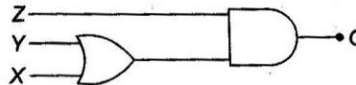
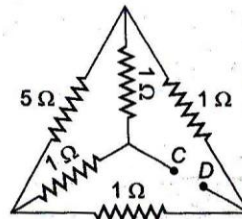


PART A PHYSICS

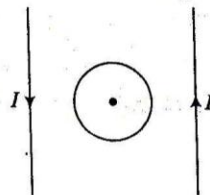
- The source S of unknown frequency produces 8 beats with a source of 250 Hz and 12 beats with a source of 270 Hz. The frequency of source S is
 a. 248 Hz b. 258 Hz c. 272 Hz d. 262 Hz
- For a coil having $L = 2$ mH, current flows through it is $i = t^2 e^{-t}$ then, the time at which emf become zero
 a. 1 s b. 3 s
 c. 4 s d. 2 s
- The energy required to charge a parallel plate capacitor having plate separation d and plate area of cross-section A and the uniform electric field E between plates is given by
 a. $\frac{1}{2} \epsilon_0 E^2 Ad$ b. $\epsilon_0 E^2 Ad$ c. $\frac{1}{2} \epsilon_0 E^2 / Ad$ d. $\epsilon_0 E^2 / Ad$
- To get an output $O = 1$ in the given circuit, which of the following input will be correct?



- a. 1 0 0 b. 1 0 1 c. 1 1 0 d. 0 1 0
- If a concave mirror of focal length f_1 is placed at a distance of d from a convex lens of focal length f_2 . A light ray coming from infinity is falling on this combination and returns to infinity. The distance d must equal
 a. $-f_1 + f_2$ b. $f_1 + f_2$ c. $-2f_1 + f_2$ d. $2f_1 + f_2$
 - The wavelength of frequency of electromagnetic waves employed in space communication vary over a range of
 a. 1 Hz to 10^{11} Hz b. 1 Hz to 10^4 Hz
 c. 10 Hz to 10^7 Hz d. 10^4 Hz to 10^{11} Hz
 - If a monochromatic light of frequency 6.0×10^{14} Hz is produced by a source and the power emitted is 2.0×10^{-3} W, then the number of photons emitted per second by the source is
 a. 3×10^{10} b. 5×10^{15} c. 7×10^{12} d. 9×10^{12}
 - For the given network (figure). The equivalent resistance between points C and D is

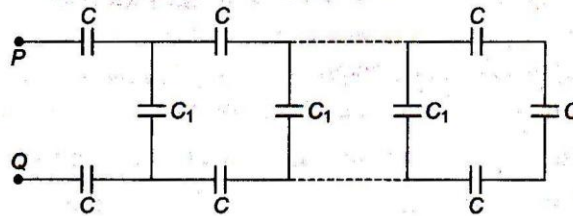


- a. 1Ω b. 4Ω c. 5Ω d. None of these
- In the following figure, the direction of induced current in figure in the coil is



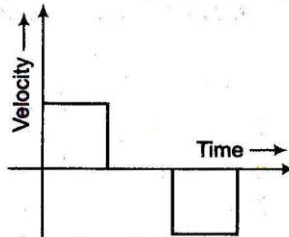
- a. anti-clockwise b. clockwise c. zero d. None of these

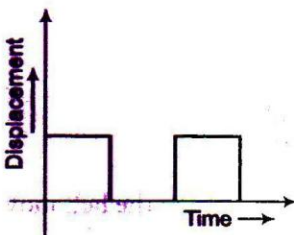
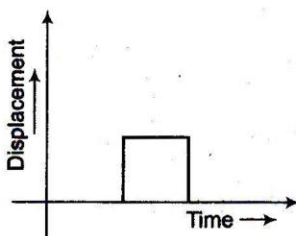
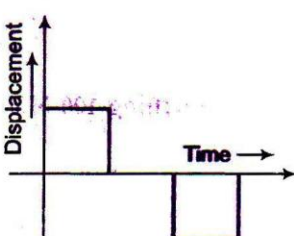
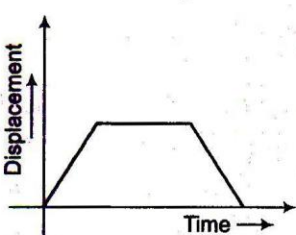
10. In the network shown in figure, $C_1 = 6 \mu\text{F}$ and $C = 9 \mu\text{F}$. The equivalent capacitance between points P and Q is



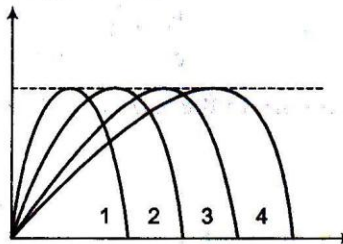
- a. $3 \mu\text{F}$ b. $6 \mu\text{F}$ c. $9 \mu\text{F}$ d. $12 \mu\text{F}$

11. For the given velocity-time graph, velocity the corresponding displacement-time graph will be



- a.  b. 
- c.  d. 

12. Figures shows four paths for a kicked football ignoring the effects of air on the flight rank the paths according to the initial horizontal velocity component highest first

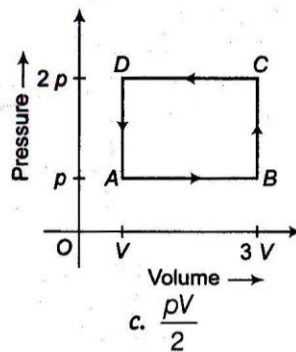


- a. 1, 2, 3, 4 b. 2, 3, 4, 1 c. 3, 4, 1, 2 d. 4, 3, 2, 1

Space for Rough Work

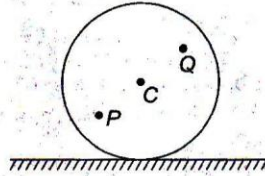
13. Which one of the following statement is not true of de-Broglie waves?
- All atomic particles in motion have waves of a definite wavelength associated with them
 - The higher the momentum, the larger is the wavelength
 - The faster the particle, the shorter is the wavelength
 - For the same velocity, a heavier particle has a shorter wavelength
14. If a particle of mass m and charge q is thrown at a speed u against a uniform electric field E . The distance that it will travel before coming to momentary rest is
- $\frac{mu^2}{2qE}$
 - $\frac{mu}{qE}$
 - $\frac{qE}{m}$
 - None of these

15. A thermodynamic system is taken through the cycle $ABCD$ as shown in figure. Heat rejected by the gas during the cycle is



