

**NEET
(UG)**

PLatFORM
MEDICAL / IIT JEE / KVPY / BOARDS

**2021
MT-14**

the STOP to train minds

5, Central Road, 1st Floor, Jadavpur Kolkata-700 032.

 : 9836255656, 6291161329  : (033) 24833019

 : aimhigh.platform@gmail.com  : facebook.com/platformedu

Website : www.platformedu.org  : PLATFORM EDUCATION

Duration : 3 Hours

Max. Marks : 720

IMPORTANT INSTRUCTIONS

1. Immediately fill the particulars on this page of the Test Booklet with Blue/Black Ball Point Pen. Use of pencil is strictly prohibited.
2. The Answer sheet is kept inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars carefully.
3. The test is of 3 hours duration.
4. The Test Booklet consists of 200 question. The maximum marks are 720.
5. There are four parts in the question paper of Physics, Chemistry, Botany and Zoology Each correct answer will be awarded four marks. One mark will be deducted for every incorrect answer. No mark will be deducted for the questions which have not been nswered. Each subject will consist of two sections. Section A will consist of 35 Questions and Section B will have 15 Questions. Out of 15 Questions in section B, candidates can choose to attempt any 10 Questions. So, the total number of questions and utllization of time will remain the same.
6. Questions that have two or more responses marked on the OMR sheet will be considered as incorrect and one mark will be deducted for them.
7. No candidate is allowed to carry any textual material, printed or written, bits of papers, paper, mobile phone, any electronic device, etc.
8. Rough work is to be done on the space provided for this purpose in the Test Booklet only. This space is given at the bottom of each page and at the end of the booklet.
9. On completion of the test, the candidate must handoverthe Answer Sheet to the Invigilator on duty in the Room / Hall .
10. Do not fold or make any stray marks on the Answer Sheet.

Name of the Candidate (in Capital _____)

Roll Number :

Examination Centre Code :

Name of Examination Centre (in Capital letters) : _____

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

PHYSICS

PHYSICS (SEC-A)

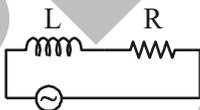
1. If a vector \vec{A} having a magnitude of 8 is added to a \vec{B} vector which lies along X axis, then the resultant of two vector lies along Y - axis and has magnitude twice that of \vec{B} . the magnitude of \vec{B} is

- (1) $6/\sqrt{5}$ (2) $\frac{12}{\sqrt{5}}$
 (3) $\frac{16}{\sqrt{5}}$ (4) $\frac{8}{\sqrt{5}}$

2. A satellite in force-free space sweeps stationary interplanetary dust at a rate $dM/dt = \alpha v$ where M is the mass, v is the velocity of the satellite and α is a constant. What is the decacceleration of the satellite

- (1) $\frac{-2\alpha v^2}{M}$ (2) $\frac{-\alpha v^2}{M}$
 (3) $\frac{+\alpha v^2}{M}$ (4) $-\alpha v^2$

3. When a material is inserted inside the inductor, current increases then the nature of material is



- (1) Ferromagnetic (2) Paramagnetic
 (3) Diamagnetic (4) All of the above
4. A body is projected along rough horizontal surface with a velocity 6 ms^{-1} . if the body comes to rest after the traveling 9 m., then co- efficient of sliding friction is (Take $g = 10 \text{ ms}^{-1}$)
- (1) 0.5 (2) 0.4
 (3) 0.6 (4) 0.2

5. The range of projectile is R when the angle of projection is 40° . For same velocity of projection and range, the other possible angle of projection is

- (1) 45° (2) 50°
 (3) 60° (4) 40°

6. Mark out the correct statememnt

- (1) Total work done by internal forces on a system is always zero
 (2) Total Work- done by internal forces on a system may sometimes be zero
 (3) Total work done by friction can never be zero
 (4) Total work done by friction is always zero

7. Molten wax of mass m drops on block of mass M, which is oscillating on a frictionless table. select the correct option

- (1) amplitude dose not change
 (2) amplitude increases
 (3) times period decreases
 (4) time period increases.

8. If T is the surface tension of soap solution, the amount of work done in blowing a soap bubble from a diameter D and 2D is

- (1) $2\pi D^2 T$ (2) $4\pi D^2 T$
 (3) $6\pi D^2 T$ (4) $8\pi D^2 T$

9. Modulus of rigidity of a liquid is

- (1) Non - zero constant (2) Infinite
 (3) Zero (4) can not be predicted

10. Which of the following is not a correct statement

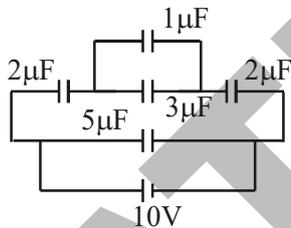
- (1) The wavelength of red light is greater than the wavelength of green light
 (2) The wavelength of blue light is smaller than the wavelength of indigo.
 (3) The frequency of green light is greater than the frequency of blue light
 (4) The frequency of violet is greater than the frequency of blue light

SPACE FOR ROUGH WORK

11. A balloon has volume of 2000 m^3 . It is filled with hydrogen $\rho = 0.09 \text{ kg/m}^3$. Its density of air is 1.29 kg/m^3 . It can lift a total weight of
- (1) 600 kg (2) 2400 kg
 (3) 300 kg (4) 1800 kg

12. A uniform metallic rod rotates about its perpendicular bisector with constant angular speed. If it is heated uniformly to raise its temperature slightly
- (1) Its speed of rotation increases
 (2) Its speed of rotation decreases
 (3) Its speed of rotation same
 (4) can not be predicted

13. The ratio of potential difference between $1 \mu\text{F}$ and $5 \mu\text{F}$ capacitors



- (1) 1 : 2 (2) 3 : 1
 (3) 1 : 5 (4) 10 : 1

14. For the Bohr's first orbit of circumference $2\pi r$, the de-Broglie wavelength of revolving electron will be
- (1) $2\pi r$ (2) πr
 (3) $\frac{1}{2\pi r}$ (4) $\frac{1}{4\pi r}$

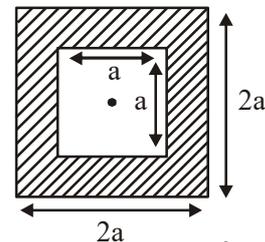
15. An AIR station is broadcasting the wavelength 300 metres. If the radiating power of the transmitter is 10 kW, then the number of photons radiated per second is
- (1) 1.5×10^{20} (2) 1.5×10^{31}
 (3) 1.5×10^{33} (4) 1.5×10^{35}

16. Two sound waves of length 1 m and 1.01 m in a gas produce 10 beats in 3 sec. The velocity of sound in gas is
- (1) 360 m/s (2) 300 m/s
 (3) 337 m/s (4) 330 m/s

17. A small steel ball of radius r is allowed to fall under gravity through a column of a viscous liquid of coefficient of viscosity η . After some time the velocity of the ball attains a constant value known as terminal velocity v_T . The terminal velocity depends on (i) the mass of the ball m , (ii) η , (iii) r and (iv) acceleration due to gravity g . Which of the following relations is dimensionally correct

