Dated : 03-05-2023

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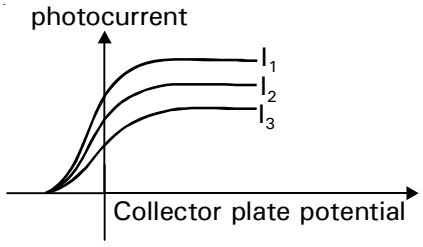
Test Series HMC-8(HP & HR), HMC-9(19-25), HMC-15(01)

MM : 720 **Test - 08** Time : 3 hrs. 20 min.

Physics	:	Dual nature, Atoms and Nuclei, Semiconductor, EM Waves
Chemistry	:	d & f block, Co-ordination compounds, Chemical Kinetics, Solid State, Surface Chemistry
Zoology	:	Biotechnology, Microbes in human welfare
Botany	:	Ecology (Organism & population, Ecosystem, Environmental issues, Biodiversity and conservation)

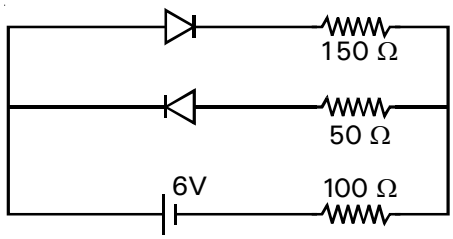
PHYSICS : SECTION-A

All questions are compulsory in section A

1. The order of magnitude of the density of nuclear matter is
   (1) 10^4 kg/m^3
   (2) 10^{17} kg/m^3
   (3) 10^{27} kg/m^3
   (4) 10^{34} kg/m^3
2. P-N junction is
   (1) a non-ohmic resistance
   (2) an ohmic resistance
   (3) a negative resistance
   (4) an inductance
3. The consituent radiation of electromagnetic spectrum which is used in satellite communication
   (1) X-rays
   (2) Microwaves
   (3) Gamma
   (4) Ultra-violet
4. 

   The above graph shows variation of photocurrent with collector plate potential for different intensity of incident radiation. Which relation is correct?
   (1) $I_1 = I_2 = I_3$
   (2) $I_1 > I_2 > I_3$
   (3) $I_1 < I_2 < I_3$
   (4) none of these
5. If 10% of a radioactive material decays in 5 days, then the amount of original material left after 20 days is approximately
   (1) 60%
   (2) 65%
   (3) 70%
   (4) 75%
6. The energy band gap of Si is
   (1) 0.70 eV
   (2) 1.1 eV
   (3) between 0.70 eV to 1.1 eV
   (4) 5 eV
7. The speed of an electron in the orbit of hydrogen atom in the ground state is
   (1) c
   (2) c/10
   (3) c/2
   (4) c/137
8. For electromagnetic wave propagating along x-direction electric and magnetic field for x, y & z directions are
   (1) $E = E_x$, $B = B_y$
   (2) $E = E_y$, $B = B_z$
   (3) $E = E_x$, $B = B_x$
   (4) $E = E_z$, $B = B_z$
9. The equation
   $4\,{}_1{}^1H^+ \rightarrow {}_2{}^4He^{2+} + 2e^+ + 26$ MeV represents a
   (1) β decay
   (2) γ decay
   (3) fusion
   (4) fission
10. Kinetic energy with which the electrons are emitted from the metal surface due to photoelectric effect is
    (1) independent of the intensity of illumination
    (2) independent of the frequency of light
    (3) inversely proportional to intensity of illumination
    (4) proportional to intensity of illumination
11. Which of the following transitions in hydrogen atoms emit photons of highest frequency?
    (1) n = 2 to n = 1
    (2) n = 5 to n = 4
    (3) n = 6 to n = 2
    (4) n = ∞ to n = 2

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



(1) Zero
(2) 0.02 A
(3) 0.03 A
(4) 0.036 A

13. Binding energy of hydrogen atom is 13.6 eV. The B.E. of a singly ionised helium atom is

(1) 13.6 eV
(2) 27.2 eV
(3) 54.4 eV
(4) 3.4 eV

14. Material which can be used as a moderator in a nuclear reactor is

a. light water b. graphite
c. heavy water d. berillium oxide

(1) both a & b
(2) both b & c
(3) both c & d
(4) a, b, c & d

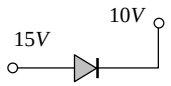
15. Which of the following statement is correct w.r.t nuclear force?

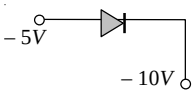
(1) It is attractive for distances larger than 0.8 fm
(2) It is repulsive for distances less than 0.8 fm
(3) It does not depend on electric charge
(4) All of these

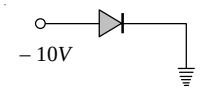
16. The Rutherford α-particle experiment shows that most of the α-particles pass through almost unscattered while some are scattered through large angles. What information does it give about the structure of the atom

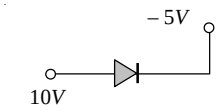
(1) Atom is hollow
(2) The whole mass of the atom is concentrated in a small centre called nucleus
(3) Nucleus is positively charged
(4) All the above

17. Which one is reverse-biased?

(1) 

(2) 

(3) 

(4) 

18. A common base amplifier gives a current gain of 0.95. If input and load resistance are respectively $50\,\Omega$ and $2\text{k}\,\Omega$, the power gain of the amplifier is

(1) 36
(2) 38
(3) 45
(4) 95

19. Hydrogen atoms in the ground state are excited by electromagnetic radiation of energy 12.1 eV. How many spectral lines will be emitted by the hydrogen atoms?

(1) One
(2) Two
(3) Three
(4) Four

20. The current gain of a transistor in common emitter configuration is 70. What is the base current if the emitter current is 8.8 m A?

