

Test Series HMC-8 (Punjab Board Students)

MM : 720

Test-03

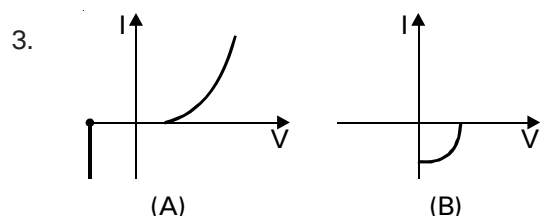
Time : 3 hrs. 20 min.

PHYSICS	: DUAL NATURE OF RADIATION AND MATTER, ATOMS AND NUCLEI, SEMI CONDUCTOR DEVICES, EM WAVES
CHEMISTRY	: D & F BLOCK ELEMENT, COORDINATION COMPOUNDS, CHEMICAL KINETICS, SOLID STATE, SURFACE CHEMISTRY
ZOOLOGY	: BIOTECHNOLOGY, MICROBES IN HUMAN WELFARE
BOTANY	: REPRODUCTION IN ORGANISMS, SEXUAL REPRODUCTION IN FLOWERING PLANTS, MORPHOLOGY OF FLOWERING PLANTS

PHYSICS : SECTION-A

All questions are compulsory in section A

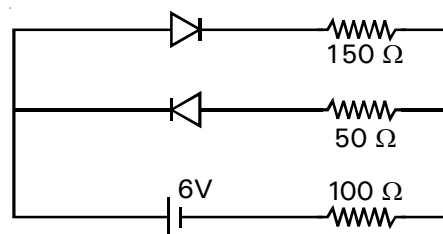
- The threshold frequency for a certain metal is 3.3×10^{14} Hz. If light of frequency 8.2×10^{14} Hz is incident on the metal, what will be the cutoff voltage for the photoelectric emission?
(1) 4 V (2) 2 V
(3) 6 V (4) 1 V
- If an orbital electron of the hydrogen atom jumps from the ground state to a higher energy state, its orbital speed reduces to half its initial value. If the radius of the electron orbit in the ground state is 'r', then the radius of the new orbit would be
(1) 2r (2) 4r
(3) 8r (4) 16r



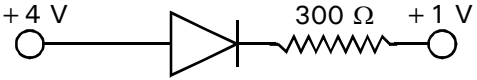
Figures A and B can represent a

- zener diode and photo diode characteristics respectively
- photo diode and a light emitting diode characteristics respectively
- zener diode and solar cell diode characteristics respectively
- zener diode and a light emitting diode characteristics respectively

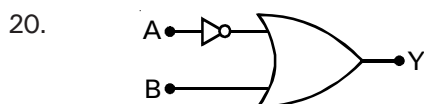
- The circuit shown in the figure contains two diodes each with a forward resistance of 50Ω and with infinite backward resistance. If the battery of 6V is connected in the circuit, the current through the 100Ω resistance is



- (1) Zero (2) 0.02 A
(3) 0.03 A (4) 0.036 A
- A radioactive material has half lives of 1620 year and 540 year for α and β emission respectively. Material decays by both α and β emission. Time in which 1/4th of material remains intact is
(1) 810 year (2) 560 year
(3) 405 year (4) 320 year
- What are the key reasons for failure of Rutherford atomic model?
(1) Energy of electron in Rutherford's model keeps on decreasing
(2) Rutherford's model does not explain line emission spectrum
(3) Both (1) & (2)
(4) Neither (1) and (2)

7. de-Broglie wavelength associated with an electron accelerated through a potential difference V is λ . Its wavelength, when the accelerating potential is increased to $4V$, will be
- (1) λ (2) 0.5λ
 (3) 0.25λ (4) 2λ
8. In a nuclear reactor
- (1) moderator is used to control the number of neutrons
 (2) moderator is used to slow down the neutrons
 (3) control rods are used to slow down the neutrons
 (4) coolant is used to slow down the neutrons
9. If an electron in a hydrogen atom jumps from an orbit $n_i = 3$ to an orbit with level $n_f = 2$, the frequency of the emitted radiation is
- (1) $\frac{36c}{5R}$ (2) $\frac{cR}{6}$
 (3) $\frac{5Rc}{36}$ (4) $\frac{6c}{R}$
10. According to Bohr's theory, the radius of the n th orbit of an atom of atomic number Z is proportional to
- (1) $\frac{n^2}{Z^2}$ (2) $\frac{n^2}{Z}$
 (3) $\frac{n}{Z}$ (4) $n^2 Z^2$
11. A nucleus ${}_nX^m$ emits one α and one β^- particle. The resulting nucleus is
- (1) ${}_nX^{m-4}$ (2) ${}_{n-2}Y^{m-4}$
 (3) ${}_{n-4}Z^{m-4}$ (4) ${}_{n-1}Z^{m-4}$
12. **Assertion** : Heavy water is preferred to ordinary water in reactors to slow down neutrons.
Reason: Deuteron in (D_2O) does not form stable nuclei by absorbing neutron but proton in the H_2O does.
- (1) Assertion is true statement but Reason is false
 (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
 (3) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
 (4) Assertion is false
13. In α -scattering experiment, the distance of closest approach for the α -particle
- (1) decreases with increase in its KE
 (2) decreases with decrease in its KE
 (3) decreases with increase in atomic number of target body
 (4) is independent of KE and atomic number
14. In the circuit given below, the value of the current is
- 
- (1) 0 amp (2) 10^{-2} amp
 (3) 10^2 amp (4) 10^{-3} amp
15. **Statement-I** : With the increase in principle quantum number, the energy difference between the two successive energy levels increases..
Statement-II : In Bohr model of the hydrogen atom, the lowest orbit corresponds to maximum energy.
- (1) Both statement-I and statement-II are correct
 (2) Both statement-I and statement-II are incorrect
 (3) Statement-I is correct but statement-II is incorrect
 (4) Statement-I is incorrect but statement-II is correct

16. The angular momentum of the electron in the hydrogen atom can be
 (1) $3h$ (2) h/π
 (3) $h/4\pi$ (4) $2h$
17. Light of frequency twice the threshold frequency is incident on a photosensitive material. If the frequency is made one-third and the intensity is doubled, the photoelectric current becomes
 (1) four times (2) double
 (3) half (4) zero
18. **Assertion** : Electrons ejected in photoelectric effect have different kinetic energies upto a certain maximum value.
Reason : The photons incident on metal surface can have different frequencies.
- (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
 (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
 (3) Assertion is true statement but Reason is false
 (4) Assertion is false
19. The radius of Ge nuclide is measured to be twice the radius of ${}^9_4\text{Be}$. The number of nucleons in Ge are
 (1) 72 (2) 73
 (3) 74 (4) 75

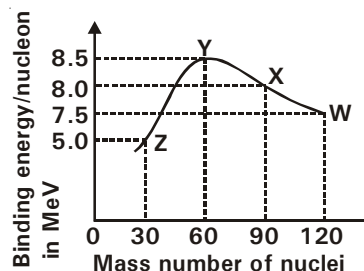


What is the Boolean equation for the logic gate shown?

- (1) $Y = A + \bar{B}$ (2) $Y = \overline{A + B}$
 (3) $Y = \bar{A} + B$ (4) $Y = \bar{A} + \bar{B}$

21. Three radioactive samples I, II, and III of same radioactive material have activities 1 Ci, 1 Ru and 1 GBq. The increasing order of the masses of sample is
 (1) $I > II > III$ (2) $I > III > II$
 (3) $II > I > III$ (4) $II > III > I$

22.