- (1) $v_T \propto \frac{mg}{\eta r}$ (2) $v_T \propto \frac{\eta r}{mg}$
 (3) $v_T \propto \eta r m g$ (4) $v_T \propto \frac{m g r}{\eta}$

18. A square of side 'a' is cut from a square of side '2a' as shown in the figure. Mass of the remaining portion of the square is M . The moment of inertia of the remaining square about axis passing through its center and perpendicular to the plane will be

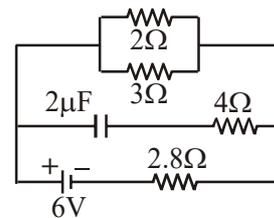


- (1) $\frac{Ma^2}{6}$ (2) $\frac{2Ma^2}{6}$
 (3) $\frac{4Ma^2}{6}$ (4) $\frac{5Ma^2}{6}$

19. Heat required to convert one gram of ice at 0°C into steam at 100°C is
 (given, $L_{\text{vap.}} = 536 \text{ cal/gm}$, $L_{\text{fusion}} = 80 \text{ cal/gm}$)
- (1) 100 calorie (2) 0.01 kilocalorie
 (3) 176 calorie (4) 1 kilocalorie

SPACE FOR ROUGH WORK

20. Which law states effect of pressure is same for all position
 (1) Pascal's law (2) Gallusac's law
 (3) Dalton's law (4) all of these
21. When the amount of work done is 333 cal and change in internal energy is 167 cal, then the heat supplied is
 (1) 166 cal (2) 333 cal
 (3) 500 cal (4) 400 cal
22. The intensity of sound gets reduced by 20 % on passing through a slab. The reduction in intensity on passing through two consecutive slabs is
 (1) 40 % (2) 36 %
 (3) 30 % (4) 40 %
23. A block is kept on an inclined plane of inclination θ of length l . The velocity of particle at the bottom of inclined is (the coefficient of friction is μ)
 (1) $\sqrt{2gl(\mu \cos \theta - \sin \theta)}$
 (2) $\sqrt{2gl(\sin \theta - \mu \cos \theta)}$
 (3) $\sqrt{2gl(\sin \theta + \mu \cos \theta)}$
 (4) $\sqrt{2gl(\cos \theta + \mu \sin \theta)}$
24. The earth radiates in the infra-red region of the spectrum. The spectrum is correctly given by
 (1) Wien's law
 (2) Rayleigh jeans law
 (3) Planck's law of radiation
 (4) Stefan's law of radiation
25. A dip circle is at right angles to the geo-magnetic meridian. What will be the apparent dip ?
 (1) 0° (2) 30°
 (3) 60° (4) 90°
26. The critical angle of a prism is 30° . The velocity light in the medium is
 (1) $1.5 \times 10^8 \text{ m/s}$ (2) $3 \times 10^8 \text{ m/s}$
 (3) $4.5 \times 10^8 \text{ m/s}$ (4) $2.5 \times 10^8 \text{ m/s}$
27. If the energy of a photon of sodium light ($\lambda = 580 \text{ nm}$) equals the band gap of semiconductor, the minimum energy required to create hole electron pair.
 (1) 1.5 eV (2) 3.2 eV
 (3) 2.1 eV (4) 4.1 eV
28. The ratio of the forces between two small spheres with constant charge (a) in air (b) in a medium of dielectric constant K is
 (1) 1 : K (2) K : 1
 (3) 1 : K^2 (4) K^2 : 1
29. The capacitance of a metallic sphere will be $1 \mu\text{F}$, if its radius is nearly
 (1) 9 km (2) 10 m
 (3) 1.11 m (4) 1.11 cm
30. Pressure-temperature relationship for an ideal gas undergoing adiabatic change is ($\gamma = C_p / C_v$)
 (1) $PT^\gamma = \text{constant}$ (2) $PT^{-1+\gamma} = \text{constant}$
 (3) $P^{\gamma-1}T^\gamma = \text{constant}$ (4) $P^{1-\gamma}T^\gamma = \text{constant}$
31. In the figure shown, the capacity of the condenser C is $2 \mu\text{F}$. The current in 2Ω resistor is
 (1) 9 A (2) 0.9 A
 (3) $\frac{1}{9} \text{ A}$ (4) $\frac{1}{0.9} \text{ A}$



SPACE FOR ROUGH WORK

32. The resolving power of a telescope whose lens has a diameter 1.22 m for a wavelength of 5000 \AA is
 (1) 2×10^5 (2) 2×10^8
 (3) 2×10^2 (4) 2×10^4
33. How much work to be done in decreasing the volume of an ideal gas by an amount of $2.4 \times 10^{-4} \text{ m}^3$ at normal temperature and constant normal pressure of $1 \times 10^5 \text{ N/m}^2$
 (1) 28 joule (2) 27 joule
 (3) 25 joule (4) 24 joule
34. Magnetic field intensity is defined as
 (1) Magnetic moment per unit volume
 (2) Magnetic induction force acting on a unit magnetic pole
 (3) Number of lines of force crossing per unit area
 (4) Number of lines of force crossing per unit volume
35. A conductor of 3 m in length is moving perpendicularly to magnetic field of 10^{-3} tesla with the speed of 10^2 m/s, then the e.m.f. produced across the ends of conductor will be
 (1) 0.03 volt (2) 0.3 volt
 (3) 3×10^{-3} volt (4) 3 volt
- PHYSICS (SEC-B)**
36. An inductive circuit contains resistance of 10Ω and an inductance of 20 H. If an ac voltage of 120 V and frequency 60 Hz is applied to this circuit, the current would be nearly
 (1) 0.32 amp (2) 0.016 amp
 (3) 0.48 amp (4) 0.80 amp
37. Two charged spheres of radii 10 cm and 15 cm are connected by a thin wire. No current will flow, if they have
 (1) The same charge on each
 (2) The same potential
 (3) The same energy
 (4) The same field on their surface
38. For a metallic wire, the ratio $\frac{V}{i}$ (V = the applied potential difference, i = current flowing) is
 (1) Independent of temperature
 (2) Increasing as the temperature rises
 (3) Decreases as the temperature rises
 (4) Increases or decreases as temperature rises, depending upon the metal
39. Two electric bulbs (60 W and 100 W respectively) are connected in series. The potential drop across bulb is
 (1) More in 100 W bulb
 (2) More in 60 W bulb
 (3) Same in both
 (4) data insufficient
40. A transparent plastic bag filled with air forms a concave lens. Now, if this bag is completely immersed in water than its behaves as
 (1) diverging lens (2) converging lens
 (3) equilateral prism (4) rectangular slab
41. Intensity at center in YDSE is I_0 . If one slit is covered then intensity at center will be
 (1) I_0 (2) $2I_0$
 (3) $I_0/4$ (4) $I_0/2$
42. An oscillator is nothing but an amplifier with
 (1) positive feedback
 (2) Large gain
 (3) No feedback
 (4) Negative feedback
43. The half-life period of radium is 1600 years. Its average life time will be
 (1) 3200 yrs (2) 4800 years
 (3) 2319 yrs (4) 4217 yrs

SPACE FOR ROUGH WORK

44. In Thomson's method of determining e/m of electrons
- (1) Electric and magnetic field are parallel to electrons beam
 - (2) Electric and magnetic fields are perpendicular to each other and perpendicular to electrons beam
 - (3) Magnetic field is parallel to the electrons beam
 - (4) Electric field is parallel to the electrons beam
45. An energy of 24.6 eV is required to remove one of the electrons from a neutral helium atom. The energy (in eV) required to remove both the electrons from a neutral helium atom is
- (1) 79.0
 - (2) 51.8
 - (3) 49.2
 - (4) 38.2
46. The correct thickness of a glass having $\mu_g = 1.5$, which permits equal number of wavelengths as that of 18 cm long column of water is [$\mu_g = 4/3$]
- (1) 12 cm
 - (2) 16 cm
 - (3) 18 cm
 - (4) 24 cm
47. A grind-stone starts revolving from rest, if its angular acceleration is 4.0 rad/sec^2 (uniform) then after 4 sec what is its angular displacement and angular velocity respectively
- (1) 32 rad, 16 rad/sec
 - (2) 16 rad, 32 rad/sec
 - (3) 64 rad, 32 rad/sec
 - (4) 32 rad, 64 rad/sec
48. When a cell is balanced on potentiometer wire, then balancing length is 125 cm. If resistance of 2 ohm is connected across the ends of cell, then balancing length is 100 cm, then internal resistance of cell is
- (1) 0.5Ω
 - (2) 0.25Ω
 - (3) 0.05Ω
 - (4) 5Ω
49. The valence band and conduction band of a solid overlap at low temperature, the solid may be
- (1) Metal
 - (2) A semiconductor
 - (3) an insulator
 - (4) all of these
50. Two charged particles traverse identical helical paths in completely opposite sense in a uniform magnetic field $\vec{B} = B_0 \hat{k}$
- (1) They have equal z - component of moment
 - (2) They must have equal charge
 - (3) They necessarily represent a particle, anti particle pair
 - (4) The charge to mass ratio satisfy $\left(\frac{e}{m}\right)_1 + \left(\frac{e}{m}\right)_2 = 0$
- CHEMISTRY (SEC-A)**
51. xL of N_2 at S.T.P. contains 3×10^{22} molecules. The number of molecules in $\frac{x}{2}$ L of ozone at S.T.P. will be
- (1) 3×10^{22}
 - (2) 1.5×10^{22}
 - (3) 1.5×10^{21}
 - (4) 1.5×10^{11}
52. A compound contains 36% C by mass. If each molecule contains two C atoms the number of moles of the compound in its 10 g is / are
- (1) 0.15
 - (2) 1.5
 - (3) 150
 - (4) 1500
53. The equivalent mass of potassium permanganate in strong alkaline medium is
- (1) $\frac{\text{Molar mass}}{5}$
 - (2) $\frac{\text{Molar mass}}{3}$
 - (3) $\frac{\text{Molar mass}}{2}$
 - (4) Molar mass itself
54. The freezing point of one molal NaCl, assuming NaCl to be 100% dissociated in water is : (molar depression constant is 1.86)
- (1) -2.72°C
 - (2) -3.72°C
 - (3) 2.72°C
 - (4) 3.72°C
55. Which of the following has the highest freezing point?
- (1) 1 n NaCl solution
 - (2) 1 m KCl solution
 - (3) 1 m $AlCl_3$ solution
 - (4) 1m $C_6H_{12}O_6$ solution

SPACE FOR ROUGH WORK

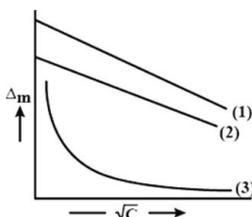
56. Van't Hoff factor more than unity indicates that the solute in solution is

- (1) Dissociated (2) Associated
(3) Both (1) and (2) (4) Cannot say anything

57. Molar conductance of KCl increases slowly with decrease in concentration because of

- (1) Increase in degree of ionisation
(2) Increase in total number of current carrying species
(3) Weakening of interionic attractions and increase in ionic mobilities
(4) Increase in hydration of ions

58. A graph of molar conductivity of three electrolytes (NaCl, HCl and NH₄OH) is plotted against \sqrt{C}



Which of the following options is correct?

1

(1) NaCl

(2) NH₄OH

(3) HCl

(4) NH₄OH

2

HCl

NaCl

NaCl

HCl

3

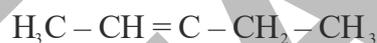
NH₄OH

HCl

NH₄OH

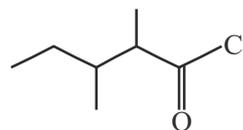
NaCl

59. Correct IUPAC name is



- (1) 3-ethylhex-2-ene
(2) 3-ethylpent-2-ene
(3) 3-ethylpent-3-ene
(4) 3-propylpent-2-ene

60. The IUPAC name is

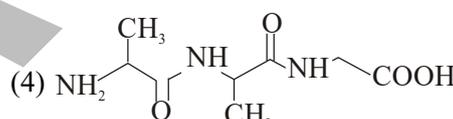
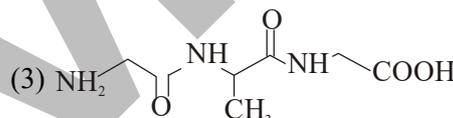
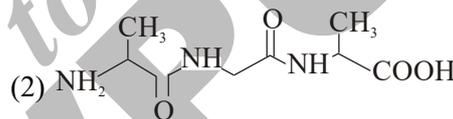
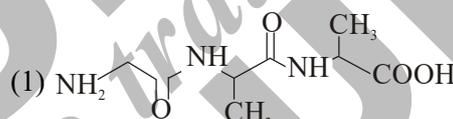


- (1) 3, 4-dimethyl pentanoyl chloride
(2) 1-chloro-1-oxo-2, 3-dimethyl pentane
(3) 2-ethyl-3-methyl butanoyl chloride
(4) 2, 3-dimethyl pentanoyl chloride

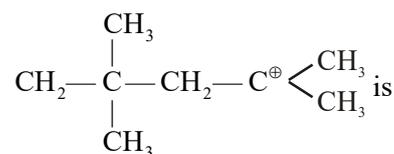
61. The helical structure of protein is stabilized by

- (1) dipeptide bonds (2) hydrogen bonds
(3) ether bonds (4) peptide bonds

62. A tripeptide is written as Glycine-Alanine-Glyche. The correct structure of the tripeptide is



63. The monomer of the polymer



- (1) $\text{H}_2\text{C}=\text{C} \begin{matrix} \text{CH}_3 \\ \text{CH}_3 \end{matrix}$, (2) $(\text{CH}_3)_2\text{C}=\text{C}(\text{CH}_3)_2$
(3) $\text{CH}_3\text{CH}=\text{CHCH}_3$ (4) $\text{CH}_3\text{CH}=\text{CH}_2$

SPACE FOR ROUGH WORK

64. Neoprene, a synthetic rubber contains which of the following element besides C and H?
 (1) N (2) O
 (3) Cl (4) F
65. $[AlF_6]^{3-}$ exists, while $[BF_6]^{3-}$ does not. Choose the most appropriate reason.
 (1) Boron is smaller in size
 (2) Boron cannot expand its valence shell
 (3) Aluminium shows variable valency
 (4) Aluminium is more electropositive
66. $A \longrightarrow A^+ + e, (E_1)$; $A^+ \longrightarrow A^{2+} + e, (E_2)$.
 The energy required to pull out the two electrons as shown above, respectively be E_1 and E_2 . Then the CORRECT relationship between the two energies is
 (1) $E_1 = E_2$ (2) $E_1 < E_2$
 (3) $E_1 > E_2$ (4) $E_1 \neq E_2$
67. The critical temperature of water is higher than that of O_2 because H_2O molecule has _____.
 (1) Less electrons than oxygen
 (2) Two covalent bonds
 (3) V-shape
 (4) Dipole moment
68. Which of the following is/are the use(s) of heavy water?
 (1) It is extensively used as a moderator in nuclear reactor
 (2) It is used in exchange reactions for the study of reaction mechanism
 (3) It is used for the preparation of other deuterium compounds
 (4) All of the above
69. If the value of ionic radius ratio $\left(\frac{r_c}{r_a}\right)$ is 0.52 in an ionic compound, the geometrical arrangement of ions in crystal is
 (1) Tetrahedral (2) Planar
 (3) Octahedral (4) Pyramidal
70. In a face-centred cubic lattice, atom X occupies the corners of the cube and atom Y occupies the face-centred positions. If one atom of Y is missing from one of the face-centred point, the formula of the compound is
 (1) X_2Y (2) X_2Y_5
 (3) X_2Y_2 (4) XY_2
71. 16g of oxygen and 3g of hydrogen are mixed and kept at 1 atm pressure and $0^\circ C$. The total volume occupied by the mixture will be nearly _____.
 (1) 22.4 litres (2) 33.6 litres
 (3) 448 litres (4) 44800 mL
72. 400 cm^3 of oxygen at $27^\circ C$ were cooled to $-3^\circ C$ without change in pressure. The contraction in volume will be
 (1) 40 cm^3 (2) 30 cm^3
 (3) 44.4 cm^3 (4) 360 cm^3
73. The combustion enthalpies of carbon, hydrogen and methane are $-395.5 \text{ kJ mol}^{-1}$, $-284.8 \text{ kJ mol}^{-1}$, $-284.8 \text{ kJ mol}^{-1}$ and $-890.4 \text{ kJ mol}^{-1}$, respectively, at $25^\circ C$. The value of standard formation enthalpies of methane at that temperature is :
 (1) 890.4 kJ mol^{-1} (2) $-298.8 \text{ kJ mol}^{-1}$
 (3) $-74.7 \text{ kJ mol}^{-1}$ (4) $-107.7 \text{ kJ mol}^{-1}$
74. Which of the following subshells does not exist?
 (1) 7s (2) 3d
 (3) 3f (4) 5d
75. If the velocity of hydrogen molecule is $5 \times 10^4 \text{ cm s}^{-1}$, then its de Broglie wavelength is
 (1) 2 Å (2) 4 Å
 (3) 8 Å (4) 10 Å
76. For a reaction $H_2 + I_2 \rightarrow 2HI$ at 721K, the value of equilibrium constant is 50. If 0.5 moles each of H_2 and I_2 is added to the system the value of equilibrium constant will be
 (1) 40 (2) 60
 (3) 50 (4) 30

SPACE FOR ROUGH WORK

77. In hydrolysis of a salt of weak acid and strong base $A^- + H_2O \rightarrow HA + OH^-$, the hydrolysis constant (K_h) is equal to...

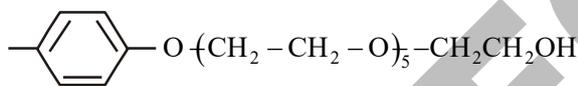
- (1) $\frac{K_w}{K_a}$ (2) $\frac{K_w}{K_b}$
 (3) $\sqrt{\frac{K_a}{C}}$ (4) $\frac{K_w}{K_a \times K_b}$

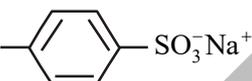
78. Name a substance which can be used as an antiseptic as well as disinfectant.

- (1) Iodine (2) Phenol
 (3) Acetone (4) Terpeneol

79. Which of the following is an example of liquid dishwashing detergent?

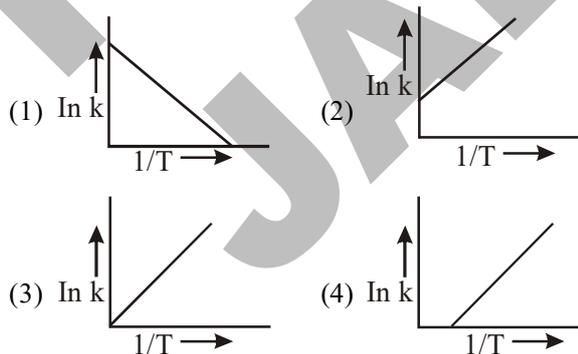
- (1) $CH_3(CH_2)_{10}-CH_2OSO_3^-Na^+$
 (2) C_9H_{19}



- (3) CH_3 -

- (4) $\left[CH_3(CH_2)_{15}-\overset{\overset{CH_3}{|}}{N}-\underset{\underset{CH_3}{|}}{CH_3} \right] Br^-$

80. According to Arrhenius equation rate constant (k) is equal to $Ae^{-E_a/RT}$. Which of the following options represent the graph of $\ln k$ vs $\frac{1}{T}$?



81. Which of the following alkaline earth metal sulphates has hydration enthalpy higher than the lattice enthalpy?

- (1) $SrSO_4$ (2) $CaSO_4$
 (3) $BeSO_4$ (4) $BaSO_4$

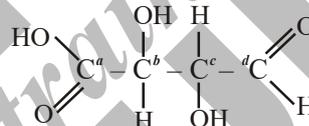
82. This compound forms a sodium salt upon reacting with $NaNH_2$.

- (1) C_2H_2 (2) CH_3NH_2
 (3) C_6H_6 (4) C_2H_6

83. n-propyl bromide on treatment with ethanolic potassium hydroxide produces

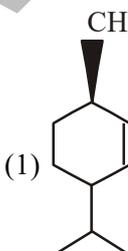
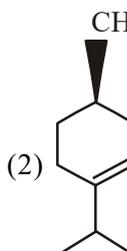
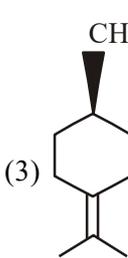
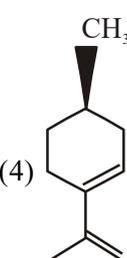
- (1) Propane (2) Propene
 (3) Proyne (4) Propanol

84. Which of the carbon atoms present in the molecule given below are asymmetric?



- (1) a, b, c, d (2) b, c
 (3) a, d (4) a, b, c

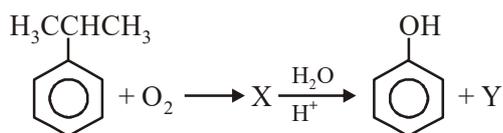
85.  \xrightarrow{NaOEt} ; Major product of the reaction is

- (1) 
 (2) 
 (3) 
 (4) 

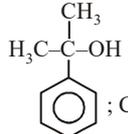
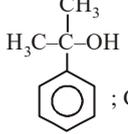
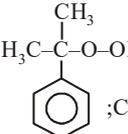
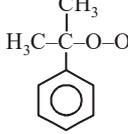
SPACE FOR ROUGH WORK

CHEMISTRY (SEC-B)

86. In the given reaction



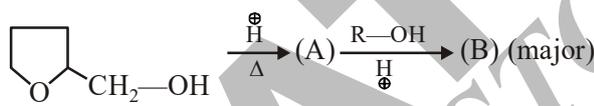
Choose 'X' and 'Y' for the reaction

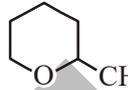
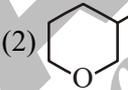
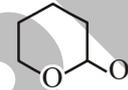
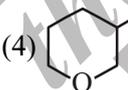
- | | | | |
|---|--|---|--|
| X | Y | X | Y |
| (1)  ; $\text{CH}_3\text{CH}_2\text{CH}_3$ | (2)  ; CH_3COCH_3 | (3)  ; $\text{CH}_3\text{CH}_2\text{CH}_3$ | (4)  ; CH_3COCH_3 |

87. Benzene diazonium chloride on reaction with phenol in basic medium gives

- (1) Diphenyl ether (2) p-Hydroxy azobenzene
(3) Chlorobenzene (4) Benzene

88. Product (B) in the following reaction is

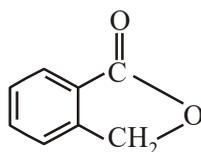


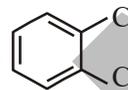
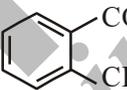
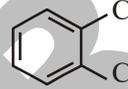
- (1)  (2) 
(3)  (4) 

89. Oxidation of toluene to benzaldehyde by the use of chromyl chloride is called

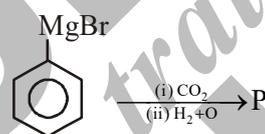
- (1) Wurtz reaction
(2) Fitting reaction
(3) Etard's reaction
(4) Rosenmund's reaction

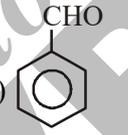
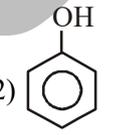
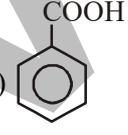
90. Which of the following reactants on reaction with conc. NaOH followed by acidification gives the following lactone as the only product?



- (1)  (2) 
(3)  (4) 

91. In the reaction product P is



- (1)  (2) 
(3)  (4) $\text{C}_6\text{H}_5\text{-CO-C}_6\text{H}_5$

92. Which of the following does not give a sulphur compound with a 1° amine?

- (1) Hinsberg reaction
(2) Mustard oil reaction
(3) Schotten-Baumann reaction
(4) conc. H_2SO_4

93. The structural formula of a compound is $\text{CH}_3\text{-CH}=\text{C}=\text{CH}_2$. The type of hybridisation at the four carbons from left to right are

- (1) $\text{sp}^2, \text{sp}, \text{sp}^2, \text{sp}^3$ (2) $\text{sp}^2, \text{sp}^3, \text{sp}^2, \text{sp}$
(3) $\text{sp}^3, \text{sp}^2, \text{sp}, \text{sp}^2$ (4) $\text{sp}^3, \text{sp}^2, \text{sp}^2, \text{sp}^2$

SPACE FOR ROUGH WORK

106. Which one act as Antagonish hormone of GA?

- (1) Auxin (2) Cytokinine
(3) ABA (4) Ethylene

107. What occurs during the light reaction of photosynthesis?

- (1) Chlorophyll is produced
(2) Water splits to form $2H^+$ and O_2
(3) CO_2 is given off as a waste
(4) Sugar is formed from CO_2 and water

108. Ploidy of endosperm in gymnosperm is

- (1) n (2) 2n
(3) 3n (4) 4n

109. Rate of photosynthesis is independent of

- (1) Intensity of light
(2) Quality of light
(3) Duration of light
(4) Temperature

110. Who proposed the fluid mosaic model of plasma membrane?

- (1) Camillo Golgi
(2) Schleiden and Schwann
(3) Singer and Nicolson
(4) Robert Brown

111. Match the columns and find out the correct combinations

A.	Endoplasmic reticulum	1.	Stack of cisternae
B.	Sphaerosome	2.	Store oils or fats
C.	Dictyosome	3.	Synthesis and storage of lipids
D.	Peroxisome	4.	Photorespiration
E.	Elaioplasts	5.	Detoxification of drugs

- (1) A-5, B-3, C-1, D-4, E-2
(2) A-5, B-3, C-2, D-4, E-1
(3) A-2, B-3, C-1, D-4, E-5
(4) A-4, B-3, C-1, D-5, E-2

112. How many of the following properties are related to lysosomes?

Membrane bound vesicular structure, hydrolases, basic pH, formed in the RER, capable of digesting nucleic acids.

- (1) Two (2) Three
(3) Four (4) Five

113. Mitosis results in the production of

- (1) Genetically identical daughter cells
(2) Two diploid daughter cells
(3) Genetically different daughter cells
(4) Both (1) and (2)

114. Which one is correct related to Law of dominance

- (1) Factors occurs in pairs.
(2) It cannot be explained the proportion of 3 : 1 obtained at the F_2
(3) In a similar pair of factors one member of the pair dominats and the other recessive
(4) The law of dominance is used to explain the expression of any one of the parental characters in a monohybrid cross in the F_1 .

115. Fruits are not found in gymnosperms because:

- (1) They are seed less
(2) They are not pollinated
(3) They have no ovary
(4) Fertilisation does not take place

116. The main plant body of bryophyte is

- (1) Haploid (2) Diploid
(3) Both (1) and (2) (4) Only diploid

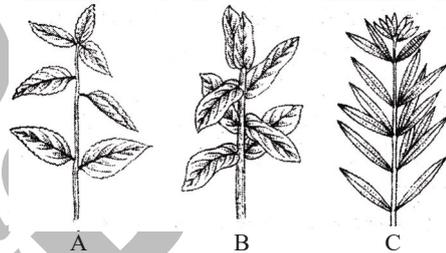
117. In Pteridophytes, which one is wrong about prothallus

- (1) It is multicellular
(2) It is free living
(3) It is inconspicuous
(4) Rarely photosynthetic thalloid gametophytes

SPACE FOR ROUGH WORK

- 118.** Some amino acids are coded by more than one codon. Hence the genetic code exhibits—
 (1) Specificity (2) Selectivity
 (3) Degeneracy (4) Regeneracy
- 119.** After a mutation at a genetic locus, the character of an organism changes due to change in
 (1) protein structure
 (2) DNA replication
 (3) protein synthesis pattern
 (4) RNA transcription pattern
- 120.** Find incorrect match—
 (1) VNTR — 0.1-20kb
 (2) SSR — 15-20kb
 (3) Laljee singh - Father of Indian DNA finger printing
 (4) Narendra Modi and Arvind Kejriwal → Differ in only 0.1% genes
- 121.** Nuclear membrane and nucleoli can be distinctly see in—
 (1) Prophase (2) Metaphase
 (3) Anaphase (4) Interphase
- 122.** The number of bivalents is 8 in prophase I. What is the number of chromosomes during anaphase II?—
 (1) 4 (2) 8
 (3) 16 (4) 32
- 123.** A student is performing a chemical analysis of xylem sap. This student should not expect to find much of
 (1) nitrogen (2) sugar
 (3) phosphorus (4) water
- 124.** Read the following statements
 (a) Important constituent of proteins involved in ETS
 (b) Activator of catalase
 (c) Important constituent of cytochrome
 (d) Essential for chlorophyll synthesis
 The above roles have been assigned to
 (1) Cu (2) Fe
 (3) Ca (4) Mo

