XII cum Competition Course for Medical

MM : 720

Test - 28

Time : 3 hrs. 20 min.

Full Syllabus - XII

PHYSICS : SECTION-A

All questions are compulsory in section A

1. If the system of two concentric hollow metal spheres has inner sphere charged and outer sphere grounded, then, in the space between the spheres, we have electric field
   (1) only due to inner sphere
   (2) only due to outer sphere
   (3) due to both inner and outer sphere
   (4) same at all points

2. The current through a coil is given by $I = t^2 - t$ in ampere. Time at which induced emf becomes zero momentarily is
   (1) $t = 1s$
   (2) $t = 0.5 s$
   (3) $t = 2s$
   (4) depends on self inductance of coil

3.
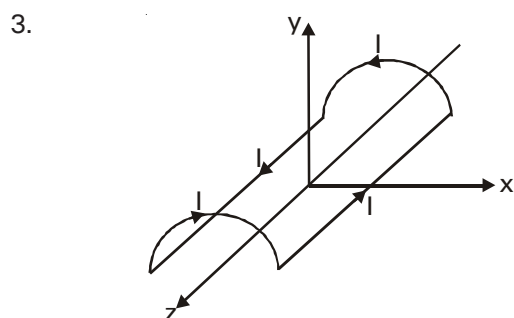

   A uniform current carrying wire loop bent in the shape as shown in the diagram. The magnetic field at the origin is
   (1) directed along x-axis
   (2) directed along y-axis
   (3) directed along z-axis
   (4) zero

4. Two samples A and B have half life T_0 and $2T_0$ respectively. If the number of nuclei is same for both samples initially, the ratio of number of nuclei of A to that of B subsequently
   (1) remains $\frac{1}{2}$
   (2) increases
   (3) decreases
   (4) first increases then decreases

5. The correct statement out of following is
   (1) All α particles emitted in the α decay of a particular sample have same energy
   (2) All β particles emitted in the β decay of a particular sample have same energy
   (3) Both (1) & (2)
   (4) Neither (1) nor (2)

6. The product of angular momentum and speed of electron in an atom depends on (n = principal quantum number, Z = atomic number)
   (1) n only   (2) Z only
   (3) both n and Z   (4) neither n nor Z

7. In an ac circuit, the resistance of a coil is $\sqrt{2}$ times its reactance. The power factor of the circuit is
   (1) $\sqrt{\frac{2}{3}}$ (2) $\frac{1}{\sqrt{3}}$
   (3) $\frac{\sqrt{3}}{2}$ (4) $\frac{1}{3}$

8. In the given circuit the current I_1 is
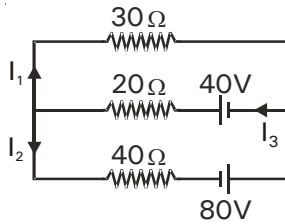
(1) 0.2 A (2) − 0.4 A
(3) −0.2 A (4) Zero

9. The work function of caesium metal is 2.1 eV. When light of wavelength $4000\,\text{Å}$ is incident on the metal surface, photoemission of electrons occurs. Maximum kinetic energy of emitted photoelectrons is approximately

(1) 2 eV (2) 0.5 eV
(3) 1 eV (4) 1.5 eV

10. $\overline{(\overline{X\cdot Y})\cdot X} =$

(1) $\overline{X\cdot Y}$ (2) $X + Y$
(3) $\overline{X + Y}$ (4) X

11. A wheel with ten metallic spokes each 1 m long is rotated with a speed of 180 rev/min in a plane normal to the earth's magnetic field at the place. If the magnitude of the field is 0.4 G, the induced e.m.f. between the axle and the rim of the wheel is equal to

(1) 2.4×10^{-3} V (2) 7.2×10^{-4} V
(3) 3.8×10^{-4} V (4) 5.3×10^{-5} V

12. A straight wire of length L is bent into a semicircle. It is moved in a uniform magnetic field with speed 'v' with diameter perpendicular to the field. Induced emf between ends of the wire is
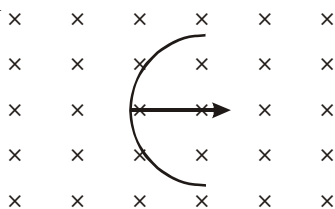
(1) BLv (2) 2BLv
(3) 2πBLv (4) $(2/\pi)$BLv

13. The de-Broglie wavelength associated with a free electron in an isolated conductor at a temperature T will be (Notations have their usual meanings)

(1) $\dfrac{h}{\sqrt{2mKT}}$ (2) $\dfrac{h}{\sqrt{3mKT}}$

(3) $\dfrac{h}{\sqrt{2eKT}}$ (4) $\dfrac{h}{\sqrt{3eKT}}$

14. A charged particle moves with velocity v in a uniform magnetic field $\vec{B}$. The magnetic force experienced by the particle is

(1) Always zero
(2) Never zero
(3) Zero, if $\vec{B}$ and $\vec{v}$ are perpendicular
(4) Zero, if $\vec{B}$ and $\vec{v}$ are parallel

15. Two beams of light having intensities I and $4I$ interfere to produce a fringe pattern on a screen.

The phase difference between the beams is $\dfrac{\pi}{3}$ at a point. The resultant intensity at this point is

(1) $2\,I$ (2) $4\,I$
(3) $5\,I$ (4) $7\,I$

16. Interference was observed in interference chamber when air was present, now the chamber is evacuated and if the same light is used, a careful observer will see

(1) no interference
(2) interference with bright bands
(3) interference with dark bands
(4) interference in which width of the fringe will be slightly increased

17. Two small conducting spheres of equal radius have charges $+30\ \mu$C and $-20\ \mu$C respectively and placed at a distance R from each other experience force F_1. If they are brought in contact and separated to the same distance, they experience force F_2. The ratio of F_1 to F_2 is

(1) $18 : 1$ (2) $-18 : 1$
(3) $-24 : 1$ (4) $-12 : 1$

18.
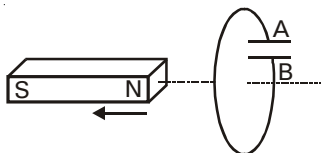
In the above situation which of the following statements is correct?
(1) Polarity of plate A will be positive w.r.t. plate B in the capacitor
(2) Polarity of plate A will be negative w.r.t. plate B in the capacitor
(3) Capacitor remains uncharged
(4) None of these

19. Polarising angle for light entering a medium from air is $60°$. The refractive index for this medium is

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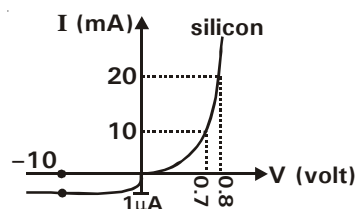
(3) $\dfrac{1}{\sqrt{2}}$ (4) 2

20.
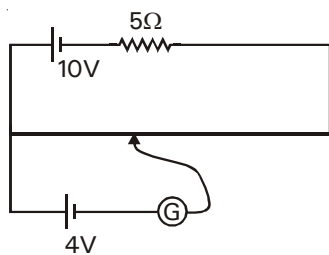
In the above arrangement, length of potentiometer wire is 1m and null point is obtained at 80 cm. The resistance of the potentiometer wire is
(1) $5\,\Omega$ (2) $10\,\Omega$
(3) $15\,\Omega$ (4) $7.5\,\Omega$

21. Light with an energy flux of 20 W/cm^2 falls on a perfect reflector normally. If the surface area is 20 cm^2, average force exerted is
(1) 3×10^{-6} N   (2) 2.67×10^{-6} N
(3) 1.75×10^{-6} N   (4) 2.4×10^{-5} N

22.

