CBSE-AIPMT - 2006

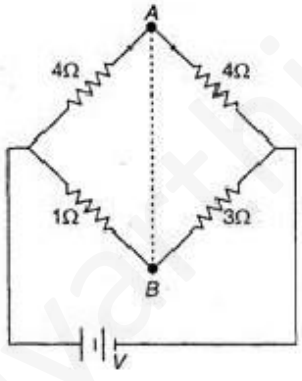
Full Paper-Prelims

Physics

1. In producing chlorine through electrolysis 100 W power at 125 V is being consumed. How much chlorine per min is liberated ? ECE of chlorine is 0.367 x 10^{-6} kg/C :

   1) 17.6 mg
   2) 34.3 mg
   3) 24.3 mg
   4) 39.6 mg

2. In the circuit shown, if a conducting wire is connected between points A and B, the current in this wire will :



   1) flow from A to B
   2) flow in the direction which will be decided by the value of V
   3) be zero
   4) flow from B to A

3. A rectangular block of mass m and area of cross-section A floats in a liquid of density ρ. If it is given a small vertical displacement from equilibrium it undergoes oscillation with a time period T. Then :

   1) $T \propto \sqrt{\rho}$
   2) $T \propto (1/\sqrt{A})$
   3) $T \propto (1/\rho)$
   4) $T \propto (1/\sqrt{m})$

4. A Carnot engine whose sink is at 300 K has an efficiency of 40%. By how much should the temperature of source be increased so as to increase its efficiency by 50% of original efficiency ?

   1) 275 K
   2) 175 K

3) 250 K

4) 225 K

5. When a charged particle moving with velocity is subjected to a magnetic field of induction $\vec{B}$, the force on it is non-zero. This implies that :

1) angle between $\vec{v}$ and $\vec{B}$ is necessarily 90°

2) angle between $\vec{v}$ and $\vec{B}$ can have any value other than 90°

3) angle between $\vec{v}$ and $\vec{B}$ can have any value other than zero and 180°

4) angle between $\vec{v}$ and $\vec{B}$ is either zero or 180°

6. Two cells, having the same emf, are connected in series through an external resistance R. Cells have internal resistances r_1 and r_2 ($r_1 > r_2$) respectively. When the circuit is closed, the potential difference across the first cell is zero, The value of R is :

1) $r_1 - r_2$

2) $(r_1 + r_2)/2$

3) $(r_1 - r_2)/2$

4) $r_1 + r_2$

7. A black body at 1227°C emits radiations with maximum intensity at a wavelength of 5000 Å. If the temperature of the body is increased by 1000°C, the maximum intensity will be observed at :

1) 7500 Å

2) 1500 Å

3) 6000 Å

4) 3000 Å

8. Two circular coils 1 and 2 are made from the same wire but the radius of the 1st coil is twice that of the 2nd coil. What is the ratio of potential difference applied across them so that the magnetic field at their centres is the same ?

1) 5 2) 4 3) 7 4) 2

9. A transistor-oscillator using a resonant circuit with an inductor L (of negligible resistance) and a capacitor C in series produce oscillations of frequency f. If L is doubled and C is changed to 4C, the frequency will be :

1) f/4

2) 8f

3) $f/2\sqrt{2}$

4) 2f

10. The binding energy of deuteron is 2.2 MeV and that of $_2^4He$ is 28 MeV. If two deuterons are fused to form one $_2^4He$ then the energy released is :

1) 21.6 MeV

2) 23.6 MeV

3) 17.2 MeV

4) 28.2 MeV

11. In a radioactive material the activity at time t_1 is R_1 and at a later time t_2, it is R_2. If the dacay constant of the material is λ, then :

1) $R_1 = R_2 e^{-\lambda(t_1 - t_2)}$

2) $R_1 = R_2 e^{\lambda(t_1 - t_2)}$

3) $R_1 = R_2 e^{(t_2 / t_1)}$

4) $R_1 = R_2$

12. Ionization potential of hydrogen atom is 13.6 eV. Hydrogen atoms in the ground state are excited by monochromatic radiation of photon energy 12.1 eV. According to Bohr's theory, the spectral lines emitted by hydrogen will be :

1) two 2) three 3) four 4) one

13. The potential energy of a long spring when stretched by 2 cm is U. If the spring is stretched by 8 cm the potential energy stored in it is :

1) 4U 2) U/8 3) 16U 4) U/4

14. For angles of projection of a projectile at angles $(45°-\theta)$ and $(45°+\theta)$, the horizontal ranges described by the projectile are in the ratio of :

1) 1 : 1

2) 2 : 3

3) 1 : 2

4) 3 : 2

15. A body of mass 3 kg is under a constant force which causes a displacement s in metres in it, given by the relation $s = (1/3)t^2$, where t is in s. Work done by the force in 2 s is :

1) (17/3)J

2) (3/8)J

3) (8/3)J

4) (3/17)J

16. A particle moves along a straight line OX. At a time t (in seconds) the distance x (in metres) of the particle from O is given by

$x = 40 + 12t - t^3$

How long would the particle travel before coming to rest ?

1) 14 m 2) 28 m 3) 56 m 4) 70 m

17. The velocity v of a particle at time t is given by $v = at + (b/t + c)$, where a, b and c are constants, The dimensions of a, b and c are respectively :

constants, The dimensions of a, b and c are respectively :

1) [LT $^{-2}$], [L] and [T]

2) [L], [T] and [LT ^{2}]

3) [L^{2}T ^{2}], [LT] and [L]

4) [L], [LT] and [T ^{2}]

18. A microscope is focussed on a mark on a piece of paper and then a slab of glass of thickness 3 cm and refractive index 1.5 is placed over the mark. How should the microscope be moved to get the mark in focus again ?

