

HFT/4/Droppers/22

Test Code

720

Max. Marks

3 hrs.

Time Allowed

Important Instructions:

1. This booklet carries 180 multiple choice questions; 45 in Physics, 45 in Chemistry and 90 in Biology.
2. The test is of 3 hours duration. Each question carries 4 marks. For each correct response, the candidate will get 4 marks. For each incorrect response, one mark will be deducted from the total scores.
3. Each question is followed by four alternatives as suggested answers. Mark the most appropriate alternative as your answer in the space provided in the OMR sheet.
4. Only one alternative is to be selected. Any cutting, overwriting, multiple responses will be treated as an incorrect response and will be awarded one negative mark.
5. Read the instructions on the OMR sheet carefully before filling up the responses.
6. Any indiscipline / use of unfair means in the Examination Hall will lead to disqualification of the candidate.
7. Use of white fluid for correction and use of electronic/manual calculator is prohibited.
8. The candidates are allowed to take away this test-booklet with them but must submit the OMR sheet before leaving the Examination Hall.
9. Use Blue/Black Ball Point Pen only for writing particulars on this page/marketing responses.

Test Syllabus

Physics :	Motion in a Straight Line, Projectile Motion, Laws of Motion, Work Energy and Power, Rotational Motion, Gravitation
Chemistry :	Some Basic Concepts of Chemistry, Structure of Atom, Classification of Elements and Periodicity of Properties, Chemical Bonding and Molecular Structure, States of Matter, Thermodynamics, Equilibrium, Hydrogen, S-Block, P-Block (13 and 14)
Botany :	Living World, Biological Classification, Kingdom Plantae, Morphology in Flowering Plants, Anatomy in Flowering Plants
Zoology :	Biomolecules, Digestive System, Respiratory System, Circulatory System, Excretory System, Movement and Locomotion, Neural Control and Coordination

Name of the Candidate (in Capitals) : _____

Roll Number (In figures) : _____ Phone No. _____

Centre of Examination (in Capitals) : _____

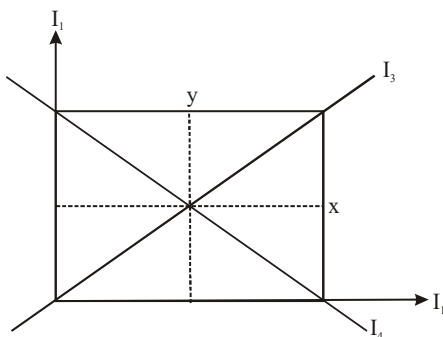
Date of Examination : _____

Candidate's Signature : _____ Invigilator's Signature : _____

1. The radius of gyration of a circular loop of radius R and mass m rotating about diameter as axis is :

1. $\sqrt{2}R$ 2. $R/\sqrt{2}$
 3. $R/2$ 4. R

2. A square Lamina lies in the $X-Y$ plane as shown in fig. The z -axis is passing through the centre and perpendicular to the plane of the Lamina. I_1, I_2, I_3 and I_4 represent the Moment of Inertia of the Lamina about the axis shown. The moment of Inertia I_z of the Lamina about z -axis is :



1. $I_1 + I_4$ 2. $I_1 + I_2$
 3. $I_1 + I_3$ 4. $I_3 + I_4$

3. An inclined plane makes an angle of 30° with the horizontal. A solid sphere rolling down this inclined plane from rest without slipping has a linear acceleration equal to

1. $g/3$ 2. $2g/3$
 3. $5g/7$ 4. $5g/14$

4. Four spheres each of mass M and radius R are placed with their centres on the four corners of a square of side ' b '. The moment of inertia of the system about any side of the square is :

1. $\frac{8}{5}MR^2 + Mb^2$ 2. $\frac{8}{5}MR^2 + 2Mb^2$
 3. $\frac{8}{5}MR^2 + 4Mb^2$ 4. $\frac{8}{3}MR^2 + 2Mb^2$

5. When a sphere of moment of inertia I rolls down an inclined plane, then the percentage of its rotational kinetic energy is :

1. 100 % 2. 50 %
 3. 28 % 4. 72 %

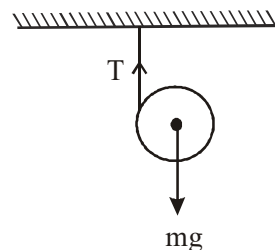
6. A solid cylinder of mass M and radius R rolls down an inclined plane of height h . The velocity of its center of mass at the bottom of the plane will be :

1. $\sqrt{\frac{4g}{h}}$ 2. $\sqrt{\frac{3}{4}gh}$
 3. $\sqrt{\frac{4}{3}gh}$ 4. $\sqrt{2hg}$

7. The angular velocity of a body is $\vec{\omega} = 2\hat{i} + 3\hat{j} + 4\hat{k}$ and a torque $\vec{\tau} = \hat{i} + 2\hat{j} + 3\hat{k}$ acts on it. The rotational power will be :

1. 20 watt 2. 15 watt
 3. $\sqrt{17}$ watt 4. $\sqrt{14}$ watt

8. A string is wrapped several times round a solid cylinder and then the end of the string is held stationary while the cylinder is released from rest with no initial motion.



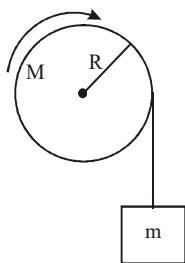
The acceleration of the cylinder and tension in the string will be :

1. $\frac{2}{3}g$ and $\frac{mg}{3}$ 2. g and $\frac{mg}{2}$
 3. $\frac{g}{3}$ and $\frac{mg}{2}$ 4. $\frac{g}{2}$ and $\frac{mg}{3}$

9. A mass M is supported by a massless string wound round a uniform cylinder of mass M and radius R . On releasing the system from rest, the acceleration of mass M is :

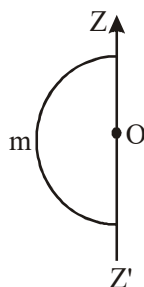
1. g 2. $g/2$
 3. $(2/3)g$ 4. depends on R

10. A block of mass 2kg hangs from the rim of a wheel of radius 0.5 m. On releasing from rest the block falls through 5m height in 2s. The moment of inertia of the wheel will be-



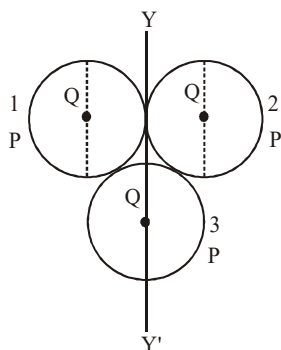
1. $1\text{ kg} - \text{m}^2$ 2. $3.2\text{ kg} - \text{m}^2$
 3. $2.5\text{ kg} - \text{m}^2$ 4. $1.5\text{ kg} - \text{m}^2$

11. A thin wire of length ℓ and mass m is bent in the form of a semicircle. Its moment of inertia about an axis joining its free ends will be :



1. zero 2. $m\ell^2$
 3. $\frac{m\ell}{\pi^2}$ 4. $\frac{m\ell^2}{2\pi^2}$

12. Three rings, each of mass P and radius Q are arranged as shown in the figure. The moment of inertia of the arrangement about YY' axis will be :



1. $\frac{7}{2} PQ^2$ 2. $\frac{2}{7} PQ^2$
 3. $\frac{2}{5} PQ^2$ 4. $\frac{5}{2} PQ^2$

13. A simple pendulum has a time period T_1 when on the earth's surface, and T_2 when taken to a height R above the earth's surface, where R is radius of earth. The value of T_2/T_1 is

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

14. A spherical uniform planet is rotating about its axis. The velocity of a point on its equator is V . Due to the rotation of planet about its axis the acceleration due to gravity g at equator is $1/2$ of g at poles. The escape velocity of a particle on the pole of planet in terms of V .

1. $V_e = 2V$ 2. $V_e = V$
 3. $V_e = V/2$ 4. $V_e = \sqrt{3}V$

15. The escape velocity of a planet is v_e . A tunnel is dug along a diameter of the planet and a small body is dropped into it at the surface. When the body reaches the centre of the planet, its speed will be –

1. v_e 2. $v_e/\sqrt{2}$
 3. $v_e/2$ 4. zero

16. An artificial satellite moving in a circular orbit around the earth has a total (K.E. + P.E.) = E_0 . Its potential energy is

1. $-E_0$ 2. $1.5 E_0$
 3. $2 E_0$ 4. E_0

17. Two point masses of mass $4m$ and m respectively separated by d distance are revolving under mutual force of attraction. Ratio of their kinetic energies will be –

1. 1 : 4 2. 1 : 5
 3. 1 : 1 4. 1 : 2

18. A satellite of mass m , initially at rest on the earth, is launched into a circular orbit at a height equal to the radius of the earth. The minimum energy required is –

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

19. A particle is projected vertically upward from the surface of the earth with a speed of $\sqrt{\frac{3}{2}gR}$,

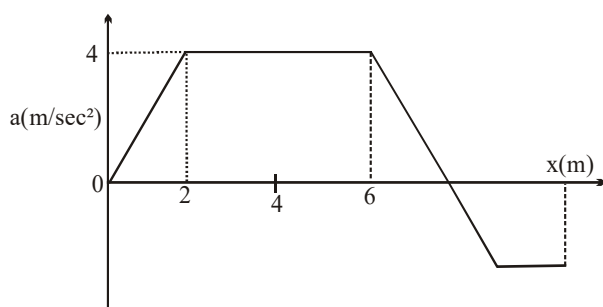
R being the radius of the earth and g is the acceleration due to gravity on the surface of the earth. Then the maximum height ascended is (neglect cosmic dust resistance)

1. $3R/4$ 2. R
3. $2R$ 4. $3R$

20. A car is moving with a constant speed of 20 ms^{-1} against a resistance of 100 N . The power exerted by the car is –

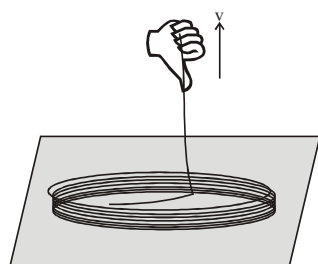
1. 2 kW 2. 5 W
3. 200 W 4. 1 kW

21. Graph shows the acceleration of a 3 kg particle as an applied force moves it from rest along x -axis. The total work done by the force on the particle by the time the particle reaches $x = 6 \text{ m}$, is equal to –



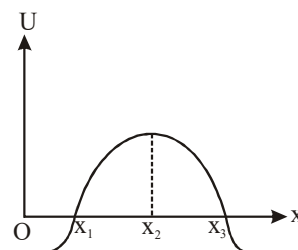
1. 20 J 2. 60 J
3. 30 J 4. 40 J

22. A uniform rope of linear mass density λ and length ℓ is coiled on a smooth horizontal surface. One end is pulled up with constant velocity v . Then the average power applied by the external agent in pulling the entire rope just off the horizontal surface is –



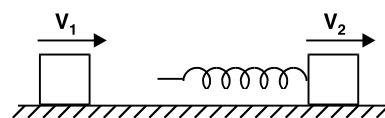
1. $\frac{1}{2}\lambda\ell v^2 + \frac{\lambda\ell^2 g}{2}$ 2. $\lambda\ell g v$
3. $\frac{1}{2}\lambda v^3 + \frac{\lambda\ell v g}{2}$ 4. $\lambda\ell v g + \frac{1}{2}\lambda v^3$

23. In the figure shown the potential energy U of a particle is plotted against its position ' x ' from origin. Then which of the following statement is correct. A particle at –



1. x_1 is in stable equilibrium
2. x_2 is in stable equilibrium
3. x_3 is in stable equilibrium
4. none of these

24. A block of mass 2 kg slides along a frictionless table with a speed of 10 m/sec . Directly in front of it and moving in the same direction is a block of mass 5 kg moving at 3 m/sec . A massless spring of spring constant $k = 1120 \text{ N/m}$ is attached to the back side of 5 kg mass as shown in figure. When the blocks collide the maximum compression in the spring (if the spring does not bend) will be



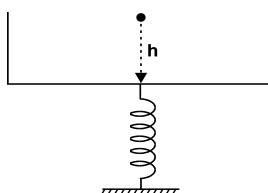
1. 0.25 m 2. 0.4 m
3. 0.33 m 4. 1.12 m

25. A cord is used to lower vertically a block of mass M a distance d at a constant downward acceleration of $g/4$. Then the work done by the cord on the block is

1. $Mgd/4$ 2. $3Mgd/4$
3. $-3Mgd/4$ 4. Mgd

26. A massless platform is kept on a light elastic spring as shown in fig. When a sand particle of mass 0.1 kg is dropped on the pan from a height of 0.24 m , the particle strikes the pan and spring

is compressed by 0.01 m. From what height should the particle be dropped to cause a compression of 0.04 m.



1. 3.96 m 2. 0.396 m
3. 4 m 4. 0.4 m

27. A particle of mass m is moving in a circular path of constant radius r , such that the centripetal acceleration a_c is varying with time t as $a_c = k^2 r t^2$ where k is a constant. What is the power delivered to the particle by the forces acting on it.

1. $2\pi m k^2 r^2 t$ 2. $m k^2 r^2 t^2$
3. $\frac{m k^4 r^2 t^5}{3}$ 4. Zero

28. The potential energy function associated with the force $\vec{F} = 4xy\hat{i} + 2x^2\hat{j}$ is :

1. $U = -2x^2y$
2. $U = -2x^2y + \text{constant}$
3. $U = 2x^2y + \text{constant}$
4. not defined

29. A particle with total energy E moves in one dimension in a region where the potential energy is $U(x)$. The acceleration of the particle is zero where

1. $U(x) = E$ 2. $U(x) = 0$
3. $\frac{dU(x)}{dx} = 0$ 4. $\frac{d^2U(x)}{dx^2} = 0$

30. A chain of mass M is placed on a smooth table with $1/n$ of its length L hanging over the edge. The work done in pulling the hanging portion of the chain back to the surface of the table is

1. MgL/n 2. $MgL/2n$
3. MgL/n^2 4. $MgL/2n^2$

31. Galileo writes that for angles of projection of a projectile at angle $(45 + \theta)$ and $(45 - \theta)$, the horizontal ranges described by the projectile are in the ratio of (if $\theta \leq 45^\circ$).

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

32. A cannon ball has the same range R on a horizontal plane for two angles of projection. If h_1 and h_2 are the greatest heights in the two paths for which this is possible, then

1. $R = h_1 h_2$ 2. $R = 4\sqrt{h_1 h_2}$
3. $R = \sqrt[3]{h_1 h_2}$ 4. $R = (h_1 h_2)^{\frac{1}{4}}$

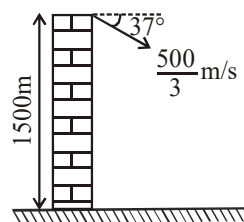
33. If the range of the projectile be R , then the potential energy will be maximum after the projectile has covered (from start) a distance equal to-

1. R 2. $R/2$
3. $R/4$ 4. $R/8$

34. Two balls A and B are thrown with speeds u and $u/2$ respectively. Both the balls cover the same horizontal distance before returning to the plane of projection. If the angle of projection of ball B is 15° with the horizontal, then the angle of projection of A is-

1. $\sin^{-1}(1/8)$ 2. $(1/2)\sin^{-1}(1/8)$
3. $(1/3)\sin^{-1}(1/8)$ 4. $(1/4)\sin^{-1}(1/8)$

35. A particle is projected from a tower as shown in figure, then the distance from the foot of the tower where it will strike the ground will be - (take $g = 10 \text{ m/s}^2$)

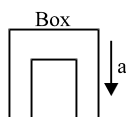


1. $4000/3 \text{ m}$ 2. $5000/3 \text{ m}$
3. 2000 m 4. 3000 m

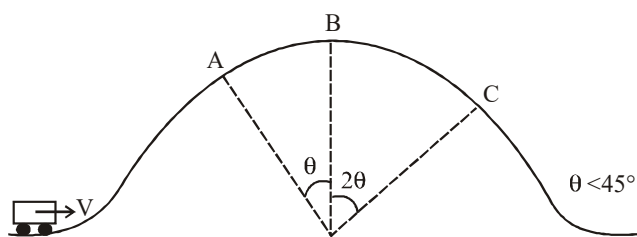
36. A rope of length L is pulled by a constant force F . What is the tension in the rope at a distance x from one end where the force is applied?

1. $\frac{FL}{x}$ 2. $\frac{F(L-x)}{L}$
3. $\frac{FL}{(L-x)}$ 4. $\frac{Fx}{(L-x)}$

37. With what acceleration 'a' should the box in the figure descend so that a body of mass M placed in it exerts a force $\frac{Mg}{4}$ on the base of the box –



1. $3g/4$
 2. $g/4$
 3. $g/2$
 4. $g/8$
38. A given object taken h times as much time to slide down a 45° rough incline as it takes to slide down a perfectly smooth 45° . The coefficient of kinetic friction between object and incline is given by
1. $\mu = \frac{1}{1-\eta^2}$
 2. $\mu = 1 - \frac{1}{\eta^2}$
 3. $\mu = \sqrt{\frac{1}{1-\eta^2}}$
 4. $\mu = \sqrt{1 - \frac{1}{\eta^2}}$
39. A self propelled vehicle (assume it as a point mass) runs on a track with constant speed V. It passes through three positions A, B and C on the circular part of the track.



Suppose N_A , N_B and N_C are the normal forces exerted by the track on the vehicle when it is passing through points A, B and C respectively then –

1. $N_A = N_B = N_C$
 2. $N_B > N_A > N_C$
 3. $N_C > N_A > N_B$
 4. $N_B > N_C > N_A$
40. A person travelling on a straight line moves with a uniform velocity v_1 for some time and with uniform velocity v_2 for the next equal time. The average velocity v is given by–

$$1. v = \frac{v_1 + v_2}{2} \quad 2. v = \sqrt{v_1 v_2}$$

$$3. \frac{2}{v} = \frac{1}{v_1} + \frac{1}{v_2} \quad 4. \frac{1}{v} = \frac{1}{v_1} + \frac{1}{v_2}$$

41. A body starts from rest and moves with constant acceleration. The ratio of distance covered by the body in n^{th} second to that covered in n second is–

$$1. 1 : n \quad 2. \frac{2n-1}{n^2}$$

$$3. \frac{n^2}{2n-1} \quad 4. \frac{2n-1}{2n^2}$$

42. A stone is thrown vertically upwards with a velocity of 98 m/s. Its velocity will be zero after ($g = 9.8 \text{ m/s}^2$) :

$$1. 14 \text{ s} \quad 2. 10 \text{ s}$$

$$3. 20 \text{ s} \quad 4. 5 \text{ s}$$

43. A point traversed half of the distance with a velocity v_0 . The remaining part of the distance was covered with velocity v_1 for half the time and with velocity v_2 for the other half of the time. The mean velocity of the point averaged over the whole time of motion is–

$$1. \frac{v_0 + v_1 + v_2}{3} \quad 2. \frac{2v_0 + v_1 + v_2}{3}$$

$$3. \frac{v_0 + 2v_1 + v_2}{3} \quad 4. \frac{2v_0 + (v_1 + v_2)}{2v_0 + v_1 + v_2}$$

44. A particle moves along the side AB, BC, CD, of a square of side 25m with a velocity of 15 ms^{-1} . Its average velocity is

$$1. 15 \text{ ms}^{-1} \quad 2. 10 \text{ ms}^{-1}$$

$$3. 7.5 \text{ ms}^{-1} \quad 4. 5 \text{ ms}^{-1}$$

45. A particle moving on a circular path with constant speed v. The change in velocity when its move through 120° is –

$$1. \sqrt{2}v \quad 2. \sqrt{3}v$$

$$3. 1.5 v \quad 4. v$$

46. 1 gm butane (C_4H_{10}) is burnt with excess of O_2 to form CO_2 . The approximate mass of CO_2 produced is

$$1. 1 \text{ gm} \quad 2. 2 \text{ gm}$$

$$3. 3 \text{ gm} \quad 4. 4 \text{ gm}$$

47. 2 gm Iron pyrite (FeS_2) is burnt with O_2 to form Fe_2O_3 and SO_2 . The mass of SO_2 produced is ($\text{Fe} = 56$, $\text{S} = 32$, $\text{O} = 16$)
1. 2 gm
 2. 2.13 gm
 3. 4 gm
 4. 4.26 gm
48. The most paramagnetic species is
1. $\text{Ni}^{2+}(\text{Z}=28)$
 2. $\text{Fe}^{2+}(\text{Z}=26)$
 3. $\text{Mn}^{2+}(\text{Z}=25)$
 4. $\text{V}^{3+}(\text{Z}=23)$
49. How many electrons in copper atom ($_{29}\text{Cu}$) have $(n+l) = 4$?
1. 6
 2. 7
 3. 8
 4. 4
50. IF E_1 , E_2 and E_3 represent respectively the kinetic energies of an electron, α -particle and a proton, each having same de-Broglie's wavelength then
1. $E_1 > E_3 > E_2$
 2. $E_2 > E_3 > E_1$
 3. $E_1 > E_2 > E_3$
 4. $E_1 = E_2 = E_3$
51. The first electron affinity values of O, S and Se are given correctly as
1. $\text{O} > \text{S} > \text{Se}$
 2. $\text{S} > \text{O} > \text{Se}$
 3. $\text{Se} > \text{S} > \text{O}$
 4. $\text{S} > \text{Se} > \text{O}$
52. Which of the following order is correct as indicated?
1. $\text{F} > \text{Cl} > \text{Br} > \text{I}$ (Electron affinity)
 2. $\text{I}^- > \text{I} > \text{I}^+$ (Ionisation Energy)
 3. $\text{I}^- > \text{I} > \text{I}^+$ (Radii)
 4. $\text{I}^{+7} > \text{I}^+ > \text{I}^{+5}$ (Ionisation Energy)
53. Which has highest dipole moment?
1. CO_2
 2. BF_3
 3. NF_3
 4. NH_3
54. What will be the total volume of the mixture when 32 gm of oxygen and 3 gm of hydrogen are mixed and kept at 1 atm at 0°C ?
1. 23.26 L
 2. 44.8 L
 3. 56 L
 4. 50 L
55. 200 ml of He at 0.66 atm pressure and 400 ml of O_2 at 0.52 atm pressure are mixed in a 400 ml vessel at 25°C . The partial pressure of He and O_2 respectively will be
1. 0.33, 0.52
 2. 0.52, 0.33
 3. 0.22, 0.45
 4. 0.33, 0.26
56. For an exothermic reaction to be spontaneous ($\Delta S = \text{negative}$)
1. Temperature must be high
 2. Temperature must be zero
 3. Temperature may have any magnitude
 4. Temperature must be low
57. Conjugate base of Hydrazoic acid is
1. HN_3^-
 2. N_2^-
 3. N_3^{-1}
 4. N^{-3}
58. For the reaction, $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3$, the value of equilibrium constant is K_1 then the equilibrium constant for the reaction, $\text{NH}_3(\text{g}) \rightleftharpoons \frac{1}{2}\text{N}_2(\text{g}) + \frac{3}{2}\text{H}_2(\text{g})$ will be
1. $\frac{1}{K_1}$
 2. $\frac{1}{2K_1}$
 3. $\frac{2}{K_1}$
 4. $\frac{1}{\sqrt{K_1}}$
59. For the reaction, $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$ on adding inert gas at constant volume, equilibrium
1. Shifts in forward direction
 2. Shifts in backward direction
 3. Unaffected
 4. Initially in forward direction
60. $\frac{K_p}{K_c}$ for the reaction, $\text{CO}(\text{g}) + \frac{1}{2}\text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g})$ is
1. 1
 2. RT
 3. $\frac{1}{\sqrt{RT}}$
 4. \sqrt{RT}
61. The strongest conjugate base is
1. CH_3COO^-
 2. NO_3^-
 3. Cl^-
 4. HSO_4^-

62. When a solution of acetic acid was titrated with NaOH, the pH of the solution when half of the acid, neutralised was 4.2. Dissociation constant of the acid is
1. 6.31×10^{-5}
 2. 3.2×10^{-5}
 3. 8.7×10^{-8}
 4. 6.42×10^{-4}
63. pH of Ba(OH)_2 solution is 12. Its solubility product is
1. 10^{-6} M^3
 2. $4 \times 10^{-6} \text{ M}^3$
 3. $5 \times 10^{-7} \text{ M}^3$
 4. $5 \times 10^{-6} \text{ M}^3$
64. Which mixture acts as buffer?
1. 50 ml 1M CH_3COOH + 100 ml 1M NaOH
 2. 50 ml 1M CH_3COOH + 25 ml 1M NaOH
 3. 50 ml 1M NH_4OH + 100 ml 1M HCl
 4. 50 ml 1M NH_4OH + 25 ml 1M NaOH
65. The solubility product of PbSO_4 is 4×10^{-10} . The solubility of PbSO_4 solution in presence of 0.01 M H_2SO_4 is
1. $2 \times 10^{-5} \text{ M}$
 2. $4 \times 10^{-6} \text{ M}$
 3. $4 \times 10^{-8} \text{ M}$
 4. $2 \times 10^{-4} \text{ M}$
66. The oxidation number of Cl in CaOCl_2 is
1. Zero
 2. -1
 3. +1
 4. -1 as well as +1
67. In the conversion, $\text{H}_2\text{SO}_4 \rightarrow \text{H}_2\text{S}_2\text{O}_8$ which process occurs?
1. Oxidation
 2. Reduction
 3. Oxidation as well as reduction
 4. Neither oxidation nor reduction
68. Which acts as reducing agent only?
1. SO_2
 2. H_2SO_4
 3. H_2S
 4. HNO_2
69. How many moles of $\text{K}_2\text{Cr}_2\text{O}_7$ are required to oxidise one mole of FeSO_4 in acidic medium?
1. 6
 2. $\frac{1}{2}$
 3. $\frac{1}{3}$
 4. $\frac{1}{6}$
70. The stoichiometric coefficient of S in the following reaction
 $\text{H}_2\text{S} + \text{HNO}_3 \rightarrow \text{NO} + \text{S} + \text{H}_2\text{O}$ is balanced (In acidic medium)
1. 1
 2. 2
 3. 3
 4. 4
71. The ionisation energy of hydrogen is high as compared to alkali metals because of
1. One electron in outermost shell
 2. Small size
 3. One proton in its nucleus
 4. No Neutron
72. High purity dihydrogen is obtained by electrolysis
1. Warm aqueous barium hydroxide
 2. Brine solution
 3. Acidified sulphate solution
 4. Water gas
73. Hardness of water cannot be removed by
1. Treating with washing soda
 2. Boiling
 3. Adding calgon
 4. Addition of chlorine
74. CO_2 gas alongwith solid (Y) is obtained when sodium salt (X) is heated. (X) is again obtained when CO_2 gas is passed into aqueous solution (Y). (X) and (Y) are
1. Na_2CO_3 , Na_2O
 2. Na_2CO_3 , NaOH
 3. NaHCO_3 , Na_2CO_3
 4. Na_2CO_3 , NaHCO_3
75. An orange coloured solution of $\text{K}_2\text{Cr}_2\text{O}_7$ acidified with H_2SO_4 and treated with H_2O_2 gives a blue coloured solution. The blue colour is due to the formation of
1. CrO_5
 2. $\text{Cr}_2(\text{SO}_4)_3$
 3. CrO_4^{2-}
 4. Cr_2O_3
76. H_2O_2 can be obtained when following reacts with H_2SO_4 except with
1. PbO_2
 2. BaO_2
 3. Na_2O_2
 4. SrO_2
77. Which nitrate cannot give light brown gas on heating?
1. LiNO_3
 2. NaNO_3
 3. $\text{Mg}(\text{NO}_3)_2$
 4. $\text{Ca}(\text{NO}_3)_2$

78. Na_2CO_3 can be manufactured by Solvay's process but K_2CO_3 cannot be prepared because
1. K_2CO_3 is more soluble
 2. K_2CO_3 is less soluble
 3. KHCO_3 is more soluble than NaHCO_3
 4. KHCO_3 is less soluble than NaHCO_3
79. Which of the following metal bicarbonates does not exist as solid?
1. LiHCO_3
 2. KHCO_3
 3. $\text{Ca}(\text{HCO}_3)_2$
 4. NaHCO_3
80. Which of the following is 'dead burnt plaster'?
1. CaCO_3
 2. $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$
 3. $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
 4. CaSO_4
81. A pair of metals which dissolves in sodium hydroxide solution is
1. Cu, K
 2. Fe, Mg
 3. Ag, Cu
 4. Sn, Zn
82. Which of the following substances can be used for drying gas?
1. Calcium carbonate
 2. Sodium carbonate
 3. Sodium bicarbonate
 4. Calcium oxide
83. Alkali metals in liquid NH_3 produce a blue coloured solution, due to
1. Polarisability of NH_3
 2. Charge transfer
 3. $d \rightarrow d$ transition
 4. Ammoniated electrons
84. Lewis acid character of boron trihalides follows the order
1. $\text{BF}_3 > \text{BCl}_3 > \text{BBr}_3 > \text{BI}_3$
 2. $\text{BCl}_3 > \text{BF}_3 > \text{BBr}_3 > \text{BI}_3$
 3. $\text{BI}_3 > \text{BBr}_3 > \text{BCl}_3 > \text{BF}_3$
 4. $\text{BI}_3 > \text{BBr}_3 > \text{BF}_3 > \text{BCl}_3$
85. Which one of the following alkali metal does not form alums?
1. Li
 2. Na
 3. K
 4. All of these
86. When we heat borax strongly then it will yield the compound
1. NaBO_2
 2. B_2O_3
 3. $\text{Na}_2\text{B}_4\text{O}_7$
 4. Both (1) and (2)
87. Which one of the following compounds has similar structure to that of graphite?
1. Boron nitride
 2. Boron carbide
 3. Aluminium oxide
 4. Aluminium carbide
88. $\text{Si}_2\text{O}_7^{6-}$ is known as
1. Chain silicate
 2. Pyrosilicate
 3. Sheet silicate
 4. Ring silicate
89. In boxax, the hybridised state of boron is
1. sp^2
 2. sp^3
 3. sp^2 as well as sp^3
 4. sp
90. The best reducing agent is
1. GeCl_2
 2. SnCl_2
 3. PbCl_2
 4. PbCl_4
91. The label of a herbarium sheet does not carry information on
1. Date of collection
 2. Name of collector
 3. Local names
 4. Height of the plant
92. Match column I with column II for housefly classification and select the correct option using the codes given below
- | Column - I | Column - II |
|---------------------------|-----------------|
| A. Family | (i) Diptera |
| B. Order | (ii) Arthropoda |
| C. Class | (iii) Muscidae |
| D. Phylum | (iv) Insecta |
| 1. A-iii, B-i, C-iv, D-ii | |
| 2. A-iii, B-ii, C-iv, D-i | |
| 3. A-iv, B-iii, C-ii, D-i | |
| 4. A-iv, B-ii, C-i, D-iii | |

93. Study the four statements (A-D) given below and select the two correct ones out of them

- A. Definition of biological species was given by Ernst Mayr.
- B. Photoperiod does not affect reproduction in plants
- C. Binomial nomenclature system was given by R.H. Whittaker.
- D. In unicellular organisms, reproduction is synonymous with growth

The two correct statements are

- 1. B and C 2. C and D
- 3. A and D 4. A and B

94. Match the items given in Column I with those in Column II and select the correct option given below:

Column I	Column II
a. Herbarium	(i) It is a place having a collection of preserved plants and animals
b. Key	(ii) A list that enumerates methodically all the species found in an area with brief description aiding identification
c. Museum	(iii) Is a place where dried and pressed plant specimens mounted on sheets are kept
d. Catalogue	(iv) A booklet containing a list of characters and their alternates which are helpful in identification of various taxa.

a	b	c	d
1. (ii)	(ii)	(i)	(iv)
2. (ii)	(iv)	(iii)	(i)
3. (i)	(iv)	(iii)	(ii)
4. (iii)	(iv)	(i)	(ii)

95. The complete compilation of information about any taxon/genus/species is called

- 1. Manual 3. Monograph
- 2. Flora 4. Catalogue

96. Which one is wrongly matched?

- 1. Biflagellate zoospores - Brown algae
- 2. Gemma cups - *Marchantia*
- 3. Uniflagellate gametes - *Polysiphonia*
- 4. Unicellular organism - *Chlorella*

97. Which among the following is not a prokaryote?

- 1. *Mycobacterium* 2. *Nostoc*
- 3. *Saccharomyces* 4. *Oscillatoria*

98. Which of the following organisms are known as chief producers in the oceans?

- 1. Diatoms 2. Cyanobacteria
- 3. Dinoflagellates 4. Euglenoids

99. Which of the following statements is incorrect?

- 1. Morels and truffles are edible delicacies
- 2. *Claviceps* is a source of many alkaloids and LSD
- 3. Conidia are produced exogenously and ascospores endogenously
- 4. Yeasts have filamentous bodies with long thread-like hyphae.

100. Match column -I with Column II

Column I	Column II
(a) Saprophyte	(i) Symbiotic association of fungi with plant roots
(b) Parasite	(ii) Decomposition of dead organic materials
(c) Lichens	(iii) Living on living plants or animals
(d) Mycorrhiza	(iv) Symbiotic association of algae and fungi

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

101. Which of the following statements is incorrect?

- 1. Viroids lack a protein coat.
- 2. Viruses are obligate parasites
- 3. Infective constituent in viruses is the protein coat
- 4. Prions consist of abnormally folded proteins

- 102. A bacterium is capable of withstanding extreme heat, dryness and toxic chemicals. This indicates that it is probably able to form**
1. A thick peptidoglycan wall
 2. Endospores
 3. Endotoxins
 4. Endogenous buds
- 103. The genetic material of rabies virus is**
1. Double stranded RNA
 2. Single stranded RNA
 3. Double stranded DNA
 4. ssDNA.
- 104. The Mycoplasma are organisms that completely lack cell wall. These are**
1. obligate aerobe
 2. facultative anaerobe
 3. obligate anaerobe
 4. facultative aerobe
- 105. Euglena is a predator of small organisms**
1. in presence of light
 2. due to holophytic nutrition
 3. due to mixotrophic nutrition
 4. in absence of light
- 106. Sexual reproduction by conjugation produces a resting diploid spore in the life cycle of**
1. *Nostoc*, *Penicillium*
 2. *Rhizopus*, *Mucor*
 3. *Ustilago*, *Puccinia*
 4. *Claviceps*, *Neurospora*
- 107. How many of the features given below are associated with organisms possessing loose tissue level body organisation?**
Eukaryotic, Multicellular, Producer, Chitinous wall, Asexual spore production, Osmotroph, Complete absence of sexual reproduction
1. Six
 2. Five
 3. Four
 4. Seven
- 108. The site of photosynthesis in blue-green algae is**
1. chromatophores
 2. mitochondria
 3. chloroplast
 4. centropasm
- 109. Select an incorrect statement for algae**
1. Agar is obtained from *Gelidium* and *Gracilaria*
 2. Members of chlorophyceae are unicellular, colonial or filamentous
 3. Pyrenoids contain protein besides glycogen
 4. Some algae may store food in the form of oil droplets
- 110. Select an incorrect statement for bryophytes**
1. Zygotes produces a multicellular body called a sporophyte
 2. Sporophyte is not free-living but attached to the gametophyte
 3. Bryophytes in general are of little economic importance
 4. leafy members of liverworts have tiny leaf-like appendages in multiple rows on the stem-like structures
- 111. The gametophytes of pteridophytes bear**
1. foot, seta and capsule
 2. non jacketed sex organs
 3. male and female sex organs called antheridia and archegonia respectively
 4. more than one option is correct
- 112. Select an incorrect statement for pteridophytes**
1. Pteridophytes are used for medicinal purposes and as packing material for trans- shipment of living material
 2. The leaves in pteridophyta are small or large
 3. Free-living, mostly photosynthetic thalloid gametophytes is called prothallus.
 4. Zygote produces a multicellular dominant phase of the pteridophytes
- 113. Select an incorrect statement for gymnosperms**
1. gymnosperms are heterosporous
 2. sporangia are borne on sporophylls
 3. development of pollen grains take place within the microsporangia
 4. microspores develop into a male gametophytic generation which is highly developed
- 114. Unlike bryophytes and pteridophytes, in gymnosperms the male and the female gametophytes do not have an**
1. independent free-living existence
 2. dependent free-living existence
 3. independent parasitic existence
 4. dependent parasitic existence

115. Select an incorrect statement.

1. Leaves are often converted into tendrils for climbing as in peas.
2. Leaves are often converted into spines in cacti.
3. In Australian acacia, the leaves are large but short-lived.
4. Fleshly leaves of onion and garlic store food.

116. Which of the following is not a characteristic of leaf?

1. Shows determinate growth
2. Originate endogeneously as a lateral outgrowth
3. Originate from shoot meristem
4. Does not possess a regular growing point

117. In racemose inflorescence, flowers are borne

1. laterally in basipetal order
2. basally in a cluster
3. terminally in a cluster
4. laterally in acropetal succession

118. In epigynous flowers

1. the margin of thalamus grows upward enclosing the ovary completely and getting fused with it, the other parts of flower arise above the ovary
2. the gynoecium occupies the highest position while the other parts are situated below it
3. gynoecium is situated in the centre and other parts of the flower are located on the rim of the thalamus almost at the same level
4. more than one options are correct

119. Select an incorrect statement.

1. In marginal placentation the ovules are borne on the ridge forming two rows.
2. When the ovules are borne on central axis and septa are absent the placentation is free central.
3. In basal placentation, the placenta develops at the base of ovary.
4. False septum is found in mustard, *Primrose* and *Argemone*

120. Select an incorrect statement w.r.t. flower.

1. A flower may be trimerous, tetramerous or pentamerous.
2. Bracts are reduced leaf found at the base of receptacle.
3. Zygomorphic flower have bilateral symmetry.
4. Asymmetric flower are called irregular.

