \sqrt{x^2 + y^2} = \sqrt{(\pi R^2) + (2R)^2} = \sqrt{\pi^2 R^2 + 4R^2}$$

but R = 1m   (given)

$$\therefore s \sqrt{\pi^2(1)^2 + 4(1)^2} = \sqrt{\pi^2 + 4} \text{ m}$$

40.

Solution: (2)

Acceleration $a = -\omega^2 x$

ie, $\omega^2 = \tan 45° = 1$

or $\frac{2\pi}{T} = 1$ or $T = 2\pi$ s

41. Solution: (2)

42. Sol.(3) Maximum K.E. = Stopping Potential

43. Friction coefficient is independent of area of contact.

44. $U = -\vec{M} \cdot \vec{B} = -M \cdot B\cos 180 = +MB$

45.

$$a = \sqrt{a_r^2 + a_t^2}$$

$$a_r = \frac{V^2}{r} = \frac{30 \times 30}{500} = 1.8 \, m/s^2$$

$$(2.7)^2 = (1.8)^2 + a_t^2 \Rightarrow a_t = 2 \, m/s^2$$

46.
Initial momentum of system = final momentum of system

$mu = mv + 3mv$

$$v = \frac{m}{4m} u$$

$$v = \frac{u}{4} \quad ....(i)$$

$$|\Delta K| = |\Delta U|$$

$$\frac{1}{2}(m + 3m)v^2 = (m + 3m)gh$$

$$h = \frac{v^2}{2g}$$

$$h = \frac{u^2}{32g} \quad \text{(from equation (i))}$$

47. Sol (3)

48. x = $\dfrac{\dfrac{24}{\frac{1}{1} / \frac{4}{3}}}{} = \dfrac{24}{\left(\dfrac{3}{4}\right)} = \dfrac{24 \times 4}{3} = 32$ cm

49. **(1)**

K.E. given to it = $\frac{1}{2}mv^2 = 100 \, J$
The height achieved 16 m
P.E. gained = mgh = 80 J
Loss due to air 20 J

50. **(1)**
Heat absorbed = Area under P-V graph
$= \pi ab$

$$= \pi r_1 r_2$$

$$= \pi \times \frac{20}{2} \times 10^3 \times \frac{100}{2} \times 10^{-3}$$

$$= \pi \times 20 \times 50 = 1000\pi$$

$$= 10^3 \pi \, J$$

CHEMISTRY

51. Ans.: (C)

s-orbitals are spherical; p-orbitals are dumb-bell; d-orbitals are double dumb-bell; f-orbitals are complicated.

52. Ans.: (C)

$$P'_{Argon} = \frac{2}{2+3} \times P_M = \frac{2P_M}{5}$$

53.

$$W = -P_{ext}(V_2 - V_1)$$
$$\because P_{ext.} = 0$$
$$\therefore W = 0$$

54. $P_4(s) + 5O_2(g) \rightleftharpoons P_4O_{10}(s)$
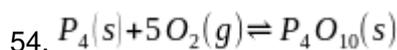
$$K_c = \frac{[P_4O_{10}(s)]}{[P_4(s)][O_2(g)]^5}$$

We know that concentration of a solid component is always taken as unity

$$K_c = \frac{1}{[O_2]^5}$$

55. Water gas is a mixture of carbon monoxide and hydrogen. It is obtained by passing steam over red-hot coke. It is a good fuel gas.

$$C + H_2O \rightarrow CO + H_2$$
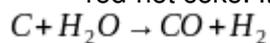
water gas

$$C + H_2O \longrightarrow \underbrace{CO + H_2}_{\text{water gas}}$$
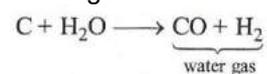
56. Ans.: (A)

3.4 g S = 100 g insulin

$$\frac{100 \times 32}{3.4} = 941.176$$

$\therefore$ 32 g S =

Insulin must contain at least one atom of S in its one molecule.

57. $MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$
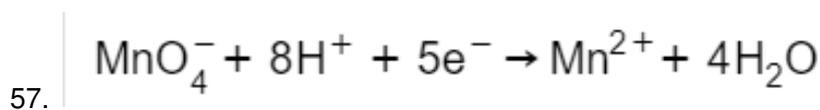
58. Greater the difference in electronegativity of bonded atoms easier will be heterolytic cleavage

59.

Phosphorous is estimated as $Mg_2P_2O_7$

$$P \xrightarrow[\Delta]{HNO_3} H_3PO_4$$

$H_3PO_4 + Mg^{2+} + NH_4OH \rightarrow MgNH_4PO_4$

$2MgNH_4PO_4 \rightarrow Mg_2P_2O_7 + H_2O + 2NH_3$
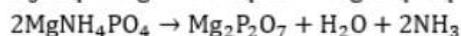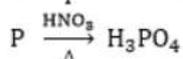
% of P $= \frac{62 \times wt.\, of\, Mg_2P_2O_7 \times 100}{222 \times w}$

60. B

61. **Sol. (3)** Maximum velocity $= a\omega = a\sqrt{\dfrac{k}{m}}$

Given that $a_1\sqrt{\dfrac{K_1}{m}} = a_2 = \sqrt{\dfrac{K_2}{m}} \Rightarrow \dfrac{a_1}{a_2} = \sqrt{\dfrac{K_2}{K_1}}$

62. **Sol. (1)** $n = \dfrac{1}{2\pi}\sqrt{\dfrac{k}{m}} \Rightarrow \dfrac{n}{n'} = \sqrt{\dfrac{k}{m} \times \dfrac{m'}{K'}} = \sqrt{\dfrac{k}{m} \times \dfrac{2m}{2k}} = 1 \Rightarrow n' = n$

63. **Sol.(1)** (a) Given, n = 400 Hz

$v_o = 72\ kmh^{-1} = 72 \times \dfrac{5}{18} = 20\ ms^{-1}$

$v = 350\ ms^{-1}$

Apparent frequency of a sound heard by policeman when he is moving towards stationary source of sound.