(1) 0.183 mA
(2) 0.124 mA
(3) 0.210 mA
(4) 0.245 mA

21. 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

22. A photodiode is

a. p-n junction diode with a window to allow light to fall on the diode
b. operated under forward bias
c. fabricated such that the generation of e-h pairs takes place in the depletion region
d. used to detect optical signals

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

23. $_{92}U^{238}$ decays to stable nucleus of $_{82}Pb^{206}$. In this process number of α and β^- particles emitted are respectively

(1) 8 and 6
(2) 6 and 8
(3) 7 and 7
(4) 8 and 4

24. The angular momentum of the electron in the hydrogen atom can be

(1) 3h
(2) $\frac{h}{\pi}$
(3) $\frac{h}{4\pi}$
(4) 2h

25. **Assertion** : Heavy water is preferred to ordinary water in reactors to slow down neutrons.

Reason: Deuterion 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

26. The longest wavelength in the Balmer series of hydrogen spectrum is

(1) $\frac{5R}{6}$
(2) $\frac{5R}{36}$
(3) $\frac{6}{5R}$
(4) $\frac{36}{5R}$

27. The work function of caesium metal is 2.14 eV. When light of frequency 6×10^{14} Hz is incident on the metal surface, photoemission of electrons occurs. What is the stopping potential?

(1) 0.4 V
(2) 0.34 V
(3) 0.68 V
(4) 0.8 V

28. In Rutherford scattering experiment, what will be the correct angle for α scattering for an impact parameter b = 0

(1) 90°
(2) 270°
(3) 0°
(4) 180°

29. In the alpha decay of a Uranium-238 nucleus into a Thorium nucleus, 4.25 MeV of energy is released. Then, the kinetic energy carried by the α-particle will be

(1) 4.15 MeV
(2) 2.26 MeV
(3) 4.24 MeV
(4) 4.18 MeV

30. A proton, when accelerated through a potential difference of V, has a wavelength λ associated with it. If an alpha particle is to have the same wavelength λ, it must be accelerated through a potential difference of

(1) V/8
(2) V/4
(3) 4 V
(4) 8 V

31. In an electromagnetic wave, the electric field has an amplitude of 48 V/m. The amplitude of the oscillating magnetic field will be

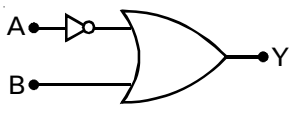
(1) 1.44×10^{-6} T
(2) 1.6×10^{-7} T
(3) 48×10^{-6} T
(4) 48 T

32. In a PN junction photo cell, the value of photo-electromotive force produced by monochromatic light is proportional to the

(1) voltage applied at the PN junction
(2) barrier voltage at the PN junction
(3) intensity of the light falling on the cell
(4) frequency of the light falling on the cell

33. Change in kinetic energy of a moving particle required to halve its de-Broglie wavelength is

(1) 100%
(2) 200%
(3) 300%
(4) 400%

34. 

What is the Boolean equation for the logic gate shown?

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

35. The binding energy per nucleon for deuteron (^2_1H) and helium (^4_2He) 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) 23.6 MeV
(3) 28.0 MeV
(4) 30.2 MeV

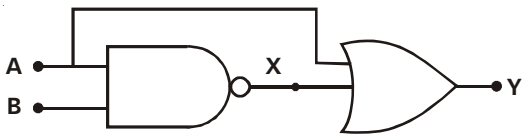
PHYSICS : SECTION-B

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

36. Let an electron jump from higher state to lower state in an hydrogen atom. Then its potential energy_____, kinetic energy_____and total energy_____.
(1) increases ; increases ; increases
(2) increases ; decreases ; increases
(3) decreases ; increases ; decreases
(4) decreases ; decreases ; decreases

37. **Statement-I** : Einstein's photoelectric equation states that $E_k = h\nu - \phi$. In this equation E_k refers to mean kinetic energy of the emitted electrons.
Statement-II : A photon of higher energy has higher velocity.
(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

38. If the work function of caesium is 2.07 eV, what is approximate threshold frequency for it?
(1) 4×10^{15} Hz
(2) 6×10^{15} Hz
(3) 5×10^{14} Hz
(4) 5×10^{12} Hz

39.


If A = 1 and B = 0, write the output at X and Y.
(1) 0 and 0
(2) 0 and 1
(3) 1 and 0
(4) 1 and 1

40. The negative total energy of an orbital electron means that it
(1) is in stable equilibrium
(2) is bound to the nucleus
(3) has emitted a photon
(4) satisfies Bohr's postulate of quantized angular momentum

41. Match the type of radioactive decay in column I with the emissions in column II.

Column I	**Column II**
a. α-decay	p. electrons or positrons
b. β-decay	q. high energy photons
c. γ-decay	r. helium nucleus ^4_2He

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

42. Fission of U^{235} starts with the absorption of
(1) slow proton
(2) fast neutron
(3) slow neutron
(4) fast proton

43. The momentum of a photon is 2×10^{-16} gm-cm/s. Its energy is
(1) 0.61×10^{-26} erg
(2) 2×10^{-26}erg
(3) 6×10^{-6} erg
(4) 6×10^{-8} erg

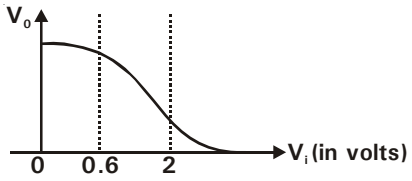
44.


Figure shows the transfer characteristics of a base biased CE transistor. Then
a. At $V_i = 0.4$ V, transistor is in active state
b. At $V_i = 1$ V, it can be used as an amplifier
c. At $V_i = 0.5$ V, it can be used as a switch turned off
d. At $V_i = 2.5$ V, it can be used as a switch turned on
(1) a, b & c
(2) a, b, c & d
(3) c only
(4) b, c & d

45. Neutron ratio (available/used) r per fission in atomic reactor and in an atom bomb are
(1) $r > 1$ in atomic reactor and $r < 1$ in bomb
(2) $r = 1$ in atomic reactor and $r > 1$ in bomb
(3) $r > 1$ in both atomic reactor and bomb
(4) $r < 1$ in both atomic reactor and bomb.

46. A suitable material for making p-type semiconductor from germanium crystal is
(1) carbon
(2) aluminium
(3) phosphorous
(4) antimony

47. When a forward bias is applied to p-n junction,
(1) it raises the potential barrier.
(2) it reduces majority carrier current to zero.
(3) it lowers the potential barrier.
(4) None of the above.

