PHYSICS : SECTION-A

All questions are compulsory in section A

1. No work will be done in rotating a dipole in a uniform electric field from
   (1) 0° to 180°   (2) 0° to 90°
   (3) 90° to 270°   (4) 0° to 45°

2. A parallel plate capacitor has capacitance C. When it is one-half filled with a dielectric of dielectric constant 2, then percentage increase in its capacitance is
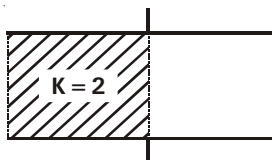
   (1) 200%   (2) 150%
   (3) 100%   (4) 50%

3. The resistance of a wire is 20 ohms. It is so stretched that the length becomes three times, then the new resistance of the wire will be
   (1) 6.67 ohms   (2) 60 ohms
   (3) 120 ohms   (4) 180 ohms

4. A charge of 5C experiences a force of 5000 N when it is kept in a uniform electric field. What is the maximum potential difference between two points separated by a distance of 1 cm
   (1) 10 V   (2) 250 V
   (3) 1000 V   (4) 2500 V

5. The magnetic induction at a point P which is distant 4 cm from a long current carrying wire is 10^{-8} T. The field of induction at a distance 12 cm from the same current would be
   (1) 3.33×10^{-9} T   (2) 1.11×10^{-4} T
   (3) 3×10^{-3} T   (4) 9×10^{-2} T

6. A proton moving with a constant velocity passes through a region of space without change in its velocity. If E and B represent electric and magnetic fields respectively this region of space may not have
   (1) $E = 0, B = 0$ (2) $E = 0, B \neq 0$
   (3) $E \neq 0, B = 0$ (4) $E \neq 0, B \neq 0$

7. Charges of $+\dfrac{10}{3} \times 10^{-9}$ C are placed at each of the four corners of a square of side 8 cm. Potential at intersection of the diagonals is
   (1) $150\sqrt{2}$ volt   (2) $1500\sqrt{2}$ volt
   (3) $900\sqrt{2}$ volt   (4) 900 volt

8. A condenser of capacity $100\,\mu$ F is charged so that the electrostatic energy stored in it is $800\,\mu$ J. It is now connected to another uncharged condenser of capacity $200\,\mu$ F in parallel. Common potential of two capacitors is
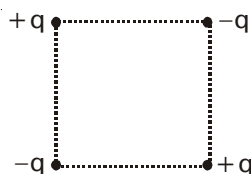   (1) 1.33 V   (2) 1.5 V
   (3) 2 V   (4) 1.67 V

9.
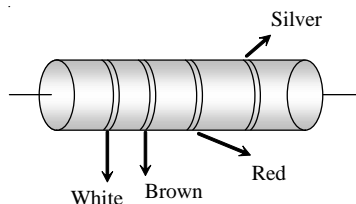
In the figure a carbon resistor has bands of different colours on its body as mentioned in the figure. The value of the resistance is

(1) $9.2\,k\Omega \pm 10\%$ (2) $8.1\,k\Omega \pm 5\%$

(3) $8.6\,k\Omega \pm 10\%$ (4) $9.1\,k\Omega \pm 10\%$

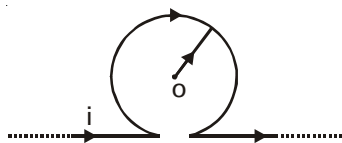10.

Charges are placed on the vertices of a square of side 'a', as shown. Dipole moment of the system is

(1) qa   (2) 2qa

(3) 4qa   (4) zero

11. An infinitely long straight conductor is bent into the shape as shown. It carries a current of i ampere and radius of the circular loop is r metre. Then the magnetic induction at its centre will be
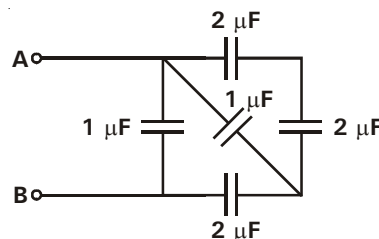

(1) $\dfrac{\mu_o}{4\pi}\dfrac{2i}{r}(\pi + 1)$ (2) $\dfrac{\mu_o}{4\pi}\dfrac{2i}{r}(\pi - 1)$

(3) zero   (4) infinite

12. Inward and outward electric flux for a closed surface in units of N-m^2/C are respectively 8×10^3 and 4×10^3. Then total charge inside surface is

(1) 4×10^3 C   (2) -4×10^3 C

(3) $\dfrac{-4 \times 10^3}{\varepsilon_0}$ C   (4) $-4 \times 10^3\ \varepsilon_0$ C

13.

The total capacity of the system of capacitors shown in the figure between points A and B is

(1) $1\ \mu F$ (2) $2\ \mu F$

(3) $3\ \mu F$ (4) $4\ \mu F$

14. Which of the following is False?

(1) An electron is travelling horizontally towards east. A magnetic field in vertically downward direction exerts a force on the electron along south.

(2) A magnetic field exerts a force, if the charged particle is moving across the magnetic field lines.

(3) Let a strong magnetic field be applied on a stationary electron. Then electron moves in the direction of the field.

(4) There is no change in the kinetic energy of a charged particle moving in a magnetic field although a magnetic force may be acting on it

15. Electric potential due to a uniformly charged spherical shell of radius R is shown by the curve

(1) (2)

(3) (4)
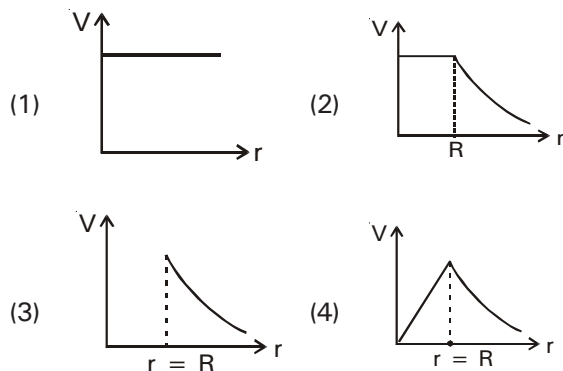
16. Resistance of a metal wire at $150°C$ is $320\,\Omega$. Its resistance temperature coefficient is $0.004/°C$. The resistance of this wire at $200°C$ will be
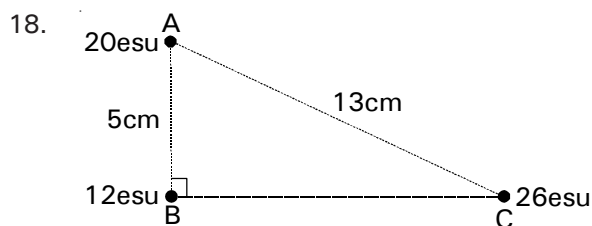
(1) $345\,\Omega$ (2) $400\,\Omega$

(3) $360\,\Omega$ (4) $427\,\Omega$

17. A resistor of resistance R is connected to a cell of internal resistance $5\,\Omega$. The value of R is varied from $1\,\Omega$ to $5\,\Omega$. The power consumed by R

(1) increases continuously

(2) decreases continuously

(3) first decreases then increases

(4) first increases then decreases

18.

Electric potential energy of the system shown above is

(1) 114 erg (2) 228 erg

(3) 86 erg (4) 168 erg

19. A current of 2A flows through a wire shown in figure. What is the potential difference between A and B?
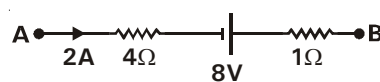
(1) 3 V (2) 1 V

(3) 2 V (4) zero

20. What is the ratio of pitch of a proton and α-particle moving with a velocity 2v and $\sqrt{3}v$ respectively at an angle $30°$ and $60°$ respectively with a uniform magnetic field B?

(1) 2 : 1 (2) $\sqrt{3}$: 1

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

21.
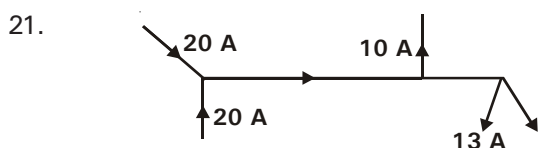
The figure below shows currents in a part of electric circuit. The current i is

(1) 17 A (2) 37 A

(3) 13 A (4) 10 A

22. Let a current 'i' be flowing in a conductor and 'v' be the drift velocity of free electrons in it. Now the radius of the conductor is made 3 times and the current is halved. Then drift velocity will be

(1) $\dfrac{v}{6}$ (2) $\dfrac{2v}{3}$

(3) $\dfrac{v}{9}$ (4) $\dfrac{v}{18}$

23.