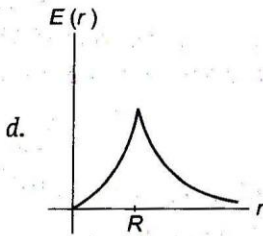
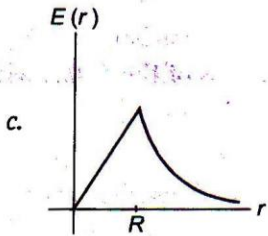
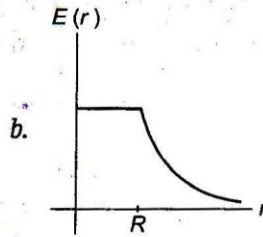
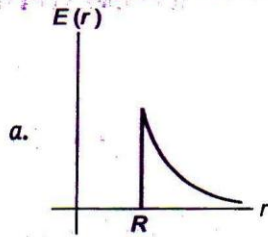
- $4pV$
 - $2pV$
 - $\frac{pV}{2}$
 - pV
16. Sand is being dropped on a conveyer belt at the rate of M kg/s. The force necessary to keep the belt moving with a constant velocity of v m/s will be
- $\frac{Mv}{2}$
 - zero
 - $2Mv$
 - Mv
17. If one end of wire of length 4.5 m of radius 3 mm is fixed to a tree limb and a body weighing 100 N is tied to it, then the elongation in the wire is ($Y = 4.8 \times 10^{11}$ N/m²)
- 2.22×10^{-5} m
 - 3.22×10^{-5} m
 - 5.5×10^{-7} m
 - 9.2×10^{-12} m
18. Sound waves travels at a speed of 350 m/s through a warm air and at 3500 m/s through gold. What will be the wavelength of a 700 Hz acoustic wave as it enters gold from warm air?
- increases by a factor 20
 - decreases of a factor 20
 - increases by a factor 10
 - decreases by a factor 10
19. If two electrical devices, whose resistances are in the ratio of 1 : 2 and connected in series, the power dissipated in them has the ratio of
- 1 : 1
 - 1 : 4
 - 2 : 1
 - 1 : 2
20. If force F is given by relation $F = M\sqrt{x} + Nt^2$, where x is distance and t is time, then the dimensions of M/N will be
- $[L^2T^2]$
 - $[L^{1/2} T^2]$
 - $[L^{-1/2} T^2]$
 - $[MLT^{-2}]$
21. An artificial satellite moving in a circular orbit around the earth has a total (kinetic + potential) energy E_0 . Its potential energy is
- $-E_0$
 - $1.5 E_0$
 - $2 E_0$
 - E_0

22. A disc is rolling (without slipping) on a horizontal surface. C is its centre and Q and P are two points equidistant from C . Let v_P , v_Q and v_C be the magnitudes of velocities of points P , Q and C respectively, then



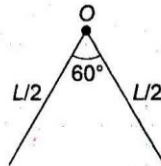
- a. $v_Q > v_C > v_P$
 b. $v_Q < v_C < v_P$
 c. $v_Q = v_P, v_C = \frac{1}{2} v_P$
 d. $v_Q < v_C > v_P$

23. A thin spherical shell of radius R has charge Q spread uniformly over its surface. Which of the following graphs, most closely represents the electric field $E(r)$ produced by the shell in the range $0 \leq r < \infty$, where r is the distance from the centre of the shell?



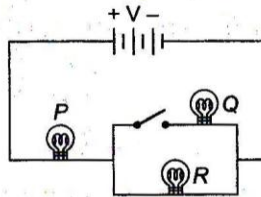
24. A bullet losses 19% of its kinetic energy when passes through an obstacle. The percentage change in its speed is
 a. increase by 10%
 b. decrease by 10%
 c. increase by 20%
 d. decrease by 20%
25. The spring constant of a spring K , when it is divided into n equal parts, then the spring constant of one piece is
 a. K/n
 b. nK
 c. $\frac{nK}{(n+1)}$
 d. $\frac{(n+1)K}{n}$
26. If mass-energy equivalence is taken into account, when water is cooled to form ice, the mass of water should
 a. increase
 b. remain unchanged
 c. decrease
 d. first increase then decrease

27. The nuclei ${}^{14}_7\text{N}$ and ${}^{13}_6\text{C}$ can be described as
- isobars
 - isotones
 - isotopes of carbon
 - isotopes of nitrogen
28. For amplification by a triode, the signal to be amplified is given to
- the grid
 - the cathode
 - the glass envelope
 - the anode
29. In the phenomenon of electric discharge through gases at low pressure, the coloured glow in the tube appears as a result of
- excitation of electron in atoms
 - collision between the atom of gas
 - collision between the charged particles emitted from the cathode and the atoms of the gas
 - collision between different electron of the atoms of the gas
30. A thin rod of length L and mass M is bent at the middle point O at an angle 60° . The moment of inertia of the rod about an axis passing through O and perpendicular to the plane of the rod will be

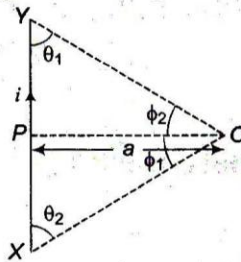


- $\frac{ML^2}{6}$
- $\frac{ML^2}{12}$
- $\frac{ML^2}{24}$
- $\frac{ML^2}{3}$

31. If 3 bulbs P , Q and R are connected as shown in figure. What changes occur in brightness of the bulbs, when the switch is closed?

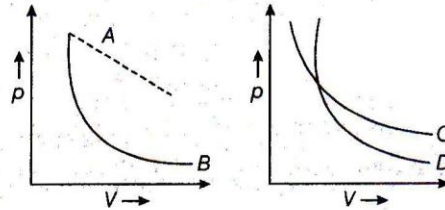


- Brightness of P increases but that of R decreases.
 - Brightness of P remains the same but that of R decreases.
 - Brightness of both P and R decreases.
 - Brightness of P increase but that of R remains same.
32. In the following arrangement as shown in figure, the magnetic field at point O is given by



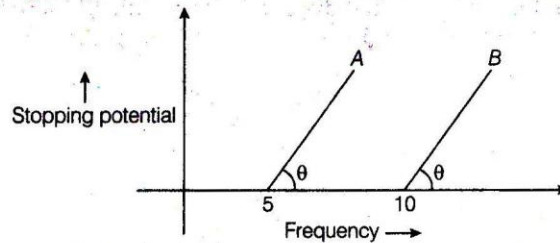
- $B = \frac{\mu_0}{4\pi} \frac{i}{a} (\sin\theta_1 + \sin\theta_2)$
- $B = \frac{\mu_0}{4\pi} \frac{i}{a} (\sin\phi_1 + \sin\phi_2)$
- Both of (a) and (b)
- None of these

33. In following figure, four curves A, B, C and D are given. The curves are



- a. isothermal for A and D while adiabatic for B and C
- b. adiabatic for A and C while isothermal for B and D
- c. isothermal for A and B which adiabatic for C and D
- d. isothermal for A and C while adiabatic for B and D

