AIPMT 2014

Test Instructions

1. Total duration of this test is **180** minutes.
2. This test has 4 subjects consisting of
   180 questions in total.
3. There are **4** total sections in the test.
4. Sections Info :
   Physics
      a. **Section A** has **45** questions, compulsory questions **45**. **4** marks will be given for correct attempt and incorrect attempt **-1** .
   Chemistry
      a. **Section A** has **45** questions, compulsory questions **45**. **4** marks will be given for correct attempt and incorrect attempt **-1** .
   Botany
      a. **Section A** has **49** questions, compulsory questions **49**. **4** marks will be given for correct attempt and incorrect attempt **-1** .
   Zoology
      a. **Section A** has **41** questions, compulsory questions **41**. **4** marks will be given for correct attempt and incorrect attempt **-1** .
5. Total marks for this test is **720** marks.
6. No marks will be deducted for unattempted questions.
7. This test can be submitted only once.
8. Once the test has been submitted, you cannot edit the responses.
9. Results will be anounced post test submission.
10. The test will be auto-submitted once the timer ends.

Physics

Section A

1. If force (F), velocity (V) and time (T) are taken as fundamental units, then the dimensions of mass are

   1. $[FVT^{-1}]$
   2. $[FVT^{-2}]$
   3. $[FV^{-1}T^{-1}]$
   4. $[FV^{-1}T]$

2. A body of mass(4m) is lying in x–y plane at rest. It suddenly explodes into three pieces. Two pieces, each of mass (m) move perpendicular to each other with equal speeds (ν). The total kinetic energy generated due to explosion is

   1. mv^2
   2. $\frac{3}{2}mv^2$
   3. $2mv^2$
   4. $4mv^2$

3. Certain quantity of water cools from 70°C to 60°C in the first 5 minutes and to 54°C in the next 5 minutes. The temperature of the surroundings is

   1. 45°C
   2. 20°C
   3. 42°C
   4. 10°C

4. A monoatomic gas at a pressure P having a volume V expands isothermally to a volume 2V and then adiabatically to a volume 16 V. The final pressure of the gas is (Take γ = 5/3)

   1. 64 P
   2. 32 P
   3. P / 64
   4. 16 P

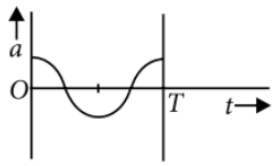
5. The oscillation of a body on a smooth horizontal surface is represented by the equation,

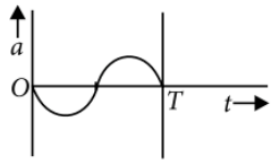
   $X = A\cos(\omega t)$

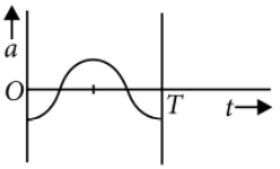
   where x = displacement at time t

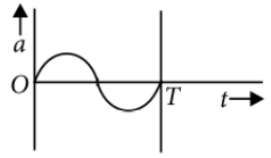
   ω=frequency of oscillation

   Which one of the following graphs shows correctly the variation a with t?

   1. 

   2. 

   3. 

   4. 

6. A conducting sphere of radius R is given a charge Q. The electric potential and the electric field at the centre of the sphere respectively are

   1. zero and $\frac{Q}{4\pi\varepsilon_0 R^2}$
   2. $\frac{Q}{4\pi\varepsilon_0 R}$ and zero
   3. $\frac{Q}{4\pi\varepsilon_0 R}$ and $\frac{Q}{4\pi\varepsilon_0 R^2}$
   4. Both are zero

7. Two cities are 150 km apart. Electric power is sent from one city to another city through copper wires. The fall of potential per km is 8 volt and the average resistance per km is 0.5 Ω. The power loss in the wire is

   1. 19.2 W
   2. 19.2 kW
   3. 19.2 J
   4. 12.2 kW

8. A potentiometer circuit has been set up for finding the internal resistance of a given cell. The main battery, used across the potentiometer wire, has an emf of 2.0 V and a negligible internal resistance. The

potentiometer wire itself is 4 m long. When the resistance R, connected across the given cell, has values of
(i) infinity (ii) 9.5 Ω the balancing lengths on the potentiometer wire are found to be 3 m and 2.85 m, respectively. The value of internal resistance of the cell is

1. 0.25 Ω
2. 0.95 Ω
3. 0.5 Ω
4. 0.75 Ω

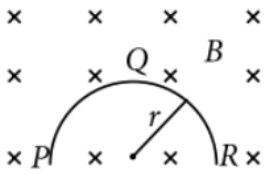
9. Two identical long conducting wires AOB and COD are placed at right angle to each other, with one above other such that 0 is their common point for the two. The wires carry I_1 and I_2 currents, respectively. Point P is lying at distance d from 0 along a direction perpendicular to the plane containing the wires. The magnetic field at the point P will be

1. $\frac{\mu_0}{2\pi d}\left(\frac{I_1}{I_2}\right)$
2. $\frac{\mu_0}{2\pi d}(I_1+I_2)$
3. $\frac{\mu_0}{2\pi d}\left(I_1^2-I_2^2\right)$
4. $\frac{\mu_0}{2\pi d}\left(I_1^2+I_2^2\right)^{1/2}$

10. In an ammeter 0.2% of main current passes through the galvanometer. If resistance of galvanometer is G, the resistance of ammeter will be

1. $\frac{1}{499}G$
2. $\frac{499}{500}G$
3. $\frac{1}{500}G$
4. $\frac{500}{499}G$

11. A thin semicircular conducting ring (PQR) of radius r is falling with its plane vertical in a horizontal magnetic field B, as shown in the figure.



The potential difference developed across the ring when its speed ν, is

1. zero
2. $\frac{Bv\pi r^2}{2}$ and P is at higher potential
3. $\pi rB\nu$ and R is a higher potential
4. 2rBv and R is at higher potential

12. A transformer having efficiency of 90% is working on 200 V and 3 kW power supply. If the current in the secondary coil is 6 A, the voltage across the secondary coil and the current in the primary coil respectively are

1. 300 V, 15 A
2. 450 V, 15 A
3. 450 V, 13.5 A
4. 600 V, 15 A

13. In the Young's double slit experiment, the intensity of light at a point on the screen (where the path difference is λ) is K, (λ - the wavelength of light used). The intensity at a point where the path difference is λ/4 will be

1. K
2. K/4
3. K/2
4. zero

14. Hydrogen atom in ground state is excited by a monochromatic radiation of λ= 975 $\mathring{A}$. Number of spectral lines in the resulting spectrum emitted will be

1. 3
2. 2
3. 6
4. 10

15. The binding energy per nucleon of $^7_3Li$and ^4_2He Nuclei are 5.60 MeV and 7.06 MeV respectively. In the nuclear reaction

$^7_3\mathrm{Li}+{}^1_1\mathrm{H}\rightarrow{}^4_2\mathrm{He}+{}^4_2\mathrm{He}+Q$

the value of energy Q released is

1. 19.6 MeV
2. -2.4 MeV

3. 8.4 MeV

4. 17.3 MeV

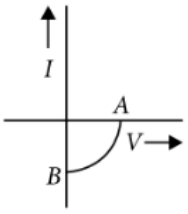
16. The barrier potential of a p-n junction depends on

1. type of semiconductor material
2. amount of doping
3. temperature

Which one of the following is correct?

1. (1) and (2) only
2. (2) only
3. (2) and (3) only
4. (1), (2) and (3)

17. The given graph presents V-I characteristic for a semiconductor device.



Which of the following statement is correct?

1. It is V-I characteristic for solar cell where, point A represents open circuit voltage and point B short circuit current.
2. It is for a solar cell and points A and B represent open circuit voltage and current, respectively.
3. It is for a photodiode and points A and B represent open circuit voltage and current, respectively.
4. It is for a LED and points A and B represent open circuit voltage and short circuit current, respectively.

18. Copper of fixed volume V is drawn into wire of length *l*. When this wire is subjected to a constant force F, the extension produced in the wire is Δl. Which of the following graphs is a straight line?

1. Δl versus $1/l$
2. Δl versus l^2
3. Δl versus $1/l^2$
4. Δl versus l

19. Light with an energy flux of $25 \text{x} 10^4 \text{W m}^{-2}$ falls on a perfectly reflecting surface at normal incidence. If the surface area is $15\,\text{cm}^2$, the average force exerted on the surface is

1. 1.25×10^{-6} N
2. 2.50×10^{-6} N
3. 1.20×10^{-6} N
4. 3.0×10^{-6} N

20. A particle is moving such that its position coordinates (x,y) are (2m, 3m) at time t = 0, (6 m, 7 m) at time t = 2s and (13 m, 14m) at time t = 5s. Average velocity vector $\left(\vec{v}_{\text{av}}\right)$ from t = 0 to t = 5 s is

1. $\frac{1}{5}\left(13\hat{i}+14\hat{j}\right)$
2. $\frac{7}{3}\left(\hat{i}+\hat{j}\right)$
3. $2\left(\hat{i}+\hat{j}\right)$
4. $\frac{11}{5}\left(\hat{i}+\hat{j}\right)$

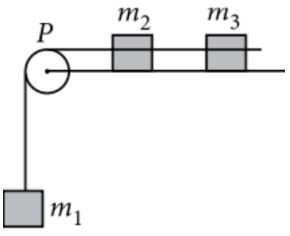
21. A projectile is fired from the surface of the earth with a velocity of 5 $ms^{-1}$and angle θ with the horizontal. Another projectile fired from another planet with a velocity of 3 ms^{-1} at the same angle follows a trajectory which is identical with the trajectory of the projectile fired from the earth. The value of the acceleration due to gravity on the planet is $\left(ms^{-2}\right)$ is (Given g =9.8 ms^{-2})

1. 3.5
2. 5.9
3. 16.3
4. 110.8

22. A system consists of three masses $m_1,\ m_2\ and\ m_3$ connected by a string passing over a pulley P. The mass m_1 hangs freely and m_2 and m_3 are on a rough horizontal table (the coefficient of friction= μ)

The pulley is frictionless and of negligible mass. The downward acceleration of mass m_1 is

$(\text{Assume } m_1 = m_2 = m_3 = m)$

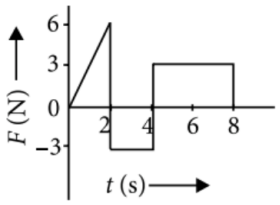


1. $\frac{g(1-g\mu)}{9}$
2. $\frac{2g\mu}{3}$

3. $\frac{g(1-2\mu)}{3}$

4. $\frac{g(1-2\mu)}{2}$

23. The force F acting on a particle of mass m is indicated by the force-time graph shown below. The change in momentum of the particle over the time interval from zero to 8s is



1. 24 N s

2. 20 N s

3. 12 N s

4. 6 N s

24. A balloon with mass m is descending down with an acceleration a (where a < g). How much mass should be removed from it so that it starts moving up with an acceleration a ?

1. $\frac{2ma}{g+a}$

2. $\frac{2ma}{g-a}$

3. $\frac{ma}{g+a}$

4. $\frac{ma}{g-a}$

25. A solid cylinder of mass 50 kg and radius 0.5 m is free to rotate about the horizontal axis. A massless string is wound round the cylinder with one end attached to it and other hanging freely. Tension in the string required to produce an angular acceleration of 2 revolutions $s^{-2}$is

1. 25 N

2. 50 N

3. 78.5 N

4. 157 N

26. The ratio of the accelerations for a solid sphere (mass m and radius R) rolling down an incline of angle θ without slipping and slipping down the incline without rolling is

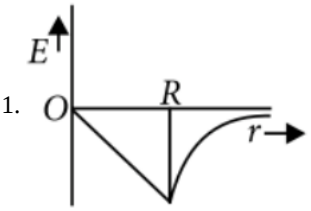
1. 5 : 7

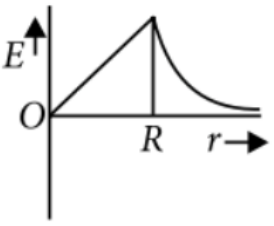
2. 2 : 3

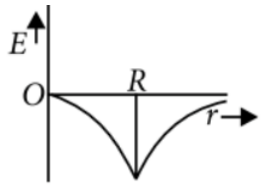
3. 2 : 5

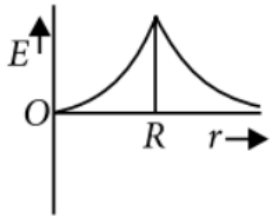
4. 7 : 5

27. Dependence of intensity of gravitational field (E) of earth with distance (r) from centre of earth is correctly represented by

1. 

2. 

3. 

4. 

28. A black hole is an object whose gravitational field is so strong that even light cannot escape from it. To what approximate radius would earth (mass = 5.98 x 10^{24} kg) have to be compressed to be a black hole?