Binding energy per nucleon versus mass number curve for nuclei is shown in figure. W, X, Y and Z are four nuclei indicated on the curve. The process that would release energy is

- (1) $Y \rightarrow 2Z$ (2) $W \rightarrow X + Z$
 (3) $W \rightarrow 2Y$ (4) $X \rightarrow Y + Z$

23. An electron is moving with an initial velocity $\vec{v} = v_0 \hat{i}$ and is in a magnetic field $\vec{B} = B_0 \hat{j}$. Then it's de Broglie wavelength
 (1) remains constant
 (2) increases with time
 (3) decreases with time
 (4) increases and decreases periodically
24. In a plane electromagnetic wave in vacuum the equation of magnetic vector can be written as $B_y = (10^{-8}\text{T}) \sin(5 \times 10^6 \pi x + 1.5 \times 10^{15} \pi t)$. Peak value of electric field vector in the wave is
 (1) $3 \times 10^8 \text{ V/m}$ (2) 3 V/m
 (3) 10^{-8} V/m (4) $3 \times 10^{-8} \text{ V/m}$

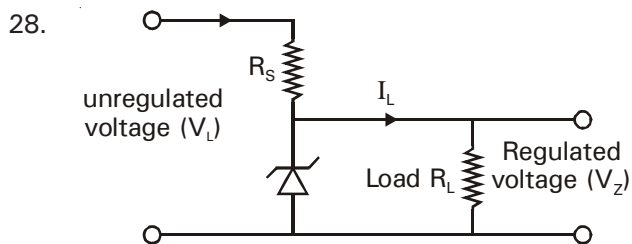
25. The constituent radiation of electromagnetic spectrum which is used for studying crystal structure is
- (1) X-rays (2) Microwaves
(3) Gamma (4) Ultra-violet

26. Which of the following statements is incorrect with respect to photoelectric effect?

- (1) Stopping potential varies exponentially with the frequency of incident radiation
(2) For a frequency lower than cut-off frequency, photoelectric emission is never possible
(3) Maximum kinetic energy of the photoelectrons is independent of intensity of radiations
(4) none of these

27. In a half wave rectifier circuit operating from 50 Hz mains frequency, the fundamental frequency in the ripple would be

- (1) 25 Hz (2) 50 Hz
(3) 70.7 Hz (4) 100 Hz



Which of the following statement is correct w.r.t above figure, if the input voltage increases

- a. the current through R_s increases
b. the current through zener diode decreases
c. the current through R_s decreases
d. the current through zener diode increases
- (1) Both a & b (2) Both b & c
(3) Both b & d (4) Both a & d

29. If E_n and L_n denote the total energy and the angular momentum of an electron in the n th orbit of Bohr atom, then

- (1) $E_n \propto L_n$ (2) $E_n \propto L_n^2$
(3) $E_n \propto \frac{1}{L_n}$ (4) $E_n \propto \frac{1}{L_n^2}$

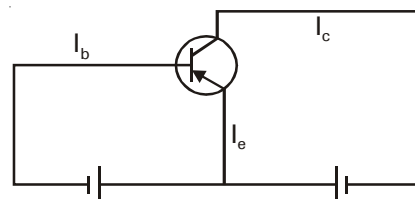
30. 5 ampere conventional current enters an aluminium sphere and 2 ampere leaves from the other side. The rate of change of electric flux coming out of the sphere (in SI units) is

- (1) 3 (2) 7
(3) $\frac{3}{\epsilon_0}$ (4) $\frac{7}{\epsilon_0}$

31. In an npn transistor circuit, the collector current is 10 mA. If 95 percent of the electrons emitted reach the collector, then

- a. The emitter current will be 8 mA
b. The emitter current will be 10.53 mA
c. The base current will be 0.53 mA
d. The base current will be 2 mA
- (1) both a & b (2) both b & c
(3) both a & c (4) both b & d

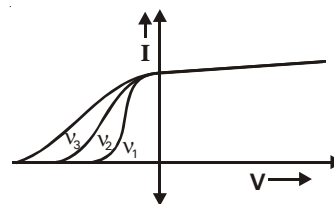
- 32.



In the transistor circuit shown in above figure, the emitter, collector and base currents are I_e , I_c and I_b respectively. Correct relation between them is

- (1) $I_b > I_c > I_e$ (2) $I_b < I_c < I_e$
(3) $I_b < I_e < I_c$ (4) $I_c < I_e < I_b$

33. A metal begins emitting photoelectrons with green light. It will also give photoemission with
 (1) blue light (2) yellow light
 (3) orange light (4) red light
34. If current gain in common base transistor circuit is 0.8, that in common emitter circuit will be
 (1) 2 (2) 4
 (3) 8 (4) 0.2
35. Nuclear forces are spin dependent. This statement implies that nuclear force
 (1) between nucleons having spins is more than those not having spins
 (2) between nucleons having parallel spins is less than those having anti-parallel spins
 (3) between nucleons having parallel spins is more than those having anti-parallel spins
 (4) only effects nucleons with spins
39. **Statement-I** : When a forward bias is applied to a p-n junction, it raises the potential barrier.
Statement-II : Light emitting diode is a heavily doped p-n junction which under forward bias emits spontaneous radiation.
 (1) Both statement-I and statement-II are correct
 (2) Both statement-I and statement-II are incorrect
 (3) Statement-I is correct but statement-II is incorrect
 (4) Statement-I is incorrect but statement-II is correct
40. If a graph is plotted between photoelectric current (I) and anode potential (V) for frequencies ν_1 , ν_2 and ν_3 then nature of graph is shown below

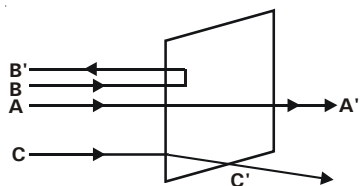


PHYSICS : SECTION-B

This section has 15 questions, attempt any 10 questions of them.

36. Neutron decay in free space is given as follows
 $n^1 \rightarrow {}_1^1\text{H} + {}_{-1}^0\text{e} + []$
 Then the particle in the bracket is
 (1) neutrino (2) photon
 (3) anti-neutrino (4) positron
37. The photocurrent in an experiment on photoelectric effect increases if
 (1) the intensity of the incident light is increased
 (2) the exposure time is increased
 (3) the intensity of the incident light is decreased
 (4) the exposure time is decreased.
38. The binding energy per nucleon for deuteron (${}^2_1\text{H}$) and helium (${}^4_2\text{He}$) are 1.1 MeV and 7.0 MeV. The energy released when deuterons fuse to form a helium nucleus is
 (1) 2.2 MeV (2) 30.2 MeV
 (3) 28.0 MeV (4) 23.6 MeV
- The relation between ν_1 , ν_2 and ν_3 is
 (1) $\nu_1 = \nu_2 = \nu_3$ (2) $\nu_1 > \nu_2 > \nu_3$
 (3) $\nu_1 < \nu_2 < \nu_3$ (4) None of these
41. At any instant the ratio of the amount of radioactive substances is 2 : 1. If their half lives be respectively 12 and 16 hours, then after two days, what will be the ratio of the substances
 (1) 1 : 1 (2) 2 : 1
 (3) 1 : 2 (4) 1 : 4
42. Consider the following statements regarding β -decay and select the correct statement.
 (1) β -particle and direction of emitted recoiling daughter nuclei are always exactly opposite to each other
 (2) net momentum of β particle and recoiling daughter nuclei is always zero
 (3) law of conservation of linear momentum is valid in β decay
 (4) Kinetic energy of the β particle is equal to Q-value of the reaction

43. A beam of fast moving alpha particles were directed towards a thin film of gold. The parts A', B' and C' of the transmitted and reflected beams corresponding to the incident parts A, B and C of the beam, are shown in the adjoining diagram. The number of alpha particles in



- (1) B' will be minimum and in C' maximum
 (2) A' will be maximum and in B' minimum
 (3) A' will be minimum and in B' maximum
 (4) C' will be minimum and in B' maximum
44. Which of the following is not known as Maxwell's equation?