34. From the given figure describing the photoelectric effect it may be inferred that

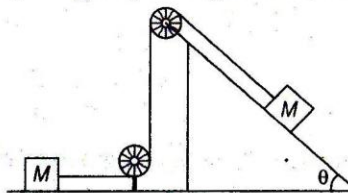


- a. A and B both have the same threshold frequency
- b. Maximum kinetic energy for both metals depend linearly on frequency both A
- c. Stopping potential are different for A and B for some change in frequency
- d. B is better photosensitive material than A

35. A stone is dropped into a well which is H metre deep, then the time after which the splash of sound is heard (let speed of sound in air is v)

- a. $\sqrt{\frac{2H}{g}}$
- b. $\sqrt{\frac{2H}{g}} + \frac{2H}{v}$
- c. $\sqrt{\frac{2H}{g}} + \frac{H}{v}$
- d. None of these

36. For the given system as shown in figure, the pulley are light and frictionless. The tension in the string is

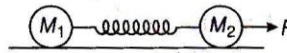


- a. $2 Mg \sin \theta$
- b. $\frac{1}{2} Mg \sin \theta$
- c. $\frac{2}{3} Mg \sin \theta$
- d. $\frac{3}{2} Mg \sin \theta$

37. A particle of mass $m = 5$ units is moving with a uniform speed $v = 3\sqrt{2}$ m in the XOY plane along the $y = x + 4$. What will be the magnitude of the angular momentum about the origin?

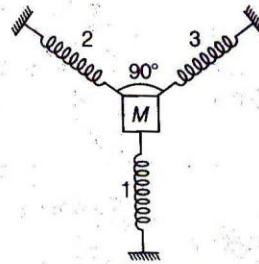
- a. 0 units
- b. 30 units
- c. 60 units
- d. None of these

38. Two balls of masses M_1 and M_2 are placed on a horizontal frictionless table connected by a spring as shown in figure, how mass M_2 is pulled to the right with a force F ? If the acceleration of mass M_1 is a , then acceleration of mass M_2 will be



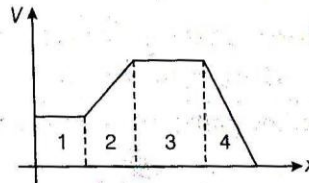
- a. $\frac{F}{M_1}$
- b. $\frac{F - M_1 a}{M_2}$
- c. $\frac{F}{M_2}$
- d. None of these

39. A block is attached to the three identical springs as shown in figure. Each spring has spring constant k and mass of block is M . If spring 1 is compressed by a small distance x , then time period of oscillation of block is?



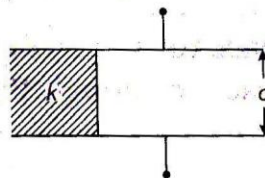
- a. $T = 2\pi\sqrt{\frac{M}{k}}$
- b. $T = 2\pi\sqrt{\frac{M}{2k}}$
- c. $T = 2\pi\sqrt{\frac{2M}{k}}$
- d. None of these

40. The figure shows variation of electric potential V as a function of x . Arrange the four region in descending order according to the magnitude of n -component of the electric field E within them?



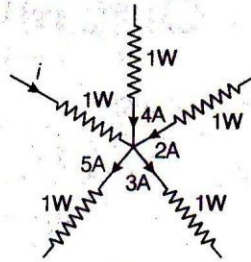
- a. $E_2 = E_4 > E_1 = E_3$
- b. $E_1 = E_2 > E_3 > E_4$
- c. $E_4 > E_1 = E_3 > E_2$
- d. $E_1 > E_2 > E_3 > E_4$

41. If a parallel plate capacitor with air as dielectric has capacitance C . A slab of dielectric constant k and having same thickness as the separation between the plates is introduced so as to fill one-fourth of the capacitor as shown in figure, then new capacitance will be



- a. $(4 + k)\frac{C}{4}$
- b. $(3 + k)\frac{C}{4}$
- c. $\frac{kC}{2}$
- d. $\frac{kC}{4}$

42. In the given distribution, what is the value of i ?

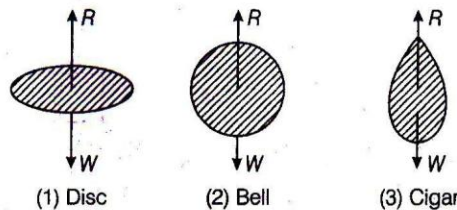


- a. 8 A b. 0 c. 2 A d. 5 A

43. If minimum angle of deviation for a glass prism is equal to its refracting angle. The refractive index of glass is 1.5 then the angle of prism is

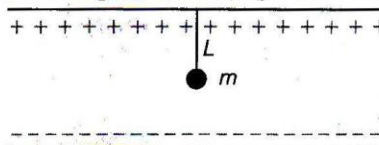
- a. $2 \sin^{-1}\left(\frac{3}{4}\right)$ b. $\sin^{-1}\left(\frac{3}{4}\right)$
 c. $\cos^{-1}\left(\frac{3}{2}\right)$ d. $2 \cos^{-1}\left(\frac{3}{4}\right)$

44. If a body falls in air, the resistance of air depends to a great extent on the shape of body. Three different shapes are given. Identify the combination of air resistances which truly represents the physical situation? (Cross sectional areas are the same)



- a. $1 < 2 < 3$ b. $2 < 3 < 1$
 c. $3 < 2 < 1$ d. $3 < 1 < 2$

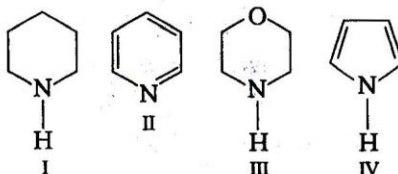
45. A small sphere carrying a charge q is having in between two parallel plates by a string of length L . Time period of pendulum is T_0 . When parallel plates are charged, the time period changes to T , the ratio of T / T_0 is equal to



- a. $\left(\frac{g + \frac{qE}{m}}{g}\right)^{1/2}$ b. $\left(\frac{g}{g + \frac{qE}{m}}\right)^{3/2}$ c. $\left(\frac{g}{g + \frac{qE}{m}}\right)^{1/2}$ d. None of these

PART B CHEMISTRY

46. Arrange following in correct sequence of basic strength



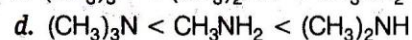
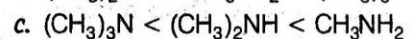
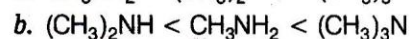
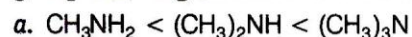
a. $IV > I > III > II$

b. $III > I > II > IV$

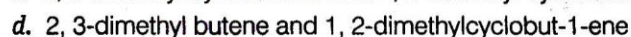
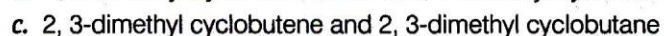
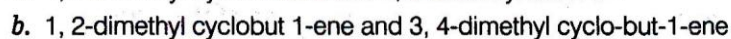
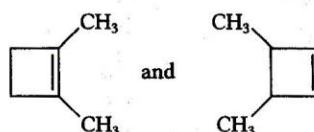
c. $II > I > III > IV$

d. $I > III > II > IV$

47. Strength of acid increases with the attachment of group showing $-I$ effect and decreases with the attachment of group showing $+I$ effect. Which of the following is correct sequence of basic strength in aqueous solution?