121. In hypogynous flower, the ovary is ___ as in ___

1. superior, cucumber
2. superior, china rose
3. inferior, ray florets of sunflower
4. half inferior, peach

122. In fruit of the wheat plant

1. many seeds are present
2. pericarp is fused with testa
3. pappus is helpful in dispersion
4. inferior ovary develops into seed

123. How many of the given plants belong to a family specialised for root nodules as a site of N_2 fixation?

Gloriosa, *Belladonna*, *Sesbania*, Tobacco, *Asparagus*, Moong, *Indigofera*, *Aloe*, Chilli, Tomato

- | | |
|---------|----------|
| 1. Five | 2. Two |
| 3. Four | 4. Three |

124. Select an incorrect statement for cereal seeds.

1. Seed coat is membranous.
2. Endosperm is bulky and stores food.
3. The embryo is very large and situated in a groove at one end of the endosperm.
4. The outer covering of endosperm separates the embryo by a proteinous layer called aleurone layer.

125. Interfascicular cambium develops from the cells of:

1. Pericycle
2. Medullary rays
3. Xylem parenchyma
4. Endodermis

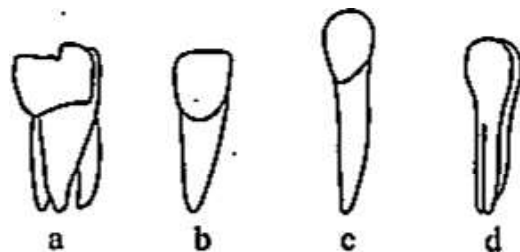
126. Select the correct pair amongst the following

1. Spring wood - light colour, high density
2. Spring wood - dark colour, low density
3. Autumn wood - light colour high density
4. Autumn wood - dark colour, high density.

127. Tracheids differ from other tracheary elements in:

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

- 128. 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. Cortical cells
 2. Secondary xylem
 3. Secondary phloem
 4. **Protoxylem**
- 129. Read the different components from (a) to (d) in the list given below and tell the correct order of the components with reference to their arrangement from outer side to inner side in a woody dicot stem:**
- (a) Secondary cortex
 - (b) Wood
 - (c) Secondary phloem
 - (d) Phellem
- The correct order is:
1. (d) (c) (a) (b)
 2. (c) (d) (b) (a)
 3. (a) (b) (d) (c)
 4. (d) (a) (c) (b)
- 130. A major characteristic of the monocot root is the presence of:**
1. Vasculature without cambium
 2. Cambium sandwiched between phloem and xylem along the radius
 3. Open vascular bundles
 4. Scattered vascular bundles
- 131. Vascular bundles in monocotyledons are considered closed because:**
1. There are no vessels with perforations
 2. Xylem is surrounded all around by phloem
 3. A bundle sheath surrounds each bundle
 4. Cambium is absent
- 132. Cortex is the region found between**
1. Epidermis and stele
 2. Pericycle and endodermis
 3. Endodermis and pith
 4. Endodermis and vascular bundle
- 133. The balloon - shaped structures called tyloses**
1. originate in the lumen of vessels
 2. characterize the sapwood
 3. are extensions of xylem parenchyma cells into vessels
 4. are linked to the ascent of sap through xylem vessels
- 134. Which of the following is made up of dead cells?**
1. Xylem parenchyma
 2. **Collenchyma**
 3. Phellem
 4. Phloem
- 135. The vascular cambium normally gives rise to**
1. Phelloderm
 2. Primary phloem
 3. Seconadry xylem
 4. Periderm
- 136. Activation energy is the difference in average energy content of**
1. S and P
 2. S and transition state
 3. **P and transition state**
 4. Both S and P transition state
- 137. A non-protein substance bound to an enzyme and essential for its activity, is called**
1. Coenzyme
 2. Prosthetic group
 3. Aponenzyme
 4. Co-factor
- 138. Mark the incorrect statement**
1. Glycogen has branches
 2. Starch forms helical primary structures
 3. Cellulose does not contain complex helices\
 4. Starch-I₂ is blue is colour
- 139. Formation of peptide bond involves**
1. Two amino acids
 2. Two monosaccharides
 3. A condensation reaction
 4. Both (1) and (3)
- 140. Enzyme catalysing optical or geometrical rearrangement of atomic groupings without altering molecular weight or number of atoms is**
1. Ligase
 2. Isomerase
 3. Oxidoreductase
 4. Hydrolase
- 141. Recognise the figure given below and select the correct option**



1. d-incisor, c-canine, b-molar, a-premolar
2. b-incisor, a-canine, c-molar, d-premolar
3. c-incisor, d-canine, a-molar, b-premolar
4. b-incisor, c-canine, a-molar, d-premolar

142. Emulsification of fat is done by

1. Gastric juice 2. Pancreatic juice
3. Succus entericus 4. Bile juice

143. Cystic duct from the gall bladder along with hepatic duct from the liver forms the

1. Common pancreatic duct
2. Common hepatic duct
3. Common bile duct
4. Common cystic duct

144. Match the column I with column II and choose the correct option

Column I	Column II
1. Vomiting	1. Faeces is retained within the rectum
2. Diarrhoea	2. Ejection of stomach contents through the mouth
3. Constipation	3. Feeling of fullness
4. Indigestion	4. Increased liquidity of faecal discharge