1. $10^{-9}m$

2. $10^{-6}m$

3. $10^{-2}m$

4. 100 m

29. A certain number of spherical drops of a liquid of radius r coalesce to form a single drop of radius R and volume V. If T is the surface tension of the liquid, then

1. energy $= 4VT\left(\frac{1}{r} - \frac{1}{R}\right)$ is released.
2. energy $= 3VT\left(\frac{1}{r} + \frac{1}{R}\right)$ is absorbed.
3. energy $= 3VT\left(\frac{1}{r} - \frac{1}{R}\right)$ is released.
4. energy is neither released nor absorbed

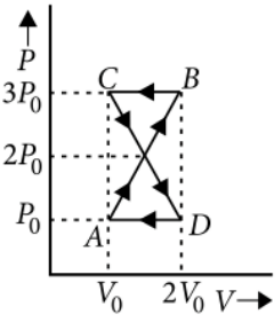
30. Steam at 100°C is passed into 20 g of water at 10°C. When water acquires a temperature of 80°C, the mass of water present will be [Take specific heat of water = 1 cal $g^{-1o}C$ and latent heat of steam = 540 cal g^{-1}]

1. 24 g
2. 31.5 g
3. 42.5 g
4. 22.5 g

31. The mean free path of molecules of a gas, (radius r) is inversely proportional to

1. r^3
2. r^2
3. r
4. $\sqrt{r}$

32. A thermodynamic system undergoes cyclic process ABCDA as shown in figure. The work done by the system in the cycle is



1. P_0V_0
2. $2P_0V_0$
3. $\frac{P_0V_0}{2}$
4. Zero

33. The number of possible natural oscillations of air column in a pipe closed at one end of length 85 cm whose frequencies lie below 1250 Hz are (Velocity of sound = 340 m s^{-1})

1. 4
2. 5
3. 7
4. 6

34. If $n_1,\ n_2\ and\ n_3$ are the fundamental frequencies of three segments into which a string is divided, then the original fundamental frequency n of the string is given by

1. $\frac{1}{n} = \frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3}$
2. $\frac{1}{\sqrt{n}} = \frac{1}{\sqrt{n_1}} + \frac{1}{\sqrt{n_2}} + \frac{1}{\sqrt{n_3}}$
3. $\sqrt{n} = \sqrt{n_1} + \sqrt{n_2} + \sqrt{n_3}$
4. $n = n_1 + n_2 + n_3$

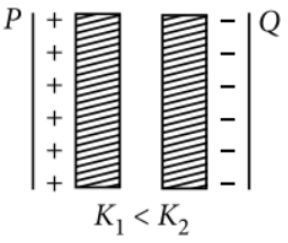
35. A speeding motorcyclist sees traffic jam ahead him. He slows down to 36 km hour^{-1}. He finds that traffic has eased and a car moving ahead of him at 18 km hour^{-1} is honking at a frequency of 1392 Hz. If the speed of sound is 343 ms^{-1}, the frequency of the honk as heard by him will be

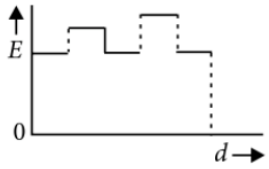
1. 1332 Hz
2. 1372 Hz
3. 1412 Hz
4. 1454 Hz

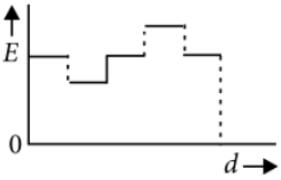
36. In a region, the potential is represented by V(x, y, z) = 6x - 8xy - 8y + 6yz, where V is in volts and x, y, z are in metres. The electric force experienced by a charge of 2 coulomb situated at point (1, 1, 1) is

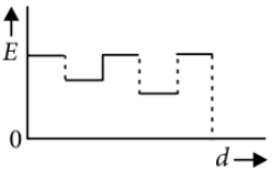
1. $6\sqrt{5}$ N
2. 30 N
3. 24 N
4. $4\sqrt{35}$ N

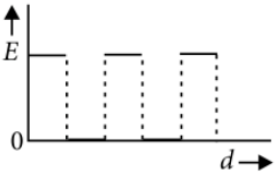
37. Two thin dielectric slabs of dielectric constants $K_1\ and\ K_2\ (K_2\ <\ K_2)$ are inserted between plates of a parallel plate capacitor, as shown in the figure. The variation of electric field E between the plates with distance d as measured from plate P is correctly shown by



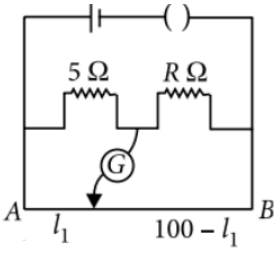
1. 

2. 

3. 

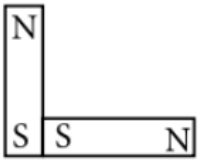
4. 

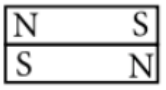
38. The resistances in the two arms of the meter bridge are 5 Ω and R Ω respectively. When the resistance R is shunted with an equal resistance, the new balance point is at 1.6 $_1$.The resistance R is

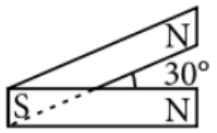


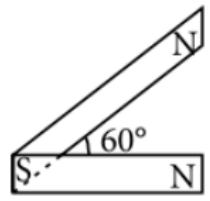
1. 10 Ω
2. 15 Ω
3. 20 Ω
4. 25 Ω

39. Following figures show the arrangement of bar magnets in different configurations. Each magnet has magnetic dipole moment $\vec{m}$. Which configuration has highest net magnetic dipole moment?

1. 

2. 

3. 

4. 

40. The angle of a prism is A. One of its refracting surfaces is silvered. Light rays falling at an angle of incidence 2A on the first surface returns back through the same path after suffering reflection at the silvered surface. The refractive index μ, of the prism is

1. 2sinA
2. 2cosA
3. $\frac{1}{2}\cos A$
4. tanA

41. If the focal length of objective lens is increased then magnifying power of

1. microscope will increase but that of telescope decrease.
2. microscope and telescope both will increase.
3. microscope and telescope both will decrease.
4. microscope will decrease but that of telescope will increase.

42. A beam of light of $\lambda = 600\,\text{nm}$ from a distant source falls on a single slit 1 mm wide and the resulting diffraction pattern is observed on a screen 2 m away.

The distance between first dark fringes on either side of the central bright fringe is

1. 1.2 cm
2. 1.2 mm
3. 2.4 cm
4. 2.4 mm

43. When the energy of the incident radiation is increased by 20%, the kinetic energy of the photoelectrons emitted from a metal surface increased from 0.5 eV to 0.8 eV. The work function of the metal is

1. 0.65 eV
2. 1.0 eV
3. 1.3 eV
4. 1.5 eV

44. If the kinetic energy of the particle is increased to16 times its previous value, the percentage change in the de Broglie wavelength of the particle is

1. 25
2. 75
3. 60
4. 50

45. A radioisotope X with a half life 1.4×10^9 years decays to Y which is stable. A sample of the rock from a cave was found to contain X and Y in the ratio 1: 7 . The age of the rock is

1. 1.96×10^9 years
2. 3.92×10^9 years
3. 4.2×10^9 years.
4. 8.40×10^9 years

Chemistry

Section A

46. Which of the following molecules has the maximum dipole moment?

1. CO_2
2. CH_4
3. NH_3
4. NF_3

47. Which of the following organic compounds has same hybridization as its combustion product (CO_2) ?

1. Ethane
2. Ethyne
3. Ethene
4. Ethanol

48. For the reversible reaction

$$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2\,NH_{3(g)} + \text{ heat}$$

The equilibrium shifts in forward direction

1. By increasing the concentration of $NH_{3(g)}$
2. by decreasing the pressure
3. By decreasing the concentrations of $N_{2(g)}$ and $H_{2(g)}$
4. by increasing pressure and decreasing temperature.

49. The reaction of aqueous $KMnO_4$ with H_2O_2 in acidic conditions gives

1. Mn^{4+} and O_2
2. Mn^{2+} and O_2
3. Mn^{2+} and O_3
4. Mn^{4+} and MnO_2

50. (I) $H_2O_2 + O_3 \longrightarrow H_2O + 2O_2$

(II) $H_2O_2 + Ag_2O \longrightarrow 2Ag + H_2O + O_2$

Role of hydrogen peroxide in the above reactions is respectively

1. Oxidizing in (I) and reducing in (II)
2. reducing in (I) and Oxidizing in (II)
3. reducing in (I) and (II)
4. Oxidizing in (I) and (II)

51. Acidity of diprotic acids in aqueous solutions increases in the order

1. $H_2S < H_2Se < H_2Te$
2. $H_2Se < H_2S < H_2Te$
3. $H_2Te < H_2S < H_2Se$
4. $H_2Se < H_2Te < H_2S$

52. Identify Z in the sequence of reactions:

$$CH_3CH_2CH = CH_2 \xrightarrow{HBr/H_2O_2} Y \xrightarrow{C_2H_5ONa} Z$$

1. $CH_3 - (CH_2)_3 - O - CH_2CH_3$

2. $(CH_3)_2CH-O-CH_2CH_3$
3. $CH_3(CH_2)_4-O-CH_3$
4. $CH_3CH_2-CH(CH_3)-O-CH_2CH_3$

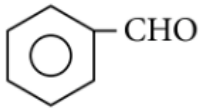
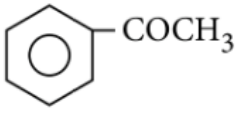
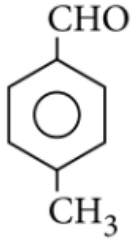
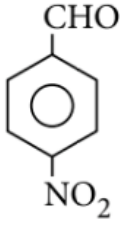
53. The weight of silver (at. wt. = 108) displaced by a quantity of electricity which displaces 5600 mL of O_2 at STP will be

1. 5.4 g
2. 10.8 g
3. 54.0 g
4. 108.0 g

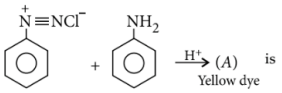
54. Which of the following statements is correct for the spontaneous adsorption of a gas?

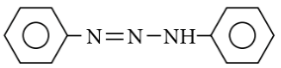
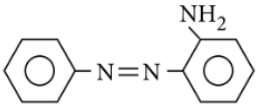
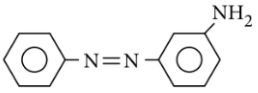
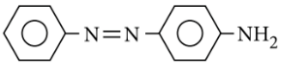
1. ΔS is negative and, therefore ΔH should be highly positive.
2. ΔS is negative and therefore, ΔH should be highly negative.
3. ΔS is positive and therefore, ΔH should be negative.
4. ΔS is positive and therefore, ΔH should also be highly positive.

55. Which one is most reactive towards nucleophilic addition reaction?

1. 
2. 
3. 
4. 

56. In the following reaction, the product (A)



1. 
2. 
3. 
4. 

57. For the reaction, $X_2O_{4(l)} \longrightarrow 2XO_{2(g)}$

$\Delta U = 2.1$ kcal, $\Delta S = 20$ cal K^{-1} at 300 K

Hence, ΔG is

1. 2.7 kcal
2. -2.7 kcal
3. 9.3 kcal
4. -9.3 kcal

58. For a given exothermic reaction, K_p and K_p' are the equilibrium constants at temperatures T_1 and T_2, respectively. Assuming that heat of reaction is constant in temperature range between T_1 *and* T_2, correct relation is $(T_1 < T_2)$

1. $K_p > K_p'$
2. $K_p < K_p'$
3. $K_p = K_p'$
4. $K_p = \frac{1}{K_p'}$

59. In acidic medium, H_2O_2 changes $Cr_2O_7^{2-}$ to CrO_5 which has two $(-O-O-)$ bonds. Oxidation state of

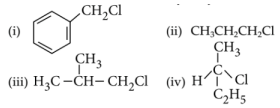
Cr in CrO_5 is:

1. +5
2. +3
3. +6
4. -10

60. When 0.1 mol MnO_4^{2-} is oxidized, the quantity of electricity required to completely oxidize MnO_4^{2-} to MnO_4^- is

1. 96500 C
2. 2 × 96500 C
3. 9650 C
4. 96.50 C

61. Which of the following compounds will not undergo racemisation when solution of KOH hydrolyses?



1. (i) and (ii)
2. (iv)
3. (iii) and (iv)
4. (i) and (iv)

62. Using the Gibb's energy change, $\Delta G^\circ = +63.3$ kJ, for the following reaction,

$Ag_2CO_{3(s)} \rightleftharpoons 2Ag^+_{(aq)} + CO^{2-}_{3(aq)}$

the K_{sp} of $Ag_2CO_{3(s)}$ in water at 25°C is

$(R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1})$

1. 3.2×10^{-26}
2. 8.0×10^{-12}
3. 2.9×10^{-3}
4. 7.9×10^{-2}

63. Which of the following orders of ionic radii is correctly represented?

1. $H^- > H^+ > H$
2. $Na^+ > F^- > O^{2-}$
3. $F^- > O^{2-} > Na^+$
4. $Al^{3+} > Mg^{2+} > N^{3-}$

64. Which one of the following species has plane triangular shape?

1. N_3
2. NO_3^-
3. NO_2^-
4. CO_2

65. The pair of compounds that can exist together is

1. $FeCl_3, SnCl_2$
2. $HgCl_2, SnCl_2$
3. $FeCl_2, SnCl_2$
4. $FeCl_3, KI$

66. Which one of the following is not a common component of Photochemical smog?

1. Ozone
2. Acrolein
3. Peroxyacetyl nitrate
4. Chlorofluorocarbons

67. Of the following 0.10 m aqueous solutions, which one will exhibit the largest freezing point depression?

1. KCl
2. $C_6H_{12}O_6$
3. $Al_2(SO_4)_3$
4. K_2SO_4

68. Which property of colloids is not dependent on the charge on colloidal particles?

1. Coagulation
2. Electrophoresis
3. Electro-osmosis
4. Tyndall effect

69. Magnetic moment 2.83 BM is given by which of the following ions?

(At.nos. Ti = 22, Cr = 24, Mn = 25, Ni = 28)