(1) $\oint_s \vec{E} \cdot d\vec{s} = \frac{Q}{\epsilon_0}$ (2) $\oint_c \vec{E} \cdot d\vec{l} = -\frac{d\phi_B}{dt}$
 (3) $\oint_s \vec{B} \cdot d\vec{s} = 0$ (4) $\oint_c \vec{B} \cdot d\vec{l} = \mu_0 I_C$

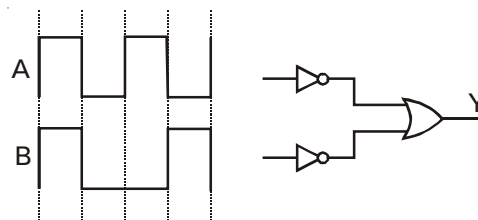
45. The frequency of the first line in Lyman series in the hydrogen spectrum is ν . What is the frequency of the corresponding line in the spectrum of doubly ionized Lithium?

- (1) ν (2) 3ν
 (3) 9ν (4) 27ν

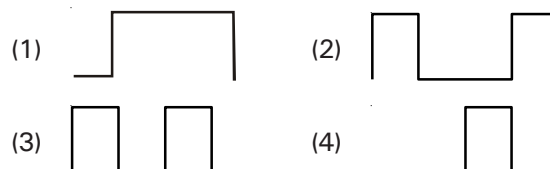
46. If momentum of a photon is 3.3×10^{-29} kg-m/s, its frequency will be

- (1) 3×10^{13} Hz (2) 6×10^3 Hz
 (3) 1.5×10^3 Hz (4) 1.5×10^{13} Hz

47.



In the circuit shown, two input waveforms A and B are applied simultaneously. The output waveform Y is



48. If the kinetic energy of the particle is increased by 16 times, the percentage change in the de-Broglie wavelength of the particle is

- (1) 25% (2) 75%
 (3) 60% (4) 50%

49. In a hypothetical atom, if transition from $n = 4$ to $n = 3$ produces visible light then the possible transition to obtain infrared radiation is

- (1) $n = 5$ to $n = 3$ (2) $n = 4$ to $n = 2$
 (3) $n = 3$ to $n = 1$ (4) none of these

50. What is the ratio of kinetic energy to potential energy of an electron in the first excited state of hydrogen atom?

- (1) $-\frac{1}{2}$ (2) $\frac{1}{2}$
 (3) 2 (4) -2

CHEMISTRY : SECTION-A

All questions are compulsory in section A

51. Coordination number and oxidation number of Cr in $K_3[Cr(C_2O_4)_3]$ are respectively
(1) 4 and +2 (2) 6 and +3
(3) 3 and +3 (4) 3 and 0
52. A chelating agent has two or more than two donor atoms to bind to a single metal ion. Which of the following is not a chelating agent?
(1) thiosulphato (2) oxalato
(3) ethane-1,2-diamine (4) glycinato
53. Which one of the following is anisotropic & covalent solid?
(1) NaCl (2) Graphite
(3) Cu (4) Sn
54. The gaseous reaction $A(g) \rightarrow 2B(g) + C(g)$ is found to be first order with respect to A. If the reaction is started with $P_A = 90$ torr, the pressure after 10 min is found to be 180 torr. The rate constant of reaction is
(1) $1.15 \times 10^{-3} s^{-1}$ (2) $2.30 \times 10^{-3} s^{-1}$
(3) $3.45 \times 10^{-3} s^{-1}$ (4) $4.60 \times 10^{-1} s^{-1}$
55. Addition of catalyst to a chemical reaction effects
(1) ΔG (2) ΔH
(3) E_a (4) K_{eq}
56. If radius of atom is X cm and element crystallises in fcc arrangement. The volume of unit cell
(1) $16\sqrt{2} X^3$ (2) $\frac{32}{3\sqrt{3}} X^3$
(3) $8X^3$ (4) $\frac{16}{3\sqrt{3}} X^3$
57. The rate expression for a chemical reaction, $2NO_2Br \rightarrow 2NO_2 + Br_2$ is given as : Rate = k $[NO_2Br]$. Rate determining step is
(1) $2NO_2Br \rightarrow 2NO_2 + Br_2$
(2) $NO_2Br + Br \rightarrow NO_2 + Br_2$
(3) $NO_2Br \rightarrow NO_2 + Br$
(4) $NO_2 + Br \rightarrow NO_2Br_2$
58. If NaCl is doped with 10^{-3} mol% of $SrCl_2$, the concentration of cation vacancies is
(1) 6.02×10^{18} (2) 6.02×10^{16}
(3) 6.02×10^{20} (4) 3.01×10^{18}
59. Under what conditions a bimolecular reaction may be kinetically of first order?
(1) When both reactants have same conc.
(2) When one of the reacting species is in large excess
(3) When reaction is in equilibrium
(4) When the activation energy of reaction is less
60. If the activation energy for the forward reaction is 150 KJ/mol and that of the reverse equation is 260 KJ/mol, ΔH for the reaction is
(1) 410 KJ/mol (2) -110 KJ/mol
(3) 110 KJ/mol (4) -410 KJ/mol
61. Which of the following is used in the treatment of lead poisoning?
(1) EDTA (2) DMG
(3) Cupron (4) α -nitroso- β -naphthol
62. **Statement-I** : Ionisation of transition metals involve loss of ns electrons before (n-1)d electrons.
Statement-II : Filling of ns-orbitals take place before the filling of (n-1)d-orbitals.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct
63. At $100^\circ C$, Cu has fcc unit cell with edge length of $x \text{ \AA}$. The approximate density of Cu (in g/cm^3) at this temperature is (atomic mass of Cu = 63.5)
(1) $\frac{105}{(x)^3}$ (2) $\frac{211}{x^3}$
(3) $\frac{205}{x^3}$ (4) $\frac{422}{x^3}$

64. The formula dichloridobis (urea) copper (II) is
 (1) $[\text{Cu}\{\text{O}=\text{C}(\text{NH}_2)_2\}] \text{Cl}_2$
 (2) $[\text{CuCl}_2 \{\text{O}=\text{C}(\text{NH}_2)_2\}_2]$
 (3) $[\text{Cu}\{\text{O}=\text{C}(\text{NH}_2)_2\}\text{Cl}]\text{Cl}$
 (4) $[\text{CuCl}_2][\text{O}=\text{C}(\text{NH}_2)_2\text{H}_2]$

65. Match the complex ions given in Column I with the hybridisation and number of unpaired electrons given in Column II.

Column I	Column II
a. $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$	i. dsp^2 , 1
b. $[\text{Co}(\text{CN})_4]^{2-}$	ii. sp^3d^2 , 5
c. $[\text{Ni}(\text{NH}_3)_6]^{2+}$	iii. d^2sp^3 , 3
d. $[\text{MnF}_6]^{4-}$	iv. sp^3 , 4
	v. sp^3d^2 , 2

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

66. If FeCl_3 is added to excess of hot water and the resultant solution is subjected to electrophoresis then the
 (1) colloidal particles move towards the anode
 (2) colloidal particles move towards the cathode
 (3) colloidal particles carry no charge
 (4) no colloid is formed

67. A compound of formula A_2B_3 has hcp lattice. Which atoms form the hcp lattice and what fraction of tetrahedral voids is occupied by the other atoms?
 (1) "A" occupies hcp lattice and 'B' is in $2/3^{\text{rd}}$ of tetrahedral voids
 (2) "B" occupies hcp lattice and 'A' is in $1/3^{\text{rd}}$ of tetrahedral voids
 (3) "B" occupies hcp lattice and 'A' is in $2/3^{\text{rd}}$ of tetrahedral voids
 (4) "A" occupies hcp lattice and 'B' is in $1/3^{\text{rd}}$ of tetrahedral voids