$n' = \left[\dfrac{v + v_o}{v}\right] n$

Now, the apparent frequency when policeman is moving way from stationary source of sound

$n' = \left[\dfrac{v - v_o}{v}\right] n$

Hence, the change in frequency

$\Delta n = n' - n'' = n\left[\dfrac{v + v_o}{v}\right] - n\left[\dfrac{v - v_o}{v}\right] = \dfrac{2nv_o}{v}$

$= \dfrac{2 \times 400 \times 20}{350} = 45.7$ Hz

64. **Sol.(3)** Pressure change will be minimum at both ends

65. **Sol:(4)**

a = −g = constant

$\dfrac{dv}{dt}$ = constant

slop of V – t curve is

constant & –ve
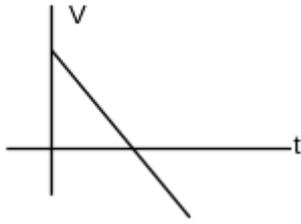
66. **Sol.** (1)

Power factor $= \dfrac{R}{Z} = \dfrac{30}{50} = \dfrac{3}{5}$

here $Z = \sqrt{R^2 + (x_L - y_c)^2} = \sqrt{(30)^2 + (60-20)^2}$

$Z = 50$

$I = \dfrac{V}{Z} = \dfrac{100}{50} = $ **2 Amp.**

67. **Sol.** **(1)**
$N = 100$, $A = 100 \times 10^{-4}\,m^2$,
$B = 50$ gauss.

$\varepsilon = \dfrac{d(N\phi)}{dt} = \dfrac{N.\Delta\phi}{\Delta t} = \dfrac{100 \times 100 \times 10^{-4} \times 50 \times 10^{-4}}{0.01}$

$= 50 \times 100 \times 10^{-4} = 0.5$ volt

68. **Sol.(4)**   Kinetic energy of gas molecules

$E = \dfrac{3}{2}pV$

$p = \dfrac{2E}{3V} = \dfrac{2}{3} \times \dfrac{1.52 \times 10^5}{20 \times 10^{-3}}$

$= \dfrac{10^5}{20 \times 10^{-3}} = 5 \times 10^6$ $N.m^{-2}$

69. **Sol.(1)** $\Delta Q = \Delta U + \Delta W$
Process ABCA is cyclic , $\Delta U = 0$
ABCA , $\Delta U = 0$
$\Delta Q = \Delta W$
$\Rightarrow \Delta Q = \Delta W_{AB} + \Delta W_{BC} + \Delta W_{CA}$
$\Rightarrow 5 = 10\,(2-1) + 0 + \Delta W_{CA}$
$\Rightarrow \Delta W_{CA} = -5J$

70. **Sol.(1)** For adiabatic , , $W = \dfrac{P_1V_1 - P_2V_2}{\gamma - 1} = \dfrac{nR(T_1 - T_2)}{\gamma - 1}$
Putting values, we get $\gamma = 1.4$, hence diatomic.
$\gamma = 1.4$

71. **Sol.(3)** Gas has different specific heat for different processes
$\therefore$ gas has infinite number of specific heats

72. **Sol.** (1)   As the maximum kinetic energy depend on the wave length/frequency but not on intensity.

73. **Sol.**(4) $\lambda_d = \dfrac{h}{mv}$

E_λ = energy of photon = $\dfrac{hc}{\lambda}$ = mvc

Energy of electron = $\dfrac{1}{2}mv^2$

The required ratio = $\dfrac{\frac{1}{2}mv^2}{mvc}$ = $\dfrac{1}{2}\dfrac{v}{c}$ = $\dfrac{1}{4}$.

74. **Sol.**(2)

75. **Sol.**(3) $E_1 = -\dfrac{13.6(3)^2}{(1)^2}$

$E_3 = -\dfrac{13.6(3)^2}{(3)^2}$

$\therefore \Delta E = E_3 - E_1$

$= 13.6(3)^2 \left[1 - \dfrac{1}{9} \right]$

$= \dfrac{13.6 \times 9 \times 8}{9}$

$\Delta E = 108.8$ eV.

76. **Sol.**(2) $h\nu_L = 13.6$ ev

$h\nu_p = \dfrac{13.6}{25}$ ev

$\dfrac{\nu_L}{\nu_P} = 25 \implies \nu_P = \dfrac{\nu_L}{25}$

77. **Ans.** (1)

Sol. $N \propto \dfrac{1}{\sin^4\left(\dfrac{\theta}{2}\right)}$

78. **Sol.**(3) $\dfrac{E_A}{E_B} = \dfrac{\frac{1}{2}I_A\omega_A^2}{\frac{1}{2}I_B\omega_B^2} = \dfrac{L_A^2}{I_A}\dfrac{I_B}{L_B^2} \implies \dfrac{L_A}{L_B} = 5$

79. **Sol.**(2)   In pure rolling, mechannical energy remains conserved. Therefore, when heights of inclines are equal, speed of sphere will be same in both the cases. But as acceleration down the plane, a $\propto$ sin θ therefore, acceleration and time of descent will be different.