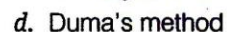
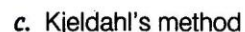
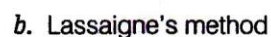
48. IUPAC name of



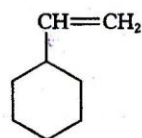
49. Phosphorous in any organic compound can be estimated by the formula

$$\% \text{ of P} = \frac{\text{wt. of } Mg_2 P_2O_7 \text{ formed} \times 62}{\text{wt. of compound}} \times 100 \times 222$$

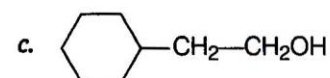
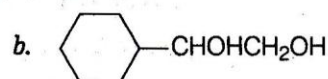
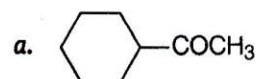
This formula is related to



50.



reacts with B_2H_6 in presence of H_2O_2 produces



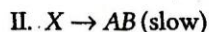
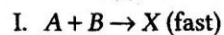
51. When benzene is heated with chlorine in the presence of sunlight, it forms
- BHC
 - cyclopropane
 - p*-dichlorobenzene
 - None of these
52. The product formed when toluene is heated in light with Cl_2 and in absence of halogen carrier is
- chlorobenzene
 - gammexane
 - benzotrichloride
 - DDT
53. In IF_7 molecule, central atom has all the bonded electrons *i.e.*, no lone pair is present on the central atom. Structure of IF_7 is
- pentagonal bipyramidal
 - octahedral
 - square pyramidal
 - octahedral monopyrarnidal
54. On dissolving moderate amount of sodium metal in liquid NH_3 at low temperature, which of the following does not occur?
- Na^+ ions are formed in the solution
 - Blue coloured solution is obtained
 - Liquid NH_3 becomes good conductor of electricity
 - Liquid NH_3 remains diamagnetic
55. Most of the compounds of transition metals are coloured in solid state or solutions. The transition metals which have either completely filled *d*-orbitals or completely empty *d*-orbitals are colourless. The colour of transition metal is due to
- presence of unpaired *d*-electrons
 - small size
 - metallic nature
 - All of these
56. Electron gain enthalpy increases across the period and decreases down the group. Which of the following order of electron gain enthalpy is correct?
- $\text{F} < \text{Cl} < \text{Br} < \text{I}$
 - $\text{F} < \text{Cl} > \text{Br} > \text{I}$
 - $\text{I} > \text{Br} > \text{F} < \text{Cl}$
 - $\text{I} < \text{Cl} < \text{Br} > \text{F}$
57. In which of the following pairs both the complexes show optical isomerism?
- $\text{cis} - [\text{Cr}(\text{C}_2\text{O}_4)_2\text{Cl}_2]^{3-}$, $\text{cis} - [\text{Co}(\text{NH}_3)_4\text{Cl}]$
 - $[\text{PtCl}(\text{dien})]\text{Cl}$, $[\text{NiCl}_2\text{Br}_2]^{2-}$
 - $[\text{Co}(\text{NO}_3)_3(\text{NH}_3)_3]$, $\text{cis} - [\text{Pt}(\text{en})_2\text{Cl}_2]$
 - $[\text{Co}(\text{en})_3]\text{Cl}_3$, $\text{cis} - [\text{Co}(\text{en})_2\text{Cl}_2]\text{Cl}$
58. XeF_6 is colourless crystalline solid. It undergoes hydrolysis in water. The final product obtained is an explosive solid. This explosive solid will be
- XeO_3
 - XeO
 - XeO_2
 - Xe

59. The number of spectral lines that can be possible when electrons in 7th shell in different hydrogen atoms return to the second shell is
- a. 12 b. 15 c. 14 d. 10
60. Principal quantum number defines the principal shell in which electron is revolving around the nucleus and Azimuthal quantum number described the name of the subshell and the shape of orbitals. The values of principal and Azimuthal quantum number for 23rd electron present in iron atom are.
- a. 3 and 2 b. 3 and 1
c. 4 and 1 d. 4 and 0
61. A compound A is obtained by reaction between first member of 1st group element and lightest element of periodic table, then correct statement about compound A is
- a. A is acidic in nature b. A is basic in nature
c. A is amphoteric in nature d. A turns blue litmus paper red
62. Potassium superoxide is the inorganic compound with the formula KO_2 . It is a yellow solid that decomposes in moist air. It is a rare example of a stable salt of the superoxide ion. Which of the following statement is incorrect regarding potassium superoxide?
- a. Oxidation state of oxygen in KO_2 is $-1/2$
b. Oxidation state of potassium is $+1$
c. It is used in preparation of breathing mask
d. It is a reducing agent
63. Werner's theory was the first successful theory, which explained the properties of complexes. According to Werner's theory the primary and secondary valence of $[\text{Co Cl}_3(\text{NH}_3)_3] \text{Cl}_3$ is
- a. 3 and 3 respectively b. 6 and 6 respectively
c. 3 and 6 respectively d. 6 and 3 respectively
64. Boron on reaction with CO_2 and H_2O produces boron hydride as a major constituent the other byproduct produced in these reactions are
- a. H_2O and C b. H_2 and CO_2
c. H_2 and C d. H_2O and CO_2
65. NaBH_4 on reaction with I_2 produces a compound X, X on reaction with oxygen produces an anhydride. X on reaction with NH_3 forms an adduct. X is
- a. B_2H_6 b. LiH
c. BH_4^\ominus d. IBH_2
66. Equilibrium constant of a chemical reaction is 1.5 and rate constant of forward reaction is 7.5×10^{-4} . Then, rate constant of backward reaction will be
- a. 1.125×10^{-3} b. 2.225×10^{-3}
c. 3.335×10^{-5} d. 1.125×10^{-1}
67. The pH of the solution is defined as the negative logarithm of the concentration of hydrogen ions which it contains. pH of 0.365 gL^{-1} HCl solution will be
- a. 1 b. 2
c. 3 d. 0.1
68. When copper metal is dipped in a solution of HNO_3 , it produces copper nitrate and some gaseous molecule, the change in oxidation number of nitrogen is
- a. +2 b. +1 c. +4 d. 0

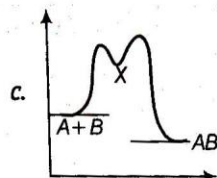
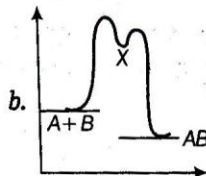
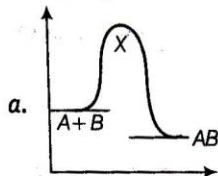
76. Freundlich gave the relationship between the gas adsorbed by solid adsorbent surface and pressure of the gas at a particular temperature. Which of the following equation represent Freundlich adsorption isotherm?