68. For the reaction $2\text{A} + \text{B} \rightarrow 3\text{C} + \text{D}$ which of the following is not the correct expression for the reaction rate?
 (1) $-\frac{d[\text{C}]}{3dt}$ (2) $-\frac{d[\text{B}]}{dt}$
 (3) $\frac{d[\text{D}]}{dt}$ (4) $-\frac{d[\text{A}]}{2dt}$

69. Statement-I : Rate constants determined from Arrhenius equation are fairly accurate for simple as well as complex molecules.
 Statement-II : Reactant molecules undergo chemical change irrespective of their orientation during collision.
 (1) Both statement-I and statement-II are correct
 (2) Both statement-I and statement-II are incorrect
 (3) Statement-I is correct but statement-II is incorrect
 (4) Statement-I is incorrect but statement-II is correct

70. In the complex $[\text{Co}_2(\text{CO})_8]$, number of Co-Co bonds is P and terminal CO ligands is Q. Then $P + Q$ is
 (1) 6 (2) 8
 (3) 7 (4) 3

71. The cottrell precipitator is used to
 (1) Neutralise charge on carbon particles in air in smoke
 (2) Coagulate carbon particles of smoke
 (3) Cause electrophoresis in carbon particles
 (4) All of these

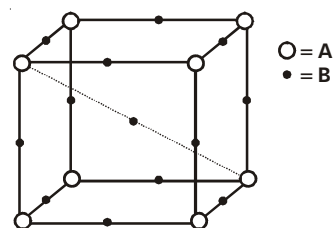
72. One mole of the complex compound $\text{Co}(\text{NH}_3)_5\text{Cl}_3$, gives 3 moles of ions on dissolution in water. One mole of the same complex reacts with two moles of AgNO_3 solution to yield two moles of $\text{AgCl}(\text{s})$. The structure of the complex is
 (1) $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$
 (2) $[\text{Co}(\text{NH}_3)_3\text{Cl}_3] \cdot 2\text{NH}_3$
 (3) $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{Cl} \cdot \text{NH}_3$
 (4) $[\text{Co}(\text{NH}_3)_4\text{Cl}]\text{Cl}_2 \cdot \text{NH}_3$

73. Half life of a certain radioactive element is such that $7/8$ of a given quantity decays in 12 days. What fraction decays in 32 days?
 (1) 0 (2) $1/128$
 (3) $1/256$ (4) $255/256$

74. Transition metal complex with highest value of crystal field splitting (Δ_0) will be
 (1) $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$ (2) $[\text{Mo}(\text{H}_2\text{O})_6]^{2+}$
 (3) $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ (4) $[\text{Os}(\text{H}_2\text{O})_6]^{3+}$

75. Identify the incorrect statement
- (1) titanium (IV) is more stable than Ti (III) or Ti (II)
 - (2) Cr(VI) in the form of dichromate in acidic medium is a strong oxidising agent
 - (3) in group 6, Mo (VI) and W(VI) are found to be more stable than Cr(VI)
 - (4) Mo(VI) and W(VI) are strong oxidizing agents in acidic medium
76. Which of the following ions exhibits d-d transition and paramagnetism as well
- (1) MnO_4^{2-}
 - (2) CrO_4^{2-}
 - (3) MnO_4^-
 - (4) $\text{Cr}_2\text{O}_7^{2-}$
77. Which one of the following is correct for the adsorption of gas on solid surface at a given temperature?
- (1) $\Delta H > 0, \Delta S > 0$
 - (2) $\Delta H > 0, \Delta S < 0$
 - (3) $\Delta H < 0, \Delta S < 0$
 - (4) $\Delta H < 0, \Delta S > 0$
78. In an octahedral co-ordination complex, the energy of the two e_g orbitals
- (1) will decrease by $\frac{3}{5} \Delta_0$
 - (2) will decrease by $\frac{2}{5} \Delta_0$
 - (3) will increase by $\frac{3}{5} \Delta_0$
 - (4) will increase by $\frac{2}{5} \Delta_0$
79. **Assertion :** $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_2$ and $[\text{Fe}(\text{H}_2\text{O})_6]\text{Cl}_2$ are reducing in nature.
Reason : Unpaired electrons are present in their d-orbitals.
- (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
 - (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
 - (3) Assertion is true statement but Reason is false
 - (4) Assertion is false

80. A compound has a unit cell of the type shown in the figure. The formula of the compound is



- (1) A_2B_3
 - (2) AB_3
 - (3) A_3B
 - (4) AB_4
81. Kraft temperature is the temperature
- (1) below which the aqueous solution of detergents start freezing
 - (2) above which the formation of micelles take place
 - (3) above which the aqueous solution of detergent behave as normal electrolyte
 - (4) below which the formation of micelle take place
82. Select the rate law that corresponds to data shown for reaction : $\text{A} + \text{B} \rightarrow \text{Products}$
- | Exp. | [A] | [B] | initial rate |
|------|-------|-------|--------------|
| 1 | 0.012 | 0.035 | 0.1 |
| 2 | 0.024 | 0.070 | 0.8 |
| 3 | 0.024 | 0.035 | 0.1 |
| 4 | 0.012 | 0.070 | 0.8 |
- (1) $\text{rate} = k [\text{B}]^3$
 - (2) $\text{rate} = k [\text{B}]^4$
 - (3) $\text{rate} = k [\text{A}] [\text{B}]^3$
 - (4) $\text{rate} = k [\text{A}]^2 [\text{B}]^2$
83. The incorrect statement(s) regarding peptization is
- (1) It is generally applied to convert a freshly prepared precipitate into a colloidal solution
 - (2) It causes the development of positive or negative charge on precipitates leading to the formation of colloidal particles
 - (3) It is process of converting a colloidal solution into precipitates
 - (4) The electrolyte used for peptization is called peptizing agent

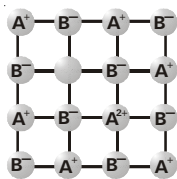
84. As_2S_3 sol has a negative charge. Capacity to precipitate it is highest in
 (1) AlCl_3 (2) Na_3PO_4
 (3) CaCl_2 (4) K_2SO_4
85. The pair in which both the elements generally show only one oxidation state is
 (1) Sc and Zn (2) Zn and Cu
 (3) Cu and Ag (4) Zn and Cr

CHEMISTRY : SECTION-B

This section has 15 questions, attempt any 10 questions of them.

86. Which of the following configuration of Ions has zero CFSE in both strong and weak ligand fields?
 (1) d^{10} (2) d^8
 (3) d^6 (4) d^4
87. A colloidal sol of substance 'X' is a reversible sol and is highly stable to be coagulated by addition of electrolyte. 'X' may be colloidal sol of
 (1) metal (2) metal sulphide
 (3) gum (4) sulphur
88. Which of the following oxide of chromium is amphoteric in nature?
 (1) CrO (2) Cr_2O_3
 (3) CrO_3 (4) CrO_5
89. Which of the following has largest metal-carbon bond length?
 (1) $[\text{Mn}(\text{CO})_6]^+$
 (2) $[\text{V}(\text{CO})_6]^-$
 (3) $\text{Cr}(\text{CO})_6$
 (4) All have equal metal-carbon bond length
90. Match the type of packing given in Column I with the items given in Column II.
- | Column I | Column II |
|-------------------------------------|---|
| i. Square close packing in 2-D | a. Triangular voids |
| ii. Hexagonal close packing in 2-D | b. Pattern of spheres is repeated in every fourth layer |
| iii. Hexagonal close packing in 3-D | c. Coordination number 4 |
| iv. Cubic close packing 3-D | d. Pattern of sphere is repeated in alternate layers |
- (1) (i-d), (ii-a), (iii-c), (iv-b)
 (2) (i-a), (ii-d), (iii-c), (iv-b)
 (3) (i-b), (ii-c), (iii-a), (iv-d)
 (4) (i-c), (ii-a), (iii-d), (iv-b)
91. The rate constant of a reaction has the units as that of rate of reaction. The reaction order is
 (1) 0 (2) 1
 (3) 2 (4) 3
92. The electronic configuration of Gd^{+2} is (atomic number = 64)
 (1) $[\text{Xe}]4f^7$ (2) $[\text{Xe}]4f^75d^1$
 (3) $[\text{Xe}]4f^8$ (4) $[\text{Xe}]4f^9$
93. **Assertion** : Scandium is a transition element but zinc is not.
Reason : Scandium has incompletely filled 3d orbitals in its ground state but zinc has completely filled d-orbitals in the ground state as well as in its oxidised state.
 (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
 (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
 (3) Assertion is true statement but Reason is false
 (4) Assertion is false