- 125.** Law of independent assortment can be explained by
 (1) monohybrid cross
 (2) dihybrid cross
 (3) test cross
 (4) reciprocal cross
- 126.** Which of the following statements is **false** for the experimental model of Mendel?
 (1) It produces bisexual flowers
 (2) It may undergo cross-pollination naturally
 (3) Its flowers have vexillary aestivation
 (4) It is an annual plant
- 127.** Study the given figures and identify the kind of phyllotaxy.



- (1) A → Alternate, B → Opposite superposed
 C → Opposite decussate
 (2) A → Alternate, B → Opposite decussate
 C → Opposite superposed
 (3) A → Opposite decussate, B → Alternate
 C → Whorled
 (4) A → Opposite decussate, B → Whorled
 C → Alternate
- 128.** The mature seed of plants such as gram and peas possess no endosperm, because
 (1) these plants are not angiosperms
 (2) there is no double fertilisation in them
 (3) endosperm is not formed in them
 (4) endosperm gets used up by the developing embryo during seed development
- 129.** The placenta is attached to the developing seed near the
 (1) testa (2) hilum
 (3) micropyle (4) chalaza

SPACE FOR ROUGH WORK

BOTANY (SEC-B)

130. By applying which of the following practices, the contamination of a hydroponic culture medium can be reduced?

- (1) Changing the medium every week
- (2) Not using tools from the outdoor garden
- (3) Complete aeration in the hydroponic tank
- (4) All of these

131. The deficiencies of micronutrients not only affect the growth of the plants, but also their vital functions, such as photosynthesis and mitochondrial electron flow.

Among the list given below, which group of three elements will mostly affect, both photosynthesis and mitochondrial electron transport?

- (1) Cu, Mn and Fe
- (2) Co, Ni and Mo
- (3) Mn, Co and Ca
- (4) Ca, K and Na

132. The number of ATP produced when a molecule of glucose undergoes fermentation is

- (1) 4
- (2) 36
- (3) 2
- (4) 38

133. The α -ketoglutarate of Krebs' cycle produces an important amino acid called....

Fill up the blank with the given option

- (1) succinate
- (2) glycine
- (3) glutamate
- (4) alanine

134. If RQ is less than 1.0 in a respiratory metabolism, it would mean that

- (1) carbohydrates are used as the respiratory substrate
- (2) organic acids are used as the respiratory substrate
- (3) the oxidation of the respiratory substrate consumed more oxygen than the amount of CO_2 released
- (4) the oxidation of the respiratory substrate consumed less oxygen than the amount of CO_2 released

135. A plant of 13 hours critical day light will flower in which condition?

	Duration of light period	Duration of dark period
(1)	13	11
(2)	11	13
(3)	12	12
(4)	10	14

136. Match the following columns

Column I

- A. IAA
- B. ABA
- C. Ethylene
- D. GA
- E. Cytokinins

Column II

- i. Herring sperm DNA
- ii. Bolting
- iii. Stomatal closure
- iv. Weed-free lawns
- v. Ripening of fruits

- (1) A \rightarrow iv, B \rightarrow iii, C \rightarrow v, D \rightarrow ii, E \rightarrow i
- (2) A \rightarrow v, B \rightarrow iii, C \rightarrow iv, D \rightarrow ii, E \rightarrow i
- (3) A \rightarrow iv, B \rightarrow ii, C \rightarrow v, D \rightarrow iii, E \rightarrow ii
- (4) A \rightarrow v, B \rightarrow iii, C \rightarrow ii, D \rightarrow i, E \rightarrow iv

137. All plants exhibit alternation of generations. This means their life cycle :

- (1) Includes both haploid and diploid gametes
- (2) Shows only asexual reproduction
- (3) Has both a multicellular haploid stage and a multicellular diploid stage
- (4) Does not include meiosis

138. Life cycle of gymnosperm is

- (1) Haplontic
- (2) Haplo-diplontic
- (3) Diplontic
- (4) Diplo-haplontic

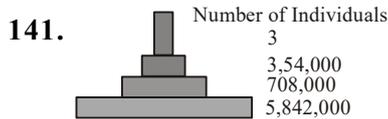
139. *Funaria* requires water because:

- (1) Fertilization occurs in presence of water only
- (2) *Funaria* is a hydrophyte
- (3) Plants need water for gametogenesis
- (4) Gametangia cannot develop without water

140. In an ecosystem, at a particular time, standing crop includes

- (1) total living material
- (2) total detritus
- (3) both (1) and (2)
- (4) total nutrients present in crop

SPACE FOR ROUGH WORK



In the given figure of pyramid of numbers in a grassland ecosystem, the number of herbivores are

- (1) 5,842,000 (2) 708,000
 (3) 3,54,000 (4) 3

142. Ecological diversity includes

- (1) species diversity (2) genetic diversity
 (3) ecosystem diversity (4) all of the above

143. Which of these is true about tropical environments?

- (1) There is more solar energy available in the tropical environment.
 (2) The environment in the tropics is stable, predictable, and less seasonal.
 (3) It has been subjected to less glaciations and thus has remained relatively undisturbed for millions of years.
 (4) All of these.

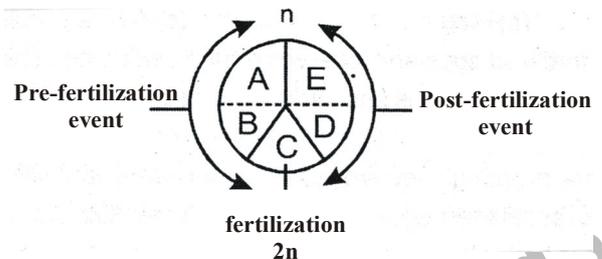
144. The ultraviolet radiations in the stratosphere are absorbed by

- (1) ozone (2) oxygen
 (3) carbon dioxide (4) sulphur dioxide

145. Deforestation has an alarming effect on

- (1) increase in grazing area
 (2) sunlight
 (3) weed control
 (4) soil erosion or desertification of habitat

146.