- a. $\frac{x}{m} = kp^{1/n}$ b. $\frac{x}{m} = \frac{k}{p}$ c. $\frac{x}{m} = kp$ d. $\frac{x}{m} = kp^n$

77. An exothermic chemical reaction occurs in two steps as follows



The progress of the reaction can be best represented by



d. All of these

78. Which of the following plots represents the behaviour of an ideal binary liquid solution?

- a. Plot of p_{total} vs Y_A (mole-fraction of A in vapour phase) is linear
 b. Plot of p_{total} vs Y_B is linear
 c. Plot of $1/p_{\text{total}}$ vs Y_A is linear
 d. Plot of $1/p_{\text{total}}$ vs Y_B is non-linear

79. A compound obtained by burning of an element belongs to 2nd group and 3rd period when passes through red litmus paper it turns blue the equivalent weight of compound is

- a. 58 b. 29 c. 116 d. 14.5

80. What will be the formation of CO_2 is?



- a. $X - Y$ b. $Y - 2X$
 c. $X + Y$ d. $2X - Y$

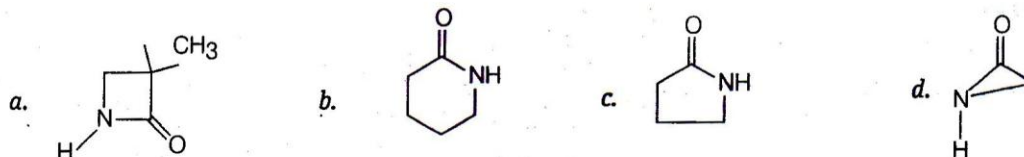
81. Which of the following is not correctly matched?

Column I	Column II
a. XeO_3	tetrahedral
b. XeF_4	square planar
c. XeF_2	linear
d. XeO_2F_2	square planar

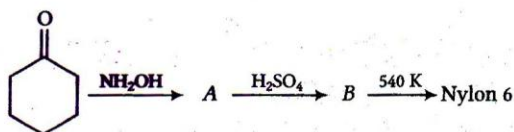
82. How many carbon in 2 methyl pentan-3-one is sp^2 hybridised?

- a. 2 b. 1 c. 0 d. 3

83. Most of the organic compounds are generally used in the formation of drugs. 1.1% solution of phenol is used as
- antiseptic
 - antipyretic
 - disinfectant
 - tranquillizer
84. CFCs, HCFCs and halons destroy the earth's protective ozone layer, which shields the earth from harmful ultraviolet rays generated from the SUN. Why CFC are widely used in air conditioners?
- Because CFC are highly reactive
 - It is highly inflammable
 - It is non-reactive
 - All of these are true
85. Nylon 4 can be prepared by polymerisation of



86. Aldohexoses are six carbon sugars with four chirality centres and an aldehyde carbonyl group. There are 16 possible stereoisomeric aldohexoses. D-glucose and D-mannose are X of each other X is
- epimer
 - anomer
 - enantiomer
 - diastereomer
87. In the below reaction, B is



- caproic acid
 - caproic anhydride
 - caprolactum
 - cyclohexanone oxime
88. Which of the following chemical reactions will produce phenol?
- Aniline $\xrightarrow[0-5^\circ\text{C}]{\text{HNO}_2}$ A $\xrightarrow{\text{H}_3\text{PO}_4}$ B
 - Aniline $\xrightarrow[0-5^\circ\text{C}]{\text{HNO}_2}$ A $\xrightarrow{\text{H}_2\text{O (hot)}}$ B
 - Benzene $\xrightarrow{\text{FeCl}_3}$ A $\xrightarrow{\text{alc. KOH}}$ B
 - All of these
89. Primary amine on reaction with a mixture of chloroform and alc. KOH produced isocyanides while phenol on reaction with a mixture of chloroform and aq KOH produces
- salicylic acid
 - benzoic acid
 - benzaldehyde
 - salicylaldehyde
90. LiAlH_4 is a strong reducing agent and reduces most of the functional groups to alcohol. The product obtained after reduction of dimethylcarbinol with LiAlH_4 , it produces
- propan-2-ol
 - propan-1-ol
 - pentan-2-ol
 - propanoic acid

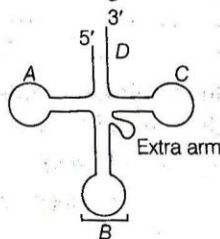
PART C **BIOLOGY**

91. Assertion (A) Blood is a connective tissue with fluid matrix.

Reason (R) Haemopoiesis is the process of formation of blood.

- Both A and R are true and R is the correct explanation of A
- Both A and R are true, but R is not the correct explanation of A
- A is true, but R is false
- A is false, but R is true

92. Label the parts in the given diagram with the following set of codes.



- A-D-loop; B-Anticodon arm; C-T Ψ C arm; D-CCA acceptor arm
- A-C Ψ C loop; B-Amino acid arm; C-Acceptor arm; D-Anticodon arm
- A-D-loop; B-T Ψ C arm; C-Acceptor arm; D-Anticodon arm
- A-Anticodon arm; B-Amino acid arm; C-C Ψ C arm; D-Acceptor arm

93. Touch receptors present in the skin are known as

- Pacinian corpuscles
- Meissner's corpuscles
- Krause's end bulbs
- Organs of Ruffini

94. Select the incorrect statement from the following options.

- Nucleic acid — Genetic material
- Proteins — Heteropolymers of amino acids
- Ribozymes — Protein with catalytic activity
- Collagen — Most abundant protein in animal world

95. Bone and cartilage can be distinguished by the presence of one of the following structure

- lacuna
- myofibril
- Haversian canal
- chromatophores

96. Which of the following disease(s) may lead to Iron Deficiency Anaemia (IDA).

- Peptic ulcer
- Inflammatory Bowel Disease (IBD)
- Hypochlorhydria
- Pregnancy

- I and III
- All may lead to IDA
- Only IV
- I, II and IV

97. When osmotic potential is either zero or negative and pressure potential is positive, then the water potential will be

- always negative
- always positive
- some times negative and some times positive
- do not show any specificity

98. Mesangial cells are specialised smooth muscle cells that function to regulate blood flow in the blood vessels. They are found in which organ of the body?