94. Which of the following intrinsic defect is shown by the figure below?



- (1) Schottky defect
(2) Frenkel defect
(3) Metal deficient defect
(4) Metal excess defect
95. The value of rate constant of a pseudo first order reaction
- (1) depends on the concentration of reactants present in small amount.
(2) depends on the concentration of reactants present in excess.
(3) is independent of the concentration of reactants.
(4) depends only on temperature.
96. The number of geometrical isomers that can exist for $[\text{Pt}(\text{Cl})(\text{Py})(\text{NH}_3)(\text{NH}_2\text{OH})]^+$ is
- (1) 2 (2) 4
(3) 3 (4) 6
97. **Statement-I** : Detergents with low CMC are more economical to use.
Statement-II : Cleansing action of detergents involves the formation of micelles. These are formed when the concentration of detergents is above CMC.
- (1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

98. If hcp layers are stacked over each other such that the resultant arrangement is ABAB... type. The packing fraction would be
- (1) 74% (2) 52.4%
(3) 26% (4) 34%
99. Which of the following statements are FALSE?
- a. Heat of physisorption is very low
b. Physical adsorption decreases with increasing temperature
c. Chemical adsorption continuously increases with increasing temperature
d. Chemisorption is multilayered
- (1) a, b, c only (2) b, c only
(3) c, d only (4) only d is incorrect
100. The correct increasing order of electrical conductivity
- (1) $\text{K}_4[\text{Fe}(\text{CN})_6] < \text{K}_2[\text{PtCl}_6] < [\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{Cl}$
(2) $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{Cl} < \text{K}_2[\text{PtCl}_6] < \text{K}_4[\text{Fe}(\text{CN})_6]$
(3) $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{Cl} < \text{Ni}(\text{CO})_4 < \text{Fe}_4[\text{Fe}(\text{CN})_6]_3$
(4) All complexes show equal electrical conductivity

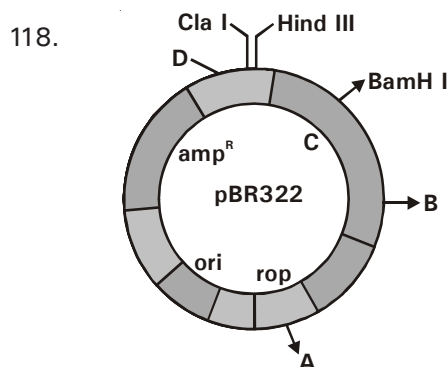
ZOOLOGY : SECTION-A

All questions are compulsory in section A

101. (i) _____ are produced by (ii) *Monascus* *purpureus* and are used as (iii) _____.
- (1) i-cyclosporin, ii-yeast, iii-immunosuppressant
(2) i-statins, ii-fungus, iii-cholesterol lowering agent
(3) i-statin, ii-bacteria, iii-cholesterol lowering agent
(4) i-cyclosporin, ii-bacteria, iii-cholesterol lowering agent
102. Some organisations and multinational companies patent biological resources of other nations without proper authorisation from concerned countries. This is called
- (1) Biowar (2) Biopatent
(3) Bioethics (4) Biopiracy

103. Fermented distilled beverages are
 (1) wine, brandy (2) beer and wine
 (3) rum and Brandy (4) whisky and wine
104. Consider following statements
 a. Plasmid vector with two selectable markers for X and Y antibiotics is taken
 b. Alien DNA is ligated at restriction site within the gene for X and rDNA is induced to enter host cell.
 The addition of only antibiotic Y to the medium will help to identify the
 (1) Recombinant (2) Non-recombinant
 (3) Transformant (4) All of the above
105. **Statement-I** : GM plants have been useful in increasing crop yields, reduce post harvest losses and make crops more tolerant to abiotic stresses.
Statement-II : Recombinant DNA technology has made it possible to engineer microbes, plants and animals such that they have novel capabilities.
 (1) Both statement-I and statement-II are correct
 (2) Both statement-I and statement-II are incorrect
 (3) Statement-I is correct but statement-II is incorrect
 (4) Statement-I is incorrect but statement-II is correct
106. For transformation, microparticles coated with DNA to be bombarded with gene gun are made up of
 (1) silver or platinum (2) platinum or zinc
 (3) silicon or platinum (4) gold or tungsten
107. Which of the restriction enzymes are part of pBR322?
 (1) Pst I, Pvu I, Bam HI, Sal I
 (2) Pst I, Pvu II, Hind III, Sma I
 (3) Eco R I, Cla I, Pvu II, Sal I
 (4) none of these
108. What is true for *cry* genes?
 a. *cry* IAc and *cry* IAb control cotton bollworms.
 b. *cry* IIAb control the cotton bollworms as well as corn borer.
 c. *cry* IAc and *cry* IIAb control cotton bollworms.
 d. *cry* IAb controls corn border.
 (1) a, b, c, d (2) c, d
 (3) b, c, d (4) only d
109. How many of the following products are of fungal origin?
 Statins, Butyric acid, Cyclosporin A, Citric acid, Streptokinase, Penicillin
 (1) Six (2) Three
 (3) Four (4) Five
110. Choose the incorrect statements
 a. RNAi takes place in prokaryotic organisms as a method of cellular defence.
 b. ds RNA attaches to DNA and prevent translation
 c. Nematode specific genes are introduced into host plants using *Agrobacterium tumefaciens*
 (1) a & c (2) b & c
 (3) a & b (4) a, b & c
111. Which of the following techniques does not serve the purpose of early diagnosis of a disease?
 (1) ELISA
 (2) polymerase chain reaction
 (3) recombinant DNA technology
 (4) Serum and urine analysis
112. Identify the event in biotechnology correctly matched to the year in which it occurred
 a. Discovery of restriction modification system in *E. coli* i. 1969
 b. First instance of construction of an artificial r-DNA molecule ii. 1963
 c. Studies by Boyer on a couple of restriction enzymes of *E. Coli* iii. 1972
 (1) a-iii, b-i, c-ii (2) a-ii, b-iii, c-i
 (3) a-i, b-ii, c-iii (4) a-ii, b-i, c-iii
113. Proteins produced by some strains of *Bacillus thuringiensis* kill certain insects of order diptera like
 (1) tobacco budworm, bollworm
 (2) army worm, beetles
 (3) mosquitoes, flies
 (4) all of these
114. There is a restriction endonuclease Eco RI. What does "co" part in it stand for?
 (1) *coli* (2) cofactor
 (3) colon (4) coenzyme
115. What is common to flavr savr and *Meloidegyne* resistant tobacco plant?
 (1) Pest resistant transgenic plants
 (2) In both expression of a native protein has been blocked
 (3) In both pest specific DNA sequences have been introduced
 (4) none of these

116. Which statement regarding proinsulin and mature insulin are not correct?
- (1) Removal of C-peptide from mature insulin make it proinsulin
 - (2) Mature insulin consists of two short polypeptide chains that are linked together by disulphide bridges.
 - (3) In humans, insulin is synthesized as proinsulin and needs to be processed before it becomes fully mature.
 - (4) American company (Eli Lilly) prepared human insulin by recombinant DNA technology.
117. Read following statements regarding STP
- a. Involves physical removal of particles large in size
 - b. Primary effluent is constantly agitated mechanically and air is pumped into it
- Statements above are related to
- (1) a-1^o treatment, b-cause breakage of flocs
 - (2) a-2^o treatment, b-causes breakage of flocs
 - (3) a-1^o treatment, b-causes formation of flocs
 - (4) a-2^o treatment, b-causes formation of flocs



In the above given figure of plasmid pBR 322, A–D are respectively?