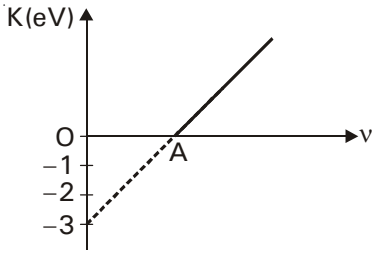
48.


Figure represents a graph of kinetic energy (K) of photoelectrons (in eV) and frequency (ν) for a metal used as cathode in photoelectric experiment. The work function of metal is
(1) −3 eV
(2) 1.5 eV
(3) 2 eV
(4) 3 eV

49. Velocity of an electromagnetic wave in a medium of relative permeability 1 is $\frac{2c}{3}$. The relative permittivity of medium is (where c is speed of light in vacuum)
(1) 2
(2) 2.5
(3) 2.25
(4) 2.75

50. A light beam of intensity 'I' falls normally on a reflecting surface of area A. The force acting on the surface is
(1) IA
(2) 2 IA
(3) $\frac{IA}{C}$
(4) $\frac{2IA}{C}$

CHEMISTRY : SECTION-A

All questions are compulsory in section A

51. Total volume of atoms present in a hcp unit cell of a metal is
(1) $\frac{20}{3}\pi r^3$
(2) $\frac{24}{3}\pi r^3$
(3) $\frac{12}{3}\pi r^3$
(4) $\frac{16}{3}\pi r^3$

52. Which of the following is true?
(1) All lanthanides are non-radioactive
(2) Enthalpy of atomisation is highest for vanadium in first transition series
(3) $KMnO_4$ is used as primary standard
(4) Mn_2O_7 contains two Mn–O–Mn bonds

53. Oil and water can form a stable dispersion with the help of a third substance commonly called
(1) Emulsifier
(2) Dispersant
(3) Lyophobic colloid
(4) Micelle

54. A hypothetical reaction
$A_2 + B_2 \rightarrow 2AB$ follows
the following mechanism
$A_2 \rightleftharpoons A + A$
$A + B_2 \rightarrow AB + B$(slow)
$A + B \rightarrow AB$ (fast)
The overall order of reaction is
(1) zero
(2) 1
(3) 1.5
(4) 2

55. If the radius of the anion in an ionic solid is 200 pm, what would be the radius of the cation that fits exactly into a cubic void?
(1) 146.4 pm
(2) 82.8 pm
(3) 45 pm
(4) 90 pm

56. $EDTA^{4-}$ is an important hexadentate ligand. It can bind through
(1) two oxygen atoms and four nitrogen atoms
(2) one nitrogen atom and five oxygen atoms
(3) two nitrogen atom and four oxygen atoms
(4) five nitrogen atom and one oxygen atom

57. Bredig's arc method for the preparation of colloid involves
(1) dispersion of metal
(2) condensation of metal
(3) dispersion as well as condensation
(4) neither dispersion nor condensation

58. At 200 K, the half life of a gaseous reaction is 180 seconds at the initial pressure of 60 Pa. The half life of the same reaction at same temperature was 45 sec. at the initial pressure of 15 Pa. Then order of the reaction is
(1) zero
(2) one
(3) two
(4) three

59. For the reaction $2A + B \rightarrow 3C + D$ which of the following does not express the reaction rate ?

(1) $-\frac{d[C]}{3dt}$

(2) $-\frac{d[B]}{dt}$

(3) $\frac{d[D]}{dt}$

(4) $-\frac{d[A]}{2dt}$

60. How many unit cells are present in 5 gm of crystal AB (formula mass = 40), having rock salt structure

(1) N_A

(2) $\frac{N_A}{10}$

(3) $4N_A$

(4) $\frac{N_A}{32}$

61. Which of the following statement is incorrect?

(1) AgBr shows both schottky & frenkel defects.

(2) In fcc packing, if each unit cell is divided into eight small cubes, then there is an octahedral void at the centre of each small cube.

(3) 6 : 6 co-ordination changes to 8 : 8 co-ordination on applying pressure.

(4) White zinc oxide turns yellow on heating and its formula becomes $Zn_{1+x}O$.

62. If crystal field stablisation energy of $[ML_6]^{2+}$ is $-0.8\ \Delta_0$, then the minimum number of electrons in t_{2g} orbitals of metal ion are

(1) 1

(2) 2

(3) 4

(4) 5

63. 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

64. **Statement-I** : Geometrical isomerism arises in heteroleptic complexes due to different possible geometric arrangements of the ligands.

Statement-II : Square planar complexes of the type MABXL (where A, B, X, L are unidentates) shows two isomers-one cis and one trans.

(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

65. Which of the following does not have one or more typical metallic structures at normal temperatures?

(1) Cd

(2) Hg

(3) Mn

(4) All of these

66. If the anions (A) form hexagonal closest packing and cations (C) occupy only 2/3 octahedral voids in it, then the general formula of the compound is

(1) CA

(2) CA_2

(3) C_2A_3

(4) C_3A_2

67. The 3d series transition metal which exhibits the largest number of oxidation states is

(1) Mn

(2) Fe

(3) Co

(4) Sc

68. Which of the following does not exist?

(1) TiX_4

(2) VF_5

(3) CrF_6

(4) MnF_7

69. Which of the following ions show highest spin only magnetic moment value?

(1) Ti^{3+}

(2) Mn^{2+}

(3) Fe^{2+}

(4) Co^{3+}

70. The oxidation number of Co in $[Co(en)_3]_2(SO_4)_3$ is

(1) +2

(2) +4

(3) +3

(4) +6

71. Which of the following is a tetrahedral species ?

(1) $[PdCl_4]^{2-}$

(2) $[Ni(CN)_4]^{2-}$

(3) $[PtCl_4]^{2-}$

(4) $[NiCl_4]^{2-}$

72. Which of the following compelxes is likely to show optical activity?

(1) Trans-$[Co(NH_3)_4Cl_2]^+$

(2) $[Cr(H_2O)_6]^{3+}$

(3) Cis-$[Co(NH_3)_2(en)_2]^{3+}$

(4) Trans-$[Co(NH_3)_2(en)_2]^{3+}$

73. Identify the correct statement

(1) The zig-zag movement of colloidal particles towards oppositely charged electrodes under the influence of electric field is called Brownian movement