- a. Testis b. Brain c. Kidney d. Ovary

99. Match the following columns.

Column I (Structure of Earthworm)	Column II (Its location)
A. Pairs of testis	1 10th and 11th segment
B. Pairs of seminal vesicles	2 17th and 19th segment
C. Pair of ovary	3 13th segment
D. Accessory gland	4 11th and 12th segment

- A B C D
a. 1 4 3 2
c. 4 1 3 2

- A B C D
b. 2 4 3 1
d. 2 3 1 4

100. The biochemical or morphological change of meristematic daughter cell to become a permanent cell is called

- a. differentiation b. dedifferentiation
c. redifferentiation d. indifferentiation

101. Which one of the following is an exclusive character of living beings?

- a. Isolated metabolic reactions occurring *in vitro*.
b. Increase in the body mass from inside only
c. Perception of happening of events in the environment and their memory
d. Increase in mass by accumulation of material both on surface as well as internally

102. Match the following columns.

Column I (Organism)	Column II (Characteristics)
A. <i>Euglena</i>	1. Causing haemoglobinuric fever in cattle
B. <i>Noctiluca</i>	2. Connecting link between plants and animals
C. <i>Babesia</i>	3. Free living marine
D. <i>Trichonympha</i>	4. Symbiotism in termite's gut

- A B C D
a. 4 3 1 2
c. 2 3 1 4

- A B C D
b. 2 4 3 1
d. 3 4 2 1

103. CFC is an organic compound that contains only carbon, chlorine and fluorine, produced as a volatile derivative of methane and ethane. They are the main culprit for ozone depletions. Which of the following pledged to phase out CFC's?

- a. Rio Declaration b. Helsinki declaration
c. Kyoto Protocol d. Earth Summit

104. Which of the following statement is not correct?

- a. Double fertilisation is characteristic feature of angiosperms. It was discovered by SG Nawaschin
b. In adventive embryos, embryos develop directly from the nucellus
c. Milky water of coconut is called liquid endosperm
d. In anatropous ovule, the micropyle, funicle and chalaza lie in a straight line

105. You have hired a driver, which is 55 year old. During the interaction before joining. He had informed you very honestly that he is a diabetic patient. Which of the following suggestion you will give him before going on a drive.

- I. Take a double dose of insulin, so that he does not develop any problem during driving
 - II. Always carry a identification card with full detail
 - III. Take regular snacks or meal during long journey.
 - IV. Drink only 500 mL of water in 24 hours to avoid any hypoglycemic attack
- a. I and III b. III and IV c. I and II d. II and III

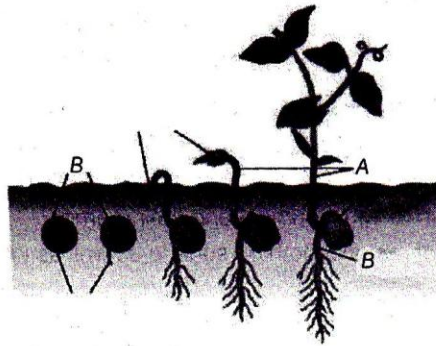
106. Cichlid fish became extinct due to a alien species in the lake Victoria. Find out the name of that alien species from the following options.

- a. Nile perch b. African catfish c. Murrels d. Water hyacinth

107. As per the fluid mosaic theory/model of cell membrane, lipid is also present in the membrane select the correct organelles in which it synthesised

- a. smooth endoplasmic reticulum b. Golgi apparatus
c. mitochondria d. lysosome

108. Label the given diagram with options given below.



- | | A | B | C |
|----|-----------|------------|------------|
| a. | Epicotyl | Hypocotyl | Cotyledons |
| b. | Hypocotyl | Epicotyl | Cotyledons |
| c. | Hypocotyl | Cotyledons | Epicotyl |
| d. | Epicotyl | Cotyledons | Hypocotyl |

109. Biosystematics is

- a. the identification and arrangement of different organisms on the basis of their morphological characters
- b. the systematic arrangement of different organisms on the basis of their ecological niche
- c. the analysis of the geographical distribution of population or organisms and then systematic organisation of the population/organisms
- d. the systematic arrangement of organisms on the basis of their evolutionary, genetic and biochemical framework to assess the taxonomic relationships of organisms or populations

110. Statement A Fertilised eggs of honeybee develop into drone and unfertilised eggs develop into female.

Statement B Female develops parthenogenetically.

- a. Both statements are true and B is the correct explanation of A.
- b. Both statements are true, but B is not the correct explanation of A.
- c. Both are false
- d. A is false, but B is true

111. All below are the symptoms of one of the following condition Urticaria

- Hypotension
- Wheeze
- Flushing
- Angioedema of lips

- a. Mitral stenosis
- b. Aortic stenosis
- c. Acute asthma
- d. Anaphylaxis

112. These processes are compulsory for the complete development of the male gametophyte from pollen mother cell

- a. two meiotic cell division
- b. one mitotic cell division and two meiotic cell division
- c. one meiotic cell division and two mitotic cell division
- d. two meiotic cell division and one mitotic cell division

113. Which one of following term is used for local population, adapted genetically to its particular environment

- a. biotic community
- b. demes
- c. biome
- d. ecotype

114. Human eyes have lot of glands, which are prone to infection. Infection of which modified gland of eyelids causes style or external hordeolum?

- a. Gland of Moll
- b. Meibomian gland
- c. Gland of Zeis
- d. Lacrimal gland

115. The Respiratory Quotient (RQ) of $C_4H_6O_6$ is

- a. 1.33 (more than unity)
- b. 0.7 (less than unity)
- c. zero
- d. ∞ (infinite)

116. Identify the correct relationship with reference to water potential of a plant cell.

- a. $\Psi_w = \Psi_m + \Psi_s + \Psi_p$
- b. $\Psi_w = \Psi_m - \Psi_s - \Psi_p$
- c. $\Psi_w = \Psi_m - \Psi_s + \Psi_p$
- d. $\Psi_w = \Psi_m + \Psi_s - \Psi_p$

117. Symptoms alcoholic withdrawal are

- a. tranquillisers
- b. sedatives
- c. opiate
- d. stimulants

118. Which among the following represent central dogma?

- a. RNA \rightarrow DNA \rightarrow Protein
- b. Protein \rightarrow RNA \rightarrow DNA
- c. DNA \rightleftharpoons RNA \rightarrow Protein
- d. DNA \rightarrow Protein \rightarrow RNA

119. Match the followings columns.

Column I	Column II
A. Food storing tissue	1. Grapes
B. Parthenocarpic fruit	2. Mango
C. Membranous seed coat	3. Maize
D. Single seeded fruit developing from monocarpellary superior ovary	4. Litchi
	5. Endosperm

- A B C D
- a. 1 2 4 5
- c. 2 4 3 1

- A B C D
- b. 5 1 3 2
- d. 5 2 4 1

120. A 12 year old boy, whose body mass index BM_I is 18.5, starts complaining of stomach-ache on every monday morning. His doctor has not found any organic cause despite of all investigations. What may be the cause of this abdominal pain