In the figure, electric lines of force associated with charges q_1 and q_2 as drawn by a student are shown.

Then ratio $\dfrac{q_1}{q_2}$ is

(1) $\dfrac{5}{6}$

(2) $-\dfrac{2}{3}$

(3) $-\dfrac{5}{3}$

(4) $\dfrac{4}{5}$

24. A square is placed horizontally and a point charge 'q' is kept at a height 'h' above one corner of the square as shown. The electric flux passing through the square is
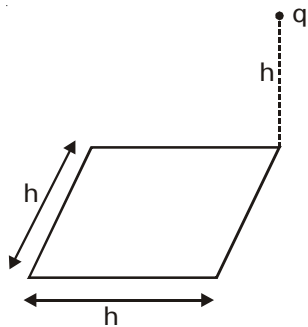
(1) $\dfrac{q}{\varepsilon_0}$
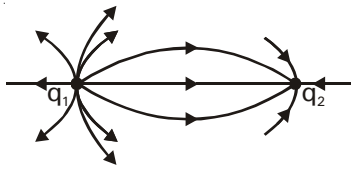
(2) $\dfrac{q}{48\varepsilon_0}$

(3) $\dfrac{q}{8\varepsilon_0}$

(4) $\dfrac{q}{24\varepsilon_0}$

25.
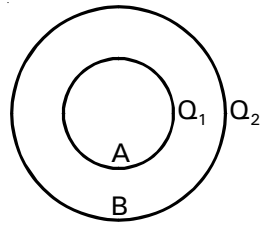
Figure shows two concentric conducting shells A and B carrying charges Q_1 and Q_2 respectively. The charge on outer surface of shell B is

(1) Q_2

(2) $Q_1 + Q_2$

(3) $Q_2 - Q_1$

(4) zero

26. Variation of magnetic induction B with distance r from a long hollow cylinderical conductor of radius R carrying current is shown as

(1)

(2)

(3)

(4)
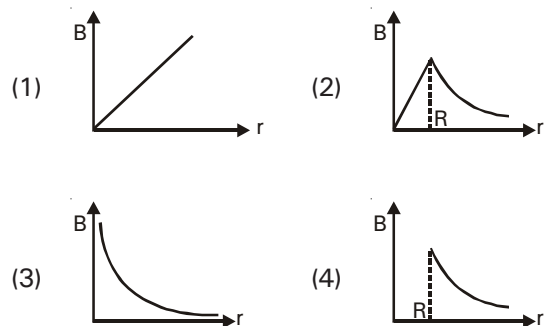
27. A cell has an e.m.f. of 1.5 volts, when short-circuited it gives a current of 3 amperes. The internal resistance of the cell is

(1) 4.5 Ω

(2) 2 Ω

(3) 0.5 Ω

(4) 4 Ω

28. The equivalent resistance between the terminal points A and B in the network shown in figure is
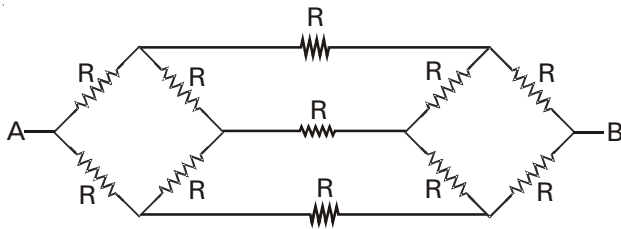
(1) $\dfrac{7R}{5}$ (2) $\dfrac{5R}{6}$

(3) $\dfrac{7R}{12}$ (4) $\dfrac{5R}{12}$

29.

In the above arrangement of two charges A and B, on the straight line joining them, electric field will be zero at a distance of
(1) 3.33 m from B towards its left
(2) 10 m from B towards its right
(3) 10 m from A towards its left
(4) 6 m from A towards its right

30. Two infinitely long, thin. insulated, straight wires lie in the x-y plane on x and y-axis respectively. Wires carry a current 'i' each respectively in the positive x-direction and positive y - direction. The magnetic field will be zero at points on the straight line
(1) $y = x$ (2) $y = -x$
(3) $y = x-1$ (4) $y = -x + 1$

31.

In the circuit shown in the figure $C = 6\,\mu F$. The charge stored in capacitor of capacity C is
(1) zero   (2) $90\,\mu C$

(3) $40\,\mu C$ (4) $60\,\mu C$

32.
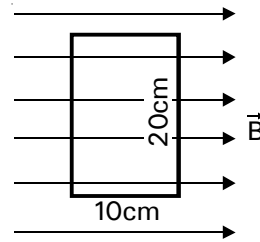
A rectangular coil placed in a uniform magnetic field of strength 2000 gauss has 100 turns and is carrying a current of 2 A. Torque acting on the coil in position shown is
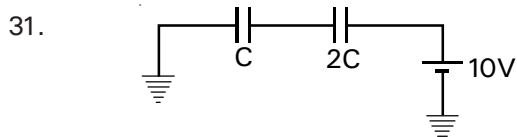(1) 0.6 Nm   (2) 0.8 Nm
(3) 1.6 Nm   (4) zero

33. Equipotential surfaces in a region are equidistant planes parallel to y-z plane. Field in region is
(1) uniform, perpendicular to x-axis
(2) uniform, perpendicular to y-axis
(3) non-uniform, parallel to y-axis
(4) uniform, parallel to x-axis

34. Around the loop shown, taking the direction of $\vec{dl}$ as that of the arrows, the value of $\oint \vec{B}.\vec{dl}$ will be
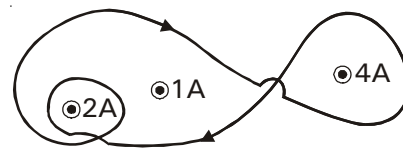
(1) μ_0 (2) $-\mu_0$
(3) $2\,\mu_0$ (4) $-2\,\mu_0$

35. In an experiment to measure the internal resistance of a cell by potentiometer, it is found that the balance point is at a length of 2m when the cell is shunted by a $5\,\Omega$ resistance; and is at a length of 3m when the cell is shunted by a $10\,\Omega$ resistance. The internal resistance of the cell is, then
(1) $1.5\,\Omega$ (2) $1\,\Omega$
(3) $15\,\Omega$ (4) $10\,\Omega$

PHYSICS : SECTION-B

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

36. Minimum number of capacitors of $2\,\mu F$ capacitance each required to obtain a capacitor of $5\,\mu F$ will be
   - (1) three
   - (2) five
   - (3) four
   - (4) six

37.
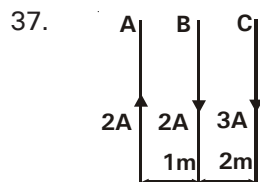
   Three long straight wires A, B and C are carrying currents as shown in the figure. The resultant force on B is
   - (1) $1.4 \times 10^{-6}\,N/m$
   - (2) $1.8 \times 10^{-6}\,N/m$
   - (3) $1.2 \times 10^{-6}\,N/m$
   - (4) $1 \times 10^{-6}\,N/m$

38. A cylinder cut along its axis as shown is placed in a uniform electric field E. The flux linked with curved surface of the cylinder is

   - (1) $-\,LrE$
   - (2) $2\,LrE$
   - (3) Zero
   - (4) πrLE

39. It is required to convert a galvanometer of current range 15 milli-ampere and resistance $50\,\Omega$ into a voltmeter of range 150 V. The necessary resistance in series is
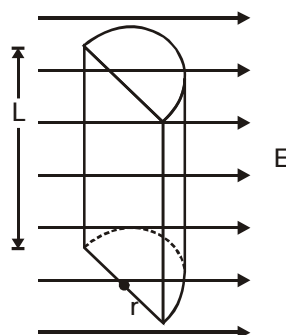   - (1) $995\,\Omega$
   - (2) $9950\,\Omega$
   - (3) $1/995\,\Omega$
   - (4) $1/9950\,\Omega$

40. A straight conductor having a length 4 m is carrying a current of 5 A. If it is placed in a magnetic field of strength 0.2 T such that the direction of current makes an angle of $37°$ with the direction of the field, the magnetic force acting on the conductor is
   - (1) 3 N
   - (2) 1 N
   - (3) 2 N
   - (4) 2.4 N

41. Two point charges Q and $-\,3Q$ are placed at some distance apart. If the electric field at the location of Q is E, then at the location of $-3Q$, electric field is
   - (1) $-E$
   - (2) $E/3$
   - (3) $-3E$
   - (4) $-E/3$

