Dated :
25-06-2026

M.L. Syal's Helix Institute

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XII cum Competition Course for Medical
Test - 5

MM : 720 Time : 3 hrs

Physics	:	Magnetic Effect of Current-I
Chemistry	:	Alkyl halides-I
Zoology	:	Theories of evolution -I
Botany	:	Principles of Inheritance and Variation-IV

All questions are compulsory

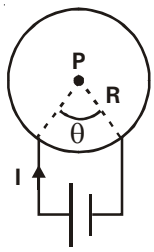
1. For the magnetic field to be maximum due to a small element of current carrying conductor at a point, the angle between the element and the line joining the element to the given point must be
(1) 0° (2) 90°
(3) 180° (4) 45°

2. Which of the following is the expression for Ampere's circuital law to determine magnetic flux density?
(1) $\oint \vec{B}.\overrightarrow{ds} = \mu_0 I$ (2) $\oint \vec{B}.\overrightarrow{dl} = \mu_0 I$
(3) $\oint \vec{B}.\overrightarrow{dv} = \mu_0 I$ (4) None of these

3. Toroid has a core of average radius 40 cm around which 1600 turns of a wire are wound. The current in the wire is 10 A. What is the magnetic field inside the core of toroid?
(1) 4 mT (2) 8 mT
(3) zero (4) 5 mT

4. An α-particle moving in a circular orbit of radius 'a' makes 'n' revolutions per second. The magnetic field produced at the centre is
(1) zero (2) $\frac{\mu_0 ne}{2a\pi}$
(3) $\frac{\mu_0 n^2 e}{a}$ (4) $\frac{\mu_0 ne}{a}$

5. The magnetic field induction at the centre P due to the uniform circular wire shown in the following circuit is



(1) Proportional to θ
(2) Proportional to $(2\pi - \theta)$
(3) Zero only for $\theta = \pi$
(4) Zero for all values of θ

6. A straight wire of diameter 0.5 mm carrying a current of 1 A is replaced by another wire of 1 mm diameter carrying the same current. The strength of magnetic field far away is
(1) twice the earlier value
(2) half of the earlier value
(3) quarter of its earlier value
(4) unchanged

7. Two parallel wires carrying current I and 2I in the opposite direction have magnetic field B at the mid point between them. If the current 2I is switched off, the magnetic field at that point will be
(1) B (2) 0.5 B
(3) $\frac{B}{3}$ (4) 3B

8. Two wires of same length are shaped into a square and a circle respectively. If they carry same current, ratio of their magnetic moments is

(1) $2 : \pi$ (2) $\pi : 3$
(3) $\pi : 4$ (4) $1 : \pi$

9. A current is flowing in a horizontal transmission line towards EAST. The direction of magnetic field at a point which is just below the wire is towards

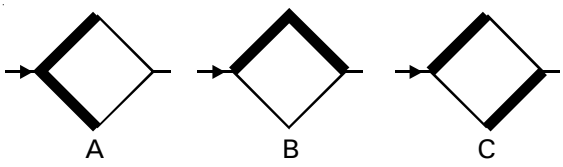
(1) east (2) west
(3) north (4) south

10. Two parallel long wires carry currents i_1 and i_2 with $i_1 > i_2$. When the currents are in the same direction, the magnetic field midway between the wires is 10 μT. When the direction of i_2 is reversed, it becomes 40 μT. Then $i_1 : i_2$ is

(1) 3 : 4 (2) 11 : 7
(3) 7 : 11 (4) 5 : 3

11. A current of 4 mA is flowing in a long straight conductor. Then the line integral of magnetic field around the closed path enclosing the straight conductor will be

(1) 1.6×10^{-9} Wb/m
(2) 1.6×10^{-9} Wb/m^2
(3) $1.6\pi \times 10^{-9}$ Wb/m
(4) $1.6\pi \times 10^{-9}$ Wb/m^2

12. 

Two thick and two thin wires, all of same material and same length are arranged to form a square in three different ways A, B and C as shown. Magnetic field at the centre of the square is zero in

(1) A only (2) both A & B
(3) both B & C (4) both A & C

13. A length of wire carries a steady current. It is bent first to form a circular plane loop of one turn. The magnetic field at the centre of loop is 0.05 T. The same length is now bent more sharply to make three turns each of same radius. The magnetic field at the centre caused by the same current is

(1) 0.05 T (2) 0.2 T
(3) 0.45 T (4) 0.15 T

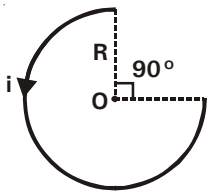
14. Magnetic induction at centre of current carrying circular coil of radius 'R' is B_0. Magnetic induction at distance 'x' from centre is

(1) $B = B_0 \dfrac{R^2}{R^2 + x^2}$ (2) $B = B_0 \dfrac{x^2}{R^2}$

(3) $B = B_0 \dfrac{R^3}{(R^2 + x^2)^{3/2}}$ (4) $B = B_0 \dfrac{x^3}{R^3}$

15. Field inside a solenoid is directly proportional to

(1) its length
(2) the square of current
(3) area
(4) number of turns per unit length

16. 

A current i ampere flows in a circular arc of wire whose radius is R, which subtends an angle $3\pi/2$ radian at its centre. The magnetic induction B at the centre is

(1) $\dfrac{\mu_0 i}{R}$ (2) $\dfrac{\mu_0 i}{2R}$

(3) $\dfrac{2\mu_0 i}{R}$ (4) $\dfrac{3\mu_0 i}{8R}$

17. Which of the following statements is true?

a. If a copper rod carries a direct current, the magnetic field associated with the current will be outside the rod and not inside the rod

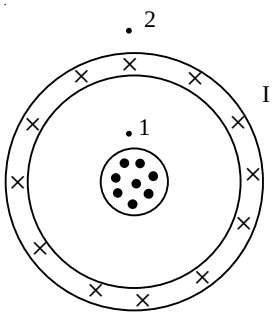
b. If a long hollow copper pipe carries a direct current, the magnetic field associated with the current will be outside the pipe and not inside the pipe

c. Magnetic field at a point on the surface of long current carrying cylindrical wire is maximum

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

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

18.



The figure shows the cross-section of two long coaxial tubes carrying equal currents I in opposite directions. If B_1 and B_2 are magnetic fields at points 1 and 2, as shown in figure then

(1) $B_1 \neq 0, B_2 = 0$ (2) $B_1 = 0; B_2 = 0$

(3) $B_1 \neq 0; B_2 \neq 0$ (4) $B_1 = 0, B_2 \neq 0$

19. Which of the following statement is true?

(1) The magnetic field intensity B is scalar quantity

(2) 1 Tesla = 10^4 gauss

(3) Magnetic permeability is unitless

(4) Gauss is SI unit of magnetic field

20.

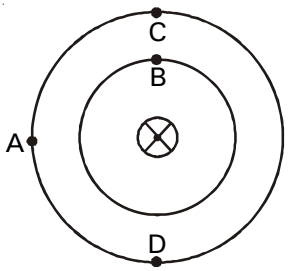
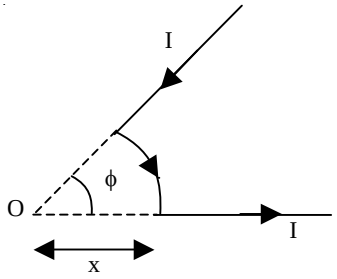


Figure shows two magnetic field lines of a long conducting wire which is perpendicular to the plane of the figure and carries an inward current. In which of the points shown, the magnetic field points to the right and has the lowest magnitude.

(1) A (2) B

(3) C (4) D

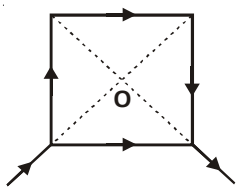
21.



In figure, the curved part represents arc of a circle of radius x. If it carries a current I, the magnetic field at the point O is

(1) $\frac{\mu_0 I\phi}{2\pi x}$ (2) $\frac{\mu_0 I\phi}{4\pi x}$

(3) $\frac{\mu_0 I\phi}{2x}$ (4) $\frac{\mu_0 I\phi}{4x}$

22. 

In the square loop made of uniform conducting wire shown above, magnetic field will be

(1) maximum at the centre of the loop
(2) zero at the centre of loop
(3) zero at all points inside the loop
(4) zero at all points outside of the loop

23. A long straight wire in the horizontal plane carries a current of 50 A in north to south direction. The magnetic field at a point 2.5 m east of wire is

(1) 6×10^{-4} T vertically upwards
(2) 4×10^{-6} T vertically upwards
(3) 3.5×10^{-5} T vertically downwards
(4) 6×10^{-5} T vertically upwards

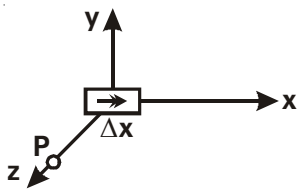
24. An electron revolving around a proton in circular orbit with angular velocity 8×10^{16} rad/sec produces a magnetic field of 7 Wb/m^2 at centre of orbit. Diameter of orbit is

(1) 2 Å (2) 4 Å
(3) 25 Å (4) 50 Å

25. The magnetic induction at a point P which is at a perpendicular distance of 4 cm from a long current carrying wire is 10^{-8} T. The field of induction at a perpendicular distance of 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

26. An element $\Delta \vec{\ell} = \Delta x \hat{i}$ is placed at origin & carries a large current i = 5 A. What is the magnetic field at point P on z-axis at a distance of 2 m from origin. $\Delta x = 1$ cm.



(1) 2×10^{-9} T in z direction
(2) 2.5×10^{-9} T in y direction
(3) 1.25×10^{-9} T in $-$y direction
(4) 4×10^{-5} T in $-$z direction

27. Magnetic induction at a point on the line of straight current carrying wire carrying current 'I' and of length 'd' is

(1) $\mu_0 I$ (2) $\frac{\mu_0 I}{\pi}$
(3) zero (4) $\mu_0 Id$

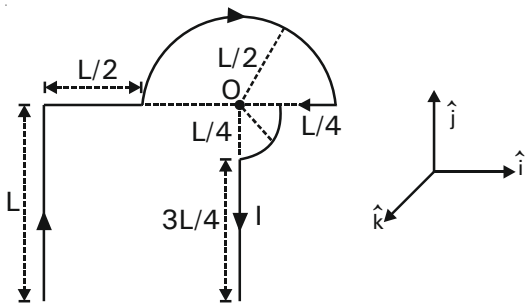
28. In a solid cylinder of radius R, carrying current i, the ratio of magnetic field at a distance R/2 to that at distance 2R from the axis is

(1) 1 : 1 (2) 1 : 2
(3) 2 : 1 (4) 1 : 4

29. 2 A current is flowing in a circular coil of radius 20 cm. If magnetic field at the centre of the coil is found to be $2\pi \times 10^{-3}$ T, then number of turns in the coil are

(1) 500 (2) 1000
(3) 100 (4) 2000

30. Which one of the following options represents the magnetic field $\vec{B}$ at O due to the current flowing in the given wire segments lying on the xy plane?



(1) $\vec{B} = \frac{-\mu_0 I}{L}\left(\frac{3}{2} + \frac{1}{4\sqrt{2\pi}}\right)\hat{k}$

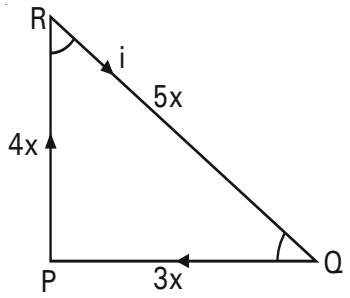
(2) $\vec{B} = \frac{-\mu_0 I}{L}\left(\frac{3}{2} + \frac{1}{2\sqrt{2\pi}}\right)\hat{k}$

(3) $\vec{B} = \frac{-\mu_0 I}{L}\left(1 + \frac{1}{4\sqrt{2\pi}}\right)\hat{k}$

(4) $\vec{B} = \frac{-\mu_0 I}{L}\left(1 + \frac{1}{4\pi}\right)\hat{k}$

31. The direction of magnetic lines of forces close to a straight conductor carrying current will be
(1) along the length of the conductor
(2) radially outward
(3) circular in a plane perpendicular to conductor
(4) helical

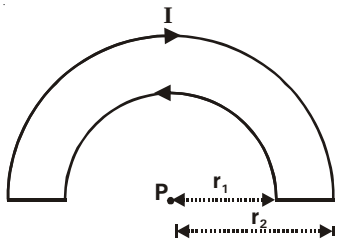
32. A steady current i goes through a wire loop PQR having shape of a right angle triangle with PQ = 3x, PR = 4x and QR = 5x. The magnitude of the magnetic field at P due to this loop is



(1) $\frac{7\mu_0 I}{8\pi x}$ (2) $\frac{7\mu_0 I}{48\pi x}$

(3) $\frac{\mu_0 I}{8\pi x}$ (4) $\frac{7\mu_0 I}{16\pi x}$

33.

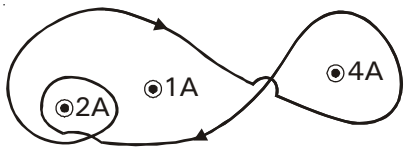


Find the magnetic field at point P due to the current carrying loop shown.

(1) $\frac{\mu_0}{4\pi} I\left(\frac{1}{r_1} - \frac{1}{r_2}\right)$ (2) $\frac{\mu_0}{4\pi} \pi I\left(\frac{1}{r_1} - \frac{1}{r_2}\right)$

(3) $\frac{\mu_0}{4\pi} I\left(\frac{1}{r_1} + \frac{1}{r_2}\right)$ (4) $\frac{\mu_0}{4\pi} \pi I\left(\frac{1}{r_1} + \frac{1}{r_2}\right)$

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) $-\mu_0$

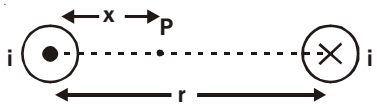
(3) $2\mu_0$ (4) $-2\mu_0$

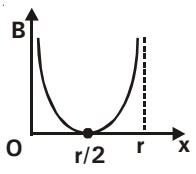
35. A very long solenoid has $400/\pi$ turns per metre. A current of 2 amp flows through it. The magnetic field induction at an end of the solenoid on the axis is

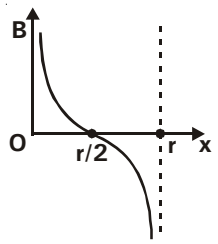
(1) 2.56×10^{-4} T (2) 1.6×10^{-4} T

(3) 3.2×10^{-4} T (4) 4.8×10^{-4} T

36. Two thin long straight wires are parallel to each other at a separation r apart and they carry current i each in opposite directions as shown. Magnetic field (B) varies with distance (x) along the line joining two wires as



(1)


(2)


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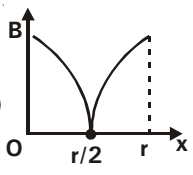

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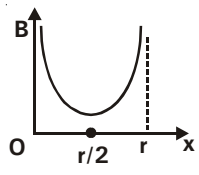


37. Two concentric coils each of radius equal to π cm are placed at right angles to each other. 6 ampere and 8 ampere are the currents flowing in each coil respectively. The magnetic induction in weber/m^2 at the centre of the coils will be

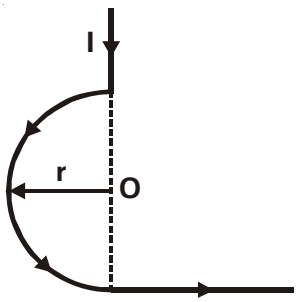
(1) 5×10^{-5} (2) 4×10^{-4}

(3) 2×10^{-4} (4) 10^{-4}

38. The magnetic field at the centre of a circular coil of radius r, due to current I flowing through it, is B. The magnetic field at a point along the axis at a distance r/2 from the centre is

(1) B/2 (2) 2B

(3) $\left(\frac{2}{\sqrt{5}}\right)^3 B$ (4) $\left(\frac{2}{\sqrt{3}}\right)^3 B$

39.


In the figure, what is magnetic field at the point O

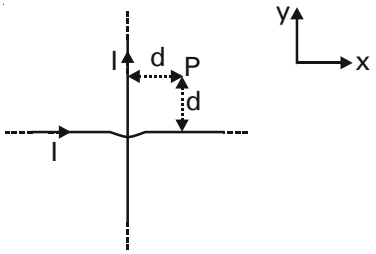
(1) $\frac{\mu_0 I}{4\pi r}$

(2) $\frac{\mu_0 I}{4\pi r} + \frac{\mu_0 I}{2\pi r}$

(3) $\frac{\mu_0 I}{4r} + \frac{\mu_0 I}{4\pi r}$

(4) $\frac{\mu_0 I}{4r} - \frac{\mu_0 I}{4\pi r}$

40. Two very long, straight and insulated wires are kept at 90° angle from each other in xy-plane as shown in the figure.



These wires carry currents of equal magnitude I, whose directions are shown in the figure. The net magnetic field at point P will be

(1) zero (2) $\frac{+\mu_0 I}{\pi d}\hat{k}$

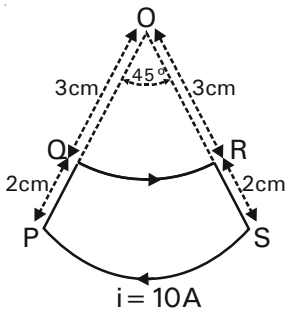
(3) $-\frac{\mu_0 I}{2\pi d}(\hat{i}+\hat{j})$ (4) $\frac{\mu_0 I}{2\pi d}(\hat{i}+\hat{j})$

41. A square loop of edge 'a' carries a current I. The magnetic field at the centre of the loop is

(1) $\frac{\mu_0 I}{2\sqrt{2}\pi a}$ (2) $\frac{2\sqrt{2}\mu_0 I}{\pi a}$

(3) $\frac{\mu_0 I}{\sqrt{2}\pi a}$ (4) $\frac{\sqrt{2}\mu_0 I}{\pi a}$

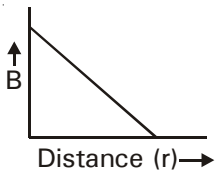
42. A current loop, having two circular arcs joined by two radial lines as shown in the figure. It carries a current of 10 A. The magnetic field at point O will be close to

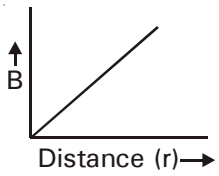


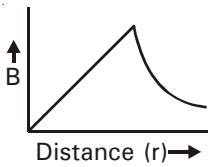
(1) 1.0×10^{-5} T (2) 1.0×10^{-7} T

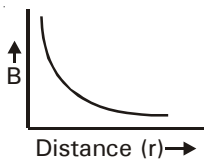
(3) 1.5×10^{-7} T (4) 1.5×10^{-5} T

43. Which of the following graphs represents variation of magnetic field B with distance 'r' from the axis of a straight long solid cylinder carrying current with uniform current density?

(1) 

(2) 

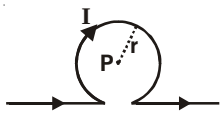
(3) 

(4) 

44. Two similar coils of radius R are lying concentrically with their planes at right angles to each other. The currents flowing in them are I and 2 I respectively. The resultant magnetic field induction at the centre will be

(1) $\frac{\mu_0 I}{2R}$ (2) $\frac{\mu_0 I}{R}$

(3) $\frac{\sqrt{5}\mu_0 I}{2R}$ (4) $\frac{3\mu_0 I}{2R}$

45. 

The magnetic field at point P in the figure above is (The straight wire is infinite. Ignore the gap)

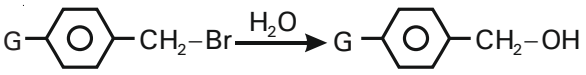
(1) $\frac{\mu_0}{2\pi}\frac{I(\pi-1)}{r}\odot$

(2) $\frac{\mu_0}{2\pi}\frac{I(\pi+1)}{r}\otimes$

(3) $\frac{\mu_0}{2\pi}\frac{I(\pi-1)}{r}\otimes$

(4) $\frac{\mu_0}{2\pi}\frac{I(\pi+1)}{r}\odot$

46. para substituted benzyl bromide undergoes the following reaction



Which of the following can be G so that reactivity of para substituted benzyl bromide is maximum in the above reaction?

(1) $-CH_3$ (2) $-CH(CH_3)_2$

(3) $-OCH_3$ (4) $-C(CH_3)_3$

47. Which of the following is mismatch ?

(1) $CH_3^- > {}^-NH_2$ (nucleophilicity)

(2) $RO^- > \overline{O}H$ (basicity)

(3) $RCOO^- > RO^-$ (basicity)

(4) $\overline{O}H > RCOO^-$ (nucleophilicity)

48. n-propyl bromide in presence of Zn, ether yields n-hexane. The name of the reaction is

(1) Wurtz reaction

(2) Frankland reaction

(3) Kolbe method

(4) Sabatier senderens method

49. How many of the following statements are correct w.r.t. Grignard reagent?

a. The carbon-magnesium bond is covalent but highly polar.

b. They are called organometallic compounds because they have magnesium halogen bond.

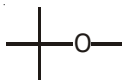
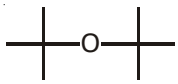
c. They are obtained by the reaction of haloalkanes with magnesium metal in water.

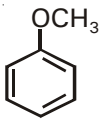
d. The magnesium halogen bond in Grignard reagent is essentially ionic.

(1) 1 (2) 3

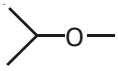
(3) 4 (4) 2

50. Which of these can be formed as a major product during Williamson's synthesis ?

a.  b. 

c. 

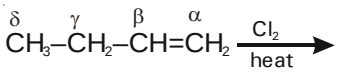
d. $CH_2=CH-O-CH=CH_2$

e. 

(1) a, c, d (2) a and e

(3) a, c, e (4) a, d, e

51. Which of the following hydrogen will be most reactive for the given reaction



(1) γ (2) α

(3) δ (4) β

52. Which is incorrect match for A^- and RA

$$R-X + A^- \rightarrow R-A + X^-$$

(1) $^-C\equiv N:$; RCN

(2) Ag–CN: ; RNC

(3) $R'COO^-$; RCOOR'

(4) $R'O^-$; ROR'

53. But-2-ene $\xrightarrow{Br_2/CCl_4}$ (Y) $\xrightarrow[\text{distillation}]{\text{Fractional}}$ (Z)

Y + Z (Y are no. of possible products including stereomers and Z is no. of fractions) is

(1) 5 (2) 4

(3) 3 (4) 7

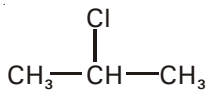
54. The most reactive towards both S_{N1} and S_{N2} is

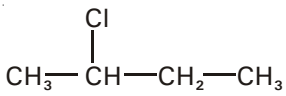
(1) R-F (2) R-I

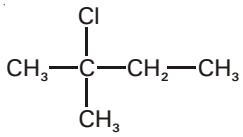
(3) R-Cl (4) R-Br

55. Which of the following undergoes elimination reaction easiest with $NaNH_2$?

(1) CH_3-CH_2-Cl

(2) 

(3) 

(4) 

56. When the concentration of alkyl halide is tripled and concentration of OH^- is reduced to half, the rate of S_{N^2} reaction increased by

(1) 3 times (2) 1.5 times
(3) 2 times (4) 6 times

57. How many of the following statements are correct regarding solvolysis of 3-methyl-3-bromohexane?

a. It involves carbocation intermediate
b. Intermediate is a chiral
c. Polar solvents accelerate the reactions
d. Formation of carbocation is rate determing step

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

58. **Assertion**: E_2 reaction fails in case of neo-pentyl bromide

Reason: Br^- is a poor leaving group.

(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

59. When alkyl halide is heated with dry Ag_2O, it produces

(1) Ester (2) Ether
(3) Ketone (4) Alcohol

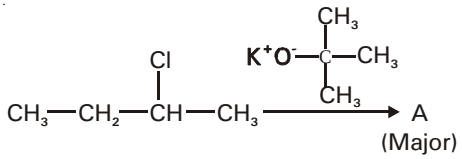
60. Which of the following reactions does not proceed through free radical mechanism?

(1) $CH_3-CH_3 \xrightarrow[h\nu]{Cl_2}$

(2) $CH_3-CH=CH_2 \xrightarrow[h\nu]{NBS}$

(3) $CH_2=CH_2+HBr \xrightarrow[h\nu]{(PhCO)_2O_2}$

(4) $CH_3-CH=CH_2+HCl \xrightarrow[h\nu]{(PhCO)_2O_2}$

61. 

What is A?

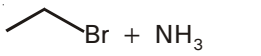
(1) Cis-2-butene (2) Trans-2-butene
(3) 1-butene (4) Butane

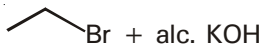
62. How many of the following reducing agents on reaction with $CH_3CH_2CH_2Cl$ produce alkane ?

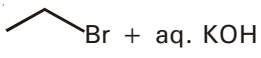
a. $LiAlH_4$ b. Ni-Al/NaOH
c. Zn/HCl d. Zn-Cu/alc.

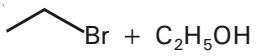
(1) three (2) four
(3) one (4) two

63. Which of these will give elimination product as the major product ?

(1) 

(2) 

(3) 

(4) 

64. Which reaction takes place at the fastest rate

(1) $CH_3CH_2CH_2Cl + NaSH \xrightarrow[25°C]{ethanol} CH_3CH_2CH_2SH + NaCl$

(2) $CH_3CH_2CH_2Cl + NaSH \xrightarrow[25°C]{ethanol} CH_3CH=CH_2 + NaCl + H_2S$

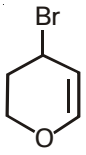
(3) $CH_3CH_2CH_2Br + NaSH \xrightarrow[25°C]{ethanol} CH_3CH_2CH_2SH + NaBr$

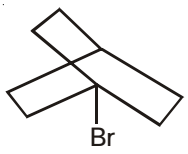
(4) $CH_3CH_2CH_2Br + NaSH \xrightarrow[25°C]{ethanol} CH_3CH=CH_2 + NaBr + H_2S$

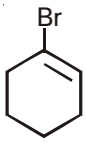
65. What is not true for S_N2 reactions?

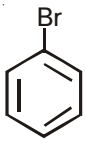
(1) It is a concerted mechanism
(2) Rate increases as the concentration of Nu^- increases
(3) Its rate is independent of concentration of RX
(4) 1° R–X are good substrates

66. Which of the following is the most reactive towards S_N1 ?

(1) 

(2) 

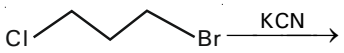
(3) 

(4) 

67. $(CH_3)_2CHCl \xrightarrow[KOH]{alc.} A \xrightarrow[475K]{SO_2Cl_2} B$

Final product 'B' will be

(1) Dimethyl sulphate
(2) 1, 2-dichloroethane
(3) 3-chloropropene
(4) 1-chloro-2-iodopropane

68. 

'X' The major product 'X' is

(1)

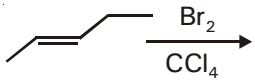
(2)

(3)

(4)

69. If the dehydrohalogenation of 2-Fluorobutane gives $CH_3CH_2CH=CH_2$. The product is

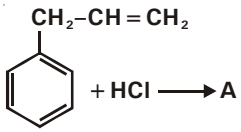
(1) Hofmann product
(2) Saytzeff product
(3) Hoffmann-Saytzeff product
(4) Markownikoff product

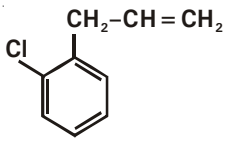
70. 

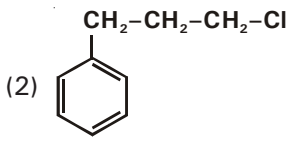
The major product in the above reaction is

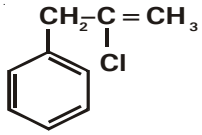
(1) recemic mixture
(2) diastereomeric mixture
(3) meso compound
(4) none of these

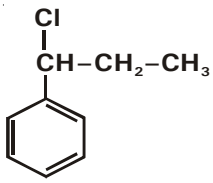
71. What is 'A' in the following reaction?



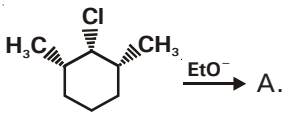
(1) 

(2) 

(3) 

(4) 

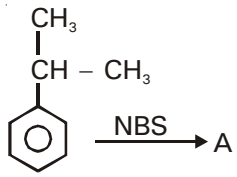
72. **Assertion**: Cyanide ion is an ambident nucleophile
Reason: Cyanide ion can attack either through carbon or nitrogen to form different products.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

73. 

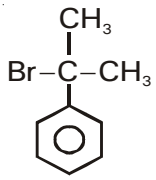
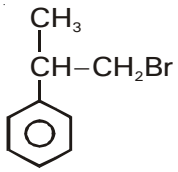
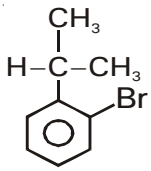
The major product of this reaction is
(1) An ether (2) An alkene
(3) An alcohol (4) An ester

74. **Assertion** : S_N1 is a one step reaction whereas SN^2 is a two step reaction.
Reason : SN^1 proceeds with racemisation whereas SN^2 proceeds with complete stereochemical inversion.
(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

75. Ethyl chloride reacts with silver nitrite to form the major product 'A'. The product 'A' is
(1) Nitroethane (2) Ethyl nitrite
(3) Ethyl acetate (4) Ethane

76. 

A is

(1) 
(2) 
(3) 
(4) none of these

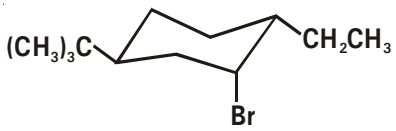
77. When excess C_2H_5Br is treated with alc. NH_3, the major product obtained is
(1) Ethylamine
(2) Diethylamine
(3) Triethylamine
(4) Tetraethylammonium bromide

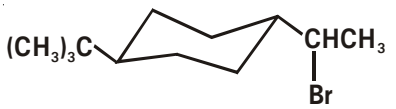
78. The incorrect order of reactivity for S_N2 reaction is
(1) $CH_3CH_2CH_2I > (CH_3)_2CHI$
(2) $NO_2-C_6HCH_2Br > CH_3O-C_6H_4-CH_2Br$
(3) $CH_3CH_2CH_2Br > CH_3CH_2CH_2Cl$
(4) $CH_3CH_2CH_2Cl > CH_3COCH_2Cl$

79. Which among the following is best leaving group?
(1) CH_3COO^- (2) MeO^-
(3) $MeOSO_2^-$ (4) $CF_3OSO_2^-$

80. Which one of the following alkyl halides would be expected to give the highest substitution to elimination ratio (most substitution, least elimination) on treatment with sodium ethoxide in ethanol?

(1)

(2) 

(3) 

(4)

81. In allylic halides halogen is bonded to
(1) sp-hybridised carbon
(2) sp^2-hybridised carbon
(3) sp^3-hybridised carbon
(4) both (1) & (3)

82. Which reagent will you use for the following reaction?

$CH_3CH_2CH_2CH_3 \rightarrow CH_3CH_2CH_2CH_2Cl + CH_3CH_2CHClCH_3$

(1) Cl_2/UV light
(2) $NaCl + H_2SO_4$
(3) Cl_2 gas in dark
(4) Cl_2 gas in the presence of iron in dark

83. Which of the following statement is true?
(1) Increased temperature favours elimination reactions over substitutions
(2) Increased temperature favours substitution reactions over eliminations
(3) Increased temperature favours both substitution reactions as well as eliminations reactions to the same extent
(4) Increased temperature has no effect on the rate of substitution/elimination reactions

84. The order of reactivities of the following alkyl halides with Mg to form Grignard's reagent is
(1) R–F > R–Cl > R–Br > R–I
(2) R–F > R–Br > R–Cl > R–I
(3) R–Cl > R–Br > R–F > R–I
(4) R–I > R–Br > R–Cl > R–F

85. **Assertion**: In the transition state of SN_2 reactions of alkyl halide, the alpha carbon is sp^2 hybridised
Reason: In the transition state, alpha carbon is surrounded by five atom
(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

86. $CH_3-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_2-CH_3 \xrightarrow{\text{alc.KOH}}$

The total isomeric alkenes formed in the above reaction is
(1) Two (2) One
(3) Four (4) Three

87. 1-chloro-1-methylcyclohexane is heated with sodium ethoxide . The major product is then treated with HBr, peroxide to form 'X' (major). What is/are true regarding 'X'?

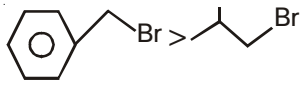
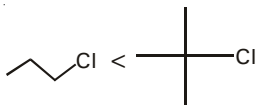
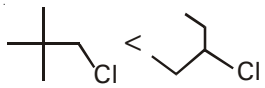
a. It has 1 chiral carbon
b. It has 4 stereomeric forms
c. It is a tertiary alkyl halide
d. It can show geometrical isomerism

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

88. The increasing order of nucleophicity of X^- is

(1) $I^- < Br^- < Cl^- < F^-$
(2) $I^- < Br^- < F^- < Cl^-$
(3) $F^- < Cl^- < I^- < Br^-$
(4) $F^- < Cl^- < Br^- < I^-$

89. Match the Column-I with Column II

	Column I	Column II
a.	$CH_3-Br > CH_3-Cl$	i. E–I
b.		ii. SN_1
c.		iii. SN_2
d.		iv. E-2

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

90. Which of the following is an example of vic-dihalide?

(1) Dichloromethane
(2) 1,2-dichloroethane
(3) Ethylidene chloride
(4) Allyl chloride

91. $(p+q)^2 = p^2 + 2pq + q^2 = 1$ represents an equation used in:

(1) population genetics
(2) mendelian genetics
(3) biometrics
(4) molecular genetics

92. Lamarck's theory of evolution fails to explain

(1) dull progeny of Nobel laureate
(2) webbed feet of aquatic birds
(3) vestigeal wings in flightless birds
(4) all of these

93. 'Darwin finches' refers to

(1) fossils of birds collected by Darwin at Galapagos islands
(2) migratory birds collected by Darwin at Galapagos islands
(3) a type of birds present on Galapagos islands
(4) fossils of reptiles collected by Darwin at Galapagos islands

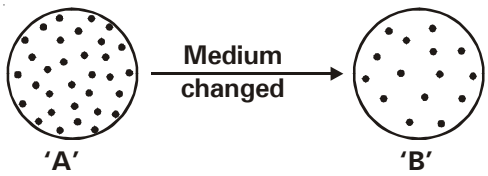
94. Which of the following statement is incorrect?

(1) Alfred Wallace, a naturalist who worked in Malay Archipelago had also come to similar conclusions as Darwin around the same time
(2) Microbes that divide fast have the ability to multiply and become millions of individuals within hours
(3) Even before Darwin, a French naturalist Lamarck had said that evolution of life forms had occurred by inheritance of useful variations
(4) Gene recombinations disturb Hardy Weinberg's genetic equilibrium

95. de Vries gave his mutation theory on organic evolution while working on :

(1) *Althea rosea*
(2) *Drosophila melanogaster*
(3) *Oenothera lamarckiana*
(4) *Pisum sativum*

96. Shown below is a bacterial colony (A) growing on a given medium, on changing medium only some part of population (say B), survived ; what can be inferred from this?



(1) Population 'B' is more fit as compared to 'A'

(2) Population 'A' had some advantageous mutations which led to its elimination

(3) Population 'B' would over a period of time may lead to speciation

(4) Both (1) & (3)

97. **Statement-I** : Nature selects for fitness.

Statement-II : Fitness according to Darwin was only reproductive fitness..

(1) Both statement-I and statement-II are correct

(2) Both statement-I and statement-II are incorrect

(3) Statement-I is correct but statement-II is incorrect

(4) Statement-I is incorrect but statement-II is correct

98. An isolated population of moths with approximately equal numbers of white winged and black winged members was disturbed by a calamity. Only a few white-winged moths remained to form the next generation. This kind of change in the gene pool is called

(1) gene migration
(2) genetic recombination
(3) blocked gene flow
(4) genetic bottle neck effect

99. Conclusion which can be drawn from Lederberg's replica plating experiment is

(1) Some organism are better adapted to survive in otherwise hostile environment

(2) Rate of appearance of new forms is linked to density of organisms

(3) Ability to adapt is end result of fitness

(4) Appetency plays a major role in evolution

100. If **V** = Darwin's Variations & **M** = Hugo deVries Mutation, then how many of the following are false?

(i) (V) is random and directionless.

(ii) (M) is minor and heritable.

(iii) (V) and (M) are inheritable.

(iv) (M) causes speciation but not (V)

(1) Two (2) One

(3) Three (4) Four

101. If streptomycin resistance mutant are to be selected and to prove that such mutations do not originate as adaptation then which type of culture plates are needed?

(1) Plates with and without streptomycin

(2) Plates with medium deficient in nutrient needed for growth

(3) Plates with streptomycin

(4) Plates without streptomycin

102. Which of the following is the inference drawn from Darwin's theory?

(1) Natural resources are limited
(2) Most populations are normally stable in size

(3) Survival in the struggle for existence is not random

(4) Individuals of a population vary extensively

103. Sometimes the change in allele frequency is so different in the new sample of population that they become a different species. The original drifted population becomes _____ and the effect is called _____.

(1) founders, founder effect
(2) original population, founder effect
(3) founders, genetic drift
(4) original population, genetic drift

104. Which one of the following sequence was proposed by Darwin and Wallace for organic evolution?

(1) variation, constancy of population size, overproduction, natural selection

(2) overproduction, constancy of population size, variation, natural selection

(3) variation, natural selection, overproduction, constancy of population size

(4) over production, variations, constancy of population size, natural selection

105. The tendency of population to remain in genetic equilibrium may be disturbed by

(1) random mating
(2) lack of migration
(3) lack of mutations
(4) lack of random mating

106. Which of the following statement is not true?

(1) Formation of new species in case of bacteria can occur within days.

(2) Cave dewellers lost their eