M-STAR ★
Momentum Scholarship Test for Admission & Rewards
8th Edition, 2023-24
Talent HUNT Exam

Class XI Studying Students (NEET Aspirants)
Physics, Chemistry, Botany & Zoology

INSTRUCTIONS FOR CANDIDATE

1. This booklet is your Question Paper. Do not open this booklet before being instructed to do so by the invigilator.
2. You may complete Your Name, Roll No. on the cover page.
3. Blank spaces and blank pages are provided in this booklet for your rough work. No Additional sheet will be provided for rough work.
4. Blank papers, clipboards, log tables, slide rules, calculators, cameras, cellular phones, pagers and electronic gadgets are NOT allowed inside the examination hall.
5. **Using a Blue/Black Pen, Darken the bubbles on the OMR sheet**
6. DO NOT TAMPER WITH/MUTILATE THE OMR OR THE BOOKLET
7. In the booklet, check that all the 200 questions and corresponding answer choices are legible.
8. Write your name, class and the Father's name in the boxes provided on the right part of the OMR. Do not write any of this information anywhere else. Darken the appropriate bubble under each digit of your Roll Number and Test ID Number.
9. The test booklet contains 200 multiple choice questions (four options with a single correct answer) from **Physics**, **Chemistry**, **Botany** and **Zoology** subject**.**
   (a) Section A shall consist of 35 Questions in each subject **(Question No. 1 to 35, 51 to 85, 101 to 135 and 151 to 185)**. All questions are compulsory.
   (b) Section B shall consist of 15 Questions in each subject of **(Question No. 36 to 50, 86 to 100, 136 to 150 and 186 to 200)**. In Section B, a candidate needs to attempt any 10 questions out of 15 in each subject.
10. Candidate are advised to read all 15 questions in each subject of section B before they start attempting the question paper. In the event of a candidate attempting more than 10 questions, the first 10 Question's answer by the candidate shall he evaluated.
11. Marking Scheme: **+4** for correct answer, **0** for unattempted and **-1** for wrong attempt .
12. On completion of the test, the candidate must hand over the **OMR** Sheet to the invigilator on duty in the Room/Hall.

MOMENTUM
## छात्रसंघ चौक, गोरखपुर | बस्ती | देवरिया

PART - I : PHYSICS

SECTION - A

1. A wave is represented by the equation :
$y = a \sin(0.01x - 2t)$ where a and x are in cm. velocity of propagation of wave is
(1) $10 \ cm/s$
(2) $50 \ cm/s$
(3) $100 \ cm/s$
(4) $200 \ cm/s$

2. The stream of a river is flowing with a speed of 2 km/h. A swimmer can swim at a speed of 4 km/h. What should be the direction of the swimmer with respect to the flow of the river to cross the river straight?
(1) 90°
(2) 150°
(3) 120°
(4) 60°

3. A source of sound S emitting waves of frequency 100 Hz and an observer O are located at some distance from each other. The source is moving with a speed of 19.4 ms⁻¹ at an angle of 60° with the source observer line as shown in the figure. The observer is at rest. The apparent frequency observed by the observer (velocity of sound in air 330 ms⁻¹), is :
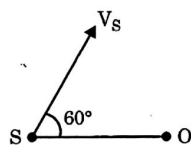
(1) 106 Hz
(2) 97 Hz
(3) 100 Hz
(4) 103 Hz

4. A boy and a man carry a uniform rod of length L, horizontally in such a way that boy gets $\frac{1}{4}$ th load. If the boy is at one end of the rod, the distance of the man from the other end is
(1) $\frac{L}{3}$
(2) $\frac{L}{4}$
(3) $\frac{2L}{3}$
(4) $\frac{3L}{4}$

5. The centripetal acceleration of a particle varies inversely with the square of the radius r of the circular path .The KE of this particle varies directly as
(1) r
(2) r^2
(3) r^{-2}
(4) r^{-1}

6. Two wires of the same material have lengths in the ratio 1:2 and their radii are in the ratio $1:\sqrt{2}$. If they are stretched by applying equal forces, the increase in their lengths will be in the ratio
(1) $\sqrt{2} : 2$
(2) $2: \sqrt{2}$
(3) $1:1$
(4) $1:2$

7. A slab is subjected to two' forces $\vec{F_1}$ and $\vec{F_2}$ of same magnitude F as shown in the figure. Force $\vec{F_2}$ is in XY-plane while force F_1 acts along z-axis at the point $(2\hat{i} + 3\hat{j})$. The moment of these forces about point O will be:
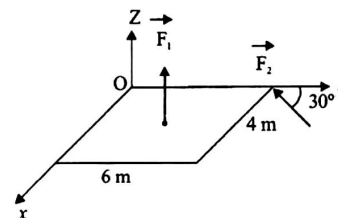
(1) $(3\hat{i} - 2\hat{j} + 3\hat{k})F$
(2) $(3\hat{i} - 2\hat{j} - 3\hat{k})F$
(3) $(3\hat{i} + 2\hat{j} - 3\hat{k})F$
(4) $(3\hat{i} + 2\hat{j} + 3\hat{k})F$

8. A needle made up of iron floats on the water surface due to
(1) surface tension of water is greater than the weight
(2) free surface energy of water surface
(3) surface energy of water surface
(4) viscus force of water

9. The number of particles crossing a unit area perpendicular to the x −axis in a unit time is given by $n = -D \left(\frac{n_2 - n_1}{x_2 - x_1}\right)$, where n_1 and n_2 are the number of particles per unit volume at $x = x_1$ and $x = x_2$, respectively, and D is the diffusion constant. The dimensions of D are
(1) $[M^0 L T^{-2}]$
(2) $[M^0 L^2 T^{-4}]$
(3) $[M^0 L^2 T^{-2}]$
(4) $[M^0 L^2 T^{-1}]$

10. If 1 kg air $(\gamma = 1.4)$ is heated from $0^{\circ}C$ to $10^{\circ}C$ then increase in its internal energy will be :
($C_V = 0.172$ cal/gm $^{\circ}C$)
(1) 1720 joule
(2) 7224 joule
(3) 172 calorie
(4) 7224 calorie

11. The x and y coordinates of the particle at any time are $x = 5t - 2t^2$ and $y = 10t$ respectively, where x and y are in metres and t in seconds. The acceleration of the particle at $t = 2$ s is
(1) 5 ms^{-2}
(2) -4 ms^{-2}
(3) -8 ms^{-2}
(4) 0

12. The length of the second pendulum is decreased by 0.3 cm when its shifted to Chennai From London. If the acceleration due to gravity at London is 981 cm/s^2, the acceleration due to gravity at Chennai is :
(assume $\pi^2 = 10$)
(1) 981 cm /s^2
(2) 978 cm / s^2
(3) 984 cm / s^2
(4) 975 cm / s^2

13. When two bodies collide elastically, the force of interaction between them is
(1) Conservative
(2) Non-conservative
(3) Either conservative or non-conservative
(4) Zero

14. At a given temperature, the pressure of an ideal gas of density ρ is proportional to
(1) $\dfrac{1}{\rho^2}$
(2) $\dfrac{1}{\rho}$
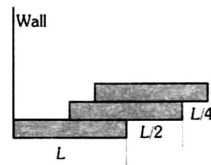(3) ρ^2
(4) ρ

15. Which of the following velocity-time graphs is not possible practically?
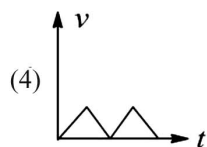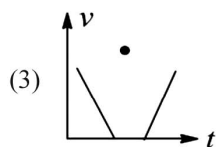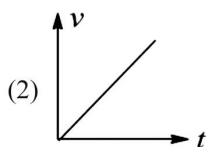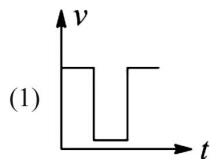
16. 19 g of water at $30^{\circ}C$ and 5 g of ice at $-20^{\circ}C$ are mixed together in a calorimeter. What is the final temperature of the mixture ?
(1) $0^{\circ}C$
(2) $-5^{\circ}C$
(3) $5^{\circ}C$
(4) $10^{\circ}C$

17. Three bricks each of length L and mass M are arranged as shown from the wall. The distance of the centre of mass of the system from the wall is

(1) $L/4$
(2) $L/2$
(3) $(3/2)L$
(4) $(11/12)L$

18. The relative density of a material is found by weighing the body first in air and then in water. If the weigh in air is (10.0 ± 0.1) gf and weight in water is (5.0 ± 0.1) gf, then the maximum permissible percentage error in relative density is
(1) 1
(2) 2
(3) 3
(4) 5

19. If a system undergoes contraction of volume then the work done by the system will be
(1) Zero
(2) Negligible
(3) Negative
(4) Positive

20. An ideal gas is subjected to cyclic process involving four thermodynamic states, the amounts of heat (Q) and work (W) involved in each of these states
$Q_1 = 6000 J, Q_2 = -5500 J; Q_3 = -3000 J; Q_4 = 3500 J$
$W_1 = 2500 J ; W_2 = -1000 J; W_3 = -1200 J; W_4 = xJ$
The ratio of the net work done by the gas to the total heat absorbed by the gas is η. The values of x and η respectively are
(1) 500; 7.5%
(2) 700; 10.5%
(3) 1000; 21%
(4) 1500; 15%

21. When a spring is stretched by a distance x, it exerts a force, given by $F = (-5x - 16x^3)N$. The work done, when the spring is stretched from 0.1 m to 0.2 m is
    (1) $8.7 \times 10^{-2}J$ (2) $12.2 \times 10^{-2}J$
    (3) $8.7 \times 10^{-1}J$ (4) $12.2 \times 10^{-1}J$

22. A rod of length 20 cm is made of metal. It expands by $0.075cm$ when its temperature is raised from 0°C to 100°C. Another rod of a different metal B having the same length expands by 0.045 cm for the same change in temperature. A third rod of the same length is composed of two parts, one of metal A and the other of metal B. This rod expands by 0.060 cm for the same change in temperature. The portion made of metal A has the length
    (1) 20 cm (2) 10 cm
    (3) 15 cm (4) 18 cm

23. The motion of a simple pendulum excuting S.H.M. is represented by following equation.
    $Y = A \sin(\pi t + \phi)$ where time is measured in second. The length of pendulum is :
    (1) 97.23 cm   (2) 25.3 cm
    (3) 99.4 cm   (4) 406.1 cm

24. Water falls from a height 500 m. The rise in temperature of water at bottom if whole of energy remains in water, will be (specific heat of water is c=4.2 kJ kg^{-1})
    (1) 0.23°C   (2) 1.16°C
    (3) 0.96°C   (4) 1.02°C

25. The moment of inertia of a body does not depend upon
    (1) The angular velocity of the body
    (2) The mass of the body
    (3) The distribution of mass in the body
    (4) The axis of rotation of the body

26. Acceleration versus velocity graph of a particle moving in a straight line starting form rest is as shown in figure. The corresponding velocity-time graph would be :
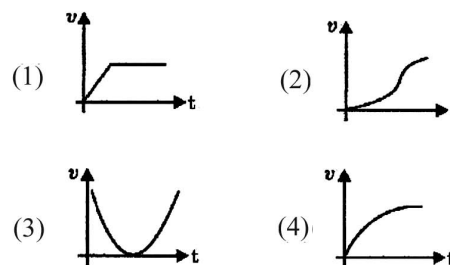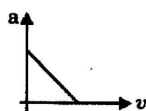
27. In which case the thermal conductivity increases from left to right
    (1) Al, Cu, Ag (2) Ag, Cu, Al
    (3) Cu, Ag, Al (4) Al, Ag, Cu

28. A train is moving with a constant speed along a circular track. The engine of the train emits a sound of frequency f. The frequency heard by the guard at rear end of the train is :
    (1) Less then f
    (2) Equal to f
    (3) Greater than f
    (4) May be greater than, less than or equal to f depending on the factors like speed of train, length of train and radius of circular track.

29. Two factories are sounding their sirens at 800 Hz. A man goes from one factory to the other at a speed of 2 m/s. The velocity of sound is 320 m/s. The number of beats heard by the person in 1 s will be
    (1) 2   (2) 4
    (3) 8   (4) 10

30. The graph between the applied force & the change in length of a wire within elastic limit is
    (1) a straight line with positive slope
    (2) a straight line, with negative slope
    (3) a straight line with zero slope
    (4) none of these

31. For three particles A, B and C moving along x-axis, $x - t$ graph is as shown below: Mark out the correct relationships between their average velocities between the points P and Q

    (1) $v_{av,A} > v_{av,B} = v_{av,C}$
    (2) $v_{av,A} = v_{av,B} = v_{av,C}$
    (3) $v_{av,A} > v_{av,B} > v_{av,C}$
    (4) $v_{av,A} < v_{av,B} < v_{av,C}$

32. A body of mass 5 kg is suspended by a spring balance on an inclined plane as shown in figure. The spring balance, measure
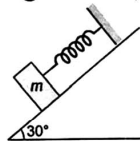
(1) 50 N   (2) 25 N
(3) 500 N   (4) 10 N

33. Sound waves travel at 350 m/s through a warm air and at 3500 m/s through brass. The wavelength of a 700 Hz acoustic wave as it enters brass from warm air
(1) Decreases by a factor 20
(2) Decreases by a factor 10
(3) Increases by a factor 20
(4) Increases by a factor 10