1. Ti^{3+}
2. Ni^{2+}
3. Cr^{3+}
4. Mn^{2+}

70. Reason of lanthanide contraction is

1. negligible screening effect of 'f' - orbitals
2. increasing nuclear charge
3. decreasing nuclear charge

4. decreasing screening effect

71. Among the following complexes the one which shows zero crystal field stabilization energy (CFSE) is

1. $[\mathrm{Mn}\,(\mathrm{H_2O})_6]^{3+}$
2. $[\mathrm{Fe}\,(\mathrm{H_2O})_6]^{3+}$
3. $[\mathrm{Co}\,(\mathrm{H_2O})_6]^{2+}$
4. $[\mathrm{Co}\,(\mathrm{H_2O})_6]^{3+}$

72. Which of the following complexes is used to be as an anticancer agent?

1. mer $-[\mathrm{Co}\,(\mathrm{NH_3})_3\,\mathrm{Cl_3}]$
2. cis-$[\mathrm{PtCl_2}\,(\mathrm{NH_3})_2]$
3. cis $-\,\mathrm{K_2}[\mathrm{PtCl_2}\,\mathrm{Br_2}]$
4. $\mathrm{Na_2\,CoCl_4}$

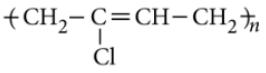
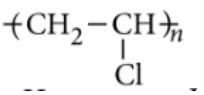
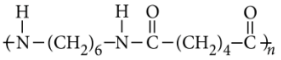
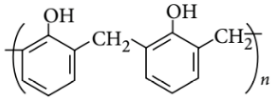
73. Among the following sets of reactants which one produces anisole?

1. $\mathrm{CH_3\,CHO;\,RMgX}$
2. $\mathrm{C_6H_5\,OH;\,NaOH;\,CH_3\,I}$
3. $\mathrm{C_6H_5\,OH}$; neutral $\mathrm{FeCl_3}$
4. $\mathrm{C_6H_5\,CH_3;\,CH_3\,COCl;\,AlCl_3}$

74. Which of the following will be most stable diazonium salt $R\,\mathrm{N_2^+}X^-$?

1. $\mathrm{CH_3\ N_2^+}X^-$
2. $\mathrm{C_6H_5\ N_2^+}X^-$
3. $\mathrm{CH_3\,CH_2\ N_2^+X^-}$
4. $\mathrm{C_6H_5\,CH_2\ N_2^+X^-}$

75. Which one of the following is an example of thermosetting polymer?

1. 
2. 
3. 
4. 

76. Which of the following organic compounds polymerizes to form the polyester Dacron?

1. Propylene and para $\mathrm{HO-(C_6H_4)-OH}$
2. Benzoic acid and ethanol
3. Terephthalic acid and ethylene glycol
4. Benzoic acid and para $\mathrm{HO-(C_6H_4)-OH}$

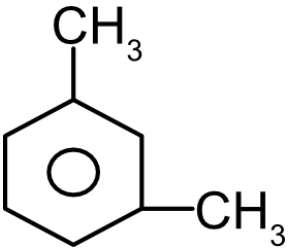
77. Which of the following salts will give highest pH in water?

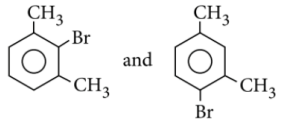
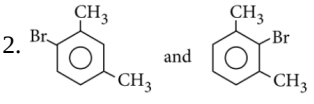
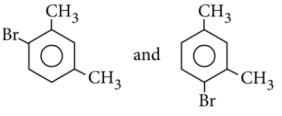
1. KCl
2. NaCl
3. Na_2CO_3
4. $CuSO_4$

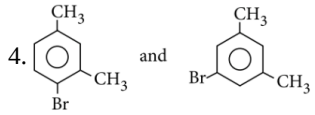
78. In the Kjeldahl's method for estimation of nitrogen present in a soil sample, ammonia evolved from 0.75 g of sample neutralized 10 mL of 1 M $\mathrm{H_2\,SO_4}$. The percentage of nitrogen in the soil is

1. 37.33
2. 45.33
3. 35.33
4. 43.33

79. What products are formed when the following compound is treated with Br_2 in the presence of $FeBr_3$?



1. 
2. 
3. 

4.  and

80. Which of the following will not be soluble in sodium hydrogen carbonate?

1. 2,4,6 - Trinitrophenol
2. Benzoic acid
3. O - Nitrophenol
4. Benzenesulphonic acid

81. Equal masses of H_2, O_2 and methane have been taken in a container of volume V at temperature 27°C in identical conditions. The ratio of the volumes of gases H_2:O_2: methane would be

1. 8 : 16 : 1
2. 16 : 8 : 1
3. 16 : 1 : 2
4. 8 : 1 : 2

82. 1.0 g of magnesium is burnt with 0.56 g O_2 in a closed vessel. Which reactant is left in excess and how much?

(At. wt. Mg = 24,O = 16)

1. Mg, 0.16 g
2. O_2, 0.16 g
3. Mg, 0.44 g
4. O_2, 0.28 g

83. When 22.4 litres of $H_2(g)$ is mixed with 11.2 litres of $Cl_2(g)$, each at S.T.P, the moles of HCl(g) formed is equal to

1. $1\ \text{mol of}\ HCl_{(g)}$
2. $2\ \text{mol of}\ HCl_{(g)}$
3. $0.5\ \text{mol of}\ HCl_{(g)}$
4. 1.5 mol of $HCl_{(g)}$

84. Calculate the energy in joule corresponding to light of wavelength 45 nm. (Planck's constant, h = 6.63 × 10^{-34} Js , speed of light, c = 3 ×10^8 ms^{-1})

1. 6.67×10^{15}
2. 6.67×10^{11}
3. 4.42×10^{-15}
4. 4.42×10^{-18}

85. Which of the following hormones is produced under the conditions of stress which stimulate glycogenolysis in the liver of human beings?