- a. Psychogenic
b. Pseudo-obstruction
c. Haemorrhoids
d. Hirschprung's disease

121. Match the following columns.

Column I (Classes of Enzymes)	Column II (Examples)
A. Transferases	1. Histadine decarboxylases
B. Lyases	2. Amylase
C. Hydrolases	3. Glutamate pyruvate transaminase
D. Ligases	4. Pyruvate carboxylase

- A B C D
a. 4 2 3 1
c. 1 2 3 4

- A B C D
b. 3 1 2 4
d. 4 1 3 2

122. Which of the following enzyme is called regulatory enzyme of glycolysis?

- a. Phosphoglucoisomerase
b. Phosphofructokinase
c. Phosphotriose isomerase
d. Mutase

123. A individual has low blood potassium and hypertension. Blood investigations show that has blood aldosterone is very high. He might be suffering from

- a. Addison's disease
b. cretinism
c. gigantism
d. Conn's disease

124. Which of the following statement(s) is/are true

- I. Salivary gland chromosomes or polytene chromosome have been seen in dipteran insects
II. Lampbrush chromosomes have been observed in primary oocyte nuclei of vertebrate only
III. Lampbrush chromosomes have been observed in primary oocyte nuclei of vertebrates as well as inventebrates.
IV. Kinetochore is an another name for satellites chromosomes.

- a. I and IV
b. I, II, III and IV
c. II and III
d. I and III

125. Identify the correct sequence of gene in an operon.

- a. Promoter, operator, regulator, structural
b. Structural, regulator, operator, promoter
c. Regulator, promoter, operator, structural
d. Operator, structural, regulator, promoter

126. Select the correct statement from the given options regarding homologous organs?

- a. Similar in origin but dissimilar in functions
b. Similar in origin with similar/dissimilar function
c. Dissimilar in origin and dissimilar in structures
d. Similar in origin but dissimilar in functions

127. Which is not used for detection of cancer of internal organs?

- a. Radiography
b. Computed tomography
c. Magnetic resonance imaging
d. Enzyme linked immunosorbent assay

128. What happens during stomatal opening

- a. Malate enter into the guard cell
 b. H^+ extruding from guard cells
 c. K^+ enters into the guard cell
 d. All of these

129. Match the following columns.

Column I	Column II
A. Azoic	1. Era of ancient life
B. Proterozoic	2. Era of no life
C. Palaeozoic	3. Era of medieval life
D. Mesozoic	4. Era of early life

Codes

- A B C D
 a. 1 3 4 2
 c. 1 2 3 4

- A B C D
 b. 2 4 1 3
 d. 4 3 2 1

130. Hassal's bodies which are potent source of the cytokine TS2P, are found in one of the following organ

- a. liver
 b. thymus
 c. adrenal
 d. thyroid

131. Being a student of biology, your one of the relative called you and informed that he has a chest pain which is peripheral, extracted by deep breathing or coughing.

Which of the following system is most likely seems to be involved?

- a. Respiratory system
 b. Cardiac system (cardio-vascular system)
 c. Neural system
 d. Sensory system

132. RFLP, RAPD, VNTR and STR are examples of

- a. enzymes
 b. molecular marker
 c. plasmids
 d. antigens

133. Assertion (A) Neo-Lamarckism is the modified form of Lamarckism.

Reason (R) Evidences in favour of inheritance of acquired characters support Neo-Lamarckism.

- a. Both A and R are true and R is the correct explanation of A
 b. Both A and R are true, but R is not the correct explanation of A
 c. A is true, but R is false
 d. A is false, but R is true

134. When one molecule of glucose enters into glycolysis two molecules of pyruvic acid is formed then pyruvic acid enter into the Krebs' cycle. How many carbon dioxide molecules are formed when one glucose molecule passes through glycolysis and Krebs' cycle?

- a. 3
 b. 4
 c. 5
 d. 6

135. Auxin cause apical dominance this hormone is mainly produces in the apical part of shoot the reason for apical dominance by auxin.

- a. Auxin in apical part of shoot have the ability to bans part the cytokinin from root in the apical part of shoot
 b. Cytokinin is not transported to apical part that is why auxin cause apical dominance
 c. Both (a) and (b).
 d. None of the above

142. Match the following columns.

Phase			Duration (in hours)		
			Vicia faba	Mouse L-cells	Human HeLa cells
A.	G ₁	1.	12	3-4	3
B.	S	2.	12	12	12
C.	G ₂	3.	1	1	1
D.	M	4.	6	10	10

- A B C D
 a. 2 4 1 3
 c. 4 1 3 2

- A B C D
 b. 3 2 1 4
 d. 1 2 3 4

143. Match the following columns.

Column I	Column II
A. Allogamy	1. Fusion of gametes
B. Homogamy	2. Cross-pollination
C. Syngamy	3. Male and female parts of a flower mature simultaneously

- A B C
 a. 3 1 2
 c. 3 2 1

- A B C
 b. 2 3 1
 d. 1 2 3

144. Assertion (A) *Plasmodium* is an endoparasite.

Reason (R) Female mosquito is an example of temporary parasite.

- a. Both A and R are true and R is the correct explanation of A
 b. Both A and R are true, but R is not the correct explanation of A
 c. A is true but R is false
 d. A is false but R is true

145. Identify the incorrect statement regarding oogenesis.

- a. It has long resting periods
 b. It forms one functional and three non-functional cells
 c. Its growth phase is very short
 d. The division of primary oocyte is not equal

146. Which one of the statement given below is not correct?

- a. The new name of dark reaction is carbon assimilation, in which CO₂ gas reduces into carbohydrates glucose
 b. Photolysis means splitting of water molecules to release oxygen in photosystem-I
 c. A chlorophyll molecule has a tadpole like structure with phytol head and porphyrin tail
 d. ATP is energy rich compound where maximum energy is present in terminal pyrophosphate bonds

147. Which of the following is not a vestigial organ in man?

- a. Nail
 b. Muscles of ear pinna
 c. Wisdom teeth
 d. Tail vertebra

148. Match the followings columns.

Column I	Column II
A. Calcium	1. Required for synthesis of mitotic spindle
B. Chlorine	2. Required to active respiratory enzyme
C. Manganese	3. Essential for constitution of nucleic acid
D. Phosphorus	4. Required for ionic balance

Codes

A B C D
 a. 1 3 2 4
 c. 4 2 3 1

A B C D
 b. 1 4 2 3
 d. 2 3 4 1

149. Consider the following statements.

I. In non-endospermic seeds, food is stored in seed coat.

II. Caryopsis is one seeded dry indehiscent fruit developed from a monocarpellary, unilocular and superior ovary.

III. Hesperidium is a modification berry.

Which of the statements given above are correct?