34. If air resistance is not considered in a projectile motion, the horizontal motion takes place with
(1) Constant velocity
(2) Constant acceleration
(3) Constant retardation
(4) Variable velocity

35. A *litre* of alcohol weighs
(1) Less in winter than in summer
(2) Less in summer than in winter
(3) Same both in summer and winter
(4) None of the above

SECTION - B
(Attempt any **10(Ten)** questions out of **15 (Fifteen)**)

36. From the top of tower a body A is projected vertically up, another body B is horizontally thrown and a third body C is thrown vertically down with same velocity. Then
(1) B strikes the ground with more velocity
(2) C strikes the ground with less velocity
(3) A, B, C strike the ground with same velocity
(4) A and C strike the ground with more velocity than B

37. Which law of thermodynamics leads to the concept of temperature ?
(1) Zeroth law   (2) First law
(3) Second law   (4) Both zeroth and first laws

38. A steel scale measures the length of copper wire as $80.0 cm$, when both are at $20°C$ (the calibration temperature for scale). What would be the scale read for the length of the wire when both are at $40°C$? (Given $\alpha_{steel} = 11 \times 10^{-6} per°C$ and $\alpha_{copper} = 17 \times 10^{-6} per°C$)
(1) $80.0096\ cm$ (2) $80.0272\ cm$
(3) $1\ cm$ (4) $25.2\ cm$

39. Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R.
Assertion A: Body 'P' having mass M moving with speed 'u' has head-on collision elastically with another body 'Q' having mass 'm' initially at rest. If m << M, body 'Q' will have a maximum speed equal to '2u' after collision.
Reason R : During elastic collision, the momentum and kinetic energy are both conserved. In the light of the above statements, choose the most appropriate answer from the options given below:
(1) Both A and R are correct and R is the correct explanation of A
(2) A is not correct but R is correct
(3) A is correct but R is not correct
(4) Both A and R are correct but R is NOT the correct explanation of A

40. In an elastic collision of two particles the following is conserved
(1) Momentum of each particle
(2) Speed of each particle
(3) Kinetic energy of each particle
(4) Total kinetic energy of both the particles

41. A refrigerator is thermally equivalent to a box of cork board 90 mm thick and 6 m^2 in inner surface area, the thermal conductivity of cork being 0.05 W/mK. The motor of the refrigerator runs 15% of the time while the door is closed. The inside wall of the door, when it is closed, is kept, on an average, 22°C below the temperature of the outside wall. The rate at which heat is taken from the interior wall while the motor is running is
(1) 400 W   (2) 500 W
(3) 300 W   (4) 250 W

42. A body is coming with a velocity of 72 kmh^{-1} on a rough horizontal surface of coefficient of friction 0.5. If the acceleration due to gravity is 10 ms^{-2}, find the minimum distance it can be stopped
(1) 400 m   (2) 40 m
(3) 0.40 m   (4) 4 m

43. The value of C_V for one mole of neon gas is
(1) $\frac{1}{2}R$ (2) $\frac{3}{2}R$
(3) $\frac{5}{2}R$ (4) $\frac{7}{2}R$

44. Water is used to cool radiators of engines, because :
(1) of its lower density   (2) it is easily available
(3) it is cheap   (4) it has high specific heat

45. The moment of inertia of a body rotating about a given axis is $12.0 \ kgm^2$ in the SI system. What is the value of the moment of inertia in a system of units in which the unit of length is 5 cm and the unit of mass is 10 g?
(1) 2.4×10^3 (2) 6.0×10^3
(3) 5.4×10^5 (4) 4.8×10^5

46. Liquid oxygen at 50 K is heated to 300 K at constant pressure of 1 atm. The rate of heating is constant. Which of the following graphs represents the variations of temperature with time?
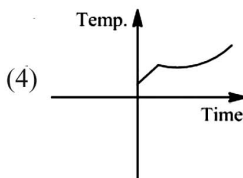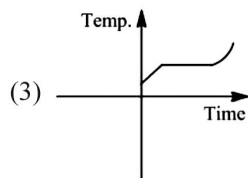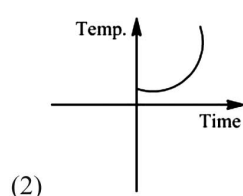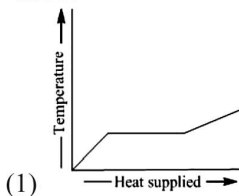
47. If temperature of an object is $140°F$, then its temperature in centigrade is
(1) 105°C   (2) 32°C
(3) 140°C   (4) 60°C

48. A force applied by an engine of a train of mass 2.05×10^6 kg changes its velocity from 5 m/s to 25 m/s in 5 minutes. The power of the engine is
(1) $1.025MW$ (2) 2.05MW
(3) $5MW$ (4) 6MW

49. Which of the following factors does not affect the angle of contact?
(1) Nature of vessel   (2) Temperature
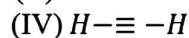(3) Nature of liquid   (4) Surface area
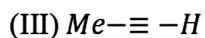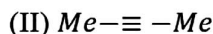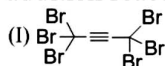
50. In an adiabatic process where pressure is increased by $\frac{2}{3}$% if $\frac{C_p}{C_v} = \frac{3}{2}$, then the volume decreases by about
(1) $\frac{4}{9}$%   (2) $\frac{2}{3}$%
(3) 4%   (4) $\frac{9}{4}$%

PART - II : CHEMISTRY

SECTION - A

51. Give the reactivity in the decreasing order of the following alkynes towards nucleophilic addition reaction with $MeO^{\ominus}/MeOH$

(I)

(II) $Me-\equiv-Me$

(III) $Me-\equiv-H$

(IV) $H-\equiv-H$

(1) (I)>(II)>(III)>(IV)
(2) (I)>(IV)>(III)>(II)
(3) (IV)>(III)>(II)>(I)
(4) (II)>(III)>(IV)>(I)

52. 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}

53. H_2SO_4 is added while preparing a standard solution of Mohr's salt to prevent:
(1) Hydration
(2) Reduction
(3) Hydrolysis
(4) Complex formation

54. A solution of KOH in water is called:
(1) Potash lye
(2) Soda lye
(3) Salt cake
(4) None of these

55. In the change of NO^+ to NO the electron is added to
(1) σ-orbital
(2) π-orbital
(3) σ^*-orbital
(4) π^*-orbital

56. Which of the following has not a lone pair over the central atom
(1) NH_3
(2) PH_3
(3) BF_3
(4) PCl_3

57. Which of the following statement is false
(1) H_2 molecule has one sigma bond
(2) HCl molecule has one sigma bond
(3) Water molecule has two sigma bonds and two lone pairs
(4) Acetylene molecule has three pi bonds and three sigma bonds

58. Which one of the elements has the maximum electron affinity
(1) F
(2) Cl
(3) Br
(4) I

59. A compound X on heating gives a colourless gas. This residue is dissolved in water to obtain Y. Excess CO_2 is bubbled through aqueous solution of Y when Z is formed. Z on gentle heating gives back X. The X is
(1) $CaCO_3$
(2) $Ca(HCO_3)_2$
(3) Na_2CO_3
(4) $NaHCO_3$

60. The percentage of oxygen in NaOH is:
(1) 40
(2) 16
(3) 8
(4) 1

61. Which of the following compound have 4 carbon atom in the parent chain ?

(1)

(2)

(3)

(4)
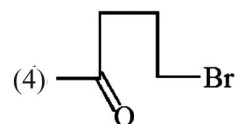
62. The equilibrium constant for the reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$ is K, then the equilibrium constant for the equilibrium $2NH_3 \rightleftharpoons N_2 + 3H_2$ is

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

**63.** Which of the following shows nitrogen with its increasing order of oxidation number?
(1) $NO < N_2O < NO_2 < NO_3^- < NH_4^+$
(2) $NH_4^+ < N_2O < NO < NO_2 < NO_3^-$
(3) $NH_4^+ < N_2O < NO_2 < NO_3^- < NO$
(4) $NH_4^+ < NO < N_2O < NO_2 < NO_3^-$

64. The structure of ICl_2^- is:
    (1) Trigonal
    (2) Octahedral
    (3) Square planar
    (4) Distorted trigonal bipyramid

65. A metal M readily forms its sulphate MSO_4 which is water-soluble. It forms its oxide MO which becomes inert on heating. It forms an insoluble hydroxide $M(OH)_2$ which is soluble in NaOH solution. Then M is :
    (1) Mg   (2) Ba
    (3) Ca   (4) Be

66. The gas used in the manufacture of ice-cream is:
    (1) CO_2 (2) N_2O
    (3) NO   (4) N_2O_3

67. Compare basic strength of the following :
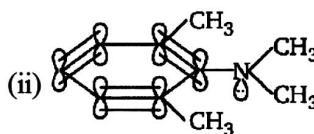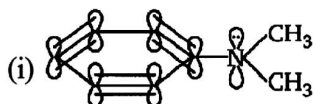
    (1) i > ii   (2) i = ii
    (3) ii > i   (4) i >> ii

68. The brown haze of photochemical smog is largely attributable to
    (1) NO
    (2) NO_2
    (3) CH_3COONO_2
         $\parallel$
          O
    (4) $CH_2 = CHCH = O$

69. Given enthalpy of formation of $CO_2(g)$ and $CaO(s)$ are $-94.0\ kJ$ and $-152\ kJ$ respectively and the enthalpy of the reaction, $CaCO_3(s) \to CaO(s) + CO_2(g)$ is 42 kJ. The enthalpy of formation of $CaCO_3(s)$ is :
    (1) $-42\ kJ$ (2) $-202\ kJ$
    (3) $+202\ kJ$ (4) $-288\ kJ$

70. The graph between $|\psi|^2$ and r (radial distance) is shown below. This represents
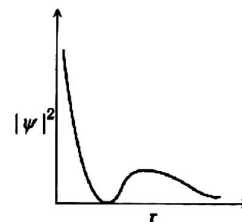
    (1) 3s orbital   (2) 1s orbital
    (3) 2p orbital   (4) 2s orbital

71. For the reaction,
    $H_2(g) + Cl_2(g) \to 2HCl(g) + x_1$ kJ   .... (i)
    $2HCl(g) \to H_2(g) + Cl_2(g) - x_2$ kJ   ...... (ii)
    Which of the following statement is correct?
    (1) x_1 and x_2 are numerically equal
    (2) x_1 and x_2 are numerically different
    (3) $x_1 - x_2 > 0$
    (4) $x_1 - x_2 < 0$

72. The solubility product of $BaSO_4$ at 25ºC is 1.0×10^{-9}. What would be the concentration of H_2SO_4 necessary to precipitate $BaSO_4$ from a solution of 0.01 M Ba^{2+} ions
    (1) 10^{-9} (2) 10^{-8}
    (3) 10^{-7} (4) 10^{-6}

73. In the following the most stable conformation of n-butane is
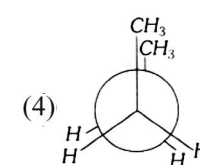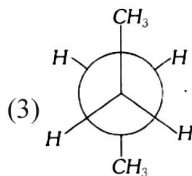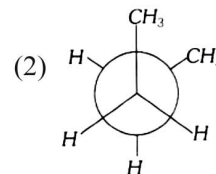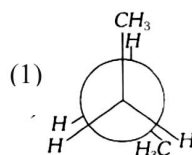
74. Which of the following series of transitions in the spectrum of hydrogen atom falls in visible region
    (1) Lyman series   (2) Balmer series
    (3) Paschen series   (4) Brackett series

75. Name of the compound given below is
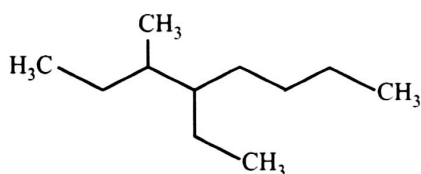
(1) 5-ethyl-6-methyloctane
(2) 4-ethyl-3-methyloctane
(3) 3-methyl-4-ethyloctane
(4) 2,3-diethylheptane

76. The number of molecule at NTP in 1 ml of an ideal gas will be
(1) 6×10^{23}
(2) 2.69×10^{19}
(3) 2.69×10^{23}
(4) None of these

77. Ammonia on heating with carbon dioxide under pressure gives:
(1) NH_4HCO_3
(2) $(NH_4)_2CO_3$
(3) NH_2COONH_4
(4) $(NH_4)_2CO$

78. Which one of the following has minimum boiling point ?
(1) 1-Butene
(2) 1-Butyne
(3) n-Butane
(4) Isobutane

79. Least malleable and ductile metal is:
(1) Au
(2) Ag
(3) Ni
(4) Bi

80. The value of gas constant R in SI unit is:
(1) $83 \; erg \; K^{-1}mol^{-1}$
(2) $0.082 \; litre \; atm$
(3) $8.3 \; J \; mol^{-1}K^{-1}$
(4) $0.987 \; cal \; mol^{-1}K^{-1}$

81. NH_3 can't be obtained by
(1) Heating of NH_4NO_3 or NH_4NO_2
(2) Heating of NH_4Cl or $(NH_4)_2CO_3$
(3) Heating of NH_4NO_3 with NaOH
(4) Reaction of AlN or Mg_3N_2 or $CaCN_2$ with H_2O