V-I characteristic of a silicon diode is shown in the figure. What is the resistane of diode at a reverse bias of 10 V?
(1) $1 \times 10^6\ \Omega$ (2) $1 \times 10^7\ \Omega$
(3) $2 \times 10^5\ \Omega$ (4) $4 \times 10^3\ \Omega$

23. The innermost orbit of the hydrogen atom has a diameter of $1.06\,\text{Å}$. What is the diameter of the tenth orbit of He$^+$?
(1) $5.3\,\text{Å}$ (2) $10.6\,\text{Å}$
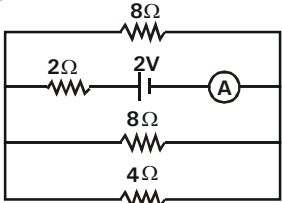(3) $53\,\text{Å}$ (4) $106\,\text{Å}$

24. In the network shown in figure, all the capacitors are identical. When an emf is applied across A and B one of the capacitors remains uncharged. That capacitor is
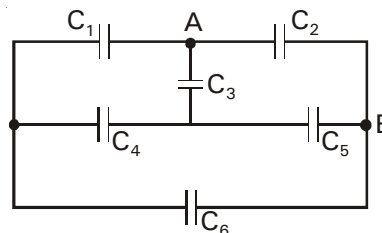
(1) C_1 (2) C_4
(3) C_5 (4) C_6

25. If a rectangular area is rotated in a uniform electric field from the position where the maximum electric flux goes through it to an orientation where only 71% the maximum flux goes through it, what has been the angle of rotation?
(1) $30°$ (2) $60°$
(3) $45°$ (4) $90°$

26. Deviation of 5° is observed from a prism whose angle is small and whose refractive index is 1.5. The angle of prism is
    (1) 7.5°
    (2) 10°
    (3) 5°
    (4) 3.3°

27. What is the de-Broglie wavelength of the α-particle accelerated through a potential difference V
    (1) $\dfrac{0.3}{\sqrt{V}}$ Å
    (2) $\dfrac{12.27}{\sqrt{V}}$ Å
    (3) $\dfrac{0.1}{\sqrt{V}}$ Å
    (4) $\dfrac{0.2}{\sqrt{V}}$ Å

28. The radii of curvature of the faces of a double convex lens are 30 cm and 10 cm. If its focal length is 20 cm, refractive index of material of lens is about
    (1) 1.42
    (2) 1.48
    (3) 1.38
    (4) 1.5

29. In an electromagnetic wave, if E_0 is the peak value of electric field vector and c is speed of electromagnetic waves then intensity of the waves is given by
    (1) $\dfrac{1}{2}\varepsilon_0 E_0^2 c$
    (2) $\dfrac{1}{4}\varepsilon_0 E_0^2 c$
    (3) $\varepsilon_0 E_0^2 c$
    (4) $\dfrac{E_0^2 c}{2\varepsilon_0}$

30. The electric field (in V/m) of an EM wave in vacuum is given by
    $\vec{E} = 10 \cos (10^7 t + kx)\ \hat{j}$, where x and t are in metre and second respectively. Then
    (1) wave number is 0.33 per metre
    (2) wave is propagating along $+x$ direction
    (3) wavelength is 188.4 m
    (4) both (2) and (3)

31. The relation between the linear magnification m, the object distance u and the focal length f in case of a spherical mirror is
    (1) $m = \dfrac{f - u}{f}$
    (2) $m = \dfrac{f}{f - u}$
    (3) $m = \dfrac{f + u}{f}$
    (4) $m = \dfrac{f}{f + u}$

32. χ_1 and χ_2 are susceptibility of a paramagnetic substance at absolute temperatures T_1 and T_2 respectively. Then
    (1) $\chi_1 = \chi_2$
    (2) $\chi_1 T_1 = \chi_2 T_2$
    (3) $\chi_1 T_2 = \chi_2 T_1$
    (4) $\chi_1 \sqrt{T_1} = \chi_2 \sqrt{T_2}$

33. A 10 cm focal length convex lens forms a real image 30 cm away from lens. If the object is brought 10 cm closer to lens, magnification produced will now be
    (1) 0.5
    (2) −0.5
    (3) 2
    (4) −2

34.

    The current through the battery is
    (1) $\dfrac{1}{8}$ A
    (2) $\dfrac{3}{4}$ A
    (3) $\dfrac{1}{2}$ A
    (4) 2 A

35. Electric field on the axis of a small electric dipole at a distance 'r' is $\vec{E}_1$ and at a distance of '2r' on the equatorial line is $\vec{E}_2$, then
    (1) $\vec{E}_2 = -\dfrac{\vec{E}_1}{8}$
    (2) $\vec{E}_2 = -\dfrac{\vec{E}_1}{16}$
    (3) $\vec{E}_2 = \dfrac{\vec{E}_1}{16}$
    (4) $\vec{E}_2 = \dfrac{\vec{E}_1}{8}$

PHYSICS : SECTION-B

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

36. A calcite crystal is placed over a dot on a piece of paper and rotated. On seeing through the calcite one will be see
    (1) one dot
    (2) two stationary dots
    (3) two rotating dots
    (4) one dot rotating about the other

37.
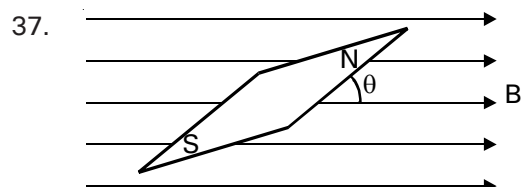
In the above figure, the magnetic needle has magnetic moment 5×10^{-2} Am^2 and its moment of inertia is 10^{-6} kg m^2. If it performs 50 complete oscillations in 10π seconds, then magnitude of the magnetic field B is
    (1) 0.04 T   (2) 0.08 T
    (3) 0.02 T   (4) 0.002 T

38. A fusion reaction takes place at very high temperature because
    (1) atoms get ionized at high temperature
    (2) molecules get decomposed at high temperature
    (3) nuclei get decomposed at high temperature
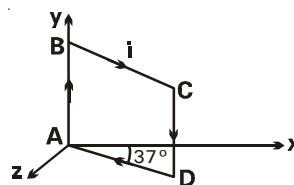   (4) due to their high energy nuclei overcome their mutual repulsion and combine

39.

Figure shows a square current carrying loop ABCD of side 10 cm and current i = 10A. The magnetic moment $\vec{M}$ of the loop is
    (1) $(0.01) (6\hat{i} + 8\hat{k})$ A-m^2
    (2) $(0.01) (6\hat{i} - 8\hat{k})$ A-m^2
    (3) $(0.1) (6\hat{i} - 8\hat{k})$ A-m^2
    (4) $(0.01) (\hat{i} + 2\hat{k})$ A-m^2

40. During a nuclear fusion reaction
    (1) a heavy nucleus breaks into two fragments by itself
    (2) a light nucleus bombarded by thermal neutrons breaks up
    (3) a heavy nucleus bombarded by thermal neutrons breaks up
    (4) two light nuclei combine to give a heavier nucleus and possibly other products

41. The transformer is use to light a 100 W, 220 V lamp from 2200 V mains. If the main current is 0.06A, the efficiency of the transformer is
    (1) 40 %   (2) 58 %
    (3) 64 %   (4) 76 %

42. 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

43. If a diamagnetic solution is poured into a U-tube and one arm of this U-tube placed between the poles of a strong magnet with the meniscus in a line with the field, then level of the solution in this arm will
(1) rise
(2) fall
(3) oscillate slowly
(4) remain as such

44. In the diagram shown, $R = 10\,\Omega$ and the reading of ammeter is 4 A. Given that ammeter and voltmeter are not ideal, reading of volt meter is
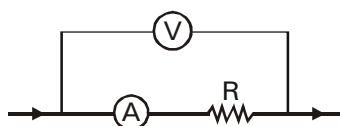

(1) equal to 40V
(2) greater than 40V
(3) less than 40V
(4) any of these

45. What is magnetic energy stored in a solenoid in terms of magnetic field B, area A & length L of solenoid?

(1) $\dfrac{1}{\mu_0}BA^2L$
(2) $\dfrac{2}{\mu_0}B^2AL$

(3) $\dfrac{1}{2\mu_0}BA^2L$
(4) $\dfrac{1}{2\mu_0}B^2AL$

46. An alternating emf is applied across a resistance R, capacitance C and an inductance L independently. If I_R, I_L, I_C are the currents through R, L and C respectively, then the diagram which correctly represents, the phase relationship among I_R, I_L, I_C and source emf E, is given by
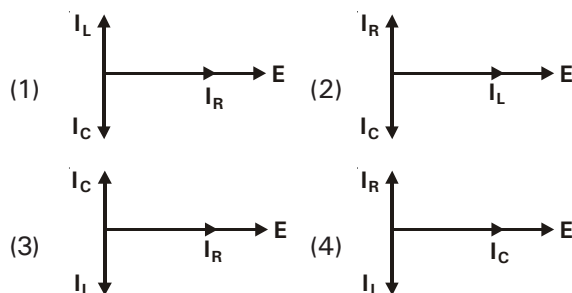
47. The stopping potential are V_1 and V_2 with incident lights of wavelengths λ and 2λ respectively in a photoelectric experiment. Then $V_1 - V_2 = ?$