a. I and II b. I and III c. II and III d. I, II and III

150. Which of the following is a missing link?

a. *Peripatus* b. *Neopilina* c. *Ichthyostega* d. *Protopterus*

151. Which hormone of pancreas inhibits the release of pancreatic juice?

a. Insulin b. Glucagon
 c. Somatostatin d. Pancreatic polypeptide

152. Select the correct statement regarding active ion uptake, which differentiate it from secondary transport

a. ions are active b. ions move freely
 c. energy is expended d. ions move passively

153. Which of the following combination of drugs has a dramatic rapid increase in sedative effect?

a. Alcohol + Antihistamines
 b. Alcohol + Benzodiazepines
 c. Alcohol + Aspirin
 d. Amphetamine + Insulin

154. Which one of the statement given below is not correct?

a. Krebs's cycle is a common pathway of oxidative breakdown of carbohydrates, fatty acids and amino acids
 b. The energy present in one gram carbohydrate is 4.4 kcal or 18.4 kJ
 c. When protein are used as respiratory substrate respiration is called protoplasmic respiration
 d. The energy present in one gram of fat is 4.8 kcal or 20 kJ

155. Genetically modified foods contain

a. same number of genes as conventional crop b. same number of genes as hybrid crop
 c. one of two additional genes d. hundreds of additional genes

156. During photorespiration, the conversion of phosphoglycolate to glycolate takes place in which cell organelle.

a. Mitochondria b. Peroxisome
 c. Chloroplast d. Glyoxysome

- 157.** Which of the following statements is correct for Cro-magnon man?
- Advanced stage of man's evolution than *Homo erectus*
 - Predecessor of *Homo neanderthalensis*
 - Direct ancestor of man
 - Lived during last ice age
- 158.** Steps of relaxation are
- Discharge of neuron
 - Release of Ca^{+2} from troponin
 - Generation of end plate potential
 - Cessation of interaction between actin and myosin.
- I, II, III and IV
 - II and IV
 - I, II and III
 - I, III and IV
- 159.** Clotting is a process *via* which flow of blood from the wound stops naturally. A step of clotting is given belows identify the correct catalyst
- Fibrinogen \rightarrow Fibrin
- prothrombium
 - thrombium
 - thrombin
 - thromboplastin
- 160.** Which of the following is incorrect about eutrophication?
- Found in all ecosystems
 - Leads to organic loading
 - Bloom formation is eutrophic water
 - Enrichment with plant nutrients
- 161.** Two chromatin fibre per chromosome is present in
- G_1
 - G_2
 - S
 - Telophase
- 162.** Wobble pairing takes place
- under unusual condition between homologous chromosomes of a somatic cell causing somatic crossing over
 - in some cases between the third base of a codon and that of an anticodon
 - in those rare instances where unequal crossing over takes place for the lack of segment to segment pairing
 - in radiation included base deletion from one strand of a DNA molecule so that the complementary counter-part of the other strand exhibits mispairing
- 163.** Which of the following statement is true for heterochromatinisation. It takes place
- during fertilisation
 - early in the gestational development
 - immediately before birth
 - prior to the onset of puberty
- 164.** Genetically modified plants are superior to parent plants in many ways. Identify the correct effect of GMFs on human gene.
- it causes damage to human gene
 - It has no effect on human gene
 - it causes change in number of human gene
 - it modifies human gene

165. Match the following columns.

Column I	Column II
A. Apple	1. Perianth
B. Walnuts	2. Juicy testa
C. Pomegranate	3. Cotyledons
D. Mulberry	4. Fleshy thalamus

- A B C D
 a. 4 3 2 1
 c. 4 2 1 3

- A B C D
 b. 3 2 1 4
 d. 2 1 3 4

166. Due to imbibition, the seed coat breaks because, kernels swell to higher degree because

- a. kernel is made up of cellulose
 b. kernel is made up of proteins, lipid and starch
 c. depends on nature of medium
 d. None of the above

167. Ozone depletion of stratosphere shall results in lot of side effects to atmosphere one of them is that it

- a. causes forest fires
 b. increased incidence of skin cancer.
 c. causes blood cancer
 d. None of these

168. Extinction of passenger pigeon (*Ictopistus migratorius*) is a result of one of the following cause.

- a. absence of food
 b. presence of predators
 c. over exploitation by humans
 d. bird flu

169. Stelosis sea cow (*Hydrodamalis gigas*) was a large herbivorous marine mammals. It was the largest number of the order-Sirenia. It was discovered in

- a. Africa
 b. Russia
 c. Mauritius
 d. Australia

170. Which one of the following human genes has the longest stretch of DNA (~ 24 Mb)?

- a. Globin gene
 b. Histone gene
 c. Dystrophin gene
 d. tRNA gene

171. Which of the following is true about Lamarckism?

- I. It was proposed by Jean Baptiste de Lamarck.
 II. It is based on use and disuse of organs.
 III. Principle of natural selection.
 IV. Inheritance of acquired characters.
 a. I, II and III
 b. IV, III and II
 c. I, IV and II
 d. I, II, III and IV

172. Mental retardation in man associated with sex chromosomal abnormality is usually due to

- a. moderate increase in Y complement
 b. large increase in Y complement
 c. reduction in X complement
 d. increase in X complement

173. Identify the correct statement regarding pBR322. It is a

- a. bacteriophage
 b. yeast
 c. plasmid
 d. parasite

174. The first step in dark reaction of photosynthesis is

- a. formation of ATP
- b. excitation of chlorophyll molecule
- c. photolysis of water
- d. attachment of carbon dioxide to a pentose sugar

175. Which of the following is helpful in studying sex-linked characters?

- a. Back cross
- b. Test cross
- c. Reciprocal cross
- d. Trihybrid cross

176. Which scientist pair determined the given structure of DNA?



- a. Brenner and Nirenberg
- b. Jacob and Monod
- c. Watson and Crick
- d. Singner and Nicolson

177. Which one of the following statements correctly describes allosteric enzymes?

- a. Not usually controlled by feedback inhibition
- b. Regulatory site may be catalytic site
- c. Michaelis-Menten kinetics describe their activity
- d. Effectors may enhance or inhibit substrate binding

178. An ideal vector must have which among the following.

- I. An origin of replication.
- II. Single cloning site.
- III. Have a gene encoding transcription.
- IV. Have a gene encoding resistance to antibiotic.

Choose the correct combination.

- a. I and IV
- b. III and IV
- c. II and IV
- d. I and II

179. Haemophilic man marries a normal woman. Their offsprings will be all

- a. haemophilic
- b. boys haemophilic
- c. girls
- d. normal

180. Assertion (A) In human eye, cornea absorbs UV-B radiation and a high dose of UV-B causes inflammation of cornea.

Reason (R) Such exposure may permanently damage the cornea.

- a. Both A and R are true and R is the correct explanation of A.
- b. Both A and R are true, but R is not the correct explanation of A
- c. A is true, but R is false
- d. Both A and R are false