1) 1 cm upward

2) 0.5 cm downward

3) 1 cm downward

4) 0.5 cm upward

19. 300 J of work is done in sliding a 2 kg block up an inclined plane of height 10 m. Taking g =10 m/s^{2}, work done against friction is :

1) 50 J

2) 100 J

3) zero

4) 150 J

20. A transistor is operated in common emitter configuration at constant collector voltage V_C = 1.5 V such that a change in the base current from 100 μA to 150 μA produces a change in the collector current from 5 mA to 10 mA. The current gain (β) is :

1) 50

2) 75

3) 100

4) 125

21. A forward biased diode is :

1) 

2) 

3) 

4) 

22. A photo-cell employs photoelectric effect to convert :

1) change in the frequency of light into a change in electric voltage

2) change in the intensity of illumination into a change in photoelectric current

3) change in the intensity of illumination into a change in the work function of the photocathode

4) change in the frequency of light into a change in the electric current

23. The core of a transformer is laminated because :

1) energy losses due to eddy currents may be minimised

2) the weight of the transformer may be reduced

3) rusting of the core may be prevented

4) ratio of voltage in primary and secondary may be increased

24. Two coils of self-inductances 2 mH and 8 mH are placed so close together that the effective flux in one coil is completely linked with the other. The mutual inductance between these coils is :

1) 8 mH

2) 12 mH

3) 4 mH

4) 16 mH

25. In a discharge tube ionization of enclosed gas is produced due to collisions between :

1) positive ions and neutral atoms/molecules

2) negative electrons and neutral atoms/molecules

3) photons and neutral atoms/molecules

4) neutral gas atoms/molecules

26. When photons of energy hv fall on an aluminium plate (of work function E_0), photoelectrons of maximum kinetic energy K are ejected. If the frequency of the radiation is doubled, the maximum kinetic energy of the ejected photoelectrons will be :

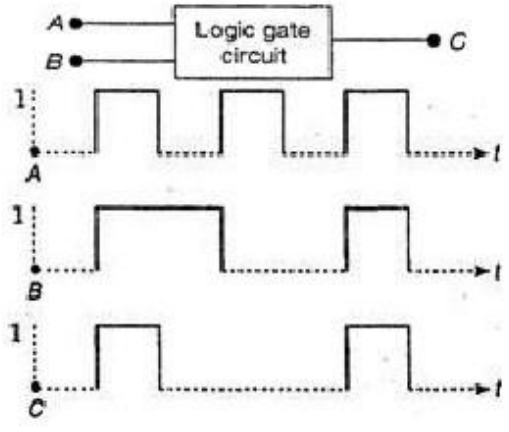
1) $K + E_0$

2) 2K

3) K

4) k + hv

27. The following figure shows a logic gate circuit with two inputs A and B and the output C. The voltage waveforms of A, B and C are as shown below :



The logic circuit gate is :

1) AND gate

2) NAND gate

3) NOR gate

4) OR gate

28. A coil of inductive reactance 31 has a resistance of 8Ω. It is placed in series with a condenser of capacitative reactance 25Ω. The combination is connected to an a.c. soruce of 110 V. The power factor of the circuit is :

1) 0.40

2) 0.128

3) 0.80

4) 0.66

29. A 0.5 kg ball moving with a speed of 12 m/s strikes a hard wall at an angle of 30° with the wall. It is reflected with the same speed and at the same angle. If the ball is in contact with the wall for 0.25 s, the average force acting on the wall is :

1) 8 N 2) 24 N 3) 16 N 4) 96 N

30. The moment of inertia of a uniform circular disc of radius R and mass M about an axis touching the disc at its diameter and normal to the disc is :

1) MR^2

2) $(2/5)MR^2$

3) $(3/5)MR^2$

4) $(5/6)MR^2$

31. The momentum of a photon of energy 1 MeV in kg m/s, will be :

1) 0.33×10^{6}

2) 8×10^{-24}

3) 5×10^{-23}

4) 5×10^{-22}

32. The radius of germanium (Ge) nuclide is measured to be twice the radius of $^{9}_{4}Be$. The number of nucleons in Ge are :

1) 73 2) 74 3) 76 4) 72

33. The molar specific heat at constant pressure of an ideal gas is (7/2)R. The ratio of specific heat at constant pressure to that at constant volume is :

1) 7/5 2) 6/7 3) 9/7 4) 4/7

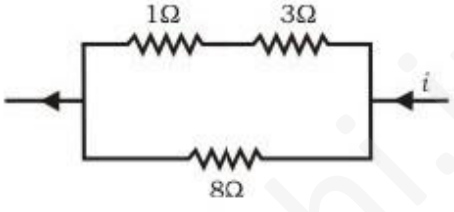
34. The earth is assumed to be a sphere of radius R. A platform is arranged at a height R from the surface of the earth. The escape velocity of a body from this platform is fv_e, where v_e is its escape velocity from the surface of the earth. The value of f is :

1) 2 2) $1/\sqrt{2}$ 3) 1/3 4) 1

35. Two sound waves with wavelengths 5.0 m and 5.5 m respectively, each propagate in a gas with velocity 330 m/s. We expect the following number of beats per second :

1) 12 2) 0 3) 3 4) 6

36. Power dissipated across the 8 Ω resistor in the circuit shown here is 2 W. The power dissipated in watt units across the 3 Ω resistor is :



1) 6.0
2) 1.5
3) 0.45
4) 3.0

37. Kirchhoff's first and second laws for electrical circuits are consequences of :

1) conservation of energy
2) conservation of electric charge and energy respectively
3) conservation of electric charge
4) conservation of energy and electric charge respectively

38. A transverse wave propagating along x-axis is represented by :
$y(x, t) = 8.0 \sin (0.5\pi x - 4\pi t - (\pi/4))$
where x is in metres and t is in seconds. The speed of the wave is :

1) 8π m/s
2) 0.5π m/s
3) $(\pi/4)$ m/s
4) 8 m/s

39. The time of reverberation of a room A is one second. What will be the time (in seconds) of reverberation of a room, having all the dimensions double of those of room A ?

1) 2 2) 4 3) 1/2 4) 8

40. Which one of the following statements is true ?

1) Both light and sound waves in air are transverse

2) The sound waves in air are longitudinal while the light waves are transverse

3) Both light and sound waves in air are longitudinal

4) Both light and sound waves can travel in vacuum

41. Above Curie temperature :

1) a ferromagnetic substance becomes paramagnetic

2) a paramagnetic substance becomes diamagnetic

3) a diamagnetic substance becomes paramagnetic

4) a paramagnetic substance becomes ferromagnetic

42. A convex lens and a concave lens, each having same focal length of 25 cm, are put in contact to form a combination of lenses. The power in diopters of the combination is :

1) 25 2) 50 3) infinite 4) zero

43. An electric dipole of moment $\vec{P}$ is lying along a uniform electric field $\vec{E}$. The work done in rotating the dipole by 90° is :

1) $\sqrt{2}$ pE

2) pE/2

3) 2pE

4) pE

44. A parallel plate air capacitor is charged to a potential difference of V volts. After disconnecting the charging battery the distance between the plates of the capacitor is increased using an insulating handle. As a result the potential difference between the plates :