(1) $\dfrac{he}{2c\lambda}$
(2) $\dfrac{he}{c\lambda}$

(3) $\dfrac{hc}{2e\lambda}$
(4) $\dfrac{hc}{e\lambda}$

48. Match the List I with the List II from the combinations shown
a. Presbiopia   p. Sphero-cylindrical lens
b. Hypermetropia   q. Convex lens
c. Astigmatism   r. Concave lens
d. Myopia   s. Bifocal lens
(1) a-p; b-r; c-q; d-s
(2) a-q; b-s; c-r; d-p
(3) a-s; b-q; c-p; d-r
(4) a-s; b-p; c-r; d-q

49. If I_0 is the intensity of the principal maximum in the single slit diffraction pattern, then what will be its intensity when the slit width is doubled?
(1) $2I_0$
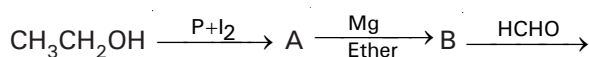(2) $4I_0$
(3) I_0
(4) $\dfrac{I_0}{2}$

50. The circuit corresponding to the given boolean expression is $Y = \overline{A}.\overline{B}$
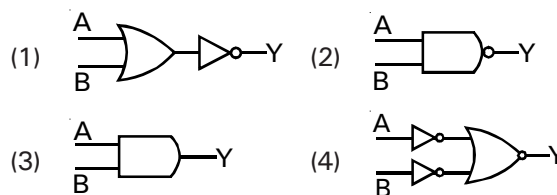
CHEMISTRY : SECTION-A

All questions are compulsory in section A

51. In the following sequence of reactions

$$CH_3CH_2OH \xrightarrow{P+I_2} A \xrightarrow[\text{Ether}]{Mg} B \xrightarrow{HCHO}$$

$$C \xrightarrow{H_2O} D.$$ The compound 'D' is

(1) n-propyl alcohol
(2) propanal
(3) butanal
(4) n-butyl alcohol
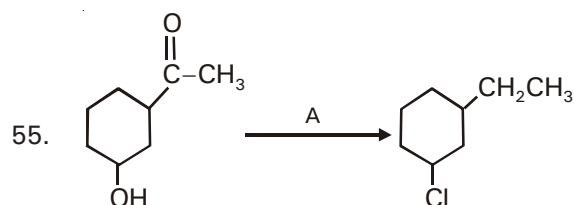
52. CFSE for low spin d^4 octahedral complexes is

    (1) $-1.8\,\Delta_0$ (2) $-1.6\,\Delta_0 + P$

    (3) $-1.2\,\Delta_0$ (4) $-0.6\,\Delta_0 + 2P$

53. A compound in which O adopt ccp arrangement, Q occupy 25% of tetrahedral void and P occupy 50% of octahedral void then the formula is
    (1) PQO (2) PQO_2
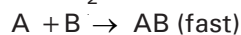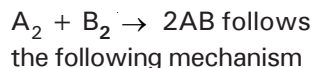   (3) PQO_4 (4) P_2QO_4

54. Optical activity is shown by the complex
    (a) $[Cr(ox)_3]^{3-}$
    (b) $[Co(en)_2Cl_2]^+$ (cis-form)
    (c) $[Co(en)_2Cl_2]^+$ (trans-form)
    (d) $[Cr(en)_3]^{3+}$
    (1) only c   (2) a and b
    (3) a,c and d   (4) a, b and d

55.

    A may be
    (1) Zn(Hg), HCl   (2) NH_2NH_2, OH^-
    (3) H_2/Ni   (4) $NaBH_4$

56. 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)
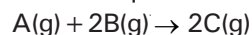 $A + B \rightarrow AB$ (fast)
    The overall order of reaction is
    (1) zero   (2) 1
    (3) 1.5   (4) 2

57. The products of electrolysis of aqueous NaCl at anode and cathode respectively are
    (1) Cl_2, Na   (2) Cl_2, H_2
    (3) O_2, H_2 (4) H_2, Cl_2

58. Compounds 'A' and 'B' react according to the following chemical e quation.
    $$A(g) + 2B(g) \rightarrow 2C(g)$$
    Concentration of either 'A' or 'B' were changed keeping the concentrations of one of the reactants constant and rates were measured as a function of initial concentration. Following results were obtained. Choose the correct option for the rate equations for this reaction.

Experiment	Initial concentration of [A]/mol L^{-1}	Initial concentration of [B]/mol L^{-1}	Initial rate of formation of [C]/mol $L^{-1}s^{-1}$
1.	0.30	0.30	0.10
2.	0.30	0.60	0.40
3.	0.60	0.30	0.20

    (1) Rate $= k\,[A]^2\,[B]$ (2) Rate $= k\,[A]\,[B]^2$
    (3) Rate $= k\,[A]\,[B]$ (4) Rate $= k\,[A]^2\,[B]0$

59. Invert sugar on hydrolysis forms equimolar mixture of
    (1) D-(+)-glucose and D-(−)-fructose
    (2) L-(+)-glucose and D-(−)-fructose
    (3) D-(+)glucose and L-(−)-fructose
    (4) D-(−)glucose and L-(−)-fructose

60. Match the following
    a. Caro's acid   (i) $Na_2S_2O_3$
    b. Oleum   (ii) $H_2S_2O_6$
    c. Marshall's acid   (iii) H_2SO_5
    d. Hypo   (iv) $H_2S_2O_8$
    e. Dithionic acid   (v) $H_2S_2O_7$
    (1) a(iii), b(v), c(i), d(iv), e(ii)
    (2) a(iii), b(v), c(iv), d(i), e(ii)
    (3) a(v), b(iii), c(iv), d(i), e(ii)
    (4) a(i), b(v), c(iii), d(iv), e(ii)

61. Among ethanol (I), acetic acid (II), phenol (III) and benzoic acid (IV), the correct order of increasing acid strength is
    (1) I < II < III < IV   (2) I < III < II < IV
   (3) I < III < IV < II   (4) III < IV < I < II

62. Which of the following will not undergo Hell Volhard Zelinsky reaction
    (1) CH_3COOH
    (2) CH_3CH_2COOH
    (3) 2, 2–dimethyl propanoic acid
    (4) 2–methyl propanoic acid

63. The correct order of ionic radii of Yb^{+3}, La^{+3}, Eu^{+3} and Lu^{+3} is
    (1) $La^{+3} > Eu^{+3} > Yb^{+3} > Lu^{+3}$
    (2) $Yb^{+3} > Lu^{+3} > Eu^{+3} > La^{+3}$
    (3) $Lu^{+3} > Eu^{+3} > La^{+3} > Yb^{+3}$
    (4) $Eu^{+3} > La^{+3} > Lu^{+3} > Yb^{+3}$

64. The final product B in the following sequence of reaction is

    $CH_3CH_2Cl \xrightarrow[KCN]{Alc.} A \xrightarrow{Partial\ hydrolysis} B$
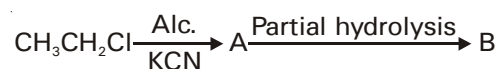
    (1) $CH_3CH_2NH_2$
    (2) CH_3CH_2COOH
    (3) $CH_3CH_2CONH_2$
    (4) $CH_3 - CH_2 - \overset{\overset{O}{\|}}{C} - O - CH_3$

65. The most volatile compound is
    (1) CH_3CH_2CHO (2) CH_3COCH_3
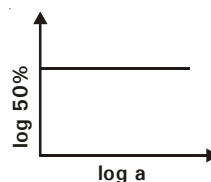   (3) $CH_3CH_2CH_2OH$ (4) CH_3COOH

66. Which of the following is not a tranquilizer?
    (1) Barbituric acid   (2) Seconal
    (3) Equanil   (4) Chloro-xylenol

67. The highest bond angle is observed in
    (1) H_2O (2) CH_3OH
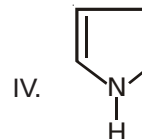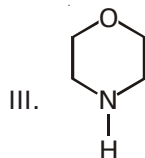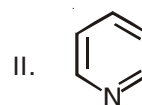   (3) CH_3OCH_3 (4) $CH_3CH_2OCH_2CH_3$

68.

A graph plotted between $\log t_{50\%}$ vs. log concentration is a straight line. What conclusion can you draw from the given graph? ($n \to$ order)

    (1) $n = 1$, $t_{1/2}\ \dfrac{1}{K.a}$ (2) $n = 2$, $t_{1/2} = 1/a$
    (3) $n = 1$, $t_{1/2} = \dfrac{0.693}{K}$ (4) none of the above

69. The order of basicity of the following compound is

    I.   II.
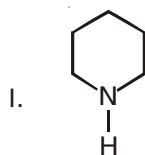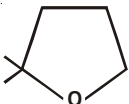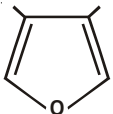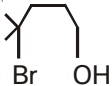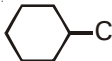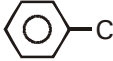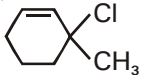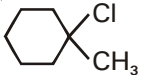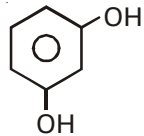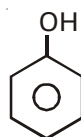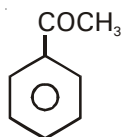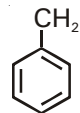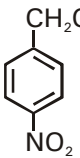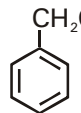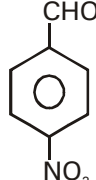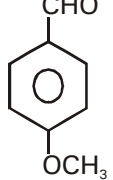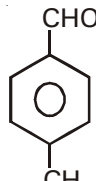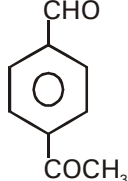
    III.   IV.

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

70. $Ag_2S + NaCN \to [A]$
    $[A] + Zn \to [B]$
    [B] is a metal. Hence, [A] and [B] are
    (1) $Na_2[Zn(CN)_4]$, Zn   (2) $Na[Ag(CN)_2]$, Ag
    (3) $Na_2[Ag(CN)_4]$, Ag   (4) $Na_3[Ag(CN)_4]$, Ag

71. on reaction with conc. aqueous HBr(1 mole) gives

(1)

(2)

(3)
   Br   OH

(4)
   OH   Br

72. Identify the mismatch
   (1) Zone refining – Ga, Ge
   (2) Hydrometallurgy– Ag, Au
   (3) Mond's –Ni
   (4) Smelting – Na

73. Which among the following has most reactivity for S_N1 reaction?

   (1) –Cl

   (2) –Cl

   (3)

   (4)

74. Which of the following is False ?
   (1) $TiCl_4$ is a colourless compound because Ti^{4+} ion has no unpaired electron
   (2) The colour of transition metal ion aries due to d-d transition.
   (3) Colour of certain oxysalts of transition metals is due to charge transfer.
   (4) $K_2Cr_2O_7$ gives coloured solution in water. The colour is due to d-d transition in Cr-atoms.

75. The quantity of electricity which deposits 1.08 g of silver from $AgNO_3$ solution is (atomic wt. Ag = 108)
   (1) 9.65 coulombs
   (2) 9650 coulombs
   (3) 965 coulombs
   (4) 96.5 coulombs

76. Which one of the following compounds can give positive iodoform test?

   a.

   b. $CH_3CH(Cl)COOH$

   c.

   d.

   e. $CH_3CH_2COCH_2I$

   f. $CH_3 - \overset{\overset{O}{\|}}{C} - O - CH_3$

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

77. Mark the correct increasing order of reactivity of the following compounds with HBr/HCl.

   a   b   c

   (1) a < b < c
   (2) b < a < c
   (3) b < c < a
   (4) c < b < a

78. Which of the following is correct order of reactivity of benzaldehyde for nucleophilic addition?

   (a)

   (b)

   (c)

   (d)

   (1) a>b>c>d
   (2) a>d>b>c
   (3) a>d>c>b
   (4) a>b>d>c

79.

H_2N—⟨benzene⟩—CH_3 $\xrightarrow{(CH_3CO)_2O}$

$X \xrightarrow{Br_2/H_2O} Y \xrightarrow{H^+/H_2O} Z$.
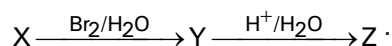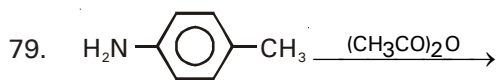
In the sequence given above Z is

(1) [structure: benzene ring with CH_3 at top, Br adjacent, NH_2 at bottom]

(2) [structure: benzene ring with CH_3 at top, NH_2 at bottom with Br adjacent]

(3) [structure: benzene ring with CH_3 at top, $COCH_3$ adjacent, NH_2 at bottom]

(4) [structure: benzene ring with CH_3 at top, NH_2 at bottom with $COCH_3$ adjacent]
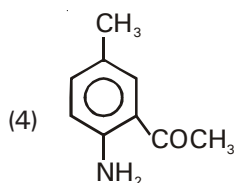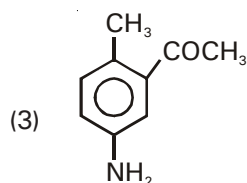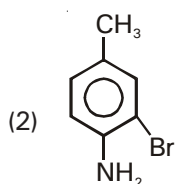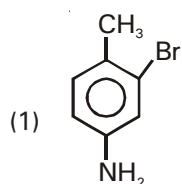
80. The correct decreasing order of acidic strength is
   (1) $HClO_4 > HClO_3 > HClO_2 > HClO$
   (2) $HClO_4 > HClO > HClO_3 > HClO_2$
   (3) $HClO > HClO_2 > HClO_3 > HClO_4$
   (4) $HClO > HClO_4 > HClO_3 > HClO_2$

81. Which electrolyte is most effective for the coagulation of CdS sol?
   (1) $CaSO_4$
   (2) Na_2SO_4
   (3) $[Cr(H_2O)_6]Cl_3$
   (4) $K_4[Fe(CN)_6]$

82. A chemical reaction was carried out at 300 K and 280 K. The temperature coefficient for the reaction is 2 and the rate constants were found to be k_1 and k_2 respectively. Then
   (1) $k_2 = 4\,k_1$
   (2) $k_2 = 2\,k_1$
   (3) $k_2 = 0.25\,k_1$
   (4) $k_2 = 0.5\,k_1$

83. Which of the following is a biodegradable polymer
   (1) PHBV
   (2) Nylon −6,10
   (3) Nylon−6
   (4) SBR

84. Number of lone pair of electrons on Xe atoms in $XeOF_4$, XeO_2F_2 and XeO_3 molecules are respectively
   (1) 1,1, and 1
   (2) 2,2 and 1
   (3) 1,2 and 3
   (4) 1,2 and 1

85. Aldol condensation will not take place in
   (1) HCHO
   (2) CH_3CH_2CHO
   (3) CH_3CHO
   (4) CH_3COCH_3

CHEMISTRY : SECTION-B

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

86. Total vapour pressure of mixture of 1 mol $B\,(p_B^0 = 150\ \text{torr})$ and 2 mol A $(p_A^0 = 240\ \text{torr})$ is 200 torr. In this case
   (1) there is positive deviation from Raoult's law
   (2) there is negative deviation from Raoult's law
   (3) there is no deviation from Raoult's law
   (4) molecular masses of A and B are also requried

87. Mark the correct order of decreasing acid strength of the following compounds.

[structures a, b, c, d, e of substituted phenols]
a: phenol (OH)
b: OH with NO_2 para
c: OH with OCH_3 meta
d: OH with NO_2 meta
e: OH with OCH_3 para
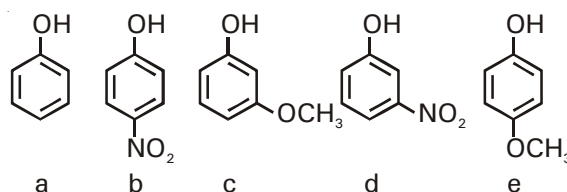
   (1) e > d > b > a > c
   (2) b > d > c > a > e
   (3) d > e > c > b > a
   (4) e > d > c > b > a

88. The product (A) of the following reaction is

$$CH_3-\underset{\underset{CH_3}{|}}{CH}-CH=CH_2 \xrightarrow[\text{(ii) NaBH}_4]{\text{(i) Hg (OAc)}_2,\ H_2O} (A)$$

(1) $CH_3 - \underset{\underset{OH}{|}}{\overset{\overset{CH_3}{|}}{CH}} - CH - CH_3$

(2) $CH_3 - \overset{\overset{CH_3}{|}}{CH} - CH_2 - CH_2OH$

(3) $CH_3 - \overset{\overset{OH}{|}}{CH} - CH - CH_3$

(4) $HO - CH_2 - \overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}} - CH_3$
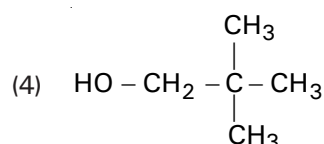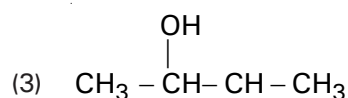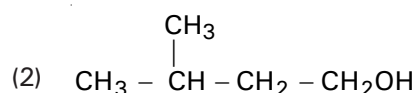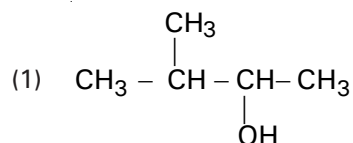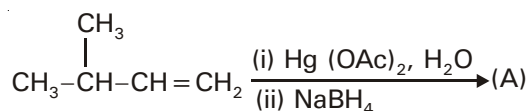
89. Glucose and Mannose are
    (1) enantiomers   (2) conformers
    (3) epimers   (4) anomers

90. Platinum crystallizes in a face-centre cubic crystal with a unit cell length 'a'. The distance between nearest neighbour is

    (1) a   (2) $a\dfrac{\sqrt{3}}{2}$

    (3) $\dfrac{\sqrt{2}\,a}{2}$ (4) $a\dfrac{\sqrt{2}}{4}$

91. Among the following the extrinisic colloid is/are
    (1) silver sol   (2) $Fe(OH)_3$ sol
    (3) As_2S_3 sol   (4) all of these

92. An interhalogen compound is formed by reaction of bromine with excess of flourine. It on hydrolysis produces HF and $HBrO_3$. The interhalogen compound must be
    (1) BrF_3 (2) BrF_5
    (3) BrF_7 (4) BrF

93. An electrochemical cell has electrode potentials
    $A^{2+}/A = 0.34V$, $x/x^{2+} = 2.37V$
    The cell voltage of feasible cell will be
    (1) 2.71 V   (2) 2.03 V
    (3) – 2.71 V   (4) – 2.03 V

94. Which of the following is a polyamide?
    (1) Teflon   (2) Nylon 6, 6
    (3) Terylene   (4) Bakelite

95. If NaCl is doped with 10^{-3} mol% of $AlCl_3$, the concentration of cation vacancies is
    (1) 6.02×10^{18} (2) 6.02×10^{16}
    (3) 0.12×10^{20} (4) 3.01×10^{18}

96. Sea water is found to contain NaCl and $MgCl_2$. If NaCl is 80 % ionised and $MgCl_2$ is 50% ionised then (i = Van't Hoff factor and n is number of particles given on complete dissociation of 1 mole substance)
    (1) $i_{NaCl} > i_{MgCl_2}$ (2) $n_{NaCl} > n_{MgCl_2}$
    (3) $i_{NaCl} < i_{MgCl_2}$ (4) $i_{NaCl} = i_{MgCl_2}$

97. The value of Λ_m^{∞} of $Al_2(SO_4)_3$ is 858 Scm^2 mol^{-1} while $\Lambda_{SO_4^{-2}}^{\infty}$ 160 scm^2 mol^{-1} then the equivalent conductance of Al^{3+} in Scm^2 geq^{-1} is
    (1) 63   (2) 189
    (3) 80   (4) 259

98. What will be the correct order of absorption of wavelength of light in the visible region, for the complexes?
    $[Co(NH_3)_6]^{3+}$, $[Co(CN)_6]^{3-}$, $[Co(H_2O)_6]^{3+}$
    (1) $[Co(CN)_6]^{3-} > [Co(NH_3)_6]^{3+} > [Co(H_2O)_6]^{3+}$
    (2) $[Co(NH_3)_6]^{3+} > [Co(H_2O)_6]^{3+} > [Co(CN)_6]^{3-}$
    (3) $[Co(H_2O)_6]^{3+} > [Co(NH_3)_6]^{3+} > [Co(CN)_6]^{3-}$
    (4) None of these

99. Which of the following statements is incorrect about the collision theory of chemical reaction?
    (1) It considers reacting molecules or atoms to be hard spheres and ignores their structural features.
    (2) Number of effective collisions determines the rate of reaction.
    (3) Collision of atoms or molecules possessing sufficient threshold energy results into the product formation.
    (4) Molecules should collide with sufficient threshold energy and should have proper orientation for the collision to be effective

100. Out of following which one is not a named reaction

    (1)

    (2)

    (3)

    (4)
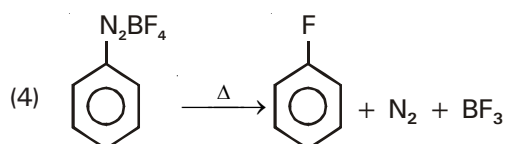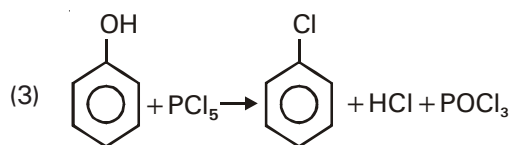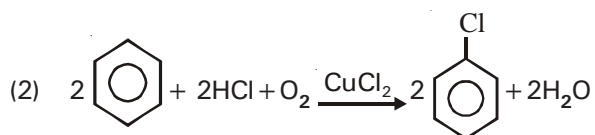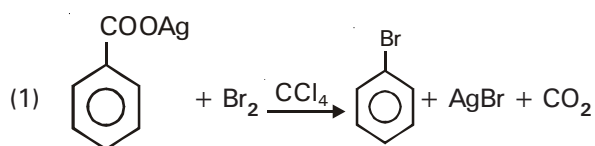
ZOOLOGY : SECTION-A

All questions are compulsory in section A

101. Which of the following is a set of primary lymphoid organs?
    (1) Bone marrow and thymus
    (2) Peyer's patches and tonsils
    (3) Lymph nodes and tonsils
    (4) Tonsils and spleen

102. DNA ligases form
    (1) hydrogen bond between A & T and G & C bases
    (2) phosphodiester bond between phosphate group at 3' carbon of one nucleotide and hydroxyl group at 5' carbon of adjacent nucleotide
    (3) DNA double helices
    (4) phosphodiester bond between adjacent nucleotides

103. Choose the incorrect statement
    (1) SCID is a secondary immunodeficiency disorder
    (2) Cell mediated immune response is responsible for graft rejection
    (3) Auto immune disease occurs when immune system fails to distinguish between self and non-self
    (4) Hepatitis B vaccine has been produced by recombinant DNA technology using yeast

104. **Statement-I** : Common approaches for the treatment of cancers are radio-therapy, surgery and Immunotherapy.
    Statement-II : Metastasis is the most feared property of malignant tumors.
    (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

105. Match the following list of bioactive substances and their roles:

Bioactive Substance		Role
i. Statins	a.	Removal of oil stains
ii. Cyclosporin A	b.	Dissolution of clots from blood vessels
iii. Streptokinase	c.	Lowering of blood cholesterol
iv. Lipase	d.	Immuno-suppressive agent

Choose the correct match
    (1) i-b, ii-c, iii-a, iv-d
    (2) i-d, ii-b, iii-a, iv-c
    (3) i-d, ii-a, iii-b, iv-c
    (4) i-c, ii-d, iii-b, iv-a

106.

How many of the following is/are correct w.r.t. given figure?
a. These are implants having progestogen and estrogen
b. They prevent ovulation and implantation
c. Their effective periods are much longer than oral contraceptives
d. Their mode of action is similar to oral contraceptives
(1) One   (2) Two
(3) Three   (4) Four

107. Choose the correct match
(1) Gene gun – DNA is coated around Ca^{2+}
(2) Electroporation– Permanent holes are created by applying strong electric field
(3) Chemical method –Polyethylene glycol is used for fusion of protoplast of 2 cells
(4) Microinjection – Micropipettes are used for insertion of recombinant plasmid

108. The pill with high contraceptive value taken weekly is
(1) Progestastert, with progesterone only
(2) Saheli, a nonsteroidal formulation
(3) Emergency contraceptive pill, a steroidal formulation
(4) Both (2) and (3)

109. Find incorrect match
(1) *Dryopithecus* – 15 mya
(2) *Australopthecus* – 2 mya
(3) *Homo erectus* – 1.5 mya
(4) *Homo sapiens fossilis* –100000–40000 years ago

110. Parturition is induced by a complex neuroendocrine mechanism involving _____ steroidal hormones
(1) Estrogen and cortisol
(2) Oxytocin
(3) Estrogen, cortisol and oxytocin
(4) Cortisol and oxytocin

111. When more than one adaptive radiation appeared to have occured in an isolated geographical area, one can call this convergent evolution. It is best supported by the following example
(1) bat and flying squirrel
(2) numbat and marsupial cat
(3) wolf and bob cat
(4) flying squirrel and sugar glider

112. During middle of menstrual cycle
a. LH & FSH attain a peak
b. ovulation occurs
c. Maximum progesterone level in blood
d. regression of corpus luteum
(1) a and b   (2) a, b and c
(3) c and d   (4) a, b, c and d