82. When potassium permanganate is titrated against ferrous ammonium sulphate in acidic medium, the equivalent weight of potassium permanganate is:
(1) $\dfrac{\text{molecular weight}}{3}$
(2) $\dfrac{\text{molecular weight}}{5}$
(3) $\dfrac{\text{molecular weight}}{2}$
(4) $\dfrac{\text{molecular weight}}{10}$

83. Which of the following is most volatile?
(1) HF
(2) HCl
(3) HBr
(4) HI

84. The number of lone pairs of electron on Xe in $XeOF_4$ is:
(1) 1
(2) 2
(3) 3
(4) 4

85. For the reaction $N_2O_4(g) \rightleftharpoons 2NO_2(g)$, the degree of dissociation at equilibrium is 0.2 at 1 atm pressure. The equilibrium constant K_p will be
(1) 1/2
(2) ¼
(3) 1/6
(4) 1/8

SECTION - B
(Attempt any **10(Ten)** questions out of **15 (Fifteen)**

86. The number of wave made by an electron moving in an orbit having maximum magnetic quantum number +3 is :
(1) 4
(2) 3
(3) 5
(4) 6

87. Pick out the molecule which has zero dipole moment
(1) NH_3
(2) H_2O
(3) BCl_3
(4) SO_2

88. At ordinary temperature and pressure, among halogens, chlorine is a gas, bromine is a liquid and iodine is a solid. This is because:
(1) The specific heats are in the order $Cl_2 > Br_2 > I_2$
(2) Intermolecular forces among molecules of chlorine are the weakest and those of iodine the strongest
(3) The order of density is $I_2 > Br_2 > Cl_2$
(4) The order of stability is $I_2 > Br_2 > Cl_2$

89. One mole of nitrogen is mixed with 3 mole of hydrogen in a closed 3 litre vessel. 20% of nitrogen is converted into NH_3. Then K_c for the $\dfrac{1}{2} N_2 + \dfrac{3}{2} H_2 \rightleftharpoons NH_3$ is:
(1) 0.36 litre mol^{-1}
(2) 0.46 litre mol^{-1}
(3) 0.5 litre mol^{-1}
(4) 0.2 litre mol^{-1}

90. $Be(OH)_2$ is insoluble in water, while $Ba(OH)_2$ is highly soluble due to
(1) Lattice energy difference
(2) Common ion effect
(3) Bond order
(4) Hard acid

91. Tautomerism is exhibited by
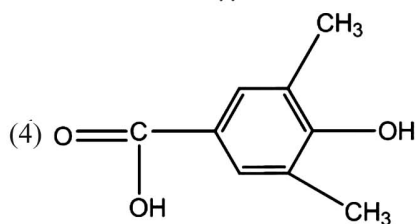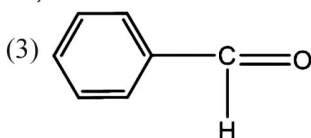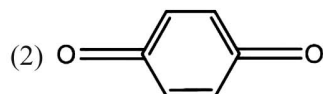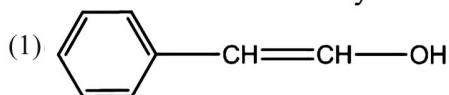
92. The correct order of increasing bond angles in the following triatomic species is:
(1) $NO_2^- < NO_2 < NO_2^+$
(2) $NO_2^+ < NO_2 < NO_2^-$
(3) $NO_2^+ < NO_2^- < NO_2$
(4) $NO_2^- < NO_2^+ < NO_2$

93. Compare relative stability of following carbocation :
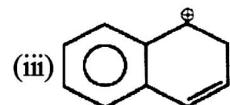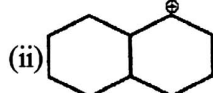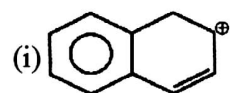
(1) i > ii > iii
(2) iii > i > ii
(3) i > iii > ii
(4) iii > ii > i

94. Which one has pH 12
(1) 0.01 M KOH
(2) 1 N KOH ml
(3) 1 N NaOH ml
(4) 1 N $Ca(OH)_2$ ml

95. Ammonium compound not used as a fertilizer is:
(1) $(NH_4)_2SO_4$
(2) $(NH_4)_2CO_3$
(3) NH_4NO_3
(4) CAN(calcium ammonium nitrate)

96. The isomers which can be converted into another forms by rotation of the molecules around single bond are
(1) Geometrical isomers
(2) Conformers
(3) Enantiomers
(4) Diastereomers

97. A certain orbital has no angular nodes and two radial nodes. The orbital is
(1) 2s
(2) 3s
(3) 3p
(4) 2p

98. For the Balmer series in the spectrum of H atom,
$$\bar{v} = R_H \left\{ \frac{1}{n_1^2} - \frac{1}{n_2^2} \right\},$$ the correct statements among (I) to (IV) are:
(I) As wavelength decreases, the lines in the series converge
(II) The integer n_1 is equal to 2
(III) The lines of longest wavelength corresponds to $n_2 = 3$
(IV) The ionization energy of hydrogen can be calculated from wave number of these lines
(1) (I), (III), (IV)
(2) (I), (II), (III)
(3) (I), (II), (IV)
(4) (II), (III), (IV)

99. The decreasing leaving group order of the following compounds is:
i.NH_3 ii.PH_3 iii.AsH_3 iv.SbH_3
(1) (i)>(ii)>(iii)>(iv)
(2) (iv)>(iii)>(ii)>(i)
(3) (ii)>(i)>(iii)>(iv)
(4) (ii)>(i)>(iv)>(iii)

100. The number of paired electron in oxygen molecule are
(1) 14
(2) 8
(3) 16
(4) 12

PART - III : BOTANY

SECTION - A

101. What is common for plasmids and mesosomes ?
(1) Both of these are made of nucleotides
(2) Both of these are concerned with molecular respiration
(3) Both of these are found in prokaryotes
(4) Both of these are found in eukaryotes

102. Ringing/girdling experiments demonstrate
(1) phloem is responsible for translocation of food
(2) xylem is responsible for ascent of sap
(3) transpiration pull
(4) both (1) and (2).