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

145. The activities of the gastro-intestinal tract are under

1. Neural control 2. Hormonal control
3. Chemical control 4. Both (1) and (2)

146. The maximum volume of air a person can breathe out after a forced inspiration is called

1. Residual volume (RV)
2. Inspiratory capacity (IC)
3. Expiratory capacity (EC)
4. Vital capacity (VC)

147. Pressure contributed by an individual gas in a mixture of gases is called

1. Boyle's pressure
2. Charles's pressure
3. Parietal pressure
4. Partial pressure

148. Concentration gradient for oxygen is in the direction from

1. Tissues to blood 2. Blood to alveoli
3. Alveoli to blood 4. Both (1) and (2)

149. Binding of O₂ with haemoglobin is interfered by

1. Temperature
2. Hydrogen ion concentration/pH
3. Partial pressure of CO₂
4. All of the above

150. Select the incorrect statement

1. Pneumotaxic centre can moderate the functions of the respiratory rhythm centre
2. The role of oxygen in the regulation of respiratory rhythm is quite significant
3. Neural signals from the pneumotaxic centre can alter the respiratory rate
4. None of these/All are correct

151. In incomplete double circulation the blood pumped by ventricle is

1. Oxygenated 2. Deoxygenated
3. Mixed 4. None of these

152. Arrange the RBCs, WBCs and Platelets according to their abundance in blood

1. RBC < WBC < Platelets
2. WBC < RBC < Platelets
3. Platelets < WBC < RBC
4. WBC < Platelets < RBC

153. Match the column I with column II and choose the correct option

Column I	Column II
a. Depolarisation of the atria	1. QRS complex
b. Repolarisation	2. P-wave
c. Depolarisation of the ventricles	3. T-wave
1. a-1, b-2, c-3	2. a-3, b-2, c-1
3. a-2, b-1, c-3	4. a-2, b-3, c-1

154. Right and left bundles (branches) give rise to minute fibres throughout the ventricular musculature of the respective sides and are called

1. Bundle of His 2. Purkinje fibre
3. Nodal fibre 4. Nodal branch

- 155. Statement A : Sinus venosus and conus arteriosus are present in frog**
Statement B : RBCs are nucleated in frog
1. Statement B is correct and statement A is wrong
2. Both the statement A and B are correct
3. Statement A is correct and statement B is wrong
4. Both the statement A and B are wrong
- 156. Sweat produced by the sweat glands is a watery fluid containing**
1. Urea
2. NaCl and Urea
3. NaCl, Urea and Lactic acid
4. NaCl, Urea, Lactic acid and Pyruvic acid
- 157. The ascending limb of HL continues as highly coiled tubular region called**
1. Proximal convoluted tubule
2. Distal convoluted tubule
3. Collecting duct
4. Renal tubule
- 158. Osmoreceptors in the body are activated by changes in**
1. Blood volume
2. Body fluid volume
3. Ionic concentration
4. All of the above
- 159. Blood from the glomerulus is carried away by an**
1. Afferent arteriole 2. Efferent arteriole
3. Efferent venule 4. Both (2) and (3)
- 160. In humans, majority of the nephrons are of the type**
1. Cortical nephrons
2. Juxta glomerular nephrons
3. Juxta-medullary nephrons
4. Medullary nephrons
- 161. Shoulder joint is formed by the articulation of head of humerus to the**
1. Spine of the scapula
2. Glenoid cavity of the scapula
3. Acromion process of the scapula
4. Head of the humerus
- 162. False ribs do not articulate directly with the sternum but join the ...a... with the help of ...b...**
1. a- 1st rib, b- hyaline cartilage
2. a- 10th rib, b- elastic cartilage
3. a- 7th rib, b- hyaline cartilage
4. a- 7th rib, b- elastic cartilage
- 163. In skeletal muscles a number of muscle bundles held together by a common collagenous connective tissue layer called**
1. Fascia 2. Fascicles
3. Sarcolemma 4. Both (1) and (3)
- 164. True ribs are attached to the sternum with the help of**
1. Elastic cartilage
2. Hyaline cartilage
3. Fibrous cartilage
4. All of these
- 165. Which of the following is an example of movement?**
1. Movement of cilia and flagella
2. Streaming of protoplasm
3. Movement of jaws, tongue and eyelids in human
4. All of these
- 166. A complex protein troponin is distributed at regular intervals on the**
1. Troponin 2. Meromyosin
3. Tropomyosin 4. G- actins
- 167. Active binding sites for myosin are present on the**
1. Actin filament 2. Myosin filament
3. Troponin filament 4. Tropomyosin filament
- 168. Find the correct statement about the muscle contraction**
1. Length of A band decreases
2. Length of H-zone decreases
3. Length of 2 Z-lines increases
4. Length of I-band increases
- 169. Axoplasm inside the axon contain high concentration of**
1. Na^+
2. K^+
3. Negatively charged protein
4. Both (2) and (3)

170. The layer of cells which covers the cerebral hemisphere is called
1. Corpus callosum
 2. Cerebral cortex
 3. Cerebral medulla
 4. Cerebral tract
171. During generation of action potential axonal membrane is supposed to become permeable for:
1. Na^+
 2. K^+
 3. Cl^-
 4. Proteins
172. Arrange the following steps of transmission of nerve impulse across the chemical synapse:
- A – Release of neurotransmitters
B – Fusion of synaptic vesicles with plasma membrane
C – Action potential reaches synapse
D – Stimulation of receptors on post synaptic membrane
1. A → B → D → C
 2. B → C → A → D
 3. C → B → A → D
 4. C → A → D → B
173. Brain stem consists of
1. Forebrain + Midbrain
 2. Midbrain + Medulla + Pons
 3. Medulla + Cerebellum
 4. Cerebrum + Midbrain
174. Select the incorrect statement:
1. Cerebellum is very much convoluted for more accommodation of neurons
 2. Medulla is centre for cardio-vascular reflexes
 3. Limbic system is involved in expression of emotional reactions and motivation
 4. Afferent neuron ends at effector organ
175. At the base of cochlea, scala tympani ends at:
1. Oval window
 2. Round window
 3. Tectoral membrane
 4. Helicotrema
176. Which transmits impulses from CNS to the involuntary organs and smooth muscles of the body?
1. Afferent nerve fibres
 2. Efferent nerve fibres
 3. Somatic neural system
 4. Autonomic neural system
177. Formation of myelin sheath around the axon by
1. Schwann cell
 2. Myelinated nerve fibres
 3. Dendrites
 4. Cell body
178. Different types of ion channels are present on the neural membrane, these ion channels are
1. Selectivity permeable
 2. Impermeable
 3. Semipermeable
 4. All type
179. At resting the axonal membrane is comparatively more permeable to
1. Ca^{++}
 2. Na^+
 3. K^+
 4. None
180. The electrical potential difference across the resting plasma-membrane is called the
1. Spike potential
 2. Action potential
 3. Resting potential
 4. Impulsive potential