113. The immediate ancestors of Crocodile, dinosaurs and birds were
(1) Therapsids   (2) Sauropsids
(3) Thecodonts   (4) Synapsids

114. The wall of uterus has three layers of tissue.
a. Perimetrium is thick, external, membranous layer
b. Myometrium is thin, middle layer that undergoes strong contractions during delivery
c. Endometrium is the innermost glandular layer that undergoes cyclic changes during menstrual cycle
Which of these are true (T) or false (F)?
(1) a–T, b–T, c–T   (2) a–T, b–F, c–T
(3) a–F, b–T, c–F   (4) a–F, b–F, c–T

115.
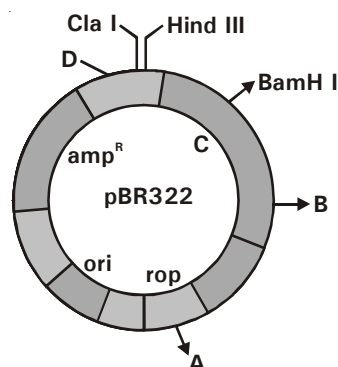
In the above given figure of plasmid pBR 322, A–D are respectively
(1) Pst I, Sal I, kan^R, Pvu I
(2) Pvu II, Sal I, tet^R, *Eco* RI
(3) Pvu II, Hind I, tet^R, *Eco* RI
(4) Pvu I, Pst I, kan^R, Sal I

116. A, B, C, D are DNA fragments
A = 9 bp long
B = 90 bp long
C = 900 bp long
D = 400 bp long
Which will be at a maximum distance in the gel if we are observing from the side opposite to wells?
(1) A   (2) B
(3) C   (4) D

117. A human female has maximum number of primary oocytes in her ovaries
    (1) at birth
    (2) just prior to puberty
    (3) early in her fertile years
    (4) midway through her fertile years

118. Which statement is correct related to malaria?
    (1) Sporozoite is the infective stage that enters mosquito body
    (2) *Plasmodium ovale* is most serious form of malarial parasite
    (3) Parasites that enter mosquito body, donot undergo any further development there
    (4) Rupture of RBCs, release a toxic substance haemozoin, which cause chill

119. **Assertion** : Overhanging stretches produced by using type-II Restriction enzymes that cut DNA strands a little away from the centre are called sticky ends.
    Reason : The overhanging stretches form hydrogen bond with their complementary cut counter parts.
    (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

120. *Ascaris* and *Wuchereria* are similar in that both are
    (1) intestinal parasites
    (2) pathogenic helminths
    (3) transmitted by female mosquito vectors
    (4) both (1) & (2)

121. A doctor while operating on a patient in emergency accidentally cuts himself with a scalpel. Later it is found the patient is HIV positive. To rule out whether doctor contracted the virus, which of the following should be done before the symptoms appear?
    (1) PCR
    (2) Radiography
    (3) Routine blood examination
    (4) Widal test

122. Source of hormone hCG is ____A____ and it helps to maintain pregnancy by mimicing the action of ____B____ and thereby maintaining ____C____ in ____D____ respectively
    (1) inner cell mass, FSH, graffian follicle, ovary
    (2) inner cell mass, FSH, corpus luteum, Fallopian tubes
    (3) trophoblast, LH, corpus albican, ovary
    (4) trophoblast, LH, corpus luteum, ovary

123. In 1983, Eli Lily an American company prepared humulin by using
    (1) three DNA sequences in 1 plasmid of *E.coli*
    (2) 2 DNA sequences in 2 plasmids of *Haemophilus*
    (3) 2 DNA sequences in 1 plasmids of *E.coli*
    (4) 2 DNA sequences in 2 plasmids of *E.coli*

124. Which of the following statement is incorrect?
    (1) Cancer of internal organs can be detected by CT scan
    (2) AIDS and hepatitis B are sexually transmitted diseases
    (3) HIV infects macrophages and T-helper cells
    (4) HIV is a retrovirus with dS RNA

125. Consider following statements
    a. Plasmid vector with two selectable markers X and Y for antibiotics resistance is taken
    b. Alien DNA is ligated at restriction site within the gene for X and rDNA is induced to enter host cell.
    The addition of only antibiotic Y to the medium will help to identify the
    (1) Recombinant   (2) Non-recombinant
    (3) Transformant   (4) All of the above

126. Study the following statements and select the incorrect ones
    i. Primary treatment of sewage involves physical removal of large and small particles through filtration and sedimentation
    ii. Secondary treatment of sewage is mainly a mechanical process
    iii. Activated sludge sediment in a sewage treatment plant is a rich source of aerobic bacteria and fungi
    iv. Biogas, commonly called gobar gas is ethane
    (1) i & ii   (2) ii & iv
    (3) ii & iii   (4) iii & iv

127. *Agrobacterium tumefaciens* is able to transfer _____ to the host plant cell
    (1) Ti–plasmid   (2) T–DNA
    (3) Vir–genes   (4) all of these

128. Appearance of hair on head and first foetal movements are observed during
    (1) 1st month of embryonic development
    (2) 5th month of gestation
    (3) 24 weeks of gestation
    (4) 3rd trimester of pregnancy

129. Mark the incorrect statement w.r.t. RNAi.
    (1) Takes place in all eukaryotic organisms as a method of cellular defence
    (2) Initiated by a double stranded RNA only
    (3) Prevents translation of specific mRNA
    (4) Host specific gene have been used as source of dsRNA to control *Meloidegyne.*

130. **Statement-I** : MOET uses FSH and LH for follicular maturation.

Statement-II : Super ovulation produces 20-25 eggs instead of 1.

(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

131. Which of the following is/are applicable to first antibiotic discovered?

(1) Obtained from mould

(2) Its potential was recognised by Chain and Florey

(3) Discovered by Robert Koch

(4) Both (1) & (2)

132. Match the following columns

Column-I		Column-II	
a.	Lady bird beetles	i.	*Methanogen*
b.	Mycorrhiza	ii.	*Trichoderma*
c.	Biological control	iii.	Aphids
d.	Biogas	iv.	*Glomus*

(1) a–ii, b–iv, c–iii, d–i

(2) a–iii, b–iv, c–ii, d–i

(3) a–iv, b–i, c–ii, d–iii

(4) a–iii, b–ii, c–i, d–iv

133. Forelimbs of cat, lizard used in walking; forelimbs of whale used in swimming and forelimbs of bats used in flying are an examples of

(1) Analogous organs

(2) Adaptive radiation

(3) Homologous organs

(4) Convergent evolution

134. Identify the correct match

	Phase of menstrual cycle	Level of hormones	Endometrial lining
A.	Menstrual phase	Low estrogen & progesterone	Being shed
B.	Follicular phase	High progesterone	Thick & non secretory
C.	Ovulatory phase	High estrogen & progesterone	Thin and secretory
D.	Luteal phase	Low progesterone & high estrogen	Thick and secretory

Identify the correct match

(1) A and B (2) C and D

(3) only D (4) only A

135. Which of the following is not included in five factors known to affect Hardy-Weinberg equilibrium?

(1) Gene flow and genetic recombinations

(2) Genetic drift

(3) Natural selection

(4) Non-random mating

ZOOLOGY : SECTION-B

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

136. Colostrum secreted by mother during initial days of lactation has abundant

(1) IgG (2) IgA

(3) IgM (4) IgD

137. Events A-D occur in aeration tanks for secondary treatment of sewage. If arranged in chronological sequence the third event is

A. Reduction of BOD

B. Mechanical agitation and aeration

C. Consumption of organic matter

D. Formation of flocs

(1) A (2) B

(3) C (4) D

138. Pair of diseases mainly spread by contaminated food and water are

(1) Diphtheria and cholera

(2) Typhoid and leprosy

(3) Cholera and typhoid

(4) Tetanus and Leprosy

139. How many of the following statements are false?

a. Vas deferens and vasa efferentia are the only male sex accessory ducts

b. Epididymis is 6 cm long highly coiled tube present along the posterior surface of testes

c. For normal fertility atleast 20% sperms should have normal motility and 60% of them should have normal shape and size

d. Seminal plasma is the secretion of male sex accessory glands

(1) One (2) Two

(3) Three (4) Four

140. **Statement-I** : Inbreeding is necessary to evolve purelines in animals.

Statement-II : Hybrid animals obtained through cross breeding are subjected to some form of inbreeding to develop a new stable breed.

(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

141. Choose the incorrect statement
   (1) Immune response to first encounter with an antigen is called primary immune response
   (2) Neutrophils and monocytes are a part of cytokine barrier
   (3) Binding sites of antibodies for antigens are towards N-terminal
   (4) Epitope is the part of antigen specifically recognized by the antibody

142. Identify the given structure, its mode of consumption and the system of body affected by consumption of these drugs.
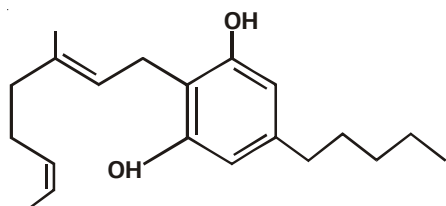
   (1) Morphine, orally, respiratory system
   (2) Cannabinoids, inhalation and orally, cardio vascular system
   (3) Amphetamine, inhalation, cardiovascular system
   (4) Cannabinoids, orally, digestive system

143. Stanley Miller synthesized simple amino acids from
   (1) CH_4, CO_2, H_2 and O_2 at $1800°C$
   (2) H_2, NH_3, CH_4 and water vapours at $800°C$
   (3) CO, H_2, HCN, CH_4 at $800°C$
   (4) CH_4, NH_3, H_2 and CO_2 at $1800°C$

144. If the following are arranged in the proper chronological sequence of their origin in evolution which would be second & fifth respectively?

   Mammals, Jawless fish, Amphibians, Reptiles, Lobe fin fish, Birds

   (1) Amphibians, Birds   (2) Lobefins, Birds
   (3) Reptiles, Mammals   (4) Lobefins, Mammals

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

	Column-I		Column-II
a.	Discovery of 2 restriction enzymes from E.coli	i.	1969
b.	First instance of construction of an artificial r-DNA molecule	ii.	1963
c.	Studies by Boyer on a couple of restriction enzymes of *E.coli*	iii.	1972

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

146. Which of the following is not a correct match?
   (1) Octopus eye & mammalian eye – Analogy
   (2) Fore limbs of vertebrates – Homology
   (3) Flipper of Penguins & Dolphins – Convergence
   (4) Sweet potato and potato – Homology

147. Usual site of infection of *Entamoeba histolytica* is
   (1) wall of large intestine
   (2) wall of small intestine
   (3) lumen of small intestine
   (4) blood and lymph

148. What is common in gene therapy for ADA deficiency, hepatitis B vaccine and genetically engineered insulin?
   (1) All have been produced by using same host
   (2) All need periodic inputs or infusions
   (3) All involve rDNA technology
   (4) Their products need downstream processes

149. In which of the following situations is evolution most likely to occur?

	Migration	Natural Selection	Variations due to mutations
1.	Absent	low	low
2.	Absent	high	absent
3.	High	low	absent
4.	High	high	high

150. **Assertion** : Using Restriction enzyme *Pst-I* with vector pBR-322, we can select transformants by growing on a medium containing tetracyclin.
   Reason : All transformants have functional tet^R and amp^R genes.
   (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

BOTANY : SECTION-A

All questions are compulsory in section A

151. Apomictic embryos in *Citrus* arise from
   (1) synergid
   (2) antipodal cell
   (3) maternal sporophytic tissue in ovule
   (4) diploid egg

152. The primary contaminants of water which are responsible for enhanced eutrophication are
   (1) sulphates and phosphates
   (2) nitrates and phosphates
   (3) calcium and sodium
   (4) sulphates and nitrates

153. Incorrect match is

(1)	Papaya	Dioecious	Autogamy and Geitonogamy both absent
(2)	Maize	Monoecious	Autogamy absent
(3)	Mulberry	Dioecious	Autogamy and xenogamy both absent
(4)	Coconut	Monoecious	Autogamy absent but xenogamy present

154. Which one of the following regulate the reproductive processes and associated behavioural expression of organisms?
    (1) Hormones only
    (2) Hormones and certain environmental factor
    (3) Hormones and type of cell division
    (4) Environmental factor only

155. How many statements are correct?
    a. According to central pollution control Board, particulate size 2.5 micrometers or less are responsible for causing the greatest harm to human health
    b. Air Act was amended in 1987 to include, noise as an air pollutant
    c. Smokestacks of thermal power plants, smelters release gaseous air pollutants only
    d. Electrostatic precipitator can remove over 99 percent particulate matter present in the exhaust from a thermal power plant
    (1) Three   (2) Four
    (3) One only   (4) Two

156. Robert May places the global species diversity at about
    (1) 20–50 million   (2) 1.7 million
    (3) 7 million   (4) 10 million

157. One of the following is not salient feature of HGP?
    (1) The average gene consist of 30,000 bases
    (2) Less than 2% of genome codes for protein
    (3) The functions are unknown for over 50% of discovered genes
    (4) Chromosome 1 has most genes

158. If modified allele produces no enzyme or non-functional enzyme then it is known as
    (1) Dominant allele
    (2) Partially dominant allele
    (3) Recessive allele
    (4) Co-dominant allele

159. 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

160. Observe the age pyramid given below and answer the question respectively
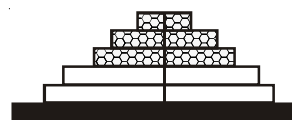
    a. What is growth status of population?
    b. What does broad dark base represent?
    (1) a- declining, b-pre-reproductive males
    (2) a-stable, b-reproductive females
    (3) a-expanding, b-pre-reproductive females
    (4) a-expanding, b-pre-reproductive males and females

161. Which is FALSE with respect to Earth's biodiversity?
    a. More than 70% of all species recorded are animals
    b. Plants comprise no more than 22% of total biodiversity
    c. Nearly 45,000 species of animals and twice as many of plants have been recorded from India
    d. India's share of global species diversity is about 2.4%
    (1) a, b & c   (2) both c & d
    (3) a, c & d   (4) a, b, c & d

162. **Statement- I** : The synergids have special cellular thickenings at the micropylar tip called filiform appartus.
    Statement- II : Filliform appartus plays an important role in guiding the pollen tubes into the synergid.
    (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

163. Which of the following causes biomagnification?
    (1) SO_2 (2) Mercury
    (3) DDT   (4) Both (2) & (3)

164. Which statement is INCORRECT with respect to the pollen grain?
    (1) In angiosperms male gametophyte is represented by pollen grain.
    (2) Sporo-pollenin which is most resistant and inorganic material deposited on the exine of pollen grain.
    (3) Germ pore is the prominent structure in the pollen exine where sporopollenin is absent.
    (4) Inner layer of pollen is continous and made up of pectin and cellulose.

165. How many statements are incorrect?
   a. India has more than 1000 genetically different strains of rice and 50,000 varieties of Mango
   b. The number of fungi species in the world is more than the combined total of the species of fishes, amphibians, reptiles & mammals
   c. Colombia located near the equator has nearly 1,400 species of birds
   d. Tropical environments, unlike temperate ones, are less seasonal, relatively more constant and predictable.
   d. Amazon forest is estimated to produce 20 percent of the total oxygen in the earth's atmopshere
   (1) One only   (2) Two
   (3) Four   (4) Three

166. Viability period of seeds of *Lupinus articus* is
   (1) 10,000 years   (2) 1000 years
   (3) 100 years   (4) 2000 years

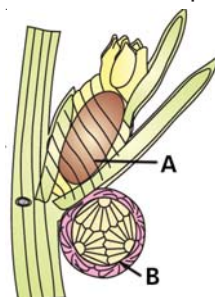167. Study the pedigree chart given below
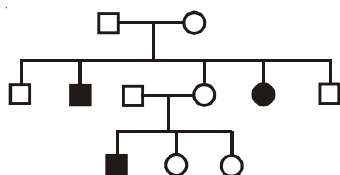
   What does it show ?
   (1) Inheritance of a condition like phenylketonuria as an autosomal recessive trait
   (2) Pedigree is wrong as this is not possible
   (3) Inheritance of a recessive sex linked disease like haemophilia
   (4) Inheritance of sex-linked inborn error of metabolism like phenylketonuria

168.