1) decreases

2) does not change

3) becomes zero

4) increases

45. A car runs at a constant speed on a circular track of radius 100 m, taking 62.8 s for every circular lap. The average velocity and average speed for each circular lap respectively is :

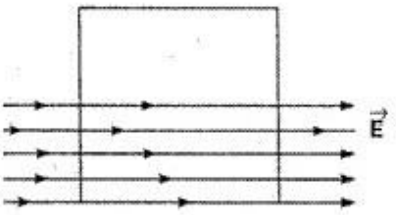
1) 0, 0

2) 0, 10 m/s

3) 10 m/s, 20 m/s

4) 20 m/s, 0

46. A square surface of side L m is in the plane of the paper. A uniform electric field $\vec{E}$ (V/m), also in the plane of the paper, is limited only to the lower half of the square surface, (see figure). The electric flux in SI units associated with the surface is :



1) $EL^2/(2\varepsilon_0)$

2) $EL^2/2$

3) zero

4) EL^2

47. A tube of length L is filled completely with an incompressible liquid of mass M and closed at both the ends. The tube is then rotated in a horizontal plane about one of its ends with a uniform angular velocity ω. The force exerted by the liquid at the other end is :

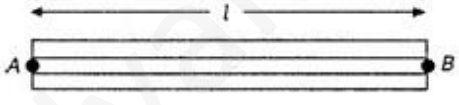
1) $(ML\omega^2)/(2)$

2) $(ML^2\omega)/(2)$

3) $2ML\omega^2$

4) $(ML^2\omega^2)/(2)$

48. A uniform rod of length l and mass m is free to rotate in a vertical plane about A. The rod initially in horizontal position is released. The initial angular acceleration of the rod is : (Moment of inertia of rod about A is $(ml^2/3)$)



1) $3g/2l$

2) $2l/3g$

3) $3g/2l^2$

4) $mg(l/2)$

49. The vectors $\vec{A}$ and $\vec{B}$ are such that a :

$$|\vec{A}+\vec{B}|=|\vec{A}-\vec{B}|$$

The angle between the two vectors is :

1) 90° 2) 60° 3) 30° 4) 0°

50. Two bodies, A (of mass 1 kg) and B (of mass 3 kg) are dropped from heights of 16 m and 25 m, respectively. The ratio of the time taken by them to reach the ground is :

1) 5/4 2) 8/5 3) 5/8 4) 4/5

Chemistry

51. Identify the correct statement for change of Gibbs energy for a system (ΔG_{system}) at constant temperature and pressure :

1) If $\Delta G_{system} > 0$, the process is spontaneous

2) If $\Delta G_{system} = 0$, the system has attained equilibrium

3) If $\Delta G_{system} = 0$, the system is still moving in a particular direction

4) If $\Delta G_{system} < 0$, the process is not spontaneous

52. A solution containing 10g per dm 3 of urea (molecular mass = 60g mol-1) is isotonic with a 5% solution of a non-volatile solute. The molecular mass of this non-volatile solute is :

1) 200 g mol-1

2) 300 g mol-1

3) 400 g mol-1

4) 500 g mol-1

53. A plot of log x/m versus log p for the adsorption of a gas on a solid gives a straight line with slope equal to :

1) - log k

2) n

3) 1/n

4) log k

54. Assume each reaction is carried out in an open container. For which reaction will $\Delta H = \Delta E$?

1) $H_2(g) + Br_2(g) \rightarrow 2HBr(g)$

2) $C(s) + 2H_2O(g) \rightarrow 2H_2(g) + CO_2(g)$

3) $PCl_5(g) \rightarrow PCl_3(g) + Cl_2(g)$

4) $2CO(g) + O_2(g) \rightarrow 2CO_2(g)$

55. In a set of reactions propionic acid yielded a compound D.

$CH_3CH_2COOH \xrightarrow{SOCl_2} B \xrightarrow{NH_3} C \xrightarrow[Br_2]{KOH} D$

The structure of D would be :

1) $CH_3CH_2CH_2NH_2$

2) $CH_3CH_2CONH_2$

3) $CH_3CH_2NHCH_3$

4) $CH_3CH_2NH_2$

56. During the process of digestion, the proteins present in food materials are hydrolysed to amino acids. The two enzymes involved in the process

$$\text{Process} \xrightarrow{\text{Enzyme (A)}} \text{Polypeptides} \xrightarrow{\text{Enzyme (B)}} \text{Amino acids,}$$ are respectively :

1) amylase and maltase

2) diastase and lipase

3) pepsin and trypsin

4) invertase and zymase

57. The human body does not produce :

1) DNA

2) vitamins

3) hormones

4) enzymes

58. CsBr crystallises in a body centred cubic lattice. The unit cell length is 436.6 pm. Given that the atomic mass of Cs = 133 and that of Br = 80 amu and Avogadro number being 6.02 x 10^{23} mol^{-1}, the density of CsBr is :

1) 42.5 g/cm^3

2) 2.25 g/cm^3

3) 0.225 g/cm^3

4) 4.25 g/cm^3

59. More number of oxidation states are exhibited by the actinoids than by the lanthanoids. The main reason for this is :

1) more energy difference between 5f and 6d orbitals than that between 4f and 5d orbitals

2) lesser energy difference between 5f and 6d orbitals than that between 4f and 5d orbitals

3) greater metallic character of the lanthanoids than that of the corresponding actinoids

4) more active nature of the actinoids

60. Given : The mass of electron is 9.11 x 10^{-31} kg

Planck constant is 6.626 x 10^{-34} Js, the uncertainty involved in the measurement of velocity within a distance of 0.1 Å is :

1) 5.79 x 10^6 ms^{-1}

2) 5.79 x 10^7 ms^{-1}

3) 5.79 x 10^8 ms^{-1}

4) 5.79 x 10^9 ms^{-1}

61. Copper sulphate dissolves in excess of KCN to give :

1) CuCN

2) $[Cu(CN)_4]^{3-}$

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

4) $Cu(CN)_2$

62. In which of the following pairs are both the ions coloured in aqueous solution ?

(At. no. : Sc = 21, Ti = 22, Ni = 28, Cu = 29, Co = 27)

1) Ni^{2+}, Ti^{3+}

2) Sc^{3+}, Ti^{3+}

3) Sc^{3+}, Co^{2+}

4) Ni^{2+}, Cu^{+}

63. Al_2O_3 can be converted to anhydrous $AlCl_3$ by heating :

1) Al_2O_3 with HCl gas

2) Al_2O_3 with NaCl in solid state

3) a mixture of Al_2O_3 and carbon in dry Cl_2 gas

4) Al_2O_3 with Cl_2 gas

64. The enthalpy and entropy change for the reaction :
$Br_2(l) + Cl_2(g) \rightarrow 2BrCl(g)$
are 30 kJ mol^{-1} and 105 JK^{-1} mol^{-1} respectively. The temperature at which the reaction will be in equilibrium is :

1) 285.7 K

2) 373 K

3) 250 K

4) 400 K

65. The appearance of colour in solid alkali metal halides is generally due to :

1) F-centres

2) Schottky defect

3) Frenkel defect

4) Interstitial positions

66. The general molecular formula, which represents the homologous series of alkanols is :

1) $C_nH_{2n}O_2$

2) $C_nH_{2n}O$

3) $C_nH_{2n+1}O$

4) $C_nH_{2n+2}O$

67. If $E^\circ_{Fe^{2+}/Fe}$ = -0.441 V and
$E^\circ_{Fe^{3+}/Fe^{2+}}$ = 0.771 V, the standard emf of the reaction :
$Fe + 2Fe^{3+} \rightarrow 3Fe^{2+}$ will be :

1) 0.441 V

2) 1.753 V

3) 1.212 V

4) 0.211 V

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

1) $-(d[C]/3dt)$
2) $-(d[B]/dt$
3) $d[D]/dt$
4) $-d[A]/2dt$

69. For the reaction,
$CH_4(g) + 2O_2(g) \rightleftharpoons CO_2(g) + 2H_2O(l)$, $\Delta_r H = -170.8$ kJ mol^{-1} Which of the following statements is not true ?

1) At equilibrium, the concentrations of $CO_2(g)$ and $H_2O(l)$ are not equal
2) The equilibrium constant for the reaction is given by $K_p = [CO_2]/[CH_4][O_2]$
3) Addition of $CH_4(g)$ or $O_2(g)$ at equilibrium will cause a shift to the right
4) The reaction is exothermic

70. $[NH(CH_2)NHCO(CH_2)_4CO]_n$ is a :

1) co-polymer
2) addition polymer
3) thermo-setting polymer
4) homopolymer

71. A carbonyl compound reacts with hydrogen cyanide to form cyanohydrin which on hydrolysis forms a racemic mixture of α-hydroxy acid. The carbonyl compound is :

1) acetaldehyde
2) acetone
3) diethyl ketone
4) formaldehyde

72. Which one of the following is a peptide hormone ?

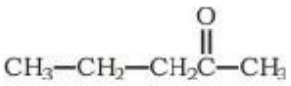
1) Glucagon
2) Testosterone
3) Thyroxin
4) Adrenaline

73. The major organic product in the reaction,
$CH_3 - O - CH(CH_3)_2 + HI \rightarrow$ Product is :

1) $CH_3OH + (CH_3)_2CHI$
2) $ICH_2OCH(CH_3)_2$
3) $CH_3O\ C(CH_3)_2$
   |
   |

4) $CH_3I + (CH_3)_2CHOH$

74. Nucleophilic addition reaction will be most favoured in :

1) 

2) $(CH_3)_2C = O$

3) CH_3CH_2CHO

4) CH_3CHO

75. The enthalpy of combustion of H_2, cyclohexene (C_6H_{10}) and cyclohexene (C_6H_{12}) are -241, -3800 and -3920 kJ per mol respectively. Heat of hydrogenation of cyclohexene is :

1) - 121 kJ per mol

2) + 121 kJ per mol

3) + 484 kJ per mol

4) - 484 kJ per mol

76. Self condensation of two moles of ethyl acetate in presence of sodium ethoxide yields :

1) ethyl butyrate

2) acetoacetic ester

3) methyl acetoacetate

4) ethyl propionate

77. Consider the reaction

$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$

The equality relationship between $(d[NH_3]/dt)$ and $-(d[H_2]/dt)$ is :

1) $(d[NH_3]/dt) = -(1/3)(d[H_2]/dt)$

2) $+(d[NH_3]/dt) = -(2/3)(d[H_2]/dt)$

3) $+(d[NH_3]/dt) = -(3/2)(d[H_2]/dt)$

4) $(d[NH_3]/dt) = -(d[H_2]/dt)$

78. Which of the following is not chiral ?

1) 2-butanol

2) 2, 3-dibromopentane

3) 3-bromopentane

4) 2-hydroxypropanoic acid

79. $[Co(NH_3)_4(NO_2)_2]Cl$ exhibits :

1) linkage isomerism, ionization isomerism and optical isomerism

2) linkage isomerism, ionization isomerism and geometrical isomerism

3) ionization isomerism, geometrical isomerism and optical isomerism

4) linkage isomerism, geometrical isomerism and optical isomerism

80. $[Cr(H_2O)_6]Cl_3$ (at. no. of Cr = 24) has a magnetic moment of 3.83 BM, the correct distribution of 3d electrons in the chromium of the complex is :

1) $3d^1_{x^2-y^2}, 3d^1_{z^2}, 3d^1_{xz}$

2) $3d^1_{xy}, 3d^1_{x^2-y^2}, 3d^1_{yz}$

3) $3d^1_{xy}, 3d^1_{zy}, 3d^1_{xz}$

4) $3d^1_{xy}, 3d^1_{yz}, 3d^1_{z^2}$

81. 1.00 g of a non-electrolyte solute (molar mass 250g mol^{-1}) was dissolved in 51.2 g of benzene. If the freezing point depression constant, K_f of benzene is 5.12 K $kg\ mol^{-1}$, the freezing point of benzene will be lowered by :

1) 0.4 K
2) 0.8 K
3) 0.12 K
4) 0.24 K

82. Which of the following pairs constitutes a buffer ?

1) HNO_2 and $NaNO_2$
2) NaOH and NaCl
3) HNO_3 and NH_4NO_3
4) HCl and KCl

83. The hydrogen ion concentration of a 10^{-8} M HCl aqueous solution at 298 K ($K_w = 10^{-14}$) is :

1) 1.0525×10^{-6} M
2) 1.0525×10^{-7} M
3) 8.525×10^{-8} M
4) 1.0525×10^{-8} M

84. A solution of acetone in ethanol :

1) shows a negative deviation from Raoult's law
2) shows a positive deviation from Raoult's law
3) behaves like a near ideal solution
4) obeys Raoult's law

85. A hypothetical electrochemical cell is shown below
$A|A^+(xM)||B^+(yM)|B$
The emf measured is +0.20V. The cell reaction is :