1. Thyroxin
2. Insulin
3. Adrenaline
4. Estradiol

86. Be^{2+} is isoelectronic with which of the following ions?

1. H^+
2. Li^+
3. Na^+
4. Mg^{2+}

87. What is the maximum number of orbitals that can be identified with the following quantum numbers?

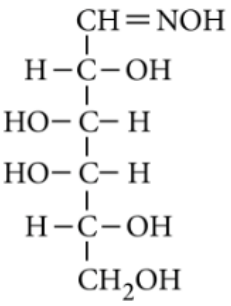
n = 3, $l = 1$, $m_l = 0$

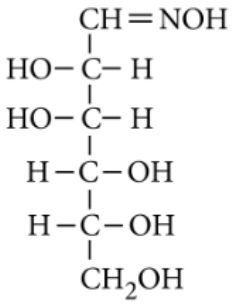
1. 1
2. 2
3. 3
4. 4

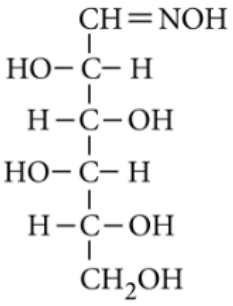
88. If a is the length of the side of a cube, the distance between the body centered atom and one corner atom in the cube will be

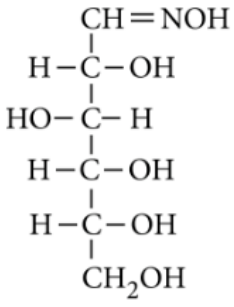
1. $\frac{2}{\sqrt{3}}a$
2. $\frac{4}{\sqrt{3}}a$
3. $\frac{\sqrt{3}}{4}a$
4. $\frac{\sqrt{3}}{2}a$

89. D(+) -glucose reacts with hydroxyl amine and yields an oxime. The structure of the oxime would be

1. 

2. 

3. 

4. 

90. Artificial sweetner which is stable under cold conditions only is

1. Saccharine
2. Sucralose
3. aspartame
4. alitame

Botany

Section A

91. An analysis of chromosomal DNA using the Southern hybridization technique does not use

1. electrophoresis
2. blotting
3. autoradiography
4. PCR

92. A few normal seedlings of tomato were kept in a dark room. After a few days they were found to have become white-coloured like albinos. Which of the following terms will you use to describe them?

1. Mutated
2. Embolised
3. Etiolated
4. Defoliated

93. *In vitro* clonal propagation in plants is characterised by

1. PCR and RAPD
2. Northern blotting
3. electrophoresis and HPLC
4. microscopy

94. Anoxygenic photosynthesis is characteristic of

1. *Rhodospirillum*
2. *Spirogyra*
3. *Chlamydomonas*
4. *Ulva*

95. Tracheids differ from other tracheary elements in

1. having casparian strips
2. being imperforate
3. lacking nucleus
4. being lignified

96. The osmotic expansion of a cell kept in water is chiefly regulated by

1. mitochondria
2. vacuoles
3. plastids
4. ribosomes

97. Which one of the following is a non - reducing carbohydrate?

1. Maltose
2. Sucrose
3. Lactose
4. Ribose 5 - phosphate

98. Archaebacteria differ from eubacteria in

1. cell membrane structure

2. mode of nutrition

3. cell shape

4. mode of reproduction

99. Which vector can clone only a small fragment of DNA?

1. Bacterial artificial chromosome

2. Yeast artificial chromosome

3. Plasmid

4. Cosmid

100. Dr. F. Went noted that if coleoptile tips were removed and placed on agar for one hour, the agar would produce a bending when placed on one side of freshly-cut coleoptile stumps. Of what significance is this experiment?

1. It made possible the isolation and exact identification of auxin

2. It is the basis for quantitative determination of sm all amounts of growth-promoting substances

3. It supports the hypothesis that IAA is auxin

4. It demonstrated polar movement of auxins

101. An aggregate fruit is one which develops from

1. multicarpellary syncarpous gynoecium

2. multicarpellary apocarpus gynoecium

3. complete inflorescence

4. multicarpellary superior ovary

102. The solid linear cytoskeletal elements having a diameter of 6 nm and made up of a single type of monomer are known as

1. microtubules

2. microfilaments

3. intermediate filaments

4. lamins

103. Select the option which is **not** correct with respect to enzyme action.

1. Substrate binds with enzyme at its active site.

2. Addition of lot of succinate does not reverse the inhibition of succinic dehydrogenase by malonate.

3. A non-competitive inhibitor binds the enzyme at a site distinct from that which binds the substrat e.

4. Malonate is a competitive inhibitor of succinic dehydrogenase.

104. Which one of the following is **wrongly** matched?

1. Transcription - Writing information from DNA to *t*-RNA

2. Translation - Using information in m-RNA to make protein

3. Repressor protein - Binds to operator to stop enzyme synthesis

4. Operon - Structural genes, operator and promoter

105. Male gametophyte with least number of cells is present in

1. *Pteris*

2. *Funaria*

3. *Lilium*

4. *Pinus*

106. Fruit colour in squash is an example of

1. Recessive epistasis

2. Dominant epistasis

3. Complementary genes

4. Inhibitory genes

107. Which one of the following fungi contains hallucinogens?

1. *Morchella esculenta*

2. *Amanita muscaria*

3. *Neurospora* sp.

4. *Ustilago* sp.

108. When the margins of sepals or petals overlap one another without any particular direction, the condition is termed as

1. Vexillary

2. Imbricate

3. Twisted

4. Valvate

109. Which one of the following living organisms completely lacks a cell wall?

1. Cyanobacteria

2. Sea - fan *(Gorgonia)*

3. *Saccharomyces*

4. Blue - green algae

110. Match the following and select the correct answer.

(A)	Centriole	(i)	lnfoldings in mitochondria
(B)	Chlorophyll	(ii)	Thylakoids
(C)	Cristae	(iii)	Nucleic acids
(D)	Ribozymes	(iv)	Basal body of cilia or flagella

	A	B	C	D
1.	iv	ii	i	iii
2.	i	ii	iv	iii
3.	i	iii	ii	iv
4.	iv	iii	i	ii

1. 1

2. 2

3. 3

4. 4

111. In which one of the following processes CO_2 is **not** released?

1. Aerobic respiration in plants

2. Aerobic respiration in animals

3. Alcoholic fermentation

4. Lactate fermentation

112. Five kingdom system of classification suggested by R.H. Whittaker is **not** based on

1. presence or absence of a well-defined nucleus

2. mode of reproduction

3. mode of nutrition

4. complexity of body organisation

113. During which phase(s) of cell cycle, amount of DNA in a cell remains at 4C level if the initial amount is denoted as 2C?