42. A parallel plate capacitor of capacitance C has charges q and $-q$ on its plates. If one of the plates is moved to double the distance between them, then work done by external force is
   - (1) $\dfrac{q^2}{C}$
   - (2) $\dfrac{q^2}{2C}$
   - (3) $\dfrac{q^2}{4C}$
   - (4) $\dfrac{2q^2}{C}$

43. Heat produced in $4\,\Omega$ resistor is 2 cal/sec. Heat produced in $5\,\Omega$ will be
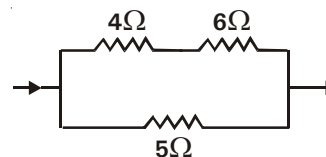
   - (1) 1 cal/sec
   - (2) 3 cal/sec
   - (3) 10 cal/sec
   - (4) 4 cal/sec

44. Two point charges, each with a charge of $-2\,\mu C$, lies some finite distance apart. At which point on the line joining the two charges, electric potential is zero (excluding at ∞)
   - (1) between the charges only
   - (2) on either side outside the system
   - (3) on perpendicular bisector of line joining charges
   - (4) no where

45. A bob of mass 'm' carrying charge 'q' is suspended in betweeen the plates of a parallel plate capacitor with $1m^2$ area of the plates and carrying charge 'Q' as shown. The angle made by the string with the vertical when bob is in equilibrium is

(1) $\tan^{-1}\left(\dfrac{Qq}{\varepsilon_0 mg}\right)$ (2) $\tan^{-1}\left(\dfrac{Qq}{2\varepsilon_0 mg}\right)$

(3) $\tan^{-1}\left(\dfrac{Qq}{\pi\varepsilon_0 mg}\right)$ (4) $\tan^{-1}\left(\dfrac{Qq}{4\pi\varepsilon_0 mg}\right)$

46. ABC is a right angled triangle in which $AB = 3$ cm and $BC = 4$ cm and $\angle ABC = \pi/2$. Three charges $+9$, $+10$ and $+32$ e.s.u. are placed respectively on A, B and C. The force acting on the charge at B is

(1) $10\sqrt{3}$ dyne   (2) $10\sqrt{5}$ dyne

(3) $10\sqrt{2}$ dyne   (4) 20 dyne

47.

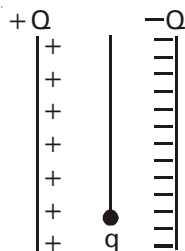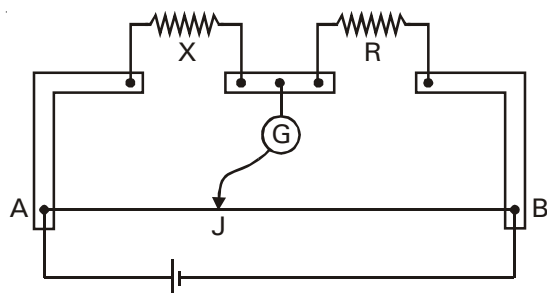The figure shows a meter-bridge circuit, $X = 12$ Ω and $R = 18$ Ω. The jockey J is at the null point. If R is made 8 Ω, through what distance will the jockey J have to be moved to obtain null point again?

(1) 10 cm   (2) 20 cm
(3) 30 cm   (4) 40 cm

48. **Assertion** : When a charged particle is released from rest in a region of electric field, its path will represent the electric field lines in the region.
Reason : The force experienced by the charged particle will be along a tangent drawn to the electric field line at a point .
(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
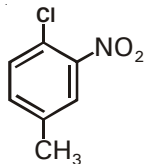
49. Electric potential at any point P(x, y, z) m in space is given by $V = 4x^2$ volt. The electric field at the point (1m, 0, 2m) in volt/metre is
(1) 8 along negative x-axis
(2) 8 along positive x-axis
(3) 16 along negative x-axis
(4) 16 along positive z-axis

50. There are 50 turns of a wire in every cm length of a long solenoid. If 4 ampere current is flowing in the solenoid, the approximate value of magnetic field along its axis at one end will be
(1) 6.3×10^{-3} Wb/m^2 (2) 25.1×10^{-3} Wb/m^2
(3) 12.6×10^{-3} Wb/m^2 (4) 12.6×10^{-5} Wb/m^2

CHEMISTRY : SECTION-A

All questions are compulsory in section A

51. Which of the following show resonance?
(1) $CH_2 = CH - CH_2^+$ (2) $CH_2 = C = CH_2$
(3) $CH_2 = CH - CH_2^-$ (4) Both (1) and (3)

52. During the chlorination of n-pentane, the ratio in which 1-chloropentane, 2-chloropentane & 3-chloropentane formed is
(1) 6 : 1 : 1   (2) 3 : 2 : 1
(3) 9 : 4 : 1   (4) 6 : 15.2 : 7.6

53. Most stable conformation of ethylene glycol
(1) Eclipsed form
(2) Staggered form
(3) Gauche form
(4) partially eclipsed form

54. The preparation of ethane by electrolysis of aqueous solution of potassium acetate is called as
    (1) Wurtz reaction
    (2) Sabatier-Senderen's reaction
    (3) Kolbe's synthesis
    (4) Grignard reaction

55. Which of the following is a method of preparation of chlorobenzene ?
    (1) Dow's process
    (2) Raschig process
    (3) Borodine-hunsdiecker
    (4) Finkelstein

56. The reactivity order of halides for dehydrohalogenation is
    (1) R–F > R–Cl > R–Br > R–I
    (2) R–I > R–Br > R–Cl > R–F
    (3) R–I > R–Cl > R–Br > R–F
    (4) R–F > R–I > R–Br > R–Cl

57. **Assertion** : Partition chromatography is based on continuous differential partitioning of components of a mixture between stationary and mobile phase.
    Reason : Thin layer chromatography is type of partition chromatography.
    (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

58. Kjeldahl's method can not be used in case of
    (1) $C_6H_5N_2{}^+Cl^-$ (2) CH_3NH_2
    (3) CH_3CONH_2 (4) CH_3CN

59. Identify the correct statement(s) about geometrical isomers?
    (1) cis form of alkene is found to be more polar than trans form
    (2) In case of solids, trans form has higher melting point than the cis form
    (3) Geometrical isomerism is also shown by alkenes of the types $XYC = CXZ$ and $XYC = CZW$
    (4) All are correct

60. Most reactive alkyl halide towards E_2 mechanism is
    (1) $(CH_3)_3C–CH_2Br$
    (2) $CH_3CH_2CHBrCH_3$
    (3) $CH_3CH_2–CH_2CH_2Br$
    (4) $(CH_3)_3C – CH – CH_2Br$
            $|$
            $CHCH_3$

61. An optically active compound is
    (1) 1-Bromobutane
    (2) 1-Bromopropane
    (3) 2-Bromo-2-methylpropane
    (4) 1-Bromo-2-methylbutane

62. An optically active 3-Bromo-3-methyl hexane on hydrolysis with H_2O gives
    (1) 3-methyl-3-hexanol with retention of configuration
    (2) 3-methyl-3-hexanol with inversion of configuration
    (3) An optically inactive mixture of 3-methyl-3-hexanol
    (4) Optically inactive 3-methyl-3-hexene.

63. Arrange the following according to their stability

    I. $CH_2 = CH — \overset{\bullet}{C}H_2$

    II. $CH_3 — CH_2 — \overset{\bullet}{C}H_2$

    III. $CH_3 — \overset{\bullet}{C}H_2$

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

64. The IUPAC name for

    (1) 1-Chloro-2-nitro-4-methylbenzene
    (2) 1-Chloro-4-methyl-2-nitrobenzene
    (3) 2-Chloro-1-nitro-5-mehylbenzene
    (4) m-nitro-p-chlorotoluene

65. A and B were heated with KOH followed by treatment with $AgNO_3$. A gives white ppt and B does not. A and B can be
   (1) $C_6H_5CH_2Cl$ and C_6H_5Cl
   (2) CH_3I and C_6H_5I
   (3) $CH_2=CH-CH_2-Cl$ and $CH_2=CH-Cl$
   (4) both 1 & 3

66. In its reaction with $AgNO_3$, $H-C\equiv CH$ shows
   (1) Oxidising property (2) Reducing property
   (3) Basic property (4) Acidic property

67. Alkynes can show _____ reaction(s).
   (1) nucleophilic addition
   (2) electrophilic addition
   (3) electrophilic substitution
   (4) Both (1) &(2)

68. An alkene upon ozonolysis yields $CHO-CH_2-CH_2-CH_2-CHO$ only. The alkene is
   (1) $CH_2=CH-CH_2-CH_2-CH_2-CH_2-CH_3$
   (2)
   (3)
   (4)

69. Which of the following compounds contains maximum number of tertiary hydrogen atoms?
   (1) n-Hexane
   (2) 2,2-Dimethyl butane
   (3) 2, 3-Dimethyl butane
   (4) 2-Methyl pentane

70. $\xrightarrow{Br_2, Fe}$ A (major product). A is

   (1) (2)

   (3) (4)
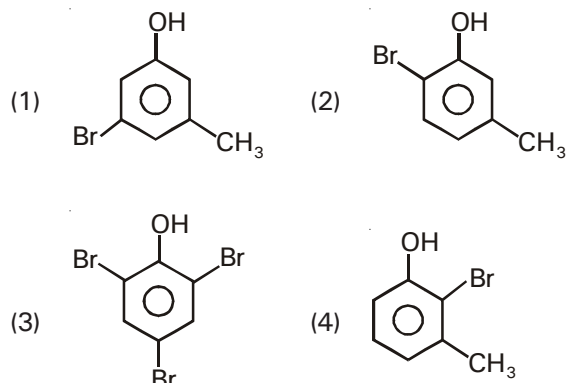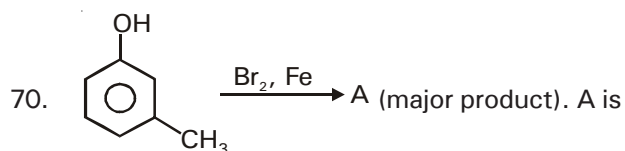
71. **Statement-I** : Electrophilic addition on alkene is faster than that of alkynes..
   Statement-II : Alkyl carbocation given by alkenes is more stable than vinylic carbocation obtained from alkynes.
   (1) Both statement-I and statement-II are correct
   (2) Both statement-I and statement-II are incorrect
   (3) Statement-I is correct but statement-II is incorrect
   (4) Statement-I is incorrect but statement-II is correct

72. Which of the following set represents nucleophiles only?
   (1) HS^-, $C_2H_5O^-$, $(CH_3)_3N$
   (2) HS^-, $C_2H_5O^-$, $\overset{\oplus}{N}O_2$
   (3) BF_3, Cl^+, $\overset{\oplus}{N}O_2$
   (4) $C_2H_5O^-$, $CH_3-\overset{\oplus}{C}=O$, $H_2\overset{\ominus}{N}$

73. Identify the major product in the following reaction

$$CH_3-\underset{\underset{CH_3}{|}}{CH}-CH=CH_2 \xrightarrow[\text{Peroxide}]{\text{HCl}}$$
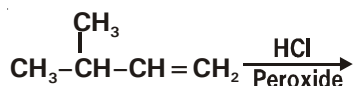
(1) 2-chloro-2-methylbutane
(2) 2-chloro-3-methylbutane
(3) 3-chloro-3-methylbutane
(4) 1-chloro-3-methylbutane

74. When ethyl chloride is treated with alcoholic KNO_2 we get
(1) $C_2H_5NO_2$ only
(2) C_2H_5ONO only
(3) A major amount of $C_2H_5NO_2$ and a minor amount of C_2H_5ONO
(4) A major amont of C_2H_5ONO and a minor amount of $C_2H_5NO_2$

75. A free radical is a chemical species which is
(1) electron rich but neutral
(2) electron rich but negatively charged
(3) electron deficient but neutral
(4) electron deficient and positively charged

76. Which one of the following will give blue colouration with Lassaigne's extract on addition of $FeCl_3$?
(1) NH_2CONH_2 (2) HCOOH
(3) NH_2NH_2 (4) CH_3SH
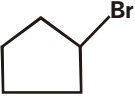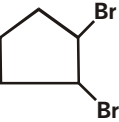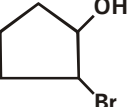
77. A solution (miscible) of benzene and $CHCl_3$ can be separated by
(1) Sublimation   (2) Filtration
(3) Distillation   (4) Crystallisation

78. The product (Y) in the reaction

is
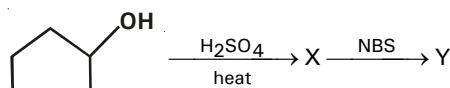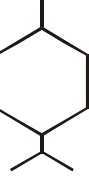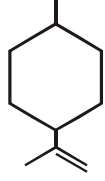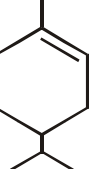
79. The most stable carbanion is

(1) $\overset{\ominus}{C}H_2-CHO$

(2) $CH_3-\underset{\underset{O}{||}}{C}-\overset{\ominus}{C}H-\underset{\underset{O}{||}}{C}-CH_3$

(3) $CH_3-\overset{\overset{O}{||}}{C}-\overset{\ominus}{C}H-\overset{\overset{O}{||}}{C}-OCH_3$
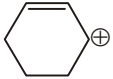
(4) $C_6H_5-\overset{\overset{O}{||}}{C}-\overset{\ominus}{C}H-\underset{\underset{O}{||}}{C}-CH_3$

80. Which of the following statement is correct?
(1) Benzene cannot undergo electrophilic substitution reaction
(2) Friedal Crafts acylation involves rearrangement of acyl carbocation
(3) Polyalkylation can occur in friedal crafts alkylation
(4) Benzene shows nucleophilic substitution reaction

81.
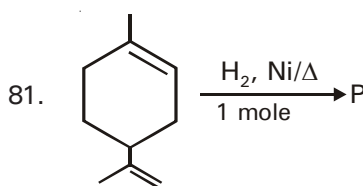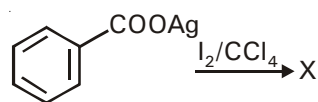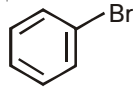
(1)   (2)

(3)   (4) no reaction

82. Which of the following gives alkane on hydrolysis?
    i.   Magnesium carbide ii.   Calcium carbide
    iii. Aluminium carbide   iv.   Beryllium carbide
    Correct option is
    (1) i, ii, iv   (2) iii, iv
    (3) ii, iii   (4) i, iv

83. Which carbocation is least likely to be formed as intermediate?

    (1) $(C_6H_5)_3 \overset{+}{C}$ (2)

    (3)   (4) $CH_3 - \overset{+}{C}H_2$

84. Which of the following statements is false?
    (1) Synthetic halogen compounds, *viz.* chloroquine is used for the treatment of malaria
    (2) halothane is used as an anaesthetic during surgery
    (3) Certain fully Brominated compounds are being considered as potential blood substitutes in surgery
    (4) Chlorine containing antibiotic, *chloramphenicol,* is very effective for the treatment of typhoid fever

85. If a chloroform bottle is kept open, the sample becomes poisonous due to presence of
    (1) CH_4 (2) $COCl_2$
    (3) CCl_4 (4) CO_2

CHEMISTRY : SECTION-B

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

86. Which of the following compound undergoes SN_1 reaction readily?
    (1) Chlorobenzene   (2) Benzylchloride
    (3) Vinylchloride   (4) Methylchloride

87. 0.25 gram of an organic compound gave 30 mL of moist dinitrogen at 288 K and 745 mm pressure. Calculate the percentage of nitrogen (aqueous tension at 288 K = 12.7 mm)
    (1) 43.7%   (2) 24.8%
    (3) 13.6%   (4) 94.1%

88. $\xrightarrow{I_2/CCl_4}$ X

    'X' is

    (1)

    (2) $C_6H_5 - \overset{\overset{\displaystyle O}{||}}{C} - C_6H_5$

    (3) $C_6H_5 - \overset{\overset{\displaystyle O}{||}}{C} - OC_6H_5$

    (4) $C_6H_5 - CH_2 - O - \overset{\overset{\displaystyle O}{||}}{C} - C_6H_5$

89. **Statement-I** : Enol form of cyclohexane-1,3,5-trione is more stable than its keto form.
    Statement-II : The enolic form is always more stable than the keto form in keto-enol tautomerism.
    (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

90. $CH_4(g) + O_2(g) \xrightarrow{\;x\;} HCHO$
    $CH_4(g) + O_2(g) \xrightarrow{\;y\;} CH_3OH$
    x & y respectively are
    (1) Cu/523 K / 100 atm ; Mo_2O_3
    (2) Ca/523 / 100 atm ; I_2O_3
    (3) Mo_2O_3; Cu/523 K / 100 atm
    (4) $KMnO_4$; Na/dry ether

91. $\overset{3}{Cl_3}\overset{2}{C}-\overset{}{CH}=\overset{1}{CH_2}$ $\overset{3}{H_3}\overset{2}{C}-\overset{}{CH}=\overset{1}{CH_2}$
    (I)   (II)
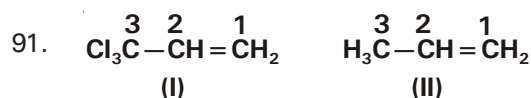
    In addition of HOBr to (I) and (II)
    (1) Br is at C_2 in both cases
    (2) Br is at C_2 in II and at C_1 in I
    (3) Br is at C_1 in II and C_2 in I
    (4) Br is at C_1 in both cases

92. **Assertion** : Carbon -halogen bond length increases from C–F to C–I.
    Reason : Electronegativity of halogen is in the order F > Cl > Br > I.
    (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

93. The least stable carbonium ion is

    (1)
    $\overset{+}{CH_2}$ on benzene ring

    (2)
    $\overset{+}{CH_2}$ on benzene ring with OH

    (3)
    $\overset{+}{CH_2}$ on benzene ring with NO_2

    (4)
    $\overset{+}{CH_2}$ on benzene ring with OH
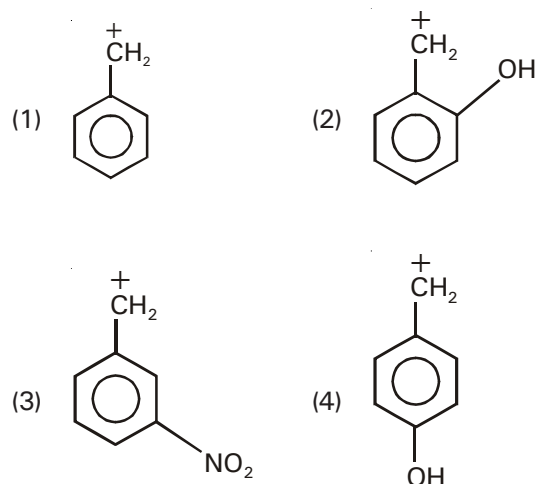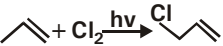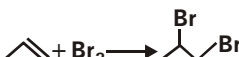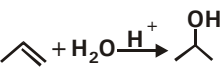
94. Flouroethane is best prepared by
    (1) $C_2H_5OH \xrightarrow[\Delta]{HF/SbF_5}$
    (2) $C_2H_5OH \xrightarrow[\Delta]{HF/H_2SO_4}$
    (3) $C_2H_5Cl \xrightarrow{Hg_2F_2, \Delta}$
    (4) $CH_3-CH_3 \xrightarrow{F_2, hv}$

95. Match the following

Column-I	Column-II
a. $\diagup\diagup + Cl_2 \xrightarrow{hv} \overset{Cl}{\diagup\diagup}$	p. cyclic transition state
b. $\diagup\diagup + Br_2 \longrightarrow \overset{Br}{\diagdown}\diagdown Br$	q. carbocation
c. $\diagup\diagup + H_2O \xrightarrow{H^+} \overset{OH}{\diagdown}$	r. free radicals
d. $\overset{Br}{\diagdown\diagup} \xrightarrow{alc. KOH} \diagdown\diagup$	s. rearrangement

    (1) a–r, b–p, c–q, d–q,s
    (2) a–r, b–p,q, c–s, d–q
    (3) a–r,s, b–q, c–s,p, d–q
    (4) a–p, b–q, c–r, d–s

96. Consider the following reaction

    [structure of cyclohexane with Br, H, CH₃ substituents]

    $+ KOH \xrightarrow[S_{N^2}]{H_2O}$

    (1R, 3S) Cis-Bromo-3-methylcyclohexane
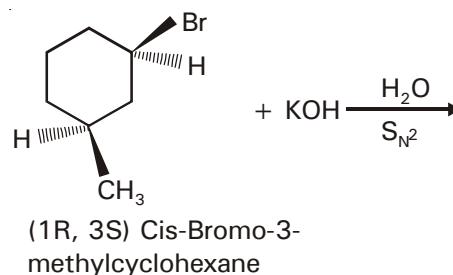
    The product formed in the above reaction is
    (1) (1R, 3S)– Cis – 3 – methylcyclohexanol
    (2) (1S, 3R)– Cis – 3 – methylcyclohexanol
    (3) (1S, 3S)– Trans – 3 – methylcyclohexanol
    (4) (1R, 3R)– Trans – 3 – methylcyclohexanol

97. Alkene $\xrightarrow[\Delta]{\text{hot KMnO}_4}$ [structure: CH₃-CO-CH₂... + HOOC...]

Alkene is

(1) [structure] (2) [structure]

(3) [structure] (4) [structure]
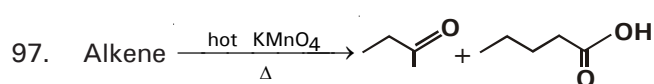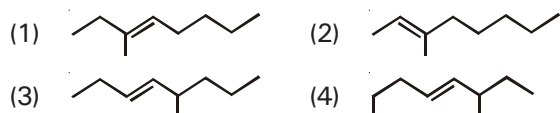
98. Which one of the following has a lone pair as part of aromatic cloud.

a. [pyrrole structure N—H] b. [pyridine structure N]

c. [furan structure O] d. [phenol structure OH]
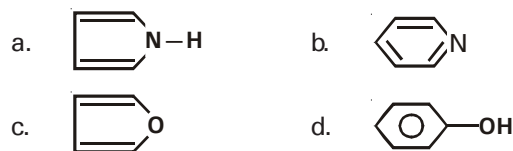
(1) a,c,d (2) b,c,d
(3) a,b,c (4) a and c only

99. Which of the following statements is incorrect?
(1) Ethyl benzene is more activated than methyl benzene towards the attack of electrophile
(2) But-2-ene is more stable than ethene
(3) Buta-1,3-diene is a conjugated compound
(4) But-2-ene can show geometrical isomerism

100. Which of the following compound is isomeric with methyl vinyl ether?
(1) propanal (2) propan-1-ol
(3) ethylmethyl ether (4) dimethyl ether

ZOOLOGY : SECTION-A

All questions are compulsory in section A

101. What is not true for placenta?
(1) Facilitates exchange of O_2, nutrients, CO_2 and wastes
(2) Act as a temporary endocrine gland
(3) Carries 100% foetal blood
(4) Is connected to embryo through umbilical cord

102. During oogenesis, what is the correct chronological sequence of appearance of structures in the ovarian follicles given below
a. theca
b. antrum
c. granulosa cells
d. polar body
(1) a–b–c–d (2) a–c–b–d
(3) c–b–d–a (4) c–a–b–d

103. Leaves of plant X and stems of plant Y gets modified into thread like structures helping X and Y to climb. Thread like structures of X and Y are
(1) Analogous (2) Homologous
(3) Connecting links (4) Vestigeal

104. Which of the following statement can considered wrong w.r.t evolution ?
(1) Evolution by natural selection started when cellular forms with similiar metabolic capabilities arose
(2) Evolution is not a directed process in sense of delerminism
(3) Change of frequency of alleles in a population can result in evolution
(4) Study of comparative anatomy as well as fossils provide evidence for evolution

105. Which step was taken up by Government of India to reduce illegal abortions and consequent maternal mortality and morbidity?
(1) Medical termination of pregnancy amendment act, 2015
(2) Legalising abortions
(3) MTP (Amendment)ACT, 2017
(4) Effective counselling after abortions

106. Which of the following statements is correct regarding fossils?
(1) Fossils are soft parts of life-forms found in rocks
(2) Different aged rock sediments contain all fossils of same life forms
(3) Certain life forms are restricted to certain geological time-spans
(4) All new forms of life have arisen at same times in history of earth

107. **Statement-I** : About 15 mya, primates called *Dryopithecus* and *Ramapithecus* were existing.
Statement-II : The most successful story is the evolution of man with language skills and self-consciousness.
(1) Both statements I & II are correct
(2) Both statements I & II are incorrect
(3) Statements I is correct but statement II is incorrect
(4) Statements I is incorrect but statement II is correct

108. How many structures / parts associated with the male reproductive system are paired?
Vas deferens, ejaculatory duct, prostate gland, seminal vesicles, fallopian tubes, bulbourethral gland, penis
(1) 2 (2) 3
(3) 4 (4) 6

109. Which of the following is an example of evolution by anthropogenic action?

    a.   Herbicide resistance & pesticide resistance

    b.   Adaptive radiation of Darwin finches

    c.   Drug resistant varieties

    d.   Industrial melanism

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

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

110. Which of the following statements are true for IUD's ?

    (1) One of the most widely accepted methods of contraceptive in India.

    (2) Progestasert is a type of IUD that makes uterus unsuitable for implantation

    (3) Cu7, CuT are types of non-medicated IUD

    (4) Both (1) & (2)

111. Which among the following is a correct match

	Source	Hormones	Exception
(1)	Placenta	hCG, hPL, progesterone, estrogen, oxytocin	Oxytocin estrogen
(2)	Ovary	Estrogen, progesterone, relaxin	Progesterone
(3)	Pregnant female	Cortisol, thyroxine, prolactin secretions more	Cortisol
(4)	Corpus luteum	Progesterone, estrogen, oxytocin	Oxytocin

112. Identify the contraceptive on the basis of given figure
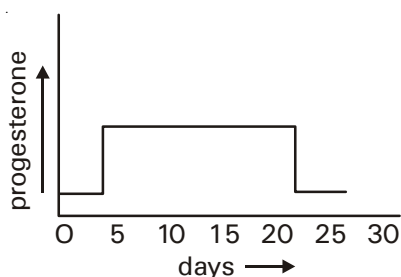
    (1) Saheli   (2) Progestasert

    (3) Oral pills   (4) Implants

113. Find the incorrect statement

    (1) Evolutionary biology is the study of history of life forms on earth

    (2) When we look at stars on a clear night sky we are looking back in time

    (3) Stellar distances are measured in light years

    (4) The universe is very old–almost 5-7 billion years old

114. **Assertion** : Convergent evolution is based on analogy.

    Reason : Different structures evolving for the different function in similar environment are analogous.

    (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

115. Identify two correctly labelled parts
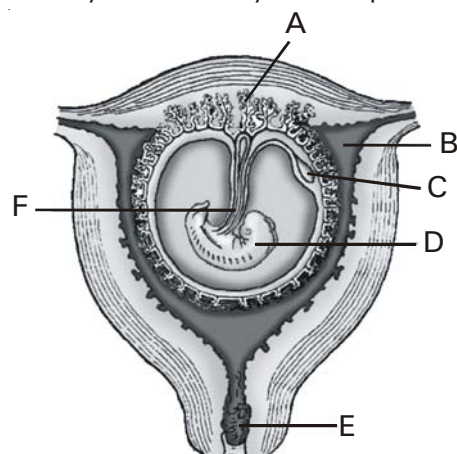
    (1) A –Villi, B– Amniotic cavity

    (2) F–Umbilical cord, E–Cervical plug

    (3) C–Chorion, D–Embryo

    (4) All of these

116. In the female external genitalia, there is a cushion of fatty tissue covered by skin and pubic hair, known as

    (1) Labia majora   (2) Labia minora

    (3) Mons pubis   (4) Hymen

117. The process of childbirth is induced by a complex neuro endocrine mechanism that involves all except

    (1) Cortisol   (2) Estrogen

    (3) Oxytocin   (4) Prolactin

118. Which of the following is incorrectly matched?

    (1) Wombat and Bobcat–Adaptive radiation

    (2) Pteranodon– flying extinct reptile

    (3) Darwin finches–Divergent evolution

    (4) None of these

119. In which phase of menstrual cycle endometrium regenerates through proliferation

    (1) Luteal phase   (2) Secretory phase

    (3) Follicular phase (4) Menstrual phase

120. Which of the following group contain hormone based contraceptive measures?

    (1) Progestasert, Cervical caps, Foams, Condoms

    (2) LNG-20, Implant, Pills, Injections

    (3) Cu7, Multiload 375, LNG-20, pills

    (4) Injections, Implants, Lippes Loop, Progestasert

121. In family tree of reptiles, A and B are respectively

Crocodilian   *Archeopteryx*
Pteranodon   *Tyrannosaurus*
A   B
Stegosaurus
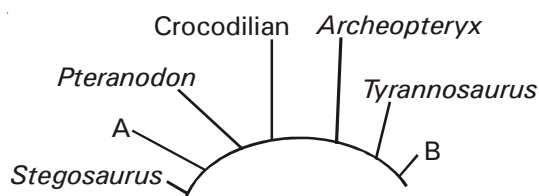
  (1) *Brachiosaurus, Icthyophis*
  (2) *Triceratops, Icthyosaurus*
  (3) *Triceratops, Brachiosaurus*
  (4) *Brachiosaurus, Icthyosaurus*

122. The contraceptive 'SAHELI'
  (1) blocks estrogen receptors in the uterus, preventing eggs from getting implanted
  (2) increases the concentration of estrogen and prevents ovulation in females
  (3) is a post-coital contraceptive.
  (4) is an IUD

123. Match the ARTs with their description
  i.   Collected gametes are made to form zygote in the lab   a. ZIFT
  ii. Transfer of ovum from donor to the oviduct of the recipient   b. GIFT
  iii. Sperm is injected into the ovum in vitro.   c. ICSI
         d. AI
         e. IVF
  (1) i–e, ii–c, iii–d   (2) i–e, ii–d, iii–b
  (3) i–b, ii–a, iii–d   (4) i–e, ii–b, iii–c

124. Fallopian tubes are lined by
  (1) ciliated epithelium
  (2) transitional epithelium
  (3) squamous epithelium
  (4) keratinised epithelium

125. The correct surgical procedure as a contraceptive method is
  (1) Ovariectomy   (2) Hysterectomy
  (3) Vasectomy   (4) Castration

126. Ideal contraceptive should have all feature except
  (1) effective   (2) userfriendly
  (3) least side effect   (4) Irreversible

127. What would be the number of gametes produced respectively from 20 primary oocytes, 10 secondary spermatocytes, 5 spermatids and 5 secondary oocytes?
  (1) 40, 20, 5 & 10   (2) 20, 10, 5 & 5
  (3) 20, 20, 5 & 5   (4) 40, 20, 10 & 5

128. Correct procedure for test tube baby program for implantation to be done in more than 8 cell stage
  (1) IVF & IUI   (2) IVF & ZIFT
  (3) IVF & GIFT   (4) IVF & IUT

129. A population will not exist in Hardy-Weinberg equilibrium if:
  (1) the population is large
  (2) individuals mate selectively
  (3) there are no mutations
  (4) there is no migration

130. Identify the correct match of hormone & its target
  a. oxytocin–myometrium
  b. progesterone – endometrium
  c. estrogen – external genitalia
  (1) a, b & c   (2) a & b only
  (3) b & c only   (4) only a

131. Identify the correct match
  (1) Perimetrium   –   exhibit strong uterine contractions of penis
  (2) Bulbourethral gland – surrounds vagenal opening
  (3) Hymen   –   secondary ovarian follicle
  (4) Antrum   –   Tertiary ovarian follicle

132. Which of the following is an incorrect match
  (1) Multiload 375–Copper ions suppress motility and fertilising capacity of sperm
  (2) LNG–20–Makes uterus unsuitable for implantation and cervix hostile for sperms
  (3) Oral pills–inhibit ovulation and implantation
  (4) Periodic abstinence–blocks gamete transport and prevents conception

133. A colony of bacteria growing on a given medium has built in variation in terms of ability to utilise a feed component. A change in medium composition would
  (1) eliminate the complete bacterial colony
  (2) bring out only that part of population that can survive under this conditions
  (3) cause the formation of spores in bacterial colony
  (4) have no effect at all on the bacterial colony

134. For the following diagram, what is correct ?
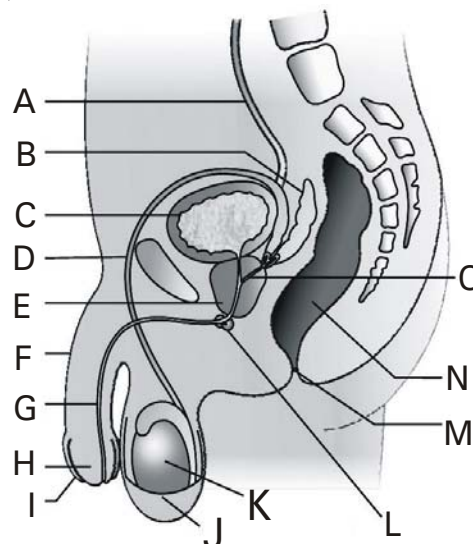
  (1) B & L are paired accesory ducts
  (2) Sperms are transported by A
  (3) D carries fructose and calcium
  (4) H is enlarged part of penis

135. Which of the following are effects of increased level of estrogen in follicular phase of the menstrual cycle?

(1) Formation of corpus luteum
(2) Thickening of cervical mucus
(3) Thinning of cervical mucus
(4) Thinning of endometrium

ZOOLOGY : SECTION-B

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

136. Pick the odd one out

(1) Java ape man – *Homo erectus*
(2) Cromagnon man – *Homo fossilis*
(3) Neanderthal man – *Australopithecus*
(4) Modern man – *Homo sapiens*

137. **Assertion** : Cyclic menstruation is an indicator of normal reproductive phase & extends between menarche and menopause

Reason : In human beings, menstrual cycles ceases around 50 years of age that is termed as menopause.

(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

138. Identify the parts of the structure a, b & c and the structure 'd' respectively
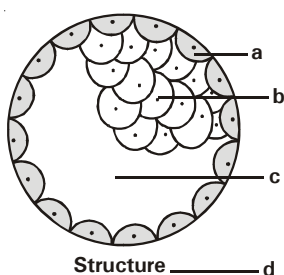
(1) Inner cell mass, Blastocoel, Trophoblast, Blastocyst
(2) Trophoblast, Inner cell mass, Blastocoel, Blastocyst
(3) Blastocyst, Inner cell mass, Blastocoel, Trophoblast
(4) Blastocoel, Blastocyst, Trophoblast, Inner cell mass

139. **Statement-I** : Nature selects for fitness which is based on characteristics that are inherited
Statement-II : Ability to adapt is end result of fitness & has no genetic basis

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

140. The process in which blastocyst gets embedded in the endometrium of uterus is called

(1) Transplantation
(2) Implantation
(3) Blastutation
(4) Both 2 & 3

141. What can be inferred from given data related to evolution of man ?

(i) Lived in east african grasslands
(ii) hunted with stone weapons but ate fruit
(iii) existed 2 mya

(1) *Homo erectus*
(2) *Australopithecus*
(3) *Homo habilis*
(4) *Ramapithecus*

142. Match the terms in column I correctly with those in column II

Column I		Column II
a. Menstrual phase	p.	Corpus luteum
b. Luteal phase	q.	Mature ovarian follicle
c. Proliferative phase	r.	Regressing corpus luteum

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

143. Hormones produced by the pregnant woman help in

a. supporting foetal growth
b. determining sex of the baby
c. supporting metabolic changes in the mother
d. maintaining pregnancy

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

144. Androgens and androgens binding proteins are produced by

(1) Sertoli cells
(2) Leydig cells
(3) Leydig and sertoli cells respectively
(4) Sertoli cells and leydig cells respectively

145. In how many of the following techniques associated with ART, does fertilization occur in the fallopian tube ?
ICSI, IUI, Test-tube baby, GIFT

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

146. If gene migration happens multiple times; it is said to be _____.

(1) genetic drift
(2) Founder effect
(3) Gene flow
(4) Genetic equilibrium

147. Which of the following is different from others?
    (1) Flippers of penguins and dolphins
    (2) Sweet potato and potato tubers
    (3) Eye of octopus and mammals
    (4) Thorn of Bougainvillea and Tendrils of Cucurbita

148. The following structure is used to prevent conception by

    (1) avoiding physical meeting of gametes
    (2) avoiding chances of meeting of gametes
    (3) blocking transport of gametes
    (4) inhibiting gamete production

149. Identify the incorrect statement
    (1) Latimeria is connecting link between fishes and amphibians
    (2) Some land reptiles evolved into fish like reptiles arround 200 mya were *Tyrannosaurus*
    (3) Jawless fish evolved about 350 mya
    (4) None of these

150. Which of the following is a correct match?
    (1) Miller's experimental flask–CH_4, NH_3, H_2 and H_2O vapours at $1800°C$
    (2) De Vries mutation –Random, directionless, minor
    (3) Australian marsupials–examples of homology, adaptive radiation and natural selection
   (4) All of the above

BOTANY : SECTION-A

All questions are compulsory in section A

151. Who has drawn parallelism between behaviour of chromosomes and genes?
    (1) Sutton & Boveri   (2) Sutton & Bateson
    (3) Sutton & Mendel   (4) Bateson & Boveri

152. Select the correct option w.r.t. replication
    (1) Bacterial and viral DNA has many origins of replication
    (2) New strands of DNA are formed in 3' - 5' direction
    (3) Replication of DNA is semi-discontinuous and semi-conservative
    (4) DNA polymerase-I shows exonuclease activity only

153. The concept of central dogma was given by
    (1) Temin   (2) Baltimore
    (3) Crick   (4) Watson

154. Which is incorrect w.r.t. eukaryotic translation?
    (1) Initiator tRNA is $tRNA_i^{met}$
    (2) hnRNA is translated
    (3) Translation begins after hnRNA processing
    (4) It occurs over 80S ribosome

155. **Statement-I** : Methodologies used in HGP were expressed sequence tags and sequence annotation.
    Statement-II : HGP was a mega project which took 13 years.
    (1) Both statement-I and statement-II are correct
    (2) Both statement-I and statement-II are incorrect
    (3) Statement-I is correct but statement-II is incorrect
    (4) Statement-I is incorrect but statement-II is correct

156. The haploid content of human DNA is
    (1) 5386 nucleotides   (2) 48502 bp
    (3) 4.6×10^6 bp   (4) 3.3×10^9 bp

157. How many different phenotypes and genotypes (respectively) are obtained in F_2 generation of dihybrid test cross?
    (1) 4, 9   (2) 4, 4
    (3) 2, 2   (4) 2, 3

158. _____ is a graphical representation to calculate the probability of all possible genotypes of offsprings in a genetic cross.
    (1) Reciprocal cross   (2) Punnett square
    (3) Test cross   (4) Tetrad analysis

159. Based upon dihybrid crosses, Mendel proposed a second set of generalisation that is called
    (1) law of independent assortment
    (2) law of dominance
    (3) law of segregation
    (4) law of purity of gametes

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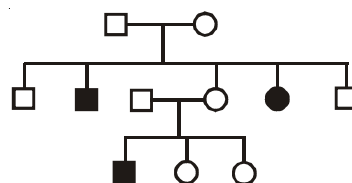
    What does it show ?
    (1) Inheritance of a condition like phenylketonuria as an autosomal recessive trait
    (2) Pedigree is wrong as this is not possible
    (3) Inheritance of a recessive sex linked disease like haemophilia
    (4) Inheritance of sex-linked inborn error of metabolism like phenylketonuria

161. How many plants in F_2 generation of a dihybrid test cross have both dominant traits?
    (1) 3/16   (2) 1/16
    (3) 1/4   (4) 9/16

162. How many of the following statements are incorrect?
   a. Emasculation is not required in plants which have unisexual flowers
   b. Variation is the degree by which progeny differ from their parents
   c. Reciprocal crosses are performed to know the effect of sex on transmission of a particular character
   d. Sickle cell anaemia is good example of incomplete dominance
   (1) 4   (2) 3
   (3) 2   (4) 1

163. If the frequency of two alleles 'A' and 'a' in a gene pool is 90% and 10% respectively, what is the frequency of individuals in the population with the genotype Aa?
   (1) 0.81   (2) 0.09
   (3) 0.18   (4) 0.01

164. The tRNA anticodon 3'–CUA–5' will pair with the mRNA codon
   (1) 3'–CUA–5' (2) 5'–CUA–3'
   (3) 5'–GAU–3' (4) 5'–UAG–3'

165. Post transcriptional processes in eukaryotes like splicing, capping and tailing occurs in the
   (1) nucleus   (2) cytosol
   (3) mitochondria (4) ribosome

166. Which of the following type of gene mutation forms the genetic basis of proof that codon is triplet and it is read in a continuous manner?
   (1) Inversion
   (2) Transition
   (3) Transversion
   (4) Frameshift mutation

167. Match the following wrt Allosomes
   a. *Drosophilla*   (i)   Haplo-diploid
   b. Fowl   (ii) XX-XO
   c. Grasshopper   (iii) XX-XY
   d. Honey bee   (iv) ZZ-ZW
   (1) a–(iv); b–(iii); c–(ii); d–(i)
   (2) a–(ii); b–(i); c–(iii); d–(iv)
   (3) a–(iii); b–(iv); c–(ii); d–(i)
   (4) a–(i); b–(iv); c–(iii); d–(ii)

168. Which of the following is a recessive trait in pea?
   (1) Yellow seed colour (2) Yellow pod colour
   (3) Axillary flower   (4) Rounded pod

169. If *E. coli* with heavier nitrogen ^{15}N in both DNA strands is allowed to grow on normal nutrient medium for 80 minutes, then proportion of light and hybrid density DNA molecules will be
   a. 50% light and 50% hybrid density
   b. one hybrid and 15 DNA molecules lighter
   c. two hybrid and 14 DNA molecules lighter
   d. 12.5% hybrid and 87.5% molecules lighter
   (1) a, c, d   (2) b, d
   (3) c, d   (4) a, b

170. Select the incorrect statement w .r.t. HGP
   (1) involved BAC and YAC
   (2) sequence of chromosome-1 was completed in May 2006
   (3) completed in year 2000
   (4) used high speed computational devices

171. When yellow-bodied, white eyed females are hybridised to brown bodied, red-eyed males and their F_1 progeny is intercrossed, then
   (1) parental types are 98.7 %
   (2) recombinant types are 37.2 %
   (3) F_2 ratio deviates very significantly from the 9:3:3:1 ratio
   (4) Both (1) and (3)

172. What gave greater credibility to the data that Mendel collected?
   (1) The selection of pea plant
   (2) Large sampling size
   (3) Applying mathematical logic in sloving problems in biology
   (4) Applying statistical analysis

173. How many type of substitutions are possible in a codon of mRNA?
   (1) Two   (2) Nine
   (3) Six   (4) Three

174. Which of the following statements are true for sickle-cell anemia?
   a. It is autosomal recessive disease
   b. Qualitative blood disease
   c. Shows incomplete dominance
   d. Mendelian disorder
   e. Quantitative blood disease
   f. Heterozygote show resistance to malaria
   (1) a, b, c, d, f   (2) a, c, d, e, f
   (3) a, b, d, f   (4) a, d, e, f

175. In a DNA strand, nucleotides are linked together by
   (1) glycosidic bonds
   (2) phosphodiester bonds
   (3) peptide bonds
   (4) hydrogen bonds

176. What is the probability of having a child with phenyl ketonuria if both parents are carriers for the same?
   (1) 0%   (2) 50%
   (3) 25%   (4) 33%

177. Which of the following statement is not true ?
   (1) Skin colour is an example of polygenic inheritance
   (2) Multiple alleles are studied at population level
   (3) ABO blood group is a n example of multiple allelism
   (4) Starch synthesis in pea is controlled by more than one gene

178. If the sequence of nucleotides in mRNA is known, the sequence of amino acids can be predicted, but if the sequence of amino acids is known, the exact sequence of nucleotides in its mRNA cannot be predicted. It is because the genetic code is
    (1) ambiguous   (2) degenerate
    (3) specific   (4) triplet

179. Two sets of parents are claiming the same baby. The blood group of the baby is O. On testing the blood group of the two sets of parents the following information is obtained

	Set I	Set II
Father	A	AB
Mother	B	O

    The child belongs to which set of parents?
    (1) set I
    (2) set II
    (3) could be either set I or set II
    (4) data insufficient

180. Which of the following monomer can act as substrate in DNA replication?
    (1) Uridine monophosphate
    (2) Deoxycytidine triphosphate
    (3) Thymidine monophosphate
    (4) Adenosine triphosphate

181. **Assertion** : Polynucleotide phosphorylase is Ochoa enzyme.
    Reason : Ochoa enzyme is helpful in polymerizing RNA with defined sequence in template dependent manner.
    (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

182. Biochemical characterization of genetic material between 1933−44 was done by
    (1) Hershey and Chase
    (2) Griffith
    (3) Avery, MacLeod, McCarty
    (4) Conrat and Sanger

183. Which of following is false statement?
    (1) Mendel worked on 7 characters in pea.
    (2) Mendel failed to discover linkage.
    (3) All the genes for characters chosen by Mendel lie on four different chromosomes.
    (4) Mendel worked for seven years on pea plant(1857-1866)

184. Hardy Weinberg principle is not applicable when there is
    (1) no selection   (2) no mutation
    (3) closed population (4) controlled breeding

185. Both husband and wife have normal vision though their fathers were colour blind. The probability of their daughter becoming colour blind is
    (1) 0%   (2) 25 %
    (3) 50 %   (4) 75 %

BOTANY : SECTION-B

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

186. When a phosphate group is linked to 5′−OH of a sugar bonded to a nitrogenous base, it forms a corresponding
    (1) nucleoside   (2) nucleotide
    (3) dinucleotide   (4) dinucleoside

187. A mRNA codon for the amino acid proline is CCA. How many proline molecules are present in the polypeptide containing six amino acids, coded by the following DNA template.
    CCAGGTAACGGTCCACCA
    (1) 3   (2) 2
    (3) 1   (4) 5

188. **Assertion** : One codon codes for only one amino acid, this feature of genetic code is called unambiguous feature.
    Reason : Amino acids have structural specialities to read the code uniquely.
    (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 fals

189. In the following pedigree, studied trait is inherited as a dominant autosomal trait. What will be the genotype of mother and father?

    (1) Mother is aa and father is Aa
    (2) father is AA and mother is aa
    (3) Father is Aa and mother Aa
    (4) none of the above

190. Which of the following disease is not related with failure of segregation of homologous pair of chromosomes during cell division cycle
    (1) Klinefelter's syndrome
    (2) Down's syndrome
    (3) Turner's syndrome
    (4) Thalassaemia

191. Which of the following statement is correct?
    a. Cytosine is common for both DNA and RNA and thymine is present in DNA
    b. Polynucleotide chain has free phosphate moity at 5' end of ribose sugar
    c. The back bone in a polynucleotide chain is formed due to sugar only
    (1) a, b and c
    (2) both a and c
    (3) c only
    (4) both a and b

192. The inheritance of flower colour in snapdragon
    (1) is an example of incomplete dominance
    (2) shows phenotypic ratio 3:1 in F_2 generation
    (3) have genotypic ratio 9:7 in F_2 generation
    (4) is an example of complementary gene interaction

193.
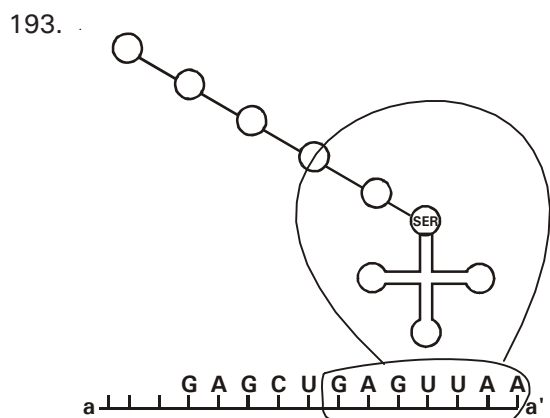
    a. Identify the polarity from a to a', in the diagram
    b. Mention how many more amino acids are expected to be added to this polypeptide chain.
    (1) a = 5'-3', b = 0
    (2) a = 3'-5', b = 0
    (3) a = 5'-3', b = 6
    (4) a = 3'-5', b = 6

194. Which of the following statements is incorrect w.r.t. concept of dominance?
    (1) A modified allele could be responsible for producing the normal enzyme
    (2) When a modified allele produces a non-functional enzyme the phenotype may be affected
    (3) Modified allele producing less efficient enzyme results in incomplete dominance
    (4) The unmodified allele which represents the original phenotype is the recessive allele

195. What is phenotypic ratio in a monohybrid test cross?
    (1) 3 : 1
    (2) 9 : 3 : 3 : 1
    (3) 1 : 1
    (4) 1 : 2 : 1

196. In *Pisum sativum,* a single gene controls the shape of seed and size of starch grains. A plant heterozygous (Bb) when selfed produces two types seeds round and wrinkled but 3 types of startch grains large, small and intermediate size. It is because the gene B for shape of seed and size of starch grains respectively shows
    (1) complete dominance & co-dominance
    (2) complete dominance & incomplete dominance
    (3) incomplete dominance & complete dominance
    (4) incomplete dominance & co-dominance.

197. The ABO blood groups in human are controlled by how many alleles?
    (1) 4
    (2) 5
    (3) 6
    (4) 3

198. **Statement-I** : Dominance is not an autonomous feature of the gene.
    Statement-II : In a pleiotropic gene dominance depends on more than one gene.
    (1) Both statement-I and statement-II are correct
    (2) Both statement-I and statement-II are incorrect
    (3) Statement-I is correct but statement-II is incorrect
    (4) Statement-I is incorrect but statement-II is correct

199. The sequence of three steps in Bacteriophage experiment by Hershey and Chase was
    (1) Blending, infection, centrifugation
    (2) Infection, centrifugation, blending
    (3) Infection, blending, centrifugation
    (4) Blending, centrifugation, injection

200. Pick incorrect match
    (1) Khorana – developed copolymer
    (2) Crick – wobble hypothesis
    (3) Nirenberg – cell free system protein synthesis
    (4) Gamow – developed homopolymer