Identify the events (A, B, D and E) in the life of general reproduction-

- (1) A-Gamete transfer, B-Gametogenesis, D-Zygote formation, E-Embryogenesis
 (2) A- Gametogenesis, B- Gamete transfer, D-Zygote formation, E- Embryogenesis
 (3) A-Gametogenesis, B-Zygote formation, D-Gamete transfer, E- Embryogenesis
 (4) A-Gametogenesis, B-Gamete transfer, D-Embryogenesis, E-Zygote formation

147. Monoecious plant of *Chara* shows the occurrence of

- (1) Stamen and carpel on the same plant
 (2) Upper antheridium and lower oogonium on the same plant
 (3) Upper oogonium and lower antheridium on the same plant
 (4) Antheridiophore and archegoniophore on the same plant

148. Embryo sac is monosporic when it develops from

- (1) One of the four megaspores of a megaspore mother cell (MMC)
 (2) 3 megaspores of a megaspore tetrad
 (3) 2 megaspores
 (4) The MMC where meiosis has occurred but cytokinesis does not take place

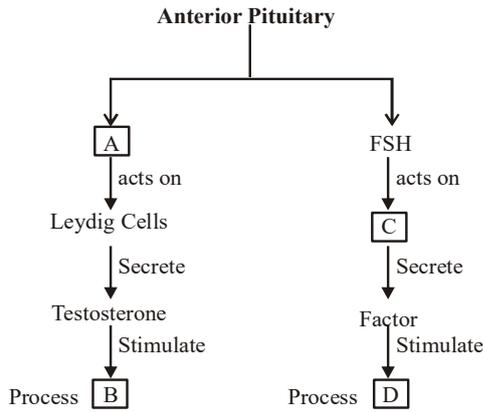
149. Active research is going on in many laboratories around the world to understand the genetics of apomixis

What is the purpose of such active research?

- (1) Hybrid plants are directly formed by apomixis
 (2) Apomixis is the method to produce seed without fertilization
 (3) To transfer apomictic genes into hybrid varieties which will prevent the loss of hybrid vigour with successive years
 (4) Apomixis produces genetically different individuals

SPACE FOR ROUGH WORK

150. Following is the flow chart, showing the influence of hormones on the testes in males. Choose the option which correctly fills the gaps represented by A, B, C and D



- (1) A-Androgen; B-Spermiation; C-Seminiferous tubule; D-Spermatogenesis
 (2) A-Inhibin; B-Spermiogenesis; C-Spermatogonia; D-Spermatogenesis
 (3) A-ICSH/ LH; B-Spermatogenesis; C-Sertoli cells; D-Spermiogenesis
 (4) A-LH; B-Spermiogenesis; C-Sustentacular cells; D-Spermatogenesis

ZOOLOGY (SEC-A)

151. Which is the second most abundant tissue among the following?
 (1) Epithelial tissue (2) Connective tissue
 (3) Muscular tissue (4) Nervous tissue
152. Intercellular matrix is "solid" while cartilage is pliable due to the presence of
 (1) Chondroitin salt (2) Ammonium salt
 (3) Magnesium salt (4) Metalloid salt
153. Co-enzyme of Vitamin Niacin is:
 (1) FMN/FAD (2) TPP
 (3) NAD/NADP (4) Pyridoxal phosphate
154. Enzyme Hexokinase belongs to
 (1) Hydrolases (2) Transferases
 (3) Oxidoreductases (4) Isomerases

155. The acidic nature of amino acids depends on
 (1) An amino group and a carboxyl group
 (2) R functional groups
 (3) Number of hydrogen atoms
 (4) All of these
156. Anal cerci present in
 (1) Both male and female cockroach
 (2) Male cockroach
 (3) Female cockroach
 (4) None of these
157. Which type of selection is industrial melanism, observed in moth, Biston betularia?
 (1) Stabilising (2) Directional
 (3) Disruptive (4) Adaptive
158. Hardy - Weinberg equilibrium is affected by
 (1) Gene migration (2) Gene flow
 (3) Gene drift (4) All the above
159. About _____ mya, the dinosaurs suddenly disappeared from the earth.
 (1) 75 (2) 55
 (3) 165 (4) 65
160. Hypertension affects the vital organs like
 (1) Heart and brain (2) Brain and kidney
 (3) Only heart diseases
 (4) Only brain
161. A patient is hooked up to a monitoring machine that shows voltage traces on a screen and makes the sound "...pip...pip...pip...peeeeeeeee" as the patient goes into
 (1) Cardiac arrest (2) Heart failure
 (3) Heart block (4) Heart attack
162. In Bowman's Capsule
 (1) Afferent arteriole narrower where as efferent arteriole is wider.
 (2) Afferent arteriole is wider where as efferent arteriole is narrow.
 (3) Afferent capillary is wider and efferent capillary is narrow
 (4) Afferent capillary is narrow and efferent capillary is wide

SPACE FOR ROUGH WORK

- 163.** Which one is more toxic and harmful
 (1) Ammonia (2) Urea
 (3) Uric Acid (4) None of them
- 164.** Which is correct for Asthma
 (1) It is chronic disorder
 (2) Asthma is difficulty in breathing causing wheezing due to inflammation of bronchi and bronchioles
 (3) It is the condition of narrowing of bronchial airways
 (4) Both (2) and (3)
- 165.** CO₂ in blood is mainly transported as
 (1) Bicarbonates
 (2) Carboxyhaemoglobin
 (3) Dissolved in plasma
 (4) Carbaminohaemoglobin
- 166.** Which of the following diseases is caused by the damaged of alveoli wall and TLC also greatly increase
 (1) Asthma (2) Fibrosis
 (3) Emphysema (4) All
- 167.** Which one has the maximum glycogen?
 (1) Liver (2) Muscles
 (3) Nerves (4) Kidneys
- 168.** Rapid spasms in muscle caused due to
 (1) Low calcium ions
 (2) Low sodium ions
 (3) High calcium ions
 (4) High sodium ions
- 169.** Which of the following is most likely to cause an increase in the glomerular filtration rates?
 (1) Blockage of ureter
 (2) Constriction of the afferent arterioles
 (3) Release of renin from the juxtaglomerular apparatus
 (4) Volume depletion
- 170.** Extrusion of second polar body from egg nucleus occurs
 (1) after entry of sperm and before completion of fertilisation
 (2) after completion of fertilisation
 (3) before the entry of the sperm
 (4) without any relation with sperm entry
- 171.** The tertiary follicle changes into mature follicle called (a). The secondary oocyte forms a new membrane called (b) surrounding it.
 (1) (a)-Graafian follicle; (b)-zona pellucida
 (2) (b)-corpus luteum; (b)-corona radiata
 (3) (a)-corpus albicans; (b)-zona pellucida
 (4) (a)-secondary follicle; (b)-zona pellucida
- 172.** Which of the following statements concerning menstrual cycle is **incorrect**?
 (1) The menstrual cycle occur only in primates
 (2) It is absent during pregnancy, may be suppressed during lactation and permanently stops at menopause
 (3) During bleeding phase resulting breakdown of Myometrium lining in the uterus and it blood vessel.
 (4) menarche is the beginning of menstrual cycle and other bodily changes.
- 173.** (A) Age-related disorder characterised by decreased bone mass and increased chances of fracture
 (B) Common causative factor is deficiency of estrogen
 The above characters are associated with
 (1) gout (2) osteoporosis
 (3) arthritis (4) polio
- 174.** Mark the pair of substances among the following which is essential for the coagulation of blood.
 (1) heparin and calcium ions
 (2) calcium ions and platelet factors
 (3) oxalates and citrates
 (4) platelet factors and heparin
- 175.** Humoral immunity is due to
 (1) B-lymphocytes (2) T-lymphocytes
 (3) L-lymphocytes (4) P-lymphocytes
- 176.** Haemozoin is a toxic substance formed in case of malaria. It is produced by
 (1) Globin protein of RBC
 (2) Colour pigment of RBC
 (3) Dead WBC
 (4) Cryptozoites