103. One of the synthetic auxin is
Or
Flowering in pineapple is promoted by
(1) NAA   (2) IAA
(3) GA   (4) IBA

104. The gynoecium consists of many free pistils in flowers of
(1) Aloe·   (2) tomato
(3) Papaver   (4) Michelia.

105. The hormone reponsible for phototropism is
(1) Auxin   (2) C_2H_4
(3) ABA   (4) GA

106. Crossing over that results in genetic reconbination in higher organisms occurs between
(1) Sister chromatids of bivalent
(2) Non-sister chromatids of a bivalent
(3) Two daughter nuclei
(4) Two different bivalent

107. In plant cells, the vacuoles can occupy upto____% of the volume of the cell.
(1) 30   (2) 20
(3) 10   (4) 90

108. Intercalary meristem results in
(1) Secondary growth (2) Primary growth
(3) Apical growth   (4) None of these

109. Hydrogen is obtained by the plant mostly through
(1) Salts   (2) Water
(3) Air   (4) Both (2) and (3)

110. Bulliform cells :
(1) Are found in grasses
(2) Has no role in roiling of leaves
(3) Are absent in monocots
(4) Are present in dicot leaves

111. NADPH is generated through
(1) photosystem I   (2) photosystem II
(3) anerobic respiration (4) glycolysis

112. The nature of cells occurring in medulla is
(1) parenchymatous   (2) sclerenchymatous
(3) collenchymatous   (4) suberized

113. During mitosis ER and nucleolus begin to disappear at
(1) Late prophase   (2) Early metaphase
(3) Late metaphase   (4) Early prophase

114. Select the correct statement for nucleolus :
(1) It is a site for mRNA synthesis
(2) Large and more numerous nucleoli are present in cells actively carrying out protein synthesis
(3) Nucleolus contain nucleoplasm
(4) Nucleolus is a single membrane bound structure

115. Intercalary meristem is a derivative of
(1) Lateral meristem   (2) Promeristem
(3) Primary meristem   (4) Secondary meristem

116. From which part and type of a plant the following is a description of many vascular bundles, polyarch, closed, radial :
(1) dicot stem T.S.
(2) monocot root T.S.
(3) dicot root T.S.
(4) monocot stem T.S.

117. Bicarpellary syncarpous gynoecium, parietal placentation, tetradynamous stamens and siliqua fruit are characteristic features of family
(1) Cucurbitaceae   (2) Cruciferae
(3) Compositae   (4) Solanaceae

118. When generic name is repeated in specific name of a plant it is called
Or
In fish, *Catla catla* the specific name is identical with the generic name, thus it is an example of
(1) Synonyms   (2) Antonyms
(3) Tautonyms   (4) None of the above

119. Which of the following gymnosperm is a bushy trailing shrub?
(1) *Ephedra*,   (2) *Cycas*
(3) *Pinus*   (4) *Araucaria*

120. Study the following :

|	List-I		List-II
A	Oxygen evolving complex	I.	Potassium ferric oxalate
B	Proton gradient	II.	High oxygen concentration
C	Hill reagent	III.	ATP synthesis
D	Photorespiration	IV.	Phaeophytin
		V.	Photolysis of water

The correct match is :

	A	B	C	D
(1)	V	III	I	II
(2)	I	II	IV	V
(3)	V	I	IV	II
(4)	I	IV	III	V

121. The given figure shows four coleoptiles set up at the start of an experiment
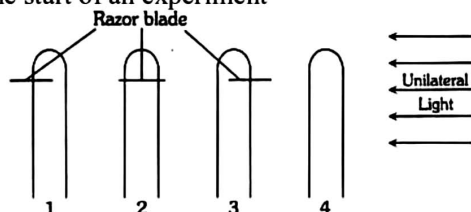
Which two coleoptiles will bend towards the source
(1) 3 and 4
(2) 2 and 3
(3) 1 and 4
(4) 1 and 2

122. Which of the following pigments are found in brown algae?
(1) Chl a, Chl c
(2) Chl a, Chl d
(3) Chl a, Chl c and fucoxanthin
(4) Chl a, phycoerythrin

123. Static concept of specis was put forward by
(1) De candolle
(2) Linnaeus
(3) Theophrastus
(4) Darwin

124. In conifers, transpiration is reduced due to the presence of :
(1) Needle-like leaves
(2) Thick cuticle in leaves
(3) Sunken stomata in leaves
(4) All are correct

125. Centriole replicates during
(1) Interphase
(2) Early prophase
(3) Late prophase
(4) Late telophase.

126. What is true for the structures marked as **A** and **B** ?
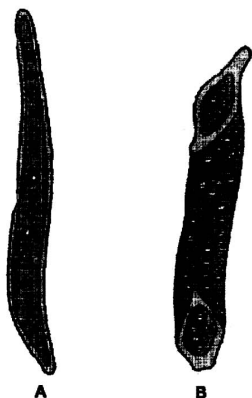
(1) **A** is evolutionarily more advanced than **B**
(2) **A** possess pits but **B** lack pit formation
(3) **A** is devoid of protoplasm whereas **B** posses it
(4) **A** transports water and minerals and **B** also transports water and minerals

127. Stomatal movement is not affected by
(1) Temperature
(2) Light
(3) CO_2 concentration
(4) O_2 concentration

128. Ribosomes are the centre for
(1) respiration
(2) photosynthesis
(3) protein synthesis
(4) fat synthesis

129. Lipids are arranged within the membrane with
(1) polar heads toward inner side and the hydrophobic tails toward outerside
(2) both heads and tails toward outerside
(3) heads toward outerside and tail towards inside
(4) both heads and tails toward innerside.

130. A: There is division of labour within the chloroplast.
R: function of chloroplast is to trap sunlight only

(1) Both A and R are correct and R is the correct explanation of A
(2) A is not correct but R is correct
(3) A is correct but R is not correct
(4) Both A and R are correct but R is NOT the correct explanation of A

131. How many turns of Calvin cycle yield one molecule of glucose ?
(1) Eight
(2) Two
(3) Six
(4) Four

132. In a botanical garden, labelling of plants indicates
(1) scientific name only
(2) scientific name and family
(3) common name, scientific name and order
(4) common name only

133. Evergreen trees remain green throughout the year on account of
(1) Absence of leaf fall
(2) Leaves falling in small numbers at intervals
(3) Supply of the moisture throughout the year
(4) Cold climate

134. r-phycoerythrin to character of algae with ….. as forge product :
(1) Algin
(2) Agar
(3) Carrageen
(4) Floridean starch

135. Inclusion bodies of blue-green, purple and green photosynthetic bacteria are
(1) Microtubules
(2) Contractile vacuoles
(3) Gas vacuoles
(4) Centroles

SECTION - B
(Attempt any **10(Ten)** questions out of **15 (Fifteen)**)

136. Dichlorophenyl dimethyl urea (DCMU) :
(1) Inhibits O_2 evolution and non-cyclic photophosphory lation
(2) Promotes O_2 evolution and non-cyclic photophospho rylation
(3) Both (1) and (2)
(4) None of the above

137. In which of the following, all three are macronutrients?
(1) Boron, zinc, manganese
(2) Iron, copper, molybdenum
(3) Molybdenum, magnesium, manganese
(4) Nitrogen, calcium, phosphorus

138. The formation of recombination nodules and terminalisation occur respectively during :
(1) Pachytene and diakinesis
(2) Leptotene and zygotene
(3) Zygotene and diakinesis
(4) Diplotene and diakinesis

139. What amount of energy is released from glucose during lactic acid fermentation ?
(1) More than 18%   (2) About 10%
(3) Less than 7%   (4) Approximately 15%

140. Balbiani rings (puffs) are sites of
(1) DNA replication
(2) RNA and protein synthesis
(3) synthesis of polysaccharides
(4) synthesis of lipids

141. Gemmae are multicellular green structures for vegetative propagation. These are found inside gemma cups in
(1) *Riccia* capsule
(2) *Marchantia* thallus
(3) *Funaria* protonema
(4) *Polytrichum thallus.*

142. The monovalent ions usually_____membrane permeability whereas divalent ions usually_____it.
(1) Decrease, decrease
(2) Increase, increase
(3) Increase, decrease
(4) Decrease, increase

143. Golgi complex is specialized from:
(1) Energy transduction
(2) Glycosidation of lipids
(3) Digestione
(4) Conversion of energy

144. The final electron acceptor during the light reaction of photosynthesis is :
(1) Chlorophyll-*a*   (2) Ferredoxin
(3) Plastoquinone   (4) Cytochromes

145. I. C_2H_4 promotes leaf senescence
II. C_2H_4 speeds the ripening of fruits
III. C_2H_4 causes apical hook formation
IV. C_2H_4 promotes horizontal growth of seeding and swelling of axis
V. C_2H_4 promotes male flowers in cucumber thereby increasing the yield Which one is false ?
(1) All   (2) I and V
(3) II and IV   (4) V

146. Thick cuticle, sunken stomata are found in leaves of:
(1) Hydrophytes   (2) Xerophytes
(3) Mesophytes   (4) Epiphytes

147. Which is not an antitranspirant:
(1) Low viscosity resin   (2) BAP
(3) Silicon oil   (4) PMA

148. A scientist having made significant contribution in the field of classification is
(1) Pasteur   (2) Oparin
(3) Darwin   (4) Linnaeus

149. Water soluble pigment present in cell vacuole is
(1) Anthocyanin   (2) Carotene
(3) Xanthophyll   (4) Chlorophyll.

150. The process of transfer of amino group from one amino acid to the keto group of a keto acid is called_____.
(1) oxidative amination   (2) reduciive amination
(3) transamination   (4) deamination

PART - IV : ZOOLOGY

SECTION - A

151. Pons Varolii connects the lateral parts of
(1) cerebrum   (2) cerebellum
(3) medulla oblongata (4) pituitary.

152. Our paired eyes are located in sockets of skull called :
(1) Orbicules   (2) Orbit
(3) Ocelle   (4) Ostiole

153. The structural and functional unit between the developing foetus and maternal body is called :
(1) Yolk sac   (2) Cervix
(3) Vagina   (4) Placenta

154. *Mycoplasma* causes a disease :
(1) Tobacco wilt   (2) Citrus canker
(3) Apple fireblight   (4) Little leaf diseases

155. Which of the following is the simplest amino acid?
(1) Tyrosine   (2) Asparagine
(3) Glycine   (4) Alanine

156. Match the following and mark the correct option
Column I	Column II
A. Fast muscle fibres	i. Myoglobin
B. Slow muscle fibres	ii. Lactic acid
C. Actin filament	iii. Contractile unit
D. Sarcomere	iv. I-band

Options
(1) A-i, B-ii, C-iv, D-iii (2) A-ii, B-i, C-iii, D-iv
(3) A-ii, B-i, C-iv, D-iii (4) A-iii, B-ii, C-iv, D-i

157. The medullary pyramic of kidney projects into :
(1) Calyces   (2) Ureter
(3) Renal capsule   (4) Cortex

158. Which one is called as sole member of kingdom monera
(1) Cyanobacteria   (2) Bacteria
(3) Archebacteria   (4) All above

159. The nerves leading to the central nervous system are called
(1) Efferent   (2) Afferent
(3) Motor   (4) None

160. You are watching a horror movie and you notice that your heart is beating fast and mouth is dry. It is because of
(1) Fight and flight response
(2) Autonomic nervous system
(3) Sympathetic nervous system
(4) Both (1) and (3)

161. What is true about pituitary glands?
(1) it is located in a bony cavity called sella tursica
(2) it is attached to hypothalamus by a stalk
(3) pars distalis secretes various hormones which are under the control of hypothalamus
(4) all of the above

162. The given figure is associated with myosin monomer (meromyosin). Identify A to C
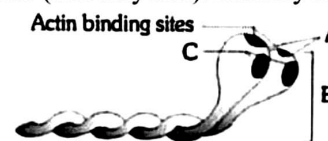
(1) A - cross arm, B - head, C - ATP binding sites
(2) A - head, B - cross arm, C - ATP binding sites
(3) A - head, B - cross arm, C - Ca42 binding sites
(4) A - head, B - cross arm, C - GTP binding sites

163. Lumbar vertebra are found in
(1) Neck region   (2) Abdominal region
(4) Hip region   (4) Thorax

164. Match List-I with List-II.
	List-I		List-II
(A)	Protein	(i)	C=C double bonds
(B)	Unsaturated fatty acid	(ii)	Phosphodiester bonds
(C)	Nucleic acid	(iii)	Glycosidic bonds
(D)	Polysaccharide	(iv)	Peptide bonds

Choose the correct answer from the options given below.
	(A)	(B)	(C)	(D)
(1)	(iv)	(iii)	(i)	(ii)
(2)	(iv)	(i)	(ii)	(iii)
(3)	(i)	(iv)	(iii)	(ii)
(4)	(ii)	(i)	(iv)	(iii)

165. Match the items in column I with those in column II and choose the correct option.
Column-I	Column-II
(A) Chelone	(1) Wall lizard
(B) Bangarus	(2) Viper
(C) Calotes	(3) Krait
(D) Hemidactylus	(4) Garden lizard
	(5) Turtle
	(6) Tortoise

Option :
(1) A-3   B-2   C-1   D-6
(2) A-5   B-3   C-4   D-1
(3) A-5   B-4   C-1   D-6
(4) A-2   B-5   C-1   D-6

166. In hypermetropia, the image is formed :
(1) Behind retina and is corrected by concave lens
(2) Before retina and is corrected by convex lens
(3) Before retina and is corrected by concave lens
(4) Behind retina and is corrected by convex lens

167. Trochophore larva occurs in
(1) Annelida and Porifera
(2) Coelenterata and Annelida
(3) Mollusca and Coelenterata
(4) Annelida and Mollusca

168. Receptor sites for neurotransmitters are presents on
(1) Membranes of synaptic vesicles
(2) Pre-synaptic membrane
(3) Tips of axons
(4) Post-synaptic membrane

169. Comprehension of spoken and written words take place in the region of
(1) association area   (2) motor area
(3) Wernicke's area   (4) Broca's area.