- (1) Pst I, Sal I, kan^R, Pvu I
 - (2) Pvu II, Sal I, tet^R, Eco RI
 - (3) Pvu II, Hind I, tet^R, Eco RI
 - (4) Pvu I, Pst I, kan^R, Sal I
119. Stickiness of the ends facilitate the action of
- (1) DNA ligase
 - (2) DNA polymerase
 - (3) molecular scissors
 - (4) Both (1) and (3)
120. Primer anneals with _____ end of DNA strand to be amplified, where nucleotides are added to _____ end of primer during extension.
- (1) 5'; 3'
 - (2) 3'; 3'
 - (3) 3'; 5'
 - (4) 5'; 5'

121. **Assertion** : The recombinant therapeutics are identical to human proteins, and do not induce unwanted immunological responses.
- Reason** : Recombinant therapeutics are made in transgenic organisms yet their structure is absolutely identical to that of the natural molecules.
- (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
 - (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
 - (3) Assertion is true statement but Reason is false
 - (4) Assertion is false
122. The crops engineered for glyphosate are resistant/ tolerant to
- (1) Bacteria
 - (2) Insects
 - (3) Herbicides
 - (4) Fungi
123. Which part of a bioreactor matches with its function?
- (1) Curved base of reactor - facilitates mixing of reactor contents
 - (2) Gas entrainment - Provide optimum pH and temperature for formation of products
 - (3) Culture broth - Allow periodic withdrawal of culture
 - (4) Foam control system-Provides optimum temperature and pH control
124. A DNA tagged with radioactive molecule is allowed to hybridize to DNA in a clone of cells followed by detection using radiography. The DNA from clone which appears on photographic film is
- (1) Mutated gene
 - (2) Normal gene
 - (3) Non complimentary gene
 - (4) Both (1) and (2)
125. Which vector can clone only a small fragment of DNA ?
- (1) Cosmid
 - (2) Plasmid
 - (3) BAC
 - (4) YAC
126. Find the correct statement
- (1) Two core techniques of biotechnology are genetic engineering and bioprocess engineering
 - (2) First recombinant DNA molecule was formed by Cohen and Boyer using *Entamoeba coli*
 - (3) Molecular scissors cut the sugar-phosphate bond between two nucleotides and ligases join the cut ends by forming H bonds
 - (4) all of these
127. First genetically modified plant in world was
- (1) Bt cotton
 - (2) Bt tobacco
 - (3) Flavr savr tomato
 - (4) Golden rice

128. First restriction endonuclease targeting specific base sequence to be isolated and characterized was
 (1) *Eco RI* (2) *Hind I*
 (3) *Hind II* (4) *Sal I*
129. After electrophoresis the separated DNA fragments can be visualised in ethidium bromide when gel is exposed to UV light. The DNA fragments appear as _____ coloured bands. Process of their extraction from gel is known as _____
 (1) Orange, spooling (2) Blue, spooling
 (3) Orange, elution (4) Blue, elution
130. Foreign gene that code for enzyme which can convert the substrate into blue colour was introduced in a plasmid. After introduction of plasmid in bacteria present in the petridish containing substrate.
 (1) Recombinants will give blue colour and non-recombinants will give white colour
 (2) Recombinants and non-recombinants both produced white colour
 (3) Recombinants and non-recombinants both produced blue colour
 (4) Recombinants will give white colour and non-recombinants will give blue colour
131. Which of the following statement is having mistakes?
 (1) Disarmed pathogen vectors are used in transfer of r-DNA into host
 (2) Enzymes are used in isolation of DNA from other macromolecules
 (3) Downstream processing is one of the steps of r-DNA technology
 (4) The genetically modified cotton in India has been developed for draught resistance
132. Which of the following is incorrect regarding mycorrhiza?
 (1) They are fungal symbionts
 (2) Mycorrhizal association helps to provide resistance for root borne pathogens
 (3) Mycorrhizal association helps to decrease tolerance to salinity and draught
 (4) Many members of genus *Glomus* form mycorrhiza
133. Arrange the following steps in correct chronological sequence regarding isolation of genetic material from bacterial cell
 A — Treatment with chilled alcohol
 B — Treatment with ribonuclease
 C — Spooling
 D — Treatment with lysozyme
 (1) D → B → A → C (2) D → A → B → C
 (3) C → A → B → D (4) A → B → D → C
134. Activated sludge is put into _____ for further sewage treatment
 (1) Aeration tank
 (2) Filtration sieves
 (3) Anaerobic sludge digester
 (4) Sedimentation tanks
135. Which of the following parts of tobacco plant is infected by *Meloidogyne incognita*?
 (1) Stem and leaf (2) Root and leaf
 (3) Root and stem (4) Roots only

ZOOLOGY : SECTION-B

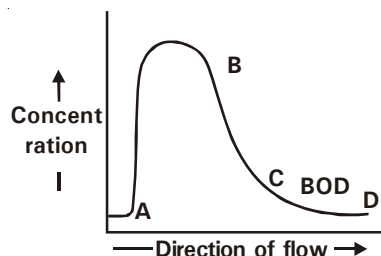
This section has 15 questions, attempt any 10 questions of them.

136. Fill in the blanks and choose the correct option
 Alexander Fleming while working on _____ observed a _____ growing in one of his _____ culture plates
 (1) *Streptococcus*, fungi, unwashed
 (2) *Staphylococcus*, mould, unwashed
 (3) *Pencillium*, penicillin, washed
 (4) *Staphylococcus*, fungi, washed
137. Identify the correct statement
 (1) The domestic sewage has a high BOD as it contains both aerobic and anaerobic bacteria
 (2) Measuring BOD is a method used for measuring the activity of *Saccharomyces cerevisiae*
 (3) During aerobic sewage treatment, biogas produced includes methane, hydrogen sulphide etc.
 (4) When domestic sewage mixes with river water, the increased microbial activity uses up dissolved oxygen.
138. How many of the following are the enzymes required to isolate DNA in pure form from bacterial cells?
 a. Chilled ethanol b. Ribonuclease
 c. Lysozyme d. Chitinase
 e. Protease
 (1) Two (2) Three
 (3) Four (4) Five
139. **Statement-I** : Currently, in our country, a number of biofertilisers are available commercially in the market and farmers use these regularly in their fields.
Statement-II : Cyanobacteria serve as an important biopesticide and also add organic matter to the soil and increase its fertility.
 (1) Both statement-I and statement-II are correct
 (2) Both statement-I and statement-II are incorrect
 (3) Statement-I is correct but statement-II is incorrect
 (4) Statement-I is incorrect but statement-II is correct

140. Feature not applicable to separation and isolation of DNA fragments by Agarose Gel Electrophoresis is
- Dilute concentration of agarose produces small sized pores
 - DNA fragments are separated on basis of size
 - DNA fragments move towards anode faster
 - Large DNA fragments are more towards cathode
141. Match the enzymes under column I with their use under column II