(2) Scattering of light by true solute particles is called tyndall effect

(3) Mixing of two oppositely charged colloids results in coagulation

(4) Movement of only dispersion medium of colloid towards oppositely charged electrode is cataphoresis

74. For a zero order reaction, $A \rightarrow B$, $t_{100\%}$, is proportional to _____
(where A_o = initial concentration)
(1) $[A_o]$
(2) $[A_o]^{1/2}$
(3) $[A_o]^{2/3}$
(4) $[A_o]^2$

75. Match the types of defect given in Column I with the statement given in Column II.

	Column I		Column II
i.	Impurity defect	a.	NaCl with anionic sites called F-centres
ii.	Metal excess defect	b.	FeO with Fe^{3+}
iii.	Metal deficiency defect	c.	NaCl with Sr^{2+} and some cationic sites vacant

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

76. MnO_4^- react with H_2O_2 in acidic medium to form X and in basic medium to form Y. X and Y are respectively
(1) Mn^{2+}, Mn^{4+}
(2) Mn^{+4}, Mn^{2+}
(3) Mn^{2+}, MnO_2
(4) MnO_2, Mn^{2+}

77. The electrical charge on a colloidal particle is indicated by
(1) Brownian movement
(2) electrophoresis
(3) ultramicroscope
(4) molecular sieves

78. The half life of a 1st order reaction having rate constant $k = 1.7 \times 10^{-5}$ sec^{-1} is
(1) 12.1 hrs
(2) 9.7 hrs
(3) 11.3 hrs
(4) 1.8 hrs

79. Which one of the following schemes of ordering closed packed sheets of equal sized spheres do not generate closest packed lattice?
(1) ABCABC
(2) ABACABAC
(3) ABBAABBA
(4) ABCBCABCBC

80. The radius of La^{+3} is 1.06 $\mathring{A}$, which of the following given values will be closest to the radius of Lu^{+3} (at. no. of Lu = 71, La = 57)?
(1) 1.6 $\mathring{A}$
(2) 1.4 $\mathring{A}$
(3) 1.06 $\mathring{A}$
(4) 0.85 $\mathring{A}$

81. The common metal in brass, bronze and german silver is
(1) Cu
(2) Mg
(3) Al
(4) Zn

82. **Assertion** : The number of collisions per second per unit volume of the reaction mixture is known as collision frequency
Reason : The collisions in which molecules collide with sufficient kinetic energy and proper orientation are called as effective collisions.
(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

83. Among TiF_6^{2-}, CoF_6^{3-}, Cu_2Cl_2 and $NiCl_4^{2-}$ the colourless species are
(1) CoF_6^{3-} and $NiCl_4^{2-}$
(2) TiF_6^{2-} and CoF_6^{3-}
(3) $NiCl_4^{2-}$ and Cu_2Cl_2
(4) TiF_6^{2-} and Cu_2Cl_2

84. Which of the following statements are applicable to a balanced chemical equation of an elementary reaction?
(1) Order is same as molecularity
(2) Order is less than the molecularity
(3) Order is greater than the molecularity
(4) Order can be less than or greater than molecularity

85. IUPAC name of the complex $K_3[Al(C_2O_4)_3]$ is
(1) Potassium alumino oxlate
(2) Potassium trioxalato aluminate (III)
(3) Potassium aluminium (III) oxalate
(4) Potassium trioxalato aluminate (VI)

CHEMISTRY : SECTION-B

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

86. $KMnO_4$ acts as oxidising agent in alkaline medium. The oxidation state of iodine changes by x units when KI reacts with alkaline $KMnO_4$. Then x is
(1) 2
(2) 1
(3) 6
(4) 8

87. The electrical double layer in the positively charged ferric hydroxide sol comprises of
(1) fixed layer of $Fe(OH)_3$ sol particles and mobile layer of anions
(2) fixed layer of $Fe(OH)_3$ precipitate and mobile layer of cations
(3) fixed layer of $Fe(OH)_3$ sol particles and mobile layer of cations
(4) fixed layer of anions and mobile layer of $Fe(OH)_3$ sol particles

88. In which of the following carbon oxygen bond length is longest?
(1) $[Mn(CO)_6]^+$
(2) $Cr(CO)_6$
(3) $[V(CO)_6]^-$
(4) all have equal carbon-oxygen bond length

89. **Assertion** : Mo(VI) and W(VI) are found to be more stable than Cr(VI).
Reason : MoO_3 and WO_3 are strong oxidising agent in acidic medium.
(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

90. Potassium manganate (K_2MnO_4) is formed when
(1) Cl_2 is passed into an aqueous $KMnO_4$ solution
(2) MnO_2 is fused with KOH in air
(3) Formaldehyde reacts with $KMnO_4$ in presence of strong alkali
(4) $KMnO_4$ reacts with concentrated H_2SO_4

91. When one mole of $CoCl_3.4NH_3$ complex is dissolved in water and treated with excess of $AgNO_3$ solution, it will give
(1) 3 moles of AgCl
(2) 2 moles of AgCl
(3) 1 moles of AgCl
(4) no precipitates of AgCl will form

92. The $t_{0.5}$ for the first order reaction,
$PCl_5(g) \rightarrow PCl_3(g) + Cl_2(g)$
is 10 min. The time in which the conc. of PCl_5 reduces to 10% of the initial conc. is close to
(1) 22 min
(2) 33 min
(3) 90 min
(4) 50 min

93. Zinc and Mercury do not show variable valency like d-block elements because
(1) they are soft
(2) their d-subshells are complete
(3) they have only two electrons in the outermost subshells
(4) their d-subshells are incomplete

94. In diamond, the coordination number of carbon is
(1) 4
(2) 8
(3) 6
(4) both (1) and (2)

95. **Statement-I** : Frenkel defect is shown by ionic substance in which there is a less difference in the size of ions
Statement-II :Frenkel defect creates a vacancy defect at its original site and an interstitial defect at its new location.
(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