   Select the incorrect option w.r.t. to above diagram
   (1) *Chara* plant   (2) Monoecious
   (3) A is antheridium   (4) B is antheridium

169. Find the correct match

	Disease	Symptom
(1)	Turner's syndrome	– Autosomal recessive disorder
(2)	Down's syndrome	– Trisomy of 21st chromosome
(3)	Sickle cell anaemia	– Autosomal dominant disorder
(4)	Klinefelter's syndrome	–Monosomy of 21st chromosome

170. The codon for Arginine is UGG, how many different single base substitution are possible in this codon?
   (1) 9   (2) 3
   (3) 5   (4) 7

171. Which statement is correct w.r.t. chromosome?
   a. Its behaviour is parallel to behaviour of genes
   b. Chromosomes as well as genes occur in pairs
   c. Chromosomes retain their structure & individuality throughout the life time
   d. One pair segregates independently of another pair
   (1) both a & d   (2) both b & c
   (3) a, b & c but not d (4) a, b, c & d

172. Which of the following statements is true?
   (1) The conventional method of breeding for disease resistance are hybridisation and selection.
   (2) Maize hybrids developed in 2000 have thrice the amount of amino acid-lysine & tryptophan.
   (3) In Mung bean, resistance to yellow mosaic virus & powdery mildew were induced by hybridization.
   (4) Single cell protein is only obtained from unicellular organism.

173. Species diversity decreases with
   (1) increase in latitude and decrease in altitude.
   (2) decrease in latitude and increase in altitude
   (3) decrease in both latitude and altitude
   (4) increase in both latitude and altitude

174.
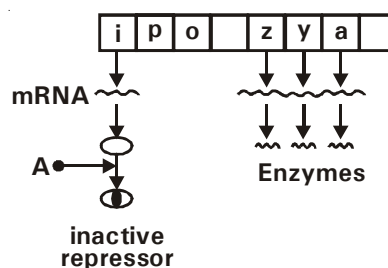
   In the above figure A is
   (1) allolactose   (2) β –galactoside
   (3) glucose   (4) both (1) and (2)
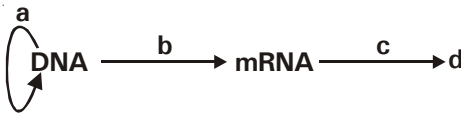
175. The pyramid of biomass in a grassland ecosystem is
   (1) always upright
   (2) always inverted
   (3) either erect or inverted
   (4) irregular

176. Which of the following statement is incorrect w.r.t DNA replication?
   (1) DNA-dependent DNA polymerases catalyse polymerisation only in one direction
   (2) DNA polymerases on their own cannot initiate the process of replication
   (3) Okazaki fragments of lagging strand are formed towards replication fork.
   (4) In eukaryotes, the replication of DNA take place at S-phase of the cell-cycle

177. **Assertion** : Gametes are always pure for a trait.

Reason : They receive only one allele of a character after meiosis.

(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

178. Choose the correct statements

a. Under unfavourable condition many zooplanktons in lakes, ponds undergo diapause

b. Every summer, Rajasthan hosts thousands of migratory birds from Siberia

c. In lower plants seeds serve as means to tide over period of stress

d. Kangaroo rat is capable of meeting only its few water requirement through internal fat oxidation

(1) a & c   (2) a, b & c

(3) a, b, c & d   (4) only a

179. RNA polymerase II, I, III is responsible for the formation of respectively

(1) mRNA, 28 s rRNA, 18s rRNA

(2) mRNA, 5s rRNA, snRNA

(3) hnRNA, 5.8s rRNA, 5s RNA

(4) hnRNA, 5S rRNA, SnRNA

180. A virus can be made radioactive by

(1) culturing the viruses in a medium of S^{35}

(2) culturing the viruses on a medium of potato, dextrose and P^{32}

(3) providing P^{32} to viruses when they are about to attack the bacteria

(4) providing P^{32} to a bacterium which has been infected by virus

181. Which statement about gene expression is not correct?

(1) Gene expression is regulated by metabolic, physiological and environmental conditions

(2) Gene expression can be regulated at several predominant sites in a prokaryotic cell

(3) It refers to the molecular mechanism by which a gene expresses a phenotype

(4) The development and differentiation of embryo into adult organisms are also a result of the co-ordinated regulation of expression of several sets of genes

182. In *Drosophila*, white eye colour in recessive X-linked trait while red eye colour is dominant. A white eyed female is crossed with red eyed male. The female offspring with red eye colour would be

(1) zero   (2) 25%

(3) 50%   (4) 100%

183. Green house gases include

(1) $CO_2-20\%$, $CH_4-20\%$, $CFC-14\%$, $N_2O-44\%$

(2) $CO_2-60\%$, $CH_4-20\%$, $CFC-14\%$, $N_2O-6\%$

(3) $CO_2-20\%$, $CH_4-60\%$, $CFC-12\%$, $N_2O-8\%$

(4) $CO_2-40\%$, $CH_4-40\%$, $CFC-5\%$, $N_2O-15\%$

184. Which of the following best describe the function of σ factor in RNA polymerase of *E.coli*?

(1) It is essential for elongation of RNA transcript

(2) It is essential for recognition of and binding to promoter sequence

(3) σ factor associates permanently with RNA polymerase to initiate transcription

(4) It is required for termination of transcription

185. "In flowering plants, zygote is formed inside the ovule. Zygote develops into ....and ovules develop into .... Ovary develops into ....which develops a thick wall called ……. that is protective in function."

Which is correct fill-up of paragraph in sequence?

(1) seed, fruit, embryo, pericarp

(2) embryo, fruit, pericarp, seed

(3) seed, fruit, pericarp, embryo

(4) embryo, seed, fruit, pericarp

BOTANY : SECTION-B

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

186. External & internal syngamy are present in (respectively)

(1) fishes and frogs

(2) algae and fungi

(3) bryophytes and reptiles

(4) reptiles and fish

187. The sequence of communities of primary succession in water is

(1) Phytoplanktons - reed swamp - free floating hydrophytes - rooted hydrophytes - grasses - trees

(2) Free floating hydrophytes - sedges - rooted hydrophytes - grasses - trees

(3) Phytoplankton -meadow and trees- rooted submerged hydrophytes - sedges - reed swamp - meadow and trees

(4) Phytoplankton - rooted submerged hydrophytes - floating hydrophytes - reed swamp - sedges - meadows - trees

188. **Assertion** : Colourblindness shows criss-cross inheritance.
    Reason : Colourblindness causing gene is dominant and passes from mother to daughter.
    (1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
    (2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
    (3) Assertion is true statement but Reason is false
    (4) Assertion is false

189. Pick out varieties which do not belong to wheat
    a. Himgiri   b. Jaya
    c. Kalyan Sona   d. Prabhani Kranti
    e. Ratna   f. Sonalika
    (1) b, d, e   (2) a, d, e, f
    (3) b, c, f   (4) a, c, e, f

190. The megasporangium is also known as
    (1) Ovule   (2) Seed
    (3) Embryo   (4) Fruit

191. The frequency of a dominant allele in a randomly mating population is 70%. Then what is the frequency of the recessive trait in the population
    (1) 42%   (2) 9%
    (3) 49%   (4) 90%

192. **Statement- I** : Better management practices and increase in acreage can increase yield upto limited extent.
    Statement- II : Major food crops are derived from the domesticated varieties of ancient times.
    (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

193. How many statements from the following are INCORRECT?
    a. A monohybrid always produces two types of gametes in equal proportions.
    b. All tall plants of F_2 generation are pure tall plants.
    c. Homozygous parent produces all gametes that are similar.
    d. Dominant trait may be homozygous or heterozygous but recessive trait is always heterozygous.
    (1) Two   (2) Three
    (3) One   (4) Four

194. Climate regulation constitutes how much percent of ecosystem services?
    (1) < 10%   (2) about 6%
    (3) 50%   (4) about 33%

195. Study the following diagram and select the suitable option for a, b, c, d respectively

    a → DNA $\xrightarrow{b}$ mRNA $\xrightarrow{c}$ d

    (1) replication, transcription, translation, polypeptide
    (2) transformation, transcription, transduction, amino acids
    (3) transformation, transduction, translation, polypeptide
    (4) replication, transcription, transduction, polypeptide

196. National forest policy recommends that plains should have a forest cover of
    (1) 33 %   (2) 67 %
    (3) 40 %   (4) 19.4 %

197. Pollen is stored in pollen banks for crop breeding programmes at a temperature of
    (1) −100°C   (2) −10 to 20°C
    (3) −196°C   (4) −15°C

198. There are four major causes of accelerated rate of species extinction, which are collectively called as evil quartet, which of following is not included in the evil quartet
    (1) over exploitation
    (2) pollution
    (3) co-extinction
    (4) alien species invasion

199. If a new habitat is just being colonised which factor will contribute more significantly to population growth
    (1) Birth rate   (2) Immigration
    (3) Emigration   (4) Death rate

200. The standing state refers to
    (1) amount of nutrient present in soil at any given time
    (2) amount of living material present in different trophic level at given time
    (3) amount of biomass of organism per unit area
    (4) species composition of an ecosystem