1) $A^+ + B \rightarrow A + B^+$

2) $A^+ + e^- \rightarrow A$; $B^+ + e^- \rightarrow B$

3) the cell reaction cannot be predicted

4) $A + B^+ \rightarrow A^+ + B$

86. Ethylene oxide when treated with Grignard reagent yields :

1) secondary alcohol

2) tertiary alcohol

3) cyclopropyl alcohol

4) primary alcohol

87. During osmosis, flow of water through a semi-permeable membrane is :

1) from solution having higher concentration only

2) from both sides of semi-permeable membrane with equal flow rates

3) from both sides of semi-permeable membrane with unequal flow rates

4) from solution having lower concentration only

88. Which of the following is more basic than aniline ?

1) Diphenylamine

2) Triphenylamine

3) p-nitroaniline

4) Benzylamine

89. In which of the following molecules are all the bonds not equal ?

1) ClF_3

2) BF_3

3) AlF_3

4) NF_3

90. The electronegativity difference between N and F is greater than that between N and H yet the dipole moment of NH_3 (1.5 D) is larger than that of NF_3 (0.2 D). This is because :

1) in NH_3 as well as in NF_3 the atomic dipole and bond dipole are in the same direction

2) in NH_3 the atomic dipole and bond dipole are in the same direction whereas in NF_3 these are in opposite directions

3) in NH_3 as well as NF_3 the atomic dipole and bond dipole are in opposite directions

4) in NH_3 the atomic dipole and bond dipole are in the opposite directions whereas in NF_3 these are in the same directions

91. The correct order of the mobility of the alkali metal ions in aqueous solution is :

1) $Li^+ > Na^+ > K^+ > Rb^+$

2) $Na^+ > K^+ > Rb^+ > Li^+$

3) $K^+ > Rb^+ > Na^+ > Li^+$

4) $Rb^+ > K^+ > Na^+ > Li^+$

92. The corect order regarding the electronegativity of hybrid orbitals of carbon is :

1) $sp > sp^2 < sp^3$

2) $sp > sp^2 > sp^3$

3) $sp < sp^2 > sp^3$

4) $sp < sp^2 < sp^3$

93. Which of the following species has a linear shape ?

1) NO_2^-

2) SO_2

3) NO_2^+

4) O_3

94. Which of the following is the most basic oxide ?

1) Al_2O_3

2) Sb_2O_3

3) Bi_2O_3

4) SeO_2

95. The orientation of an atomic orbital is governed by :

1) azimuthal quantum number

2) spin quantum number

3) magnetic quantum number

4) principal quantum number

96. Which of the following is not a correct statement ?

1) The electron-deficient molecules can act as Lewis acids

2) The canonical structures have no real existence

3) Every AB_5 molecule does in fact have square pyramid structure

4) Multiple bonds are always shorter than corresponding single bonds

97. The number of unpaired electrons in a paramagnetic diatomic molecule of an element with atomic number 16 is :

1) 2 2) 3 3) 4 4) 1

98. Which one of the following orders is not in accordance with the property stated against it?

1) $F_2 > Cl_2 > Br_2 > I_2$: Oxidising power

2) HI > HBr > HCl > HF : Acidic property in water

3) $F_2 > Cl_2 > Br_2 > I_2$: Electronegativity

4) $F_2 > Cl_2 > Br_2 > I_2$: Bond dissociation energy

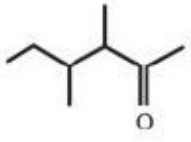
99. Which of the following is not isostructural with $SiCl_4$?

1) SCl_4

2) SO_4^{2-}

3) PO_4^{3-}

4) NH_4^+

100. The IUPAC name of  is :

1) 3, 4-dimethylpentanoyl chloride

2) 1-chloro-1-oxo-2, 3-dimethylpentane

3) 2-ethyl-3-methylbutanoyl chloride

4) 2, 3-dimethylpentanoyl chloride

Biology

101. What would be the number of chromosomes in the cells of the aleurone layer in a plant species with 8 chromosomes in its synergids ?

1) 16 2) 24 3) 32 4) 8

102. Pineapple (annanas) fruit develops from :

1) a unilocular polycarpillary flower

2) a multipistillate syncarpous flower

3) a cluster of compactly borne flowers on a common axis

4) a multilocular monocarpillary flower

103. Golden rice is a promising transgenic crop. When released for cultivation, it will help in :

1) alleviation of vitamin-A deficiency

2) pest resistance

3) herbicide tolerance

4) producing a petrol-like fuel from rice

104. Parthenocarpic tomato fruits can be produced by :

1) removing androecium of flowers before pollen grains are released

2) treating the plants with low concentrations of gibberellic acid and auxins

3) raising the plants from vernalized seeds

4) treating the plants with phenylmercuric acetate

105. How does pruning help in making the hedge dense ?

1) It induces the differentiation of new shoots from the rootstock
2) It frees axillary buds from apical dominance
3) The apical shoot grows faster after pruning
4) It releases wound hormones

106. The 'blue baby' syndrome results from :

1) excess fo chloride
2) methaemoglobin
3) excess of dissolved oxygen
4) excess of TDS (Total Dissolved Solids)

107. Praying mentis is a good example of :

1) mullerian mimicry
2) warning colouration
3) social insects
4) camouflage

108. Which one of the following statements is correct ?

1) Neurons regulate endocrine activity, but not vice versa
2) Endocrine glands regulate neural activity and nervous system regulates endocrine glands
3) Neither hormones control neural activity nor the neurons control endocrine activity
4) Endocrine glands regulate neural activity, but not vice versa

109. Examination of blood of a person suspected of having anaemia, shows large, immature, nucleated erythrocytes without haemoglobin. Supplementing his diet with which of the following, is likely to alleviate his symptoms ?

1) Thiamine
2) Folic acid and cobalamine
3) Riboflavin
4) Iron compounds

110. Farmers in a particular region were concerned that pre-mature yellowing of leaves of a pulse crop might cause decrease in the yield. Which treatment could be most beneficial to obtain maximum seed yield ?