80. **Sol.**(1)   a = (g tan θ) so net force along the indined plane is zero so it will continue in pure rolling with angular velocity.

81. Solution: (2)
With the reference frame of trolley, a Pseudo force will be applied on the block in left direction.
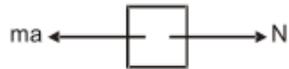
$$mg = \mu N$$
$$mg = \mu(ma)$$
$$\mu = \frac{9}{a} = \frac{10}{30} = 0.33$$

82. Solution: (2)
$$Q = C_{eq}V$$
$$C_{eq} = \left(\frac{1}{2} + \frac{1}{2}\right) + 1$$

Charge flown through battery = $2 \times 10 \times 10^{-6}$
$= 2 \times 10^{-5}$ C
Work done by battery = $QV = 2 \times 10^{-5} \times 10$
$= 2 \times 10^{-4} = 0.2$ mJ

83. Solution: (1)
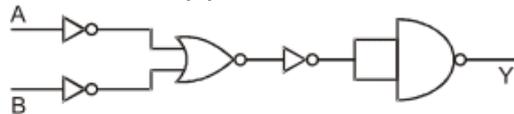
A	B	$\bar{A}$	$\bar{B}$	$\overline{A+B}$	$\overline{\overline{A+B}}$	$\overline{\overline{\overline{A+B}}}$
0	0	1	1	0	1	0
1	0	0	1	0	1	0

84. Solution: (4)
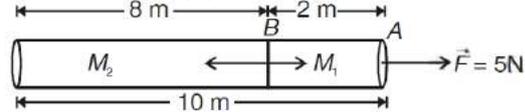
$$T = M_2 a$$
$$= \left[\frac{M}{10} \times 8\right]\left[\frac{5}{M}\right]$$
$$T = 4N$$

85. Solution: (2)
$$P = \frac{w}{\Delta t}$$
(constant)
$$p = \frac{\Delta k}{\Delta t} \text{ (change in kinetic energy)}$$
$$P = \frac{\frac{1}{2}mv^2 - 0}{t - 0}$$

$$\Rightarrow v^2 = \frac{2pt}{m}$$

$$\Rightarrow v \propto t^{1/2}$$

86. **Ans.: (B)**

$$\frac{r_{He}}{r_{CH_4}} = \sqrt{\frac{M_{CH_4}}{M_{He}}} = \sqrt{\frac{16}{4}} = 2$$

87. It has sextet of electron and can accept lone pair of electron.

88. , $M^{2+} \rightarrow M^{3+}$ after the removal of the nuclear charge per electron increases due to which high energy is required to remove $3e^-$

89. **Ans.: (B)**

Since, the molecular formula is n times the empirical formula, therefore, different compounds having the same empirical formula must have different molecular weights.

90. **Ans.: (C)**

Wt. of H : O in H_2O is 2 : 16

91. **Ans.: (B)**

(According to molecular orbital theory)

Bond order = $\dfrac{bonding\ electrons - antibonding\ electrons}{2}$ =1/2=0.5

H_2^+ is paramagnetic due to the presence of one unpaired electron.

92.

This reaction is utilized for the preparation of higher alkynes

$CH_3 - C \equiv C - H + Na\,Liq.\,N\,H_3\,CH_3 - C \equiv C - Na$

Propyne

$CH_3 - C \equiv C - Na + BrCH_3 \rightarrow CH_3 - C \equiv C - CH_3 + NaBr$
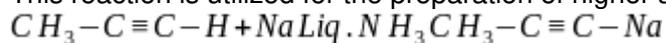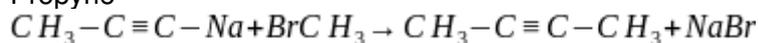
But-2-yne

93. It is antimalarial drug.

94. Cellulose is a linear polymer of β-glucose.

95. A sequence of three nucleotides in messenger RNA makes a codon for an amino acid because four bases in messenger RNA adenine, cytosine, guanine and uracil have been shown to act in the form of triplet.

96. **Ans.: (a)**

97. **Ans.: (C)**
Body diagonal in bcc = $\sqrt{3}\,a = \sqrt{3} \times 400 = 692.8\,pm$

98. Elevation in boiling point is a colligative property as it depends upon the number of particles
$\Delta T_b \propto n$

For sucrose $n = 1\,\Delta T_b = 0.1\,°C$
For $NaCl, n = 2, \Delta T_b = 0.2\,°C$

99. E_{op}° of K $> E_{Op}^{\circ}$ of Al.

100. **Ans.: (A)**
Follow IUPAC rules.

ZOOLOGY

101. Answer (3)
Explanation
Earthworm (Pheretima posthuma) has segmented body. It belongs to phylum-Annelida

102. Answer (2)
Explanation
Plasmids are autonomously replicating circular extra-chromosomal DNA that are used as important tool of genetic engineering.