SPACE FOR ROUGH WORK

- 177.** The full form of NACO is
- (1) Non-governmental AIDS Control Organisation
 - (2) National AIDs Co-ordination
 - (3) National AIDS Control Organisation
 - (4) None of these.
- 178.** In the resting stage of a neuron, a concentration gradient generates due to a
- (1) high concentration of K^+ and a low concentration of Na^+ inside the axon
 - (2) high concentration of Na^+ and a low concentration of K^+ inside the axon
 - (3) low concentration of Na^+ outside the axon
 - (4) high concentration of K^+ outside the axon
- 179.** Association areas of the brain are
- (1) always sensory areas
 - (2) always motor areas
 - (3) neither sensory nor motor areas
 - (4) none of the above
- 180.** Androgens act on the ...A... and influence the male sexual behaviour called... B These hormones produce ...C... effect on protein and carbohydrate metabolism. Choose the correct combination of A, B and C
- (1) A-PNS, B-penile erection, C-anabolic
 - (2) A-ANS, B-libido, C-catabolic
 - (3) A-CNS, B-libido, C-anabolic
 - (4) A-CNS, B-penile erection, C-catabolic
- 181.** Match the following columns
- | Column I | Column II |
|------------------------|---------------------------|
| A. Adrenaline | I. Myxoedema |
| B. Hyperparathyroidism | II. Accelerates heartbeat |
| C. Oxytocin | III. Salt-water balance |
| D. Hypothyroidism | IV. Child birth |
| E. Aldosterone | V. Demineralisation |
- (1) A → I, B → II, C → III, D → IV, E → V
 - (2) A → V, B → IV, C → III, D → II, E → I
 - (3) A → II, B → V, C → IV, D → I, E → III
 - (4) A → II, B → V, C → IV, D → III, E → I

- 182.** What is true for an ideal contraceptive?
- I. It should be user-friendly
 - II. It should be easily available
 - III. It should be ineffective and reversible with least side effects
 - IV. It should be effective and reversible with least side effects.
 - V. It should interfere with the sexual act of the user
- (1) All
 - (2) I, II, III
 - (3) I, II, IV
 - (4) I, II, IV, V
- 183.** What is false for GIFT?
- (1) It is Gamete Intra-Fallopian Transfer
 - (2) Ovum from a donor is transferred into the oviduct of the recipient
 - (3) Zygote from a donor is transferred into the oviduct of the recipient
 - (4) The recipient cannot produce ovum
- 184.** RNA interference (RNAi)
- (1) Takes place in all eukaryotic organisms as a method of cellular defense
 - (2) Involves silencing of a specific mRNA due to a complementary dsRNA molecule that binds and prevents translation of the mRNA (silencing)
 - (3) Involves RISC (RNA Induced Silencing Complex)
 - (4) All of the above
- 185.** The bacterium *Bacillus thuringiensis* is widely used in contemporary biology as
- (1) Indicator of water pollution
 - (2) Insecticide
 - (3) Agent for production of dairy products
 - (4) Source of industrial enzyme

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ZOOLOGY (SEC-B)

186. C-peptide of human insulin is

- (1) A part of the mature insulin molecule
- (2) Responsible for the formation of disulphide bridges
- (3) Removed during the maturation of proinsulin to insulin
- (4) Responsible for its biological activity

187. Stirred-tank bioreactors have advantages over shake flasks because they

- (1) provide high temperature and pH
- (2) provide better aeration and mixing properties
- (3) do not allow the entry of CO₂
- (4) are easy to operate

188. Primers are

- (1) small chemically synthesised oligonucleotides of about 10-18 nucleotides that are complementary to the region of template DNA
- (2) chemically synthesised oligonucleotides of about 10-18 nucleotides that are not complementary to the region of template DNA
- (3) the double-stranded DNA that needs to be amplified
- (4) The specific sequences present on the recombinant DNA

189. Restriction enzyme cuts the DNA strand a little away from the centre of the palindrome site between

- (1) same two bases on the same strand
- (2) same two bases on the opposite strand
- (3) opposite bases on the same strand
- (4) opposite bases on the opposite strand

190. The intrauterine devices are used to prevent

- (1) the sperm to reach egg
- (2) the sperm to reach female
- (3) the sperm from living
- (4) all of the above

191. The free-living fungus *Trichoderma* can be used in:

- (1) Killing insects
- (2) Biological control of plant diseases
- (3) Controlling butterfly caterpillars
- (4) Producing antibiotics

192. BGA is chiefly used as fertilizer in —

- (1) Wheat
- (2) Mustard
- (3) Gram
- (4) Paddy

193. Flocs is :

- (1) Primary sludge produced in sewage treatment
- (2) A type of biofortified food
- (3) A mesh like structure formed by association of bacteria and fungal filaments in sewage treatment
- (4) The effluent in primary treatment tank obtained during sewage treatment

194. Fishes undergo aestivation to avoid

- (1) heat
- (2) cold temperature
- (3) dessication
- (4) both (A) and (C)

195. If '+' sign is assigned to beneficial interaction, '-' sign to detrimental and '0' sign to neutral interaction, then the population interaction represented by '+' '-' refers to

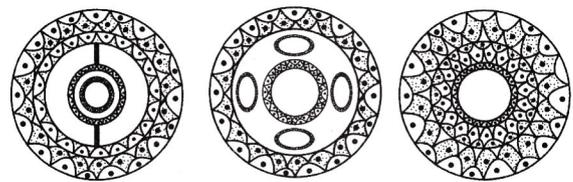
- (1) parasitism
- (2) mutualism
- (3) ammensalism
- (4) commensalism

196. Triploblastic, unsegmented, acoelomate exhibiting bilateral symmetry and reproducing both asexually and sexually, with some parasitic forms.

The above description is the characteristic of phylum

- (1) Annelida
- (2) Ctenophora
- (3) Cnidaria
- (4) Platyhelminthes

197. Which one of the following figures shows coelomate condition?



A

B

C

- (1) A
- (3) C

- (2) B
- (4) None of these

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198. Some hormone need the secondary messenger, because

- (1) they need activator
- (2) they can't cross cell membrane
- (3) they can cross cell membrane
- (4) they need a prosthetic group

199. By which part of thyroid gland T_3 and T_4 hormones are synthesised?

- (1) Follicles
- (2) Stromal tissue
- (3) Isthmus
- (4) Both (1) and (3)

200. Which one of the following groups of three animals is correctly matched with their one characteristic morphological feature?

Animals	Morphological features
(1) Cockroach, Locust, Taenia	Metameric segmentation
(2) Liver fluke, Sea anemone, Sea cucumber	Bilateral symmetry
(3) Centripede, Prawn, Sea urchin	Jointed appendages
(4) Scorpion, Spider, Cockroach	Ventral solid central nervous system

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