1) Frequent irrigation of the crop
2) Treatment of the paints with cytokinins along with a small dose of nitrogenous fertilizer
3) Removal of all yellow leaves and spraying the remaining green leaves with 2, 4, 5-trichlorophenoxy acetic acid
4) Application of iron and magnesium to promote synthesis of chlorophyll

111. In which of the following fruits is the edible part the aril ?

1) Custard apple

2) Pomegranate

3) Orange

4) Litchi

112. Which one of the following aminoacids was not found to be synthesized in Miller's experiment ?

1) Glycine

2) Aspartic acid

3) Glutamic acid

4) Alanine

113. Crop plants grown in monoculture are :

1) low in yield

2) free from intraspecific competition

3) characterised by poor root system

4) highly prone to pests

114. Montreal protocol which calls for appropriate action to protect the ozone layer from human activities was passed in the year :

1) 1986 2) 1987 3) 1988 4) 1985

115. The formula for exponential population growth is :

1) dt/dN = rN

2) dN/rN = dt

3) rN/dN = dt

4) dN/dt = rN

116. Which one of the following is not used for construction of ecological pyramids ?

1) Dry weight

2) Number of individuals

3) Rate of energy flow

4) Fresh weight

117. Niche overlap indicates :

1) active co-operation between two species

2) two different parasites on the same host

3) sharing of one or more resources between the two species

4) mutualism between two species

118. In photosystem-I, the first electron acceptor is :

1) ferredoxin
2) cytochrome
3) plastocyanin
4) an iron-sulphur protein

119. Treatment of seed at low temperature under moist conditions to break its dormancy is called :
1) scarification
2) vernalization
3) chelation
4) stratification

120. Which one of the following is the most suitable, medium for culture of Drosophila melanogaster ?
1) Moist bread
2) Agar agar
3) Ripe banana
4) Cow dung

121. Which one of the following is not included under in situ conservation ?
1) Sanctuary
2) Botanical garden
3) Biosphere reserve
4) National park

122. Which antibiotic inhibits interaction between t-RNA and m-RNA during bacterial protein synthesis ?
1) Erythromycin
2) Neomycin
3) Streptomycin
4) Tetracycline

123. Phenotype of an organism is the result of :
1) mutations and linkages
2) cytoplasmic effects and nutrition
3) environmental changes and sexual dimorphism
4) genotype and environment interactions

124. Photochemical smog pollution does not contain :
1) ozone
2) nitrogen dioxide
3) carbon dioxide

4) PAN (Peroxy Acyl Nitrate)

125. Moss peat is used as a packing material for sending flowers and live plants to distant places because :

1) it is easily available
2) it is hygroscopic
3) it reduces transpiration
4) it serves as a disinfectant

126. A common structural feature of vessel elements and sieve tube elements is :

1) thick secondary walls
2) pores on lateral walls
3) presence of P-protein
4) enucleate condition

127. The thalloid body of a slime mould (Myxomycetes) is known as :

1) protonema
2) Plasmodium
3) fruiting body
4) mycelium

128. In which mode of inheritance do you expect more maternal influence among the off spring ?

1) Autosomal
2) Cytoplasmic
3) Y-linked
4) X-linked

129. What type of placentation is seen in sweet pea ?

1) Basal
2) Axile
3) Free central
4) Marginal

130. Long filamentous threads protruding at the end of a young cob of maize are :

1) anthers
2) styles
3) ovaries
4) hairs

131. Conifers differ from grasses in the :

1) production of seeds from ovules

2) lack of xylem tracheids

3) absence of pollen tubes

4) formation of endosperm before fertilization

132. How many different kinds of gametes will be produced by a plant having the genotype AABbCC ?

1) Three 2) Four 3) Nine 4) Two

133. In maize, hybrid vigour is exploited by :

1) bombarding the protoplast with DNA

2) crossing of two inbreed parental lines

3) harvesting seeds from the most productive plants

4) inducing mutations

134. Which of the following statements regarding mitochondrial membrane is not correct ?

1) The outer membrane is permeable to all kinds of molecules

2) The enzymes of the electron transfer chain are embedded in the outer membrane

3) The inner membrane is highly convoluted forming a series of infoldings

4) The outer membrane resembles a sieve

135. Amino acid sequence, in protein synthesis is decided by the sequence of :

1) t-RNA

2) m-RNA

3) c-DNA

4) r-RNA

136. How many ATP molecules could maximally be generated from one molecule of glucose, if the complete oxidation of one mole of glucose to CO_2 and H_2O yields 686 kcal and the useful chemical energy available in the high energy phosphate bond of one mole of ATP is 12 kcal ?

1) Two

2) Thirty

3) Fifty seven

4) One

137. An organic substance bound to an enzyme and essential for its acvity is called :

1) coenzyme

2) holoenzyme

3) apoenzyme

4) isoenzyme

138. Bowman's glands are found in :

1) olfactory epithelium
2) external auditory canal
3) cortical nephrons only
4) juxtamedullary nephrons

139. The bacterium (Clostridium botulinum) that causes botulism is :
1) a facultative anaerobe
2) an obligate anaerobe
3) a facultative aerobe
4) an obligate aerobe

140. Which one of the following is the correctly matched pair of an endangered animal and a National Park ?
1) Lion — Corbett National Park
2) Rhinoceros — Kaziranga National Park
3) Wild ass — Dudhwa National Park
4) Great Indian bustard — Keoladeo National Park

141. A person showing upredictable moods, outbursts of emotion, quarrelsome behaviour and conflicts with others is suffering from :
1) schizophrenia
2) borderline personality disorder (BPD)
3) mood disorders
4) addictive disorders

142. Sulphur is an important nutrient for optimum growth and productivity in :
1) pulse crops
2) cereals
3) fibre crops
4) oilseed crops

143. Pentamerous, actinomorphic flowers, bicarpillary ovary with oblique septa, and fruit a capsule or berry, are characteristic features of :
1) Asteraceae
2) Brassicaceae
3) Solanaceae
4) Liliaceae

144. In a moss the sporophyte :
1) is partially parasitic on the gametophyte
2) produces gametes that give rise to the gametophyte
3) arises from a spore produced from the gametophyte

4) manufactures food for itself, as well as for the gametophyte

145. Curing of tea leaves is brought about by the activity of :

1) bacteria
2) mycorrhiza
3) viruses
4) fungi

146. People living at sea level have around 5 million RBC per cubic millimeter of their blood whereas those living at an altitude of 5400 metres have around 8 million. This is because at high altitude :

1) people get pollution-free air to breathe and more oxygen is available
2) atmospheric O_2 level is less and hence more RBCs are needed to absorb the required amount of O_2 to survive
3) there is more UV radiation which enhances RBC production
4) people eat more nutritive food, therefore more RBCs are formed

147. An important evidence in favour of organic evolution is the occurrence of :

1) homologous and vestigial organs
2) analogous and vestigial organs
3) homologous organs only
4) homologous and analogous organs

148. Which one of the following is not a living fossil ?

1) King crab
2) Sphenodon
3) Archaeopteryx
4) Peripatus

149. Annual migration does not occur in the case of :

1) salmon
2) Siberian crane
3) salamander
4) arctic tern

150. A major breakthrough in the studies of cells came with the development of electron microscope. This is because :

1) the resolution power of the electron microscope is much higher than that of the light microscope
2) the resolving power of the electron microscope is 200 – 350 nm as compared to 0.1 – 0.2 nm for the light microscope
3) electron beam can pass through thick materials, whereas light microscopy requires thin sections

4) the electron microscope is more powerful than the light microscope as it uses a beam of electrons which has wavelength much longer than that of photons

151. Which one of the following is a matching set of a phylum and its three examples ?

1) Cnidaria — Bonellia, Physalia, Aurelia
2) Platyhelminthes — Planaria, Schistosoma, Enterobius
3) Mollusca — Loligo, Teredo, Octopus
4) Porifera — Spongilla, Euplectella, pennatula

152. Metameric segmentation is the characteristic of :

1) Platyhelminthes and Arthropoda
2) Echinodermata and Annelida
3) Annelida and Arthropoda
4) Mollusca and Chordata

153. Which of the following pairs of an animal and a plant represents endangered organisms in India ?

1) Bentinckia nicobarica and red panda
2) Tamarind and rhesus monkey
3) Cinchona and leopard
4) Banyan and black buck

154. Jurassic period of the Mesozoic era is characterised by :

1) gymnosperms are dominant plants and first birds appear
2) radiation of reptiles and origin of mammal like reptiles
3) dinosaurs become extinct and angiosperms appear
4) flowering plants and first dinosaurs appear

155. What is common about Trypanosoma, Noctiluca, Monocystis and Giardia ?

1) These are all unicellular protists
2) They have flagella
3) They produce spores
4) These are all parasites

156. Which of the following statements regarding cilia is not correct ?

1) The organized beating of cilia is controlled by fluxes of Ca^{2+} across the membrane
2) Cilia are hair-like cellular appendages
3) Microtubules of cilia are composed of tubulin
4) Cilia contain an outer ring of nine doublet microtubules surrounding two single microtubules

157. Microbes found to be very useful in genetic engineering are :

1) Escherichia coli and Agrobacterium tumefaciens

2) Vibrio cholerae and a tailed bacteriophage

3) Diplococcus sp. and Pseudomonas sp.

4) Crown gall bacterium and Caenorhabditis elegans

158. Which of the following environmental conditions are essential for optimum growth of Mucor on a piece of bread ?

A. Temperature of about 25°C
B. Temperature of about 5°C
C. Relative humidity of about 5%
D. Relative humidity of about 95%
E. A shady place
F. A brightly illuminated place

Choose the answer from the following options :

1) A, C and E only

2) A, D and E only

3) B, D and E only

4) B, C and F only

159. Evolutionary history of an organism is known as :

1) Phylogeny

2) Ancestry

3) Paleontology

4) Ontogeny

160. Which of the following is considered a hot-spot of biodiversity in India ?

1) Western ghats

2) Indo-Gangetic plain

3) Eastern ghats

4) Aravalli hills

161. During photorespiration, the oxygen consuming reaction(s) occur in :

1) stroma of chloroplasts and mitochondria

2) stroma of chloroplasts and peroxisomes

3) grana of chloroplasts and peroxisomes

4) stroma of chloroplasts

162. Which one of the following is an example of polygenic inheritance ?

1) Flower colour in Mirabilis jalapa

2) Production of male honey bee

3) Pod shape in garden pea

4) Skin colour in humans

163. Which one of the following not act as a neurotransmitter ?

1) Acetylcholine
2) Epinephrine
3) Nor epinephrine
4) Cortisone

164. Sertoli cells are regulated by the pituitary hormone known as :

1) FSH 2) GH 3) Prolactin 4) LH

165. A steroid hormone which regulates glucose metabolism is :

1) cortisol
2) corticosterone
3) 11-deoxycorticosterone
4) cortisone

166. The contractile protein of skeletal muscle involving ATPase activity is :

1) tropomyosin
2) myosin
3) α-actinin
4) troponin

167. Which one of the following is not a second messenger in hormone action ?

1) cGMP
2) Calcium
3) Sodium
4) cAMP

168. In Mendel's experiments with garden pea, round seed shape (RR) was dominant over wrinkled seeds (rr), yellow cotyledon (YY) was dominant over green cotyledon (yy). What are the expected phenotypes in the F 2 generation of the cross RRYY x rryy ?

1) Only round seeds with green cotyledons
2) Only wrinkled seeds with yellow cotyledons
3) Only wrinkled seeds with green cotyledons
4) Round seeds with yellow cotyledons and wrinkled seeds with yellow cotyledons

169. One gene – one enzyme hypothesis was postulated by :

1) R. Franklin
2) Hershey and Chase
3) A. Garrod
4) Beadle and Tatum

170. One turn of the helix in a B-form DNA is approximately :

1) 20 nm
2) 0.34 nm
3) 3.4 nm
4) 2 nm

171. Test cross involves :
1) crossing between two genotypes with recessive trait
2) crossing between two F 1 hybrids
3) crossing the F 1 hybrid with a double recessive genotype
4) crossing between two genotypes with dominant trait

172. Antiparallel strands of a DNA molecule means that :
1) one strand turns anti-clockwise
2) the phosphate groups of two DNA strands, at their ends, share the same position
3) the phosphate groups at the start of two DNA strands are in opposite position (pole)
4) one strand turns clockwise

173. Areolar connective tissue joins :
1) fat body with muscles
2) integument with muscles
3) bones with muscles
4) bones with bones

174. Mast cells secrete :
1) hippurin
2) myoglobin
3) histamine
4) haemoglobin

175. If a colourblind woman marries a normal visioned man, their sons will be :
1) all normal visioned
2) one-half colourblind and one-half normal
3) three-fourths colourbling and one-fourth normal
4) all colourblind

176. Cri-du-chat syndrome in humans is caused by the :
1) fertilization of an XX egg by a normal Y-bearing sperm
2) loss of half of the short arm of chromosome 5
3) loss of half of the long arm of chromosome 5
4) trisomy of 21st chromosome

177. Restriction endonuclease :

1) cuts the DNA molecule randomly
2) cuts the DNA molecule at specific sites
3) restricts the synthesis of DNA inside the nucleus
4) synthesizes DNA

178. Antibodies in our body are complex :
1) lipoproteins
2) steroids
3) prostaglandins
4) glycoproteins

179. Limit of BOD prescribed by Central Pollution Control Board for the discharge of industrial and municipal waste water into natural surface water, is :
1) < 3.0 ppm
2) < 10 ppm
3) < 100 ppm
4) < 30 ppm

180. Earthworms are :
1) ureotelic when plenty of water is available
2) uricotelic when plenty of water is available
3) uricotelic under conditions of water scarcity
4) ammonotelic when plenty of water is available

181. Which of the following is an accumulation and release centre of neurohormones ?
1) Posterior pituitary lobe
2) Intermediate lobe of the pituitary
3) Hypothalamus
4) Anterior pituitary lobe

182. Withdrawal of which of the following hormones is the immediate cause of menstruation ?
1) Eastrogens
2) FSH
3) FSH-RH
4) Progesterone

183. Which one of the following statements is incorrect ?
1) The residual air in lungs slightly decreases the efficiency of respiration in mammals
2) The presence of non-respiratory air sacs, increases the efficiency of respiration in birds
3) In insects, circulating body fluids serve to distribute oxygen to tissues
4) The principle of countercurrent flow facilitates efficient respiration in gills of fishes

184. Which one of the following has an open circulatory system ?

1) Pheretima
2) Periplaneta
3) Hirudinaria
4) Octopus

185. Which hormone causes dilation of blood vessels, increased oxygen consumption and glycogenolysis ?

1) ACTH
2) Insulin
3) Adrenalin
4) Glucagon

186. The causative agent of mad-cow disease is a :

1) bacterium
2) prion
3) worm
4) virus

187. The translocation of organic solutes in sieve tube members is supported by :

1) root pressure and transpiration pull
2) P-proteins
3) mass flow involving a carrier and ATP
4) cytoplasmic streaming

188. Biradial symmetry and lack of cnidoblasts are the characteristics of :

1) Starfish and sea anemone
2) Ctenoplana and Beroe
3) Aurelia and Paramecium
4) Hydra and starfish

189. The arrangement of the nuclei in a normal embryo sac in the dicot plants is :

1) 2 + 4 + 2
2) 3 + 2 + 3
3) 2 + 3 + 3
4) 3 + 3 + 2

190. An enzyme that can stimulate germination of barley seeds is :

1) α-amylase
2) lipase
3) protease

4) invertase

191. In a cereal grain the single cotyledon of embryo is represented by :

1) coleorhiza
2) scutellum
3) prophyll
4) coleoptile

192. The majority of carbon dioxide produced by our body cells is transported to the lungs :

1) dissolved in the blood
2) as bircarbonates
3) as carbonates
4) attached to haemoglobin

193. Triticale, the first man-made cereal crop, has been obtained by crossing wheat with :

1) rye
2) pearl millet
3) sugarcane
4) barley

194. In order to obtain virus-free plants through tissue culture the best method is :

1) protoplast culture
2) embryo rescue
3) anther culture
4) meristem culture

195. HIV that causes AIDS, first starts destroying :

1) B-lymphocytes
2) leucocytes
3) thrombocytes
4) helper T-lymphocytes

196. In which one of the following sets of animals do all the four give birth to young ones ?

1) Lion, bat, whale, ostrich
2) Platypus, penguin, bat, hippopotamus
3) Shrew, bat, cat, kiwi
4) Kangaroo, hedgehog, dolphin, loris

197. Sickle cell anaemia has not been eliminated from the African population because :

1) it is controlled by recessive genes
2) it is not a fatal disease
3) it provides immunity against malaria

4) it is controlled by dominant genes

198. Two common characters found in centipede, cockroach and crab are :

1) compound eyes and anal cerci
2) jointed legs and chitinous exoskeleton
3) green gland and tracheae
4) book lungs and antennae

199. Both sickle cell anaemia and Huntington's chorea are :

1) bacteria-related diseases
2) congenital disorders
3) pollutant-induced disorders
4) virus-related diseases

200. Angiotensinogen is a protein produced and secreted by :

1) macula densa cells
2) endothelial cells (cells lining the blood vessels)
3) liver cells
4) juxtaglomerular (JG) cells

Answer Key

1) 1	2) 4	3) 2	4) 3	5) 3	6) 1	7) 4	8) 2	9) 3	10) 2
11) 1	12) 2	13) 3	14) 1	15) 3	16) 3	17) 1	18) 1	19) 2	20) 3
21) 4	22) 2	23) 1	24) 3	25) 2	26) 4	27) 1	28) 3	29) 2	30) 3
31) 4	32) 4	33) 1	34) 2	35) 4	36) 4	37) 2	38) 4	39) 1	40) 2
41) 1	42) 4	43) 4	44) 4	45) 2	46) 3	47) 1	48) 1	49) 1	50) 4
51) 2	52) 2	53) 3	54) 1	55) 4	56) 3	57) 2	58) 4	59) 2	60) 1
61) 2	62) 1	63) 3	64) 1	65) 1	66) 4	67) 3	68) 1	69) 2	70) 1
71) 1	72) 1	73) 4	74) 4	75) 1	76) 2	77) 2	78) 3	79) 2	80) 3
81) 1	82) 1	83) 2	84) 2	85) 4	86) 4	87) 4	88) 4	89) 1	90) 2
91) 4	92) 2	93) 3	94) 3	95) 3	96) 3	97) 1	98) 4	99) 1	100) 4
101) 2	102) 3	103) 1	104) 2	105) 2	106) 2	107) 3	108) 1	109) 4	110) 4
111) 4	112) 3	113) 4	114) 2	115) 4	116) 4	117) 2	118) 4	119) 4	120) 3
121) 2	122) 4	123) 4	124) 3	125) 2	126) 2	127) 2	128) 2	129) 4	130) 2
131) 4	132) 4	133) 2	134) 2	135) 2	136) 2	137) 1	138) 1	139) 2	140) 2
141) 1	142) 1	143) 3	144) 1	145) 1	146) 2	147) 1	148) 3	149) 3	150) 1
151) 3	152) 3	153) 1	154) 1	155) 1	156) 3	157) 1	158) 2	159) 1	160) 1
161) 2	162) 4	163) 4	164) 1	165) 1	166) 2	167) 3	168) 4	169) 4	170) 3
171) 3	172) 3	173) 2	174) 3	175) 4	176) 2	177) 2	178) 4	179) 2	180) 4
181) 3	182) 4	183) 1	184) 2	185) 3	186) 2	187) 3	188) 2	189) 2	190) 1
191) 2	192) 2	193) 1	194) 4	195) 4	196) 4	197) 3	198) 2	199) 2	200) 3