170. The junction between the axon of one neuron and the dendrite of the next is called
(1) a synapse   (2) constant bridge
(3) a joint   (4) junction point

171. During cardiac cycle each ventricle pumps out about 70 ml of blood which is called
(1) Stroke volume   (2) Cardiac output
(3) Tidal volume   (4) Residual volume

172. Which of the following is wrong ?
(1) Saliva is a type of exocrine secretion
(2) Cartilage is the only type of specialized connective tissue
(3) Areolar tissue is most widely distributed connective tissue
(4) Salivary glands, intestinal glands and most of the sweat glands are merocrine glands

173. Which of the following is found only in animals?
(1) Cholesterol   (2) Diosgenin
(3) Glycoprotein   (4) Vit. A

174. NaCl is transported by the ascending limb o Henle,s lop which is exchanged with
(1) DCT
(2) PCT
(3) Acending limb of vasa recta
(4) Descending limb of vasa recta

175. Which of the following does not favour the formation of large quantities of dilute urine ?
(1) Caffeine
(2) Renin
(3) Atrial natriuretic factor
(4) Alcohol

176. Wuchereria bancrofti is a common filarial worm. It belongs to phylum
(1) Platyhelminthes   (2) Aschelminthes
(3) Annelida   (4) Coelenterata

177. The urine of a man is very dilute and the quantity of urine is too much and dehydration has started in his body and he is very thirsty by the cause of
(1) Hypersecretion of ADH
(2) Hyposecretion of ADH
(3) Both (1) and (2)
(4) None of the above

178. Peptidoglycan is characteristic constituent of cell wall in:
(1) Archaebacteria and Eukaryotes
(2) Eubacteria and unicellular Eukaryotes
(3) Bacteria and Cyanobacteria
(4) Monera and Protista

179. ATPase enzyme required for muscular contraction is found in :
(1) Myosin   (2) Tropomyosin
(3) Actin   (4) Troponin

180. Epithelial tissue with thin flat cells appearing like packed tiles occurs on
(1) Inner lining of cheek
(2) Inner lining of stomach
(3) Inner lining of fallopian tubes
(4) Inner lining of ovary

181. Which one of the following flows directly into blood from the seat of its production to act on an organ away from it
(1) Enzyme   (2) Hormone (Renin)
(3) Blood   (4) Lymph

182. Which one of the following pairs of animals are similar to each other pertaining to the feature stated against them?
(1) Pteropus and Ornithorhyncus - viviparity
(2) Garden lizard and crocodile - three chambered heart
(3) Ascaris and Ancylostoma - metameric segmentation
(4) Sea horse and flying fish - cold blooded (poikilothermal)

183. Which of the following characters are related to lampreys?
(1) They have two nostrils
(2) They have a persistent notochord
(3) They have a bifid stomach
(4) They live in fresh water

184. Pectoral girdle constitute
(1) scapula and clavicle
(2) radius and ulna
(3) ilium and ischium
(4) maxilla and mandible.

185. Find the correct pathway of blood in the kidney.
I. Peritubular capillary and vasa recta
II. Renal vein
III. Efferent arteriole
IV. Renal artery
V. Glomerulus
VI. Afferent arteriole
(1) I→II→IV→ III→VI →V
(2) IV→VI→ V →I → II→ III
(3) IV→V →VI→I→ III →II
(4) IV→ VI→ V →III→I →II

SECTION - B
(Attempt any **10(Ten)** questions out of **15 (Fifteen)**)

186. Which of the following happens in the common cockroach?
(1) Malpighian tubules are excretory organs projecting out from the colon.
(2) Oxygen is transported by haemoglobin in blood.
(3) Nitrogenous excretory product is urea.
(4) The food is ground by mandibles and gizzard.

187. Bone marrow in some bones is important for
(1) Production of RBCs
(2) Breakdown of RBC
(3) Production of WBC
(4) Breakdown of WBCs

188. Nutrients absorbed by the blood capillaries of intestinal villi first go into
(1) liver through hepatic portal vein
(2) hepatic artery
(3) aorta
(4) posterior vena cava

189. Hearts of Pheretima are situated in the segments
(1) 10, 13, 16 and 17   (2) 7, 9, 12 and 13
(3) 4, 5, 10 and 13   (4) 11, 14, 17 and 18

190. Animals/organisms floating on the surface of water are
(1) Plankton   (2) Pelagic
(3) Benthon   (4) Neritic

191. One of the constituents of the pancreatic juice while poured into the duodenum in humans, is:
(1) trypsinogen   (2) chymotrypsin
(3) trypsin   (4) enterokinase

192. Modern detergents contain enzyme preparations of:
(1) Thermoacidophiles   (2) Thermophiles
(3) Acidophiles   (4) Alkaliphiles

193. In neurons the average resting membrane potential value is -70 mV. This minus (-) sign indicates that:
(1) Inner side of the membrane is negative relative to the outer side
(2) Outer side of the membrane is negative relative to the inner side
(3) Both the outer and inner sides are negative
(4) Outer side of the membrane is negative and inner side is positive

194. When 2 to 3 drops of benedict's reagent are added to a urine sample and heated gently, it turns yellow. This colour change indicates that
(1) Urine contains 2% glucose
(2) Urine contains 0.5% glucose
(3) Urine contains 1.5% glucose
(4) Urine contains 1% glucose

195. Which type of tissue correctly matches with its location?
Tissue	Location
(1) Transitional epithelium	- Tip of nose
(2) Cuboidal epithelium	- Lining of stomach
(3) Smooth muscle	- Wall of intestine
(4) Areolar tissue	- Tendons

196. Hepatic portal system is a
(1) vascular connection between the digestive tract and liver
(2) vascular connection between the liver and lungs
(3) vascular connection between the spleen and liver
(4) vascular connection between the digestive tract and spleen

197. Oxytocin helps in
(1) lactation
(2) child birth
(3) ovulation
(4) implantation of the embryo

198. Which of the following are not secondary metabolites in plants ?
(1) Rubber, gums
(2) Morphine, codeine
(3) Amino acids, glucose
(4) Vinblastin, curcumin

199. Air sac regulates buoyancy in :
(1) chondriochythes   (2) ostoecthythes
(3) whales   (4) none

200. Which of the following are saprophytic protists?
(1) Slime moulds   (2) Fungi
(3) Bacteria   (4) Dinoflagellates

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