96. Silver crystallises in fcc lattice. If edge length of the cell is 4.07×10^{-8} cm and density is 10.5 g/cm^3, the atomic mass of silver is
(1) 107.8 kg
(2) 107.8 u
(3) 53.9 kg
(4) 53.9 u

97. The rate constant of a reaction is given by the equation $k = A\, e^{-Ea/RT}$. Which factor should decrease for the reaction to proceed more rapidly?
(1) T
(2) A
(3) E_a
(4) Z

98. 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.	$[Cr(H_2O)_6]^{3+}$	i.	dsp^2, 1
b.	$[Co(CN)_4]^{2-}$	ii.	sp^3d^2, 5
c.	$[Ni(NH_3)_6]^{2+}$	iii.	d^2sp^3, 3
d.	$[MnF_6]^{4-}$	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

99. Which of the following is not an application of adsorption?
(1) Heterogenous catalysis
(2) Froth floatation process
(3) Blue colour of sky
(4) Chromatography

100. The ability of an ion to bring about coagulation of a given colloid depends upon
(1) its size
(2) the magnitude of its charge only
(3) the sign of its charge only
(4) both magnitude and sign of its charge

ZOOLOGY : SECTION-A

All questions are compulsory in section A

101. A small part of activated sludge from settling tank is
(1) Pumped into anaerobic sludge digester to serve as inoculum
(2) suitable for release into rivers and streams
(3) Pumped into aeration tank to serve as inoculum
(4) Rich in floating debris and stable particles

102. In biogas plant slurry is fed. in
(1) 10–15 feet deep tank above the ground level
(2) 20–30 feet deep tank below the ground level
(3) 10–15 feet deep tank below the ground level
(4) 30–40 feet deep tank above the ground level

103. 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

104. Streptokinase is an enzyme produced from
(1) *Streptococcus* and is used as clot buster in it's natural form
(2) *Streptococcus* and is used as clot buster after modification by genetic engineering
(3) *Staphylococcus* and is used as clot buster in it's natural form
(4) *Staphylococcus* and is used as clot buster after modification by genetic engineering

105. Night blindness is prevented by use of which crop in poor countries?
(1) Golden rice
(2) Wheat
(3) Gram
(4) Pea

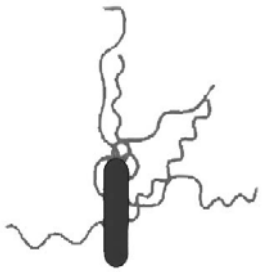
106. Maintenance of sterile ambience in chemical engineering processes enables growth only of
a. desired microbe
b. desired eukaryotic cell
c. plasmid
d. r–DNA
(1) c and d
(2) a and b
(3) a only
(4) b only

107. Which of the following are produced by bacteria ?
(1) Acetic acid and butyric acid
(2) Alcohol and citric acid
(3) Streptokinase
(4) Both (1) and (3)

108. Identify the correct sequence in which the enzymes/chemicals are used to isolate DNA from bacteria for r-DNA technology
(1) Cellulase–chilled ethanol–RNase
(2) Lysozyme–RNase–chilled ethanol
(3) Cellulase–chitinase–lysozyme
(4) lysozyme–chitinase–chilled ethanol

109. Which of the following is not a component of downstream processing?
(1) Expression
(2) Separation
(3) Purification
(4) Preservation

110. Identify the given figure



(1) A bacteriophage
(2) Rod shaped bacterium with many cilia
(3) Rod shaped tabacoo mosaic virus
(4) Rod shaped bacterium with flagella

111. Choose the correct match
(1) Gene gun – DNA is coated around Ca^{2+}
(2) Electrophoresis– Permanent holes are created by applying strong electric field
(3) Disarmed pathogen– transfer of recombinant DNA into host
(4) Microinjection – Micropipettes are used for insertion of recombinant plasmid

112. How many recognition sites preferably should be present for one restriction enzyme in a plasmid vector?
(1) One
(2) Three
(3) Five
(4) Six

113. **Assertion** : Microbes like bacteria and many fungi can be grown on nutritive media to form colonies , that can be seen with the naked eyes.
Reason : *In vitro* cultures of microbes like bacteria, viruses, viroids are useful in studies on micro-organisms.
(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

114. Which is the best and permanent method to treat a genetic disorder in which gene product (protein/ enzyme) is not made?
(1) Transplantation
(2) Enzyme replacement therapy
(3) Blood transfusion
(4) Introduction of desired gene into cell at early embryonic stages

115. For cloning of a desired DNA it is essential that it should be a part of chromosome which has a sequence called
(1) Origin of replication
(2) Selectable marker
(3) Reporter gene
(4) All of these

116. In agarose gel electrophoresis, the smallest DNA fragment can be traced
(1) towards anode, farthest from wells
(2) towards cathode, farthest from wells
(3) towards anode, nearest to wells
(4) towards cathode, nearest to wells

117. Identify the event in biotechnology correctly matched to the year in which it occured

a.	discovery of restriction enzymes from *E.coli*	i.	1972
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.	1969

(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

118. 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

119. Fill in gaps using the correct option given below
_____an American company prepared _____DNA sequences corresponding to A and B, chains of human insulin and introduced them in _____ of *E.coli* to produce insulin chains. Chains A and B were produced separately, extracted and combined by creating _____ to form humulin
(1) Eli lily, 3, plasmids, disulphide bond
(2) Pfizer, 2, plasmids, peptide
(3) Eli lily, 2, plasmids, disulphide bond
(4) Eli lily, 2, plasmid, peptide

120. **Statement-I** : Lymphocytes are extracted from blood of AIDS patient and with the help of rhinoviruses ADA gene is incorporated.
Statement-II : At present, about 15 recombinant therapeutics have been approved for human use the world over. In India, 6 of these are presently being marketed.
(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

121. High value of BOD (Biochemical Oxygen Demand) indicates that:
(1) consumption of CO_2 is higher by the microbes
(2) water is pure
(3) water is highly polluted
(4) water is less polluted