1. G_0 and G_1

2. G_1 and S

3. Only G_2

4. G_2 and M

114. In 'S' phase of the cell cycle

1. amount of DNA doubles in each cell

2. amount of DNA remains same in each cell

3. chromosome number is increased

4. amount of DNA is reduced to half in each cell

115. Transformation was discovered by

1. Meselson and Stahl

2. Hershey and Chase

3. Griffith

4. Watson and Crick

116. Which one of the following shows isogamy with non-flagellated gametes?

1. *Sargassum*

2. *Ectocarpus*

3. *Ulothrix*

4. *Spirogyra*

117. An alga which can be employed as food for human beings is

1. *Ulothrix*

2. *Chlorella*

3. *Spirogyra*

4. *Polysiphonia*

118. An example of edible underground stem is

1. carrot

2. groundnut

3. sweet potato

4. potato

119. Which structure performs the function of mitochondria in bacter

1. Nucleoid

2. Ribosomes

3. Cell wall

4. Mesosomes

120. The motile bacteria are able to move by

1. fimbriae

2. flagella

3. cilia

4. pili

121. Which of the following is responsible for peat formation?

1. *Marchantia*
2. *Riccia*
3. *Funaria*
4. *Sphagnum*

122. You are given a fairly old piece of dicot stem and a dicot root. Which of the following anatomical structures will you use to distinguish between the two?

1. Secondary xylem
2. Secondary phloem
3. Protoxylem
4. Cortical cells

123. Deficiency symptoms of nitrogen and potassium are visible first in

1. senescent leaves
2. young leaves
3. roots
4. buds

124. Select the correct option with respect to transcription.

	Direction of RNA synthesis	Direction of reading of the template DNA strand
1	5' → 3'	3' → 5'
2	3' → 5'	5' → 3'
3	5' → 3'	5' → 3'
4	3' → 5'	3' → 5'

1. 1
2. 2
3. 3
4. 4

125. What gases are produced in anaerobic sludge digesters?

1. Methane and CO_2 only
2. Methane, hydrogen sulphide and CO_2
3. Methane, hydrogen sulphide and O_2
4. Hydrogen sulphide and CO_2 only

126. Which one of the following growth regulators is known as 'stress hormone'?

1. Abscisic acid
2. Ethylene
3. GA_3
4. Indole acetic acid

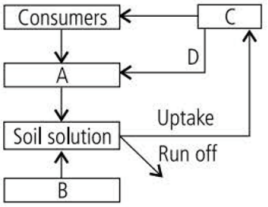
127. Which one of the following is **wrong** about *Chara?*

1. Upper oogonium and lower round antheridium
2. Globule and nucule present on the same plant
3. Upper antheridium and lower oogonium
4. Globule is male reproductive structure

128. Placenta and pericarp are both edible portions in

1. apple
2. banana
3. tomato
4. potato

129. Given below is a simplified model of phosphorus cycling in a terrestrial ecosystem with four blanks (A-D). Identify the blanks.



	A	B	C	D
1.	Rock minerals	Detritus	Litter fall	Producers
2.	Litter fall	Producers	Rock minerals	Detritus
3.	Detritus	Rock minerals	Producers	Litter fall
4.	Producers	Litter fall	Rock minerals	Detritus

1. 1
2. 2
3. 3
4. 4

130. Which of the following shows coiled RNA strand and capsomer

1. Polio virus
2. Tobacco mosaic virus
3. Measles virus
4. Retrovirus

131. To obtain virus- free healthy plants from a diseased one by tissue culture technique, which part/parts of the diseased plant will be taken?

1. Apical meristem only

2. Palisade parenchyma
3. Both apical and axillary meristems
4. Epidermis only

132. Which one of the following statements is correct?
1. The seed in grasses is not endospermic.
2. Mango is a parthenocarpic fruit.
3. A proteinaceous aleurone layer is present in maize grain.
4. A sterile pistil is called as staminode

133. Viruses have
1. DNA enclosed in a protein coat
2. prokaryotic nucleus
3. single chromosome
4. both DNA and RNA

134. A location with luxuriant growth of lichens on the trees indicates that the
1. trees are very healthy
2. trees are heavily infested
3. location is highly polluted
4. location is not polluted

135. The enzyme recombinase is required at which stage of meiosis?
1. Pachytene
2. Zygotene
3. Diplotene
4. Diakinesis

136. Function of filiform apparatus is to
1. recognize the suitable pollen at stigma
2. stimulate division of generative cell
3. produce nectar
4. guide the entry of pollen tube

137. Geitonogamy involves
1. fertilisation of a flower by the pollen from another flower of the same plant
2. fertilisation of a flower by the pollen from the same flower
3. fertilisation of a flower by the pollen from a flower of another plant in the same population
4. fertilisation of a flower by the pollen from a flower of another plant belonging to a distant population

138. Pollen tablets are available in the market for
1. *in vitro* fertilization
2. breeding programmes
3. supplementing food
4. *ex situ* conservation

139. Non-albuminous seed is produced in
1. maize
2. castor
3. wheat
4. pea

Zoology

Section A

140. A scrubber in the exhaust of a chemical industrial plant removes
1. gases like sulphur dioxide
2. particulate matter of the size 5 micrometer or above
3. gases like ozone and methane
4. particulate matterof the size 2.5 micrometer or less.

141. Person with blood group AB is considered as universal recipient because he has
1. both A and B antigens on RBC but no antibodies in the plasma
2. both A and B antibodies in the plasma
3. no antigen on RBC and no antibody in the plasma
4. both A and B antigens in the plasma but no antibodies

142. Which of the following causes an increase in sodium reabsorption in the distal convoluted tubul
1. Increase in aldosterone levels.
2. Increase in antidiuretic hormone levels.
3. Decrease in aldosterone levels.

4. Decrease in antidiuretic hormone levels.

143. Forelimbs of cat, lizard used in walking; forelimbs of whale used in swimming and forelimbs of bats used in flying are an example of

1. analogous organs
2. adaptive radiation
3. homologous organs
4. convergent evolution

144. Choose the correctly matched pair.

1. Tendon - Specialised connective tissue
2. Adipose tissue - Dense connective tissue
3. Areolar tissue - Loose connective tissue
4. Cartilage - Loose connective tissue

145. Choose the correctly matched pair.

1. Inner lining of salivary ducts - Ciliated epithelium
2. Moist surface of buccal cavity - Glandular epitheli um
3. Tubular parts of nephrons - Cuboidal epithelium
4. Inner surface of bronchioles - Squamous epitheliu m

146. Tubectomy is a method of sterilisation in which

1. small part of the fallopian tube is removed or tied up
2. ovaries are removed surgically
3. small part of vas deferens is removed or tied up
4. uterus is removed surgically

147. Which of the following is a hormone releasing Intra Uterine Device (IUD)?

1. Multiload 375
2. Cervical cap
3. LNG - 20
4. Vault

148. A man whose father was colour blind marries a woman who had a colour blind mother and normal father. What percentage of male children of this couple will be colour blind?