103. Answer (1)
Explanation
The secretion of intestinal gland is called intestinal juice or success entericus.

104. Answer (2)
Explanation
Apnea – no breathing
Dyspnea – painful breathing
Asphyxia – oxygen starvation due to low atmospheric oxygen
Hypoxia – inadequate supply of oxygen to tissue

105. Answer (3)
Explanation
We can voluntarily take deep breath by an effort. In the process of deep inspiration, chest distention is brought about by the external intercostal muscles and the abdominal muscles

106. Answer (1)
Explanation
Glomerular area of adrenal cortex is responsible for water and electrolyte balance. Zona glomerulosa layer of adrenal cortex secretes hormones that influences the kidneys to excrete or retain sodium and potassium, depending on the needs of the body. These hormones and mineralocorticoids.

107. Answer (2)
Explanation
The skull region articulates with the superior regien of the vertebral column with the help of two occipital condyles (dicondylic skull).

108. Answer (3)
Explanation
The junction between a motor neuron and the sarcolemma of the muscle fibre is called the neuromuscular junction or motor end plate. A neural signal reaching this junction releases a neurotransmitter, acetyl choline which generates an action potential in the sarcolemma.

109. Answer (3)
Explanation
The receptors for the sense of taste are found in taste buds, mostly located in tongue. These receptors are called gustatoreceptors. Most of the taste buds are located within papillae that extends down into the epithelium of the tongue

110. Answer (1)

Parturition

(i)   The average duration of human pregnancy is about 9 months which is called the gestation period

(ii)   The act of expelling the full term foetus from the mother's uterus at the end of gestation period is called parturition

(iii)   It is induced by a complex neuroendocrine mechanism

(iv)   Parturition signals originates from the fully developed foetus and the placenta, which induce mild uterine contractions called foetus ejection reflex

(v)   This triggers the release of oxytocin from the maternal pituitary

(vi)   Oxytocin induces stronger uterine muscle contractions

(vii)   Relaxin increases the flexibility of the pubic symphysis and ligaments that helps to dilate the uterine cervix during labour pain

This leads to the expulsion of baby

111. Answer (2)
Explanation

In lactating mother, there is the release and the production of milk secreting hormone. These hormones suppresses the release of Follicle Stimulating Hormone (FSH), so during intense lactation there is no ovulation hence, no pregnancy

112. Answer (3)
Explanation

Ernst Haeckel (1866) proposed recapitulation theory or biogenetic law which states that 'ontogeny' (development of the embryo) is recapitulation of phylogeny (the ancestral sequence). It is narrated in the embryological evidences for organic evolution, e.g., homology in early embryonic development of all multicellular organisms, resemblance among vertebrate embryos, etc.

113. Answer (1)
Explanation

Rhinoviruses represent one such group of viruses, which causes one of the most infectious human ailments-the common cold

114. Answer (4)
Explanation

Biogas or gobar gas is produced during anaerobic fermentation of agricultural wastes. Biogas is used as fuel for heating and cooking, lighting power for irrigation and other purposes as an alternative of fire wood, kerosene, dung cakes or even electricity. It is considered as eco-friendly and pollution free source of energy

115. Answer (4)
Explanation

Plant cells do not have endogenous plasmids. The plasmid vectors used for plant cell transformation are mostly based on Agrobacterium tumefaciens-Ti plasmid. These are plant pathogenic Gram–ve soil bacteria which cause crown gall disease of dicot plants.

116. Answer (3)
Explanation

Murrah and Jaffarabdi are indigenous varieties if Buffaloes.

117. Answer (2)

Explanation

This interstitial fluid is called the tissue fluid or lymph, which plays an important role in immunity against disease. It has same mineral distribution as that of the plasma

118. Answer (2)

Explanation

Amniocentesis is the diagnostic test for chromosomal/genetic disorders in the embryo/foetus. It cannot cure or detect morphological defects

119. Answer (1)

Explanation

An oncogene is a gene that has the potential to cause cancer. In tumour cells, they are often mutated of expressed at high levels. Tumour virus or cancer causing viruses are called oncogenic viruses

120. Answer (3)

Explanation

Mutation happens by itself. It is a spontaneous phenomena that is directionless

121. Answer (4)

Explanation

All statements are correct
  I. Left end of a polysaccharide is called nonreducing end while right end is called reducing end
  II. Starch and glycogen are branched molecules
  III. Starch and glycogen are the reserve food materials of plants and animals, respectively
  IV. Starch can hold iodine molecules in its helical secondary structure
      but cellulose being non-helical, cannot hold iodine

122. Answer (3)

Explanation

Fats are broken down by lipases with the help of bile into di- and monoglycerides.

$$\text{Fats} \xrightarrow[\text{Bile}]{\text{Lipases}} \text{Diglycerides} \rightarrow \text{Monoglycerides}$$
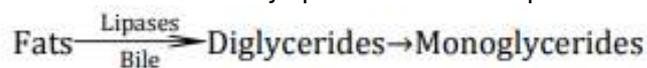
123. Answer (1)

Explanation

The hindbrain or rhombencephalon basically contains cerebellum (or metencephalon) and medulla oblongata (myelencephalon). Telencephalon or cerebrum is the part of forebrain.

124. Answer (1)

Explanation

The expulsion of urine from the urinary bladder is called micturition. It is a reflux process but in grown up children and adults, it can be controlled voluntarily to some extent

125. Answer(3)

Explanation

The corticoids which are involved in carbohydrate metabolism are called glucocorticoids. In our body, cortisol is the main glucocorticoids. Glucocorticoids stimulate, gluconeogenesis lipolysis and proteolysis. So, they are involved in carbohydrate, fat and protein metabolism

126. Answer (3)
Explanation
The animal found by the boy belongs to mollusca phylum. Mollusca are the second largest phylum after arthropoda and include predominantly marine animals. They are triploblastic, bilaterally symmetrical, schizocoelic and unsegmented protostomes. They have moist skin, a complete digestive tract, a ventral nerve cord, and had gone through torsion

127. Answer (1)
Explanation
The Epithelial tissue cells are compactly arranged in a basement membrane with the help of cell junctions

128. Answer (3)
Explanation
Nose – elastic cartilage
Costal cartilage of ribs – hyaline /tough
Intervertebral discs are white fibrous cartilage

129. Answer (1)
Explanation
Anal cerci is found in both males and females
Forewings are dark and chitinous for protection
The hind wings are transparent, membranous and are used in flight.

130. Answer (2)
Explanation
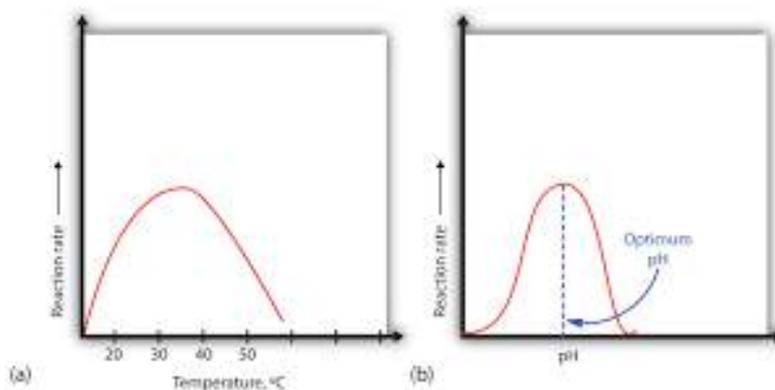
131. Answer (2)
Explanation
Brunner's glands are submucous intestinal glands present in the region of duodenum for secretion of mucus and bicarbonate.

132. Answer(3)
Explanation

Propagation of the action potential
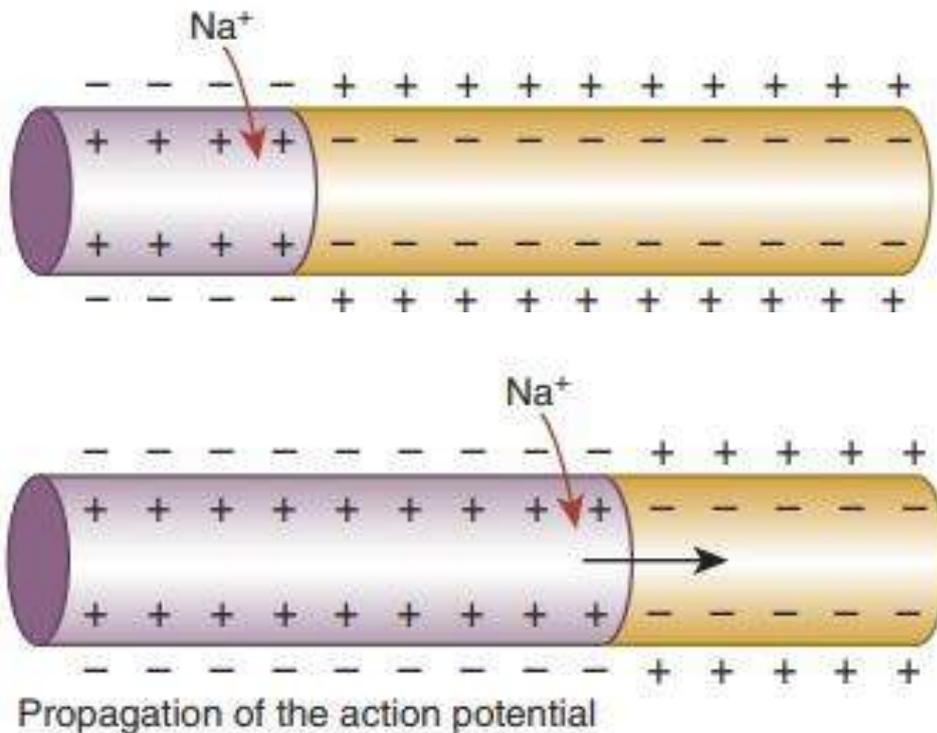
133. Answer(2)
Explanation
cAMP , IP3 and GTP act as secondary messengers for hormones forming hormone receptor complex at the membrane surface

134. Answer (4)
Explanation
The collecting ducts release small amount of urea in medullary interstitium to maintain a hyperosmolar medulla for osmotic balance and counter current mechanism

135. Answer (1)
Explanation
The selectable marker genes have restriction sites where addition of foreign gene leads to inactivation of the native gene and leads to insertional inactivation confirming transformation

136.
Answer (4)
Explanation
Metabolic reactions can also be performed outside the body in a cell free system, i.e., an isolated metabolic reaction in vitro
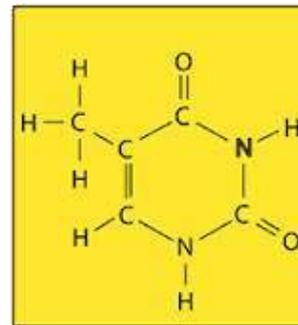
137. Answer (1)
Explanation
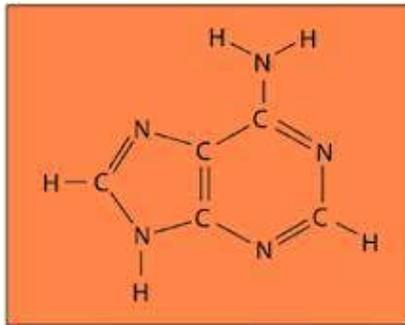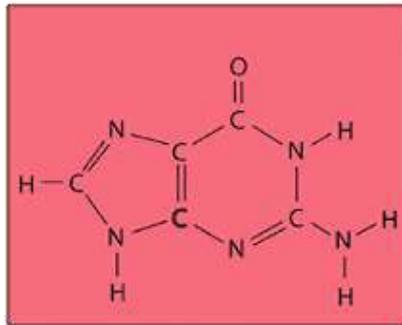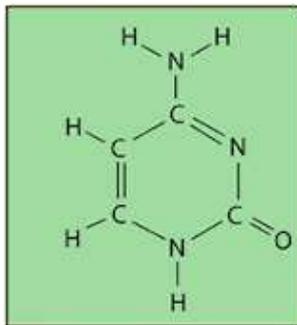
Adenine Guanine Cytosine Uracil Thymine
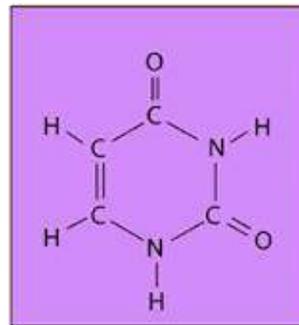
138. Answer (3)
Explanation
Both (bicuspid and tricuspid) valves are connected below to the walls of ventricles by chordae tendinae. They prevent the valves from turning inside out or from being forced upward during the contraction of ventricles

139. Answer (3)
Explanation
The term 'pelvis' is common to both kidney and skeleton in mammals. In relation to kidney, it can be described as a chamber in the kidney into which the urine drains from renal tubules before passing to the ureter. For skeleton, it is related with pelvic girdle or hip girdle.

140. Answer (3)
Explanation
Almost all secretion by the pituitary gland are controlled by hormonal signal from hypothalamus. The neurohormones are secreted and accumulated by hypothalamus.

141. Answer (1)
Explanation
FSH – it is responsible for maturation of ovarian follicles that release estrogen and cause thickening of endometrium
LH – causes ovulation, maintains corpus luteum
Progesterone – secreted by corpus luteum and maintains the thickening of endometrial lining

142. Answer (4)
Explanation

Adenosine deaminase enzyme is very important for the immune system to function. In the absence of adenosine deaminase enzyme, purine metabolism is disturbed and T-lymphocytes fails to function. ADA deficiency can lead to Severe combined Immune Deficiency (SCID)

SCID is caused due to defect in the genes for the enzyme adenosine deaminase
In some children, ADA deficiency can be cured by bone marrow transplantation.
However, in others it can be treated by the enzyme replacement therapy, in which functional ADA is given to the patient by injection.
But in both approaches, the patients are not completely cured.
For permanent cure, gene isolated from the bone marrow cells producing ADA at early embryonic stage can be a possible cure

143. Answer (3)
Explanation
Adrenaline (epinephrine) is a hormone produced by adrenal medulla and is secreted in great amounts during emotional stress. It elevates the glucose level in blood stream (by glycogenolysis) which is accompanied by increase in oxygen consumption, body temperature, heat production. Adrenaline also cause an increase in the flow of blood by dilating blood vessels.

144. Answer (1)
Explanation
The plasmid DNA confers certain unique phenotypic characters to such bacteria in which they are found. One such character is resistance to antibiotics

145. Answer (4)
Explanation
Both statements (I) and (II) are correct as Graft rejection is a cell mediated immune response generated by T-lymphocyte that can be suppressed by taking immunosuppressive drugs like cyclosporins

146. Answer (2)
Explanation
CO2 Transport by blood is much easier than oxygen due to high solubility of CO2. About 7% of CO2 is transported dissolved in plasma, 23% loosely bind with the haemoglobin and forms bicarbonates and about 70% of CO2 reacts with water to form carbonic acid in erythrocytes in the presence of enzyme carbonic anhydrase. The carbonic acid (H2CO3) dissociates into H + and HCO — 3 ions

$$CO_2 + H_2O \xrightarrow{\text{Carbonic Anhydrase}} H_2CO_3 \rightleftharpoons HCO_3^- + H^+$$
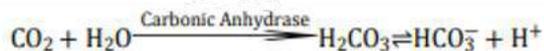
147. Answer (4)
Explanation
Skull has 29 bones in total, their distribution is as follows: 1. Cranial bones -08 2. Facial bones - 14 3. Hyoid bone -01 4. Ossicles (ear bones)-3 in each ear ($i.e.$,6)

148. Sol. Answer (3)
Explanation
ADH, Renin, and Angiotensin all help in increasing blood pressure whereas ANF, plays a significant role in reducing the blood pressure by removal of excess sodium ions via urine.

149. Answer (4)

Explanation

Vasa recta is present in cortical nephron at the juxta medullary region for conserving the water (counter current mechanism). During summers, when body loses lot of water by evaporation, the release of ADH is increased due to decrease of water loss

150. Answer (4)

Explanation

VNTR forms the basis of DNA fingerprinting.

BOTANY

151. Answer (1)
Explanation
Flora is a book or taxonomic aid which have adequate information about habitat, distributions of climate and index of plants present in a particular region

152. Answer (3)
Explanation
Endosperm formation & Embryo development are the post fertilization . Gamete formation is pre – Fertilization

153. Answer (2)
Explanation
Mushrooms (*Agaricus* sp) are edible fungus, which belong to class-Basidiomycetes, also called club fungi.

154. Answer (3)
Explanation
In mosses the first stage is protonema stage, which develops directly from a spore
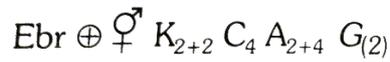
155. Answer (3)
Explanation
When the incisions of the lamina reaches up to the midrib, breaking it into a number of leaflets, the leaf is called compound. A bud is present in the axil of petiole in both simple and compound leaves, but not in the axil of leaflets of the compound leaf

156. Answer (4)
Explanation
Mustard belongs to Brassicaceae family.

$$Ebr \oplus \male\female \ K_{2+2} \ C_4 \ A_{2+4} \ \underline{G_{(2)}}$$

157. Answer (2)
Explanation
In reticulate venation, the veins are arranged in a net-like manner, e.g., most of the dicots.

158. Answer(3)
Explanation
The centrosome is present in animals and some lower plants such as dinoflagellates, *Euglena* and *Chlamydomonas*, etc.

159. Answer (1)
Explanation
During cell division, chromosomes attaches with spindle at kinetochore.

160. Answer (1)
Explanation
Photochemical reaction is also known as light reaction because it takes place in the presence of light in the grana portion of chloroplast. In this reaction, photolysis of water takes place, which generates ATP and NADPH

161. Answer (4)
Explanation
Gibberellins causes fruit like apple to elongate and improve its shape. They also delay senescence

162. Answer (1)
Explanation
Since only parent is involved in reproduction of offsprings they all are clones of each other.
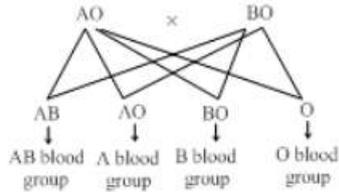
163. Answer (2)
Explanation
Tapetum is the innermost layer of the wall of pollen sac. Tapetum cells are nutritive in function.

164. Answer (2)
Explanation
There are two possibility for blood group A = AA and AO. There are two possibility for blood group B = BB or BO cross between AO, BO. Give four types of blood groups are AB, A, B, O

165. Answer (2)
Explanation
Arginine and lysine are the basic amino acids found in histones

166. Answer (3)
Explanation
Rice is being used since thousands of years in Asia's agricultural history of which 50,000 varieties are in India alone

167. Answer (3)
Explanation
Another name of nutrient cycle is biogeochemical cycle. The movement of nutrient elements through various components (abiotic and biotic) of an ecosystem is called nutrient cycling or biogeochemical cycle

168. Answer (4)
Explanation
All these are exotic species leading to death of native species in agricultural or aquatic ecosystem
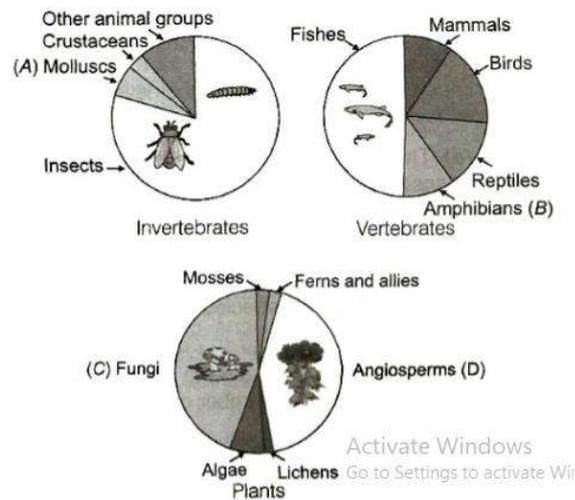
169. Answer (4)
Explanation
The frog have the ability to change the colour to hide them from their enemies. This protective colouration is called camouflage

170. Answer (2)
Explanation

Invertebrates / Vertebrates / Plants

On earth, more than 70% of all the species recorded are animals, while plants (including algae, fungi, bryophytes gymnsoperms and angiosperms) comprises no more than 22% of the total. Among animals, insects are the most species-rich taxonomic group, making up more than 70% of the total. Number of fungi species in the world is more than the combined total of the species of fishes, amphibians, reptiles and mammals

171. Answer (1)
Explanation
In roots the protoxylem lies towards the periphery and metaxylem lies toward the centre. Such arrangement is called exarch

172. Answer (4)
Explanation
Fruitfly is excellent model for genetics because
(i)   Life cycle is very short (14 days)
(ii)   Can be feed on simple synthesis medium
(iii)   Single mating produces large number of progeny
(iv)   Clear differentiation of sexes
(v)   Variation can be seen simply by hand lens or simple microscope
They (fruitfly) are easy to handle

173. Answer (2)
Explanation
Spray of water or lime. A scrubber can remove gases like sulphur dioxide. In a scrubber, the exhaust is passed through a spray of water or lime

174. Answer (2)
Explanation
In 700 nm of wavelength, photosystem-I is active.
In photo system-I, the photo center is special chlorophyll-a molecule

175. Answer (4)
Explanation
All show haplontic lifecycle mostly

176. Answer (4)
Explanation
Average life span of a Horse is 60 years
Banyan tree is 150-200 years
Parrot is 140 yrs

177. Answer (3)

Explanation

'Himgiri' is a wheat variety resistant to leaf and stripe rust, hill bunt etc.

178. Answer (1)

Explanation

Ribozymes are RNA molecules that are capable of performing specific biochemical reactions. They play very important role is therapeutic agents

179. Answer (1)

Explanation

According to Chargaff, the percentage of Adenine (A) is equal to Thymine (T) and the percentage of Guanine (G) is equal to cytosine(C).

180. Answer (1)

Explanation

Phloem sap is mainly water and sucrose, as food is transported in the form of sucrose

181. Answer (4)

Explanation

Rust & Smut are Fungal disorders
Yellow Mosaic is viral

182. Answer (4)

Explanation

The process of decay of dead organic matter is known as ammonification.

183. Answer (3)

Explanation

After fertilisation ovules develop into seeds and ovaries develop into fruit

184. Answer (3)

Explanation

Von Helmont gave the species area relationship in an ecosystem

185. Answer (4)

Explanation

By 10% law of energy transfer in an ecosystem

186. Sol. Answer (1)

Explanation

Ciliated antherozoids and necessity of water for fertilization suggest that the bryophytes have originated from aquatic ancestors

187. Answer (4)

Explanation

Root pressure, a manifestation of active water absorption is a positive pressure, which develops in the sap of xylem of root of the same plant. It is observed maximum in rainy season in tropical plants and during spring in temperate plants. It is commonly met in plants at around 1-2 atm. It is absent in gymnosperms. Normally observed value of root pressure is not able to raise the level of sap to the top of tree and is only able to raise water level upto or above ground
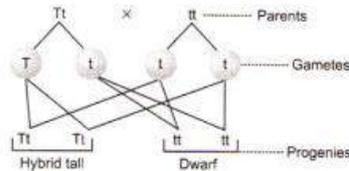
188. Answer (1)
Explanation
Genes, (DNA) present in cytoplasm are known as cytoplasmic genes or plasma genes. These are responsible for cytoplasmic inheritance or extrachromosomal inheritance

189. Answer (3)
Explanation
Test cross is a cross between homozygous recessive parent and F1 offsprings. The genotypic ratio as well as phenotypic ratio of such cross is 1 : 1.

190. Answer (2)
Explanation
Earth climate is changing as a result of natural and human processes

191. Answer (4)
Explanation
Conventional breeding method is carried out by the following steps
(i)   Selection and screening of germplasm for disease resistance
(ii)   Hybridisation of selected plants
(iii)   Selecting the desirable plant(hybrid)
Testing and release of new varieties into the market

192. Answer (2)
Explanation
ABA plays an important role in seed development, maturation and dormancy. By inducing dormancy, ABA helps the seeds to withstand desiccation and other factors. As we can compare that most of ABA effects are opposite to G.A., thus, in most situation, the ABA is considered as antagonist to GA

193. Answer (1)
Explanation
The ribosome has two binding sites for tRNA molecules: The A (aminoacyl) and P(peptidyl) and E (exit) site is for polypeptide..

194. Answer (1)
Explanation
Linkage genes always arranged linearly on the homologous chromosome called linkage group

195. Sol. Answer (2)
Explanation
Protonema is a branched, multicellular, filamentous or (less commonly) thalloid structure, produced on germination of a bryophyte spore, from which new plant develops as buds. It forms the juvenile filamentous stage in the life cycle of $Funaria$.

196. Answer (1)
Explanation
During anaerobic respiration, one molecule of glucose gives two molecules of ATP. Thus, 8 molecules of ATP are produced.

197. Solution (4)
Explanation

Order is a higher taxon and is the assemblage of families having similar characteristics. However, the common characteristic will be fewer than at family or genus level. In mammals the common orders are primates (monkey, gorilla and human), carnivora, rodentia and cetacea (whale and dolphin).

198. Answer (2)
Explanation
Cycas (a gymnosperm) and Adiantum (known as Maiden hair fern, a pteridophyte) resemble each other in having motile sperms. Seeds, cambium are common in gymnosperms but absent in pteridophytes. True vessels are absent in both pteridophytes and gymnosperms

199. Answer (3)
Explanation
Meiocytes undergo meiosis
Chara has upper oogonium and lower Anthredium
Marchantia is dioecious
Garden pea bears bisexual flowers

200. Answer (3)
Explanation
The pedigree if shows parents unaffected with affected offsprings is always recessive and its autosomal for the reason that it does not show criss cross inheritance pattern.