Column-I	Column-II
a. Lipase	p. fibrinolysis
b. Pectinase	q. detergent formulation
c. Streptokinase	r. clarification of fruit juices
(1) a-q, b-r, c-p	(2) a-q, b-p c-r
(3) a-r, b-q, c-p	(4) a-r, b-p, c-q

142. Which one of the following statements is false?
- Baker's yeast is used for bread making
 - Saccharomyces cerevisiae* is brewer's yeast
 - Toddy is produced by the fermentation of cereals
 - none is false
143. Genetically engineered bacteria are being employed for production of
- Thyroxine
 - Human insulin
 - Cortisol
 - Epinephrine
144. If the curve in the following graph represents changing BOD, addition of untreated sewage to river water is indicated at point



- A
 - B
 - C
 - D
145. Choose the incorrect statement with reference to transgenic animals
- Used in study of complex factors involved in growth such as insulin like growth factors
 - First transgenic cow rosie was developed in 1997 that produce human protein enriched milk (2.4 gm/lit)
 - 95% of all existing transgenic animals are cows
 - Transgenic mice can replace the use of monkeys to test the safety of batches of vaccine

146. Golden rice is a promising transgenic crop. When released for cultivation, it will help in
- producing a petrol-like fuel from rice
 - alleviation of vitamin A
 - pest resistance
 - herbicide tolerance

147. **Assertion** : Microbes can be used to kill harmful pests, and the process is called as biocontrol.

Reason : The biocontrol measures help us to avoid heavy use of toxic pesticides for controlling pests.

- Both Assertion and Reason are true and the reason is the correct explanation of the assertion
- Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
- Assertion is true statement but Reason is false
- Assertion is false

148. Fill in the blanks with correct option

A drug used for _____(I)_____ patients is obtained from a species of the organism _____(II)_____

Column- I	Column - II
(1) Swine flu	<i>Monascus</i>
(2) AIDS	<i>Pseudomonas</i>
(3) Heart	<i>Penicillium</i>
(4) Organ transplant	<i>Trichoderma</i>

149. Which of the following is incorrect statement about EcoRI restriction endonuclease enzyme?

- It is isolated from *Escherichia coli* RY13
- It's recognition sequence is
5'-GAATTC-3'
3'-CTTAAG-5'
- It produces complimentary blunt ends on both strands of DNA
- It cleaves the bond between nucleotides carrying G and A

150. Strength of sewage can be expressed on the basis of

- water in it
- organic matter in it
- inorganic compounds in it
- none of these

BOTANY : SECTION-A

All questions are compulsory in section A

151. Monocot seeds of orchids are
- endospermic
 - nonendospermic
 - perispermic
 - both (1) and (3)
152. Conidia are
- motile
 - non-motile
 - sexual spores
 - multicellular

153. In butterfly the chromosome number in a meiocyte is 380. What will be the chromosome number in a gamete ?
- (1) 760 (2) 190
(3) 180 (4) 380

154. Which of the following statement is incorrect w.r.t. endosperm development?

- (1) It succeeds embryo development
(2) Primary endosperm cell divides repeatedly and forms a triploid endosperm tissue
(3) The cells are filled with reserve food materials for nutrition of the developing embryo
(4) Often PEN undergoes successive nuclear divisions to give rise to free nuclei

155. **Statement-I** : When a shoot tip transforms into a flower, it is always solitary.

Statement-II : Pitchers of insectivorous plants are modified leaves.

- (1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

156. What are biennials?

- (1) Plants that remain vegetative in first growing season but produce flowers in the next season
(2) Plants that produce flowers twice during their life cycle
(3) Plants that flower many times during their life time
(4) Plants that complete their life cycle in one growing season only

157. Pick the incorrect statement

- (1) Fleshy conical tap roots are seen in carrot
(2) In monocots the primary root is short-lived
(3) Tap root is found in mustard
(4) Adventitious roots always arise from radicle

158. Tap roots can be modified for

- (1) storage (2) respiration
(3) nitrogen fixation (4) all of these

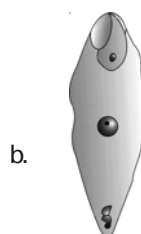
159. Match the figure in column I with details in column II

Column I

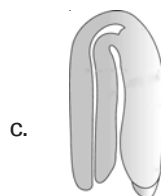
Column II



p. Fertilised embryo sac



q. Typical dicot embryo



r. L.S. of embryo of grass

- (1) a-r, b-p, c-q (2) a-q, b-r, c-p
(3) a-p, b-q, c-r (4) a-r, b-q, c-p

160. A hexaploid female plant is pollinated with a tetraploid plant. The ploidy level of endosperm will be

- (1) Tetraploid (2) Hexaploid
(3) Octaploid (4) Septaploid

161. **Statement-I** : Apple is a false fruit.

Statement-II : *Petunia* belongs to family liliaceae.

- (1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

162. Given one sequence is correct in sexual reproduction in plants.

- (1) Sporogenesis → gametogenesis → pollination → embryogenesis
(2) Embryogenesis → pollination → gametogenesis → sporogenesis
(3) Pollination → sporogenesis → gametogenesis → embryogenesis
(4) Pollination → gametogenesis → sporogenesis → embryogenesis

163. Fill in the blank a, b, c, d respectively

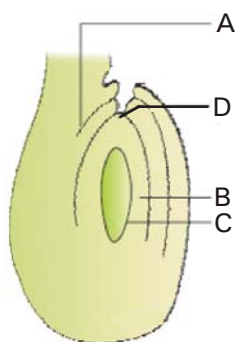
Earthworm	a
<i>Chara</i>	b
<i>Marchantia</i>	c
Cockroach	d

- (1) Monoecious, Monoecious, Dioecious, Dioecious
 (2) Monoecious, Monoecious, Monoecious, Dioecious
 (3) Monoecious, Monoecious, Monoecious, Monoecious
 (4) Dioecious, Monoecious, Monoecious, Monoecious

164. An edible root is

- (1) Mustard (2) *Brassica oleracea*
 (3) *Raphanus sativus* (4) *Colocasia*

165. Identify the correct labelling



- (1) A–Hilum, B–Embryo sac, C–Nucellus, D–Micropyle
 (2) A–Hilum, B–Embryo sac, C–Nucellus, D–Micropylar pole
 (3) A–Hilum, B–Nucellus, C–Embryo sac, D–Micropylar pole
 (4) A–Hilum, B–Micropylar pole, C–Embryo sac, D–Nucellus

166. Pick the incorrectly matched feature of the families

- (1) Fabaceae– diadelphous
 (2) Liliaceae–perianth
 (3) Solanaceae–epipetalous
 (4) Brassicaceae–axile placentation

167. Pick the wrong statement

- (1) Pollen grains generally measure 25 - 50 micrometer in diameter.
 (2) Pollen grains of many species cause severe allergies
 (3) Pollen consumption increases performance of athletes.
 (4) In Rice and wheat, pollen grains remain viable for several months.

168. Persistent nucellus in the seed is known as

- (1) Chalaza (2) Perisperm
 (3) Hilum (4) Tegmen

169. Match the items in column I with their respective items in column II.

Column I	Column II
A. Aleurone layer	i. Without fertilization
B. Parthenocarpic fruit	ii. Proteinaceous
C. Ovule	iii. Double fertilization
D. Endosperm	iv. Seed
(1) A-i, B-ii, C-iii, D-iv	(2) A-ii, B-i, C-iv, D-iii
(3) A-iv, B-ii, C-i, D-iii	(4) A-ii, B-iv, C-i, D-iii

170. Emasculation is the technique of removal of

(A) of a (B) flower and not required

in plants which have (C) flowers.

- (1) A–anther; B–unisexual; C–bisexual
 (2) A–stigma ; B–bisexual; C–unisexual
 (3) A–carpel; B–bisexual; C–unisexual
 (4) A–anther; B–bisexual; C–unisexual

171. A leaf is simple, when its lamina is (i) or

incisions do not touch the (ii) .