1. 25%
2. 0%
3. 50%
4. 75%

149. 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

1. 0.02 J
2. 0.002 J
3. 0.2 J
4. 0.0002 J

150. Which of the following is a marine cartilaginous fish that can produce electric current?

1. *Pristis*
2. *Torpedo*
3. *Trygon*
4. *Scoliodon*

151. The zone of atmosphere in which the ozone layer is present is called

1. ionosphere
2. mesosphere
3. stratosphere
4. troposphere

152. Which one of the following statements is **not** correct?

1. Retinal is the light absorbing portion of visual photo pigments.
2. In retina the rods have the photopigment rhodopsi n while cones have three different photopigments.
3. Retinal is a derivative of vitamin C.
4. Rhodopsin is the purplish red protein present in ro ds only.

153. Which is the particular type of drug that is obtained from the plant whose one flowering branch is shown here?

1. Hallucinogen
2. Depressant
3. Stimulant
4. Pain - killer

154. Match the following and select the correct option.

(A) Earthworm	(i) Pioneer species
(B) Succession	(ii) Detritivore
(C) Ecosystem service	(iii) Natality
(D) Population growth	(iv) Pollination

	A	B	C	D
1	i	ii	iii	iv
2	iv	i	iii	ii
3	iii	ii	iv	i
4	ii	i	iv	iii

1. 1
2. 2
3. 3
4. 4

155. The shared terminal duct of the reproductive and urinary system in the human male is

1. urethra
2. ureter
3. vas deferens
4. vasa efferentia

156. Stimulation of a muscle fiber by a motor neuron occurs at

1. the neuromuscular junction
2. the transverse tubules
3. the myofibril
4. the sacroplasmic reticulum

157. Identify the hormone with its correct matching of source and function.

1. Oxytocin - posterior pituitary, growth and maintenance of mammary glands
2. Melatonin - pineal gland, regulates the normal rhythm of sleep-wake cycle
3. Progesterone - corpus luteum, stimulation of growth and activities of female secondary sex organs.
4. Atrial natriuretic factor - ventricular wall, increase s the blood pressure.

158. Just as a person moving from Delhi to Shimla to escape the heat for the duration of hot summer, thousands of migratory birds from Siberia and other extremely cold northern regions move to

1. Western Ghat
2. Meghalaya
3. Corbett National Park
4. Keolado National Park

159. Injury localised to the hypothalamus would most likely disrupt

1. short - term memory
2. co-ordination during locomotion
3. executive functions, such as decision making
4. regulation of body temperature

160. A species facing extremely high risk of extinction in the immediate future is called

1. vulnerable
2. endemic
3. critically endangered
4. extinct

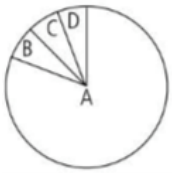
161. The organization which publishes the Red list of species is

1. ICFRE
2. IUCN
3. UNEP
4. WWF

162. Which one of the following are analogous structures?

1. Wings of bat and wings of pigeon
2. Gills of prawn and lungs of man
3. Thorns of *Bougainvillea* and tendrils of *Cucurbita*
4. Flippers of dolphin and legs of horse

163. Given here is a pie chart representation of the extent of global diversity of invertebrates. What groups the four portions (A-D)represent respectively?



	A	B	C	D
1	Insects	Crustaceans	Other animal groups	Molluscs
2	Crustaceans	Insects	Molluscs	Other animal groups
3	Molluscs	Other animal groups	Crustaceans	Insects
4	Insects	Molluscs	Crustaceans	Other animal groups

1. 1
2. 2
3. 3
4. 4

164. Approximately seventy percent of carbon dioxide absorbed by the blood will be transported to the lungs

1. as bicarbonate ions
2. in the form of dissolved gas molecules
3. by binding to RBC
4. as carbamino-haemoglobin

165. Fight-or-flight reactions cause activation of

1. the parathyroid glands, leading to increased metabolic rate
2. the kidney, leading to suppression of renin-angiotensin aldosterone pathway
3. the adrenal medulla, leading to increased secretion of epinephrine and n orepinephrine
4. the pancreas leading to a reduction in the blood sugar levels

166. The initial step in the digestion of milk in humans is carried out by

1. lipase
2. trypsin
3. rennin
4. pepsin

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

	Type of joint	Example
1.	Cartilaginous joint	Between frontal and parietal
2.	Pivot joint	Between third and fourth cervical vertebrae
3.	Hinge joint	Between humerus and pectoral girdle
4.	Gliding joint	Between carpals

1. 1
2. 2
3. 3
4. 4

168. Select the taxon mentioned that represents both marine and fresh water species.

1. Echinoderms
2. Ctenophora
3. Cephalochordata
4. Cnidaria

169. *Planaria* possesses high capacity of

1. metamorphosis
2. regeneration
3. metagenesis
4. bioluminescence

170. The main function of mammalian corpus luteum is to produce

1. oestrogen only
2. progesterone
3. human chorionic gonadotropin
4. relaxin only

171. In a population of 1000 individuals 360 belong to genotype AA, 480 to Aa and the remaining 160 to aa. Based on this data, the frequency of allele A in the population is

1. 0.4
2. 0.5
3. 0.6

4. 0.7

172. Fructose is absorbed into the blood through mucosa cells of intestine by the process called

1. active transport
2. facilitated transport
3. simple diffusion
4. co-transport mechanism

173. Select the correct option describing gonadotropin activity in a normal pregnant female.

1. High level of FSH and LH stimulates the thickeni ng of endometrium.
2. High level of FSH and LH facilitates implantation of the embryo.
3. High level of hCG stimulates the synthesis of estrogen and progesterone.
4. High level of hCG stimulates the thickening of en dometrium.

174. At which stage of HIV infection does one usually show symptoms of AIDS?

1. Within 15 days of sexual contact with an infected person
2. When the infected retrovirus enters host cells
3. When HIV damages large number of helper T - Lymphocytes
4. When the viral DNA is produced by reverse transcriptase

175. Commonly used vectors for human genome sequencing are

1. T - DNA
2. BAC and YAC
3. expression vectors
4. T/A cloning vectors

176. An example of *ex situ* conservation is

1. national park
2. seed bank
3. wildlife sanctuary
4. sacred grove

177. The first human hormone produced by recombinant DNA technology is

1. insulin
2. oestrogen
3. thyroxin
4. progesterone

178. Assisted reproductive technology, IVF involves transfer of

1. ovum into the fallopian tube
2. zygote into the fallopian tube
3. zygote into the uterus
4. embryo with 16 blastomeres into the fallopian tube

179. How do parasympathetic neural signals affect the working of the heart?

1. They Reduce both heart rate and cardiac output.
2. Heart rate is increased without affecting the cardia c output.
3. Both heart rate and cardiac output increase.
4. Heart rate decreases but cardiac output increases.

180. A human female with Turner's syndrome

1. has 45 chromosomes with XO
2. has one additional X chromosome
3. exhibits male characters
4. is able to produce children with normal husband