122. Match the items of column-I with column-II

	Column-I		**Column-II**
i.	*Aspergillus niger*	a.	butyric acid
ii.	*Monascus purpureus*	b.	cyclosporin-A
iii.	*Trichoderma polysporum*	c.	Citric acid
iv.	*Clostridium butylicum*	d.	statins

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

123. Which one of the following is commonly used in transfer of foreign DNA into crop plants?
(1) *Meloidogyne incognita*
(2) *Agrobacterium tumefaciens*
(3) *Penicillium expansum*
(4) *Trichoderma harzianum*

124. Choose the incorrect statement
(1) Bacterial chromosomes and plasmids posses a single Ori
(2) Insulin produced by genetic engineering does not illicit immune response and can be orally administered by a diabetic patient
(3) A probe is used in screening test for genetic disorders
(4) Root of tobacco plant gets infected by *Meloidogyne incognita*

125. The crystal proteins from *Bacillus thuringiensis* do not harm the bacteria because
(1) Inactive proteins are activated in the midgut of insects at alkaline pH.
(2) Inactive proteins are activated in the midgut of insects at acidic pH.
(3) Inactive proteins are activated in the midgut of insects by pepsin.
(4) Both 1 and 2

126. Competent host for the functional expression of eukaryotic genes can not be
(1) Yeast
(2) Plant cell
(3) Retrovirus
(4) Animal cell

127. In pBR322 Tet^R site and rop site carries restriction site respectively for
(1) *Bam H1 and Sal I*
(2) *Sal I and Pst I*
(3) *Sal I and Pvu I*
(4) *Bam H I and Pvu II*

128. Which one of the following statment is correct?
(1) Sewage contains wastes of domestic and industrial units
(2) Sewage water is rich in inorganic matter
(3) Effuents of sugar factories are heavity loaded with inorganic wastes and do not need proper treatment
(4) All are correct

129. Vector DNA and plasmid DNA, cut by the same restriction enzyme are joined together by __A__ and the reaction is catalysed by __B__ . A and B respectively are
(1) S-S bonds ; DNA ligase
(2) H-bonds ; DNA polymerase
(3) Phosphodiester bond ; DNA ligase
(4) Phosphodiester bond ; DNA polymerase

130. Antibiotics are very effective for one of the following group of diseases
(1) whooping cough, diphtheria and leprosy
(2) whooping cough, diphtheria and mumps
(3) leprosy, small pox and typhoid
(4) diphtheria, tetanus and measles

131. Choose the incorrect statement with reference to transgenic animals
(1) used in study of complex factors involved in growth such as insulin like growth factor
(2) first transgenic cow rosie was developed in 1997 that produce human protein enriched milk (2.4 gm/lit)
(3) 95% of all existing transgenic animals are cows
(4) transgenic mice can replace the use of monkeys to test the safely of batches of vaccine

132. How many of the following are the examples of distilled beverages?
Beer, Wine, Whisky, Brandy, Rum
(1) 4
(2) 7
(3) 5
(4) 3

133. Small oligonucleotides tagged with radio-isotopes, capable of recognizing complementary sequence are known as
(1) Primer
(2) Hybridoma
(3) Molecular probes
(4) Both (1) and (3)

134. Which of the following statement is incorrect w.r.t. biogas production?
(1) Biogas is a mixture of CH_4, CO_2, H_2S & H_2
(2) Biogas plants are more often built in urban areas
(3) Biogas can be used for cooking & lightning
(4) The technology of biogas production was developed in India mainly due to efforts of IARI & KVIC

135. Use of bioresources by multinational companies without proper authorisation from the countries concerned is called
(1) biopatent
(2) biopiracy
(3) bioethics
(4) GEAC

ZOOLOGY : SECTION-B

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

136. Which of the following statement is incorrect w.r.t. PCR?
(1) It is *in-vitro* method of gene amplification
(2) Used for diagnosis of specific mutation
(3) It is more labour intensive than gene cloning
(4) It require less user skills

137. Which should be chosen for best yield if one were to produce a recombinant protein in large amounts?
(1) Laboratory flask of largest capacity
(2) A stirred-tank bioreactor without in-lets and out-lets
(3) A continuous culture system
(4) Any of the above

138. Mark the incorrect statement about restriction endonuclease?
(1) Restriction endonuclease functions by inspecting the length of DNA sequence
(2) It binds to specific sequence of DNA and cut one of the two strands of the double helix
(3) It recognizes a specific palindromic nucleotide sequences in the DNA
(4) They act as molecular scissors

139. Bacteria called natural genetic engineer has
(1) *Agrobacterium tumefacien*
(2) T DNA
(3) Tumor inducing plasmid (Ti plasmid)
(4) both (2) and (3)

140. Identify the incorrect statement
(1) A key belief of organic farmer is that biodiversity furthers health
(2) A large variety of species in a landscape increases sustainability
(3) It is desirable to eliminate all pests
(4) Biocontrol is the use of biological methods for controlling plant diseases & pests

141. **Assertion** :Chains A and C of insulin produced separately, extracted and combined to form humulin .
Reason : Insulin can not be assembled into mature form within bacteria .
(1) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(2) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

142. Select the correct group of biocontrol agents.
(1) *Bacillus thuringiensis,* Tobacco mosaic virus, Aphids
(2) *Trichoderma, Baculovirus, Bacillus thuringiensis*
(3) *Oscillatoria, Rhizobium, Trichoderma*
(4) *Nostoc, Azospirillium, Nucleopolyhedrovirus*

143. Which of the following is correct for the following transgenic plants?

	Pest Resistant Plant	**Bt Cotton**
(1)	Silencing of specific tRNA due to complimentary dsRNA	Killing of insect due to conversion of inactive toxin to active toxin.
(2)	dsRNA triggers protection against nematode infestation.	Choice of *cry* gene will vary depending upon targeted pest.
(3)	Source of complementary RNA could be from an infection by viruses having DNA genome.	Cry II Ab control corn borer and cry I Ab control cotton boll worms
(4)	Based on masking of native gene.	Based on method of cellular defence.