- (1) (i) incised (ii) petiole (2) (i) entire (ii) petiole
 (3) (i) incised (ii) midrib (4) (i) entire (ii) midrib

172. Find the correct match

- (1) Rhizome of *Oxalis* (2) Bulbils of *Agave*
 (3) Offset of Potato (4) Eyes of *Bryophyllum*

173. How many of the following plants show superior ovary?

Peach, Plum, Rose, Guava, Cucumber, Onion, Lily, Mustard, China rose, Brinjal, Pea

- (1) 4 (2) 6
 (3) 5 (4) 9

174. **Assertion** : In Australian *Acacia*, it is the petiole that flattens like lamina and performs the function of photosynthesis.

Reason : Modification of petiole into leaf like, photosynthetic structure is called phylloclade.

- (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
 (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
 (3) Assertion is true statement but Reason is false
 (4) Assertion is false

175. Which is **false** w.r.t. structure of microsporangium?

- (1) Cells of tapetum possess dense cytoplasm
 (2) Tapetal cells have only one nucleus
 (3) When anther is young sporogenous tissue occupies the centre of each microsporangium
 (4) As anther develops, cells of sporogenous tissue undergo meiotic divisions to form microspore tetrads

176. Which statement is incorrect w.r.t. gametogenesis?
- Plants may have both male and female reproductive structures on the same plant
 - Plants never have both male and female reproductive structures on different plants
 - In flowering plants, the unisexual male flower is staminate
 - In flowering plants, the unisexual female flower is pistillate

177. Which is not an outbreeding device ?
- Unisexual flowers
 - Synchronization in stigma receptivity and pollen release
 - Placement of anther and stigma at different position so that they do not come in touch with each other
 - Self incompatibility.

178. The flowers are Zygomorphic in
- Mustard
 - Gulmohar
 - Cassia*
 - Datura*
 - Pea

Choose the correct answer from the options given below :

- (a), (b), (c) only
- (b), (c), (e) only
- (d), (e) only
- (c), (d), (e) only

179. Vegetative propagation in certain plants like *Bryophyllum*, water hyacinth and ginger is considered as asexual reproduction. Possible reasons for this are
- it is uniparental
 - there is no meiosis nor formation of gametes
 - the progeny is clone of the parents
 - all of these

180. Which is incorrect statement regarding animal-pollinated flowering plants?
- Often these flowers are specifically adapted for a particular species of animal
 - Majority of insect pollinated flowers are small and poor in nectar
 - The flowers, pollinated by flies and beetles, secrete foul odours to attract them
 - To sustain animal visits, flowers have to provide rewards (nectar and pollen grains)

181. Which of the following is incorrect w.r.t. the calyx?
- It is the outermost whorl of the flower
 - Its members are green, leaf like and protect the flower in the bud stage.
 - It may be gamosepalous (sepals united) or polysepalous (sepals free)
 - It is an essential reproductive whorl

182. In *Cassia*, the margins of sepals or petals overlap one another but not in any particular direction. This represents the aestivation

- Twisted
- Vexillary
- Imbricate
- Valvate

183. How many statements are correct ?

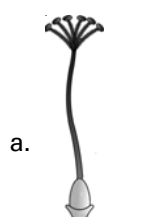
- Roots synthesize plant growth regulators.
- Root cap protects the tender apex of root.
- Root hair arise in the zone of elongation
- Zone proximal to region of elongation is called region of maturation.

- a, b, c
- a, c, d
- a, b, d
- a, b, c, d

184. Match the gynoecium, the reproductive part of flower, consisting of pistil in different arrangements in column I with description in column II.

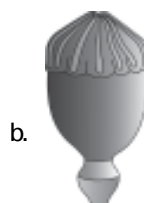
Column I

Column II



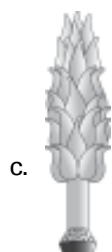
a.

p. apocarpous gynoecium of *Michelia*



b.

q. syncarpous pistil of *Papaver*



c.

r. pistil of *Hibiscus*

- a-r, b-p, c-q
- a-q, b-r, c-p
- a-p, b-q, c-r
- a-r, b-q, c-p

185. There is maximum growth in root

- (1) just behind the root apex
- (2) at the root apex
- (3) in the zone of maturation
- (4) in the zone of division

BOTANY : SECTION-B

This section has 15 questions, attempt any 10 questions of them.

186. *Cuscuta* and *Viscum* have

- (1) haustorial roots
- (2) insect capturing mechanism
- (3) floating roots
- (4) stilt roots

187. Match the asexual reproductive structure in column-I with their figures in column-II

Column I

Column II

a. *Chlamydomonas*

p.



b. *Penicillium*

q.



c. Sponge

r.



(1) a-p, b-r, c-q

(2) a-q, b-r, c-p

(3) a-r, b-q, c-p

(4) a-q, b-p, c-r

188. **Assertion** : Endosperm development precedes embryo development.

Reason : Endosperm is diploid structure.

- (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
- (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
- (3) Assertion is true statement but Reason is false
- (4) Assertion is false

189. Which is correct w.r.t. embryo?

- a. It develops at the micropylar end of the embryo sac where the zygote is situated
- b. Most zygotes divide only after certain amount of endosperm is formed
- c. The early stages of embryogeny are different in both monocotyledons and dicotyledons

(1) Both a & b

(2) Both b & c

(3) c only

(4) a, b & c

190. Match the following

Column-I

Column-II

i. Drupe

a. Bamboo

ii. Culm

b. *Bougainvillea*

iii. Thorns

c. Mango

(1) i-c, ii-a, iii-b

(2) i-a, ii-c, iii-b

(3) i-a, ii-b, iii-c

(4) i-c, ii-b, iii-a

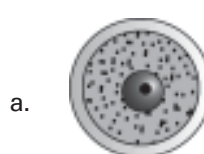
191. Pistillode term is used to represent

- (1) underdeveloped fertile pistil
- (2) undeveloped sterile pistil
- (3) pistil expanded leaf-life
- (4) pistil possessing hairy outgrowths

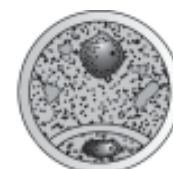
192. The failure of flowers to open, thus enforcing self-fertilization is termed as

- (1) cleistogamy
- (2) homogamy
- (3) geitonogamy
- (4) chasmogamy

193. Which is correct sequence of the four stages a, b, c & d of a microspore maturing into a pollen grain?



a.



b.



c.



d.

(1) b → a → c → d

(2) c → a → d → b

(3) b → c → a → d

(4) a → c → d → b

194. Ginger is a stem which can be differentiated from root because it

- (1) grows parallel to ground
- (2) stores food
- (3) lacks chlorophyll
- (4) has nodes and internodes

195. Potato tubers are modified stem as they bear
(1) axillary buds (2) tap roots
(3) fibrous roots (4) adventitious roots
196. Translator apparatus occurs in
(1) *Calotropis* (2) *Vallisneria*
(3) *Hibiscus* (4) *Brassica*
197. **Statement-I** : Pre-fertilisation events include events prior to fusion of gametes.
Statement-II : It includes gametogenesis and embryogenesis.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct
198. Pick the incorrect match
(1) Embryo sac – female gametophyte
(2) Pollen grain – male gametophyte
(3) Egg apparatus – seven celled
(4) Exine – sporopollenin
199. Which is not true regarding wind pollination ?
(1) Plants show well exposed stamens
(2) It is common in grasses and maize
(3) Pollens are non sticky
(4) Pollens are long, ribbon like
200. Ovule generally differentiate a single megaspore mother cell in which region of the nucellus?
(1) chalazal region
(2) micropylar region
(3) middle region
(4) sporogenous region
-