144. Validity of GM research & safety of introducing GM-organisms for public services is done by
(1) GEAC (2) GEEC
(3) EAGC (4) EGAC

145. In secondary treatment of sewage
(1) these is vigorous growth of useful aerobic microbes into flocs
(2) microbes consume the major part of organic matter
(3) BOD is significantly reduced
(4) all of these

146. The technique which can be used to detect a disease before its symptoms appear is
(1) ELISA
(2) PCR
(3) Agarose gel electrophoresis
(4) Both (1) and (2)

147. What is not true for restriction endonucleases?
(1) Occur in bacteria
(2) Cut DNA at specific sites
(3) Required for PCR
(4) Do not attack on source DNA as it is methylated

148. Which of the following is incorrect statement w.r.t. Baculoviruses?
(1) Attack insects and other arthropods
(2) Mainly belong to nucleopolyhedrovirus
(3) Species specific
(4) Broad-spectrum insecticidal applications

149. **Statement-I** : Addition of exonuclease after the formation of recombinant plasmid will not likely affect the experiment.
Statement-II : Recombinant plasmid is closed and has no free ends which can be acted upon by exonuclease.
(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

150. Primary treatment of sewage include
a. filteration and sedimentation
b. physical removal of small and large particles
c. Microbial breakdown of organic waste
d. separation of primary sludge
(1) a, b, c & d
(2) a, b & c
(3) b, c & d
(4) a, b & d

BOTANY : SECTION-A

All questions are compulsory in section A

151. The ecosystem spread over a large area and defined by specified latitude, precipitation, temperature, flora and fauna is
(1) biosphere
(2) landscape
(3) biome
(4) habitat

152. Predation helps in
(1) transferring energy fixed by plants to higher trophic levels
(2) regulating prey population
(3) maintaining species diversity in a community
(4) all of these

153. The term ecosystem was coined by
(1) E. Haeckel
(2) E. Warming
(3) E.P. Odum
(4) A.G. Tansley

154. The association between cattle egrets, which feed on insects, and the cows they follow, which flush insects from the vegetation is an example of
(1) amensalism
(2) mutualism
(3) commensalism
(4) parasitism

155. Succession is characterised by all except
(1) change is orderly and sequential in succession
(2) In secondary succession, climax is reached more quickly
(3) All successions proceed to a similar climax community the mesic
(4) Description of succession focuses on both plants and animals equally

156. A zone of transition between two communities is known as
(1) ecotype
(2) niche
(3) ecotone
(4) liana

157. Main air pollutant which causes ozone layer depletion is
(1) sulphur dioxide
(2) carbon dioxide
(3) nitrogen oxides
(4) chloro fluorocarbons

158. **Assertion** : During course of evolution conformers have not evolved to become regulators.
Reason : Thermoregulation is energetically expensive for many organisms.
(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

159. A tiger feeding on wolf (which feeds on a wild cat) is an example of
(1) secondry consumer
(2) top carnivore
(3) tertiary carnivore
(4) both (2) and (3)

160. Find odd one w.r.t. sacred forests.
(1) Khasi and Jaintia hill in Meghalaya
(2) Aravalli Hills of Rajasthan
(3) Khecheopalri lake of Sikkim
(4) Sarguja of Madhya Pradesh

161. The rate of formation of new organic matter by goat in an ecosystem, is called
(1) net productivity
(2) secondary productivity
(3) gross primary productivity
(4) net primary productivity

162. The natural aging of a lake by biological enrichment of its water is called
(1) bioconcentration
(2) eutrophication
(3) cultured eutrophication
(4) biochemical oxygen demand

163. Which statement is false?
(1) In every ecosystem, the biotic and abiotic components interact to produce a typical physical structure
(2) The standing state varies from place to place and also shows seasonal variations in a place
(3) The biomass at each trophic level is called standing crop at a given time
(4) In aquatic ecosystem, pyramid of total biomass produced per unit time is always spindle

164. What is BOD?
(1) Amount of oxygen utilised by organisms in water
(2) Amount of oxygen utilised by microbes for biological oxidation
(3) Total oxygen amount present in water
(4) All of the above

165. Select the incorrect match
(1) Animal species – 70% of total species
(2) Sunderbans – largest mangrove forest
(3) Scandinavian country – high diversity
(4) Columbia – 1400 species of birds

166. Pick the odd one in relation to phosphorous cycle
(1) Reservoir is earth crust
(2) Respiratory release
(3) Guano deposits
(4) Shells, bones, teeth

167. Choose the correct statement w.r.t. decomposition.
(1) Rate of decomposition is fast, if detritus contain lignin and chitin
(2) Low temperature and anaerobic conditions promote decomposition
(3) Warm and moist conditions favour decomposition
(4) Rate of decomposition is slow, if detritus contain nitrogen and sugars

168. How many national parks in India spread over 1% area ?
(1) 448
(2) 90
(3) 34
(4) 450

169. **Statement-I** : Of the total incident solar radiation, less than 5% of it is photosynthetically active radiation.
Statement-II : Network of natural interconnection of food chains is called food web.
(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

170. Which method is used to remove particulate pollutants from the chimney smoke?
(1) Combustion system
(2) Dry system
(3) Electrostatic precipitator
(4) Wet system

171. Find the incorrect match
(1) Air (prevention of control of pollution)Act – 1981
(2) Water (prevention and control of pollution) Act – 1974
(3) JFM –1980
(4) Chipko Movement – 1731

172. Ozone depletion in stratosphere shall result in
(1) forest fires
(2) increased incidence of skin cancer
(3) global warming
(4) none of these

173. How many of the following statements about temperature is /are not correct?
a. Average temperature on land varies seasonally
b. It decreases progressively from the equator to the poles
c. It decreases progressively from plains to the mountains
d. Unique habitats such as thermal springs and deep sea hydrothermal vents have average temperatures is 90°C
e. A vast majority of organisms can tolerate and thrive in a wide range of temperature (i.e. eurythermal) but, a few are restricted to narrow range of temperature (i. e. stenothermal)
(1) one (2) two
(3) zero (4) three

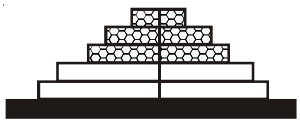
174. Which of the following statement is incorrect?
(1) India has more ecosystem diversity than Norway
(2) Fungal diversity is much more than the combined diversity of mammals, fishes, reptiles and amphibians
(3) More than 1000 varieties of mango grow in India indicating a high level of species diversity
(4) Western Ghats have a much greater amphibian diversity than Eastern Ghats

175. Lichen is an association of
(1) fungus and virus
(2) bacteria and mosses
(3) fungus and algae
(4) fungus and roots of higher plants

176. **Statement-I** : Population density is only measured in number.
Statement-II : Immigration involves the number of individuals escaped from the habitat.
(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

177. Historic convention on biological diversity i.e. the earth summit was held in
(1) 1997
(2) 1992
(3) 1993
(4) 2002

178. Observe the age pyramid given below and answer the question respectively



a. What is growth status of population?
b. What does broad dark base represent?
(1) a- declining, b-pre-reproductive males
(2) a-stable, b-reproductive females
(3) a-expanding, b-pre-reproductive females
(4) a-expanding, b-pre-reproductive males and females

179. Match the correct pair

(1)	Jhum cultivation	–	JFM
(2)	Montreal Protocol	–	Global warming
(3)	National Forest Policy of India	–	1988
(4)	Reforestation	–	Establishment of forest on the land where there was no forest earlier

180. Diapause differs from hibernation in
(1) occurring only in summer
(2) occurring only in winter
(3) being suspended developmental stage
(4) being inactive state of adult organism

181. Which of the following is not included in ecosystem services?
(1) Maintenance of biodiversity
(2) Recharging of ground water
(3) Decrease in atmospheric humidity
(4) Pollination of crops

182. Which of the following is not a criteria for biodiversity hot spot?
(1) Species richness
(2) Accelerated habitat loss
(3) High degree of endemism
(4) Competition between species

183. Ecological niche of an organism is comprised of
(1) defined range of conditions that it can tolerate
(2) diversity in the resources that it utilizes
(3) distinct functional role of an organism
(4) all of these

184. Loss of biodiversity in a region may lead to
(1) more resilience
(2) increased resistance to environmental perturbations
(3) no change in water use
(4) increased variability in certain ecosystem processes

185. Which is not in accordance with 10% law?
(1) 1000 kg of grass can support a 10 kg tiger (which feeds on deer)
(2) If energy is 100 k cal at the primary consumer level then there will be 10 k cal at the secondary consumer level
(3) The pyramid of energy is always upright in all ecosystems
(4) In an ecosystem with 1,000,000 J of sunlight, 100,000 J will be trapped at the producer level

BOTANY : SECTION-B

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

186. Which of the following attibutes is possessed by a population but not by an individual?
(1) Sex ratio
(2) Birth
(3) Age
(4) Death

187. Which of the following statement is true?
(1) In recent years, *ex-situ* conservation has advanced beyond keeping threatened species in enclosures
(2) In Meghalaya, the sacred groves are last refuge of large number of rare animals
(3) Habitat manipulation are allowed in National parks
(4) *Parthenium* threatens many aquatic species

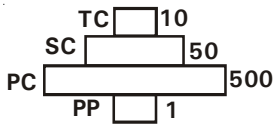
188. Productivity of an ecosystem depends on
(1) photosynthetic activity of plant
(2) solar radiation
(3) soil type and precipitation
(4) all of these

189. **Assertion** : Tropical rain forests have a higher rate of synthesis of biomass i.e. productivity, than temperate forests.
Reason : In temperate forests, the primary productivity is limited due to severity of cold climate and lesser input of solar radiations.
(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

190. For reducing the current rate of biodiversity loss at global, regional and local level, a convention was held in 2002 which was named as
(1) Earth summit
(2) World summit on sustainable development
(3) Forest conservation act
(4) MAB programme

191. A scrubber is a device used for controlling
(1) soil pollution
(2) air pollution
(3) thermal pollution
(4) radioactive pollution

192. Given below is an imaginary pyramid of number. What could be one of the possibilities about certain organisms at some of the different levels ?



(1) Level PP is phytoplanktons in sea and where on top level TC is lion
(2) Level one PP is peepal tree and level SC is sheep
(3) Level PC is wolf and level SC is cat
(4) Level PC is insect and level SC is small insectivorous birds.

193. Select the incorrect match w.r.t. productivtity of ecosystem
(1) Estuaries – High productivity
(2) Coral reefs – High productivity
(3) Deep sea – Low productivity
(4) Sugarcane field – Average productivity

194. Which of the following is a secondary pollutant?
(1) CO
(2) CO_2
(3) PAN
(4) SO_2

195. Domestic sewage is rich in ____ and ____ which lead to eutrophication and algal blooms
(1) calcium and potassium
(2) oxygen and carbon
(3) nitrogen and phosphorus
(4) nitrogen and hydrogen

196. Given below are some of the stages of the hydrarch
A. Marsh meadow stage
B. Reed swamp stage
C. Submerged plant stage
D. Phytoplankton stage
E. Free floating plant stage
Select the option that represents the correct sequence of these stages
(1) D, C, E, B and A
(2) C, E, A, B and D
(3) B, D, C, A and E
(4) D, E, C, B and A

197. Which of the following is not an *in-situ* conservation strategy?
(1) Gene bank
(2) Sacred groves
(3) National park
(4) Hot spots

198. **Statement-I** : All the buses of Delhi were converted to run on CNG by the end of 2002 after being censured very strongly by the Supreme Court.
Statement-II : As per Govt. of India, according to Euro III norms, the content of sulphur should be controlled at 350 ppm in diesel and 150 ppm in petrol.
(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

199. *Lantana* and *Eichhornia* are
(1) endangered species of India
(2) critically endangered species of India
(3) neither threatened nor indigenous species of India
(4) key stone species of India

200. Which of the following statements is incorrect w.r.t. energy flow in an ecosystem ?
(1) There is unidirectional flow of energy towards higher trophic level
(2) Amount of energy flow decreases with successive trophic levels.
(3) Organisms at each trophic level depend on those at the higher trophic level for their energy demands.
(4) Primary producers convert only 1% the energy in the sunlight available to them into NPP

Space for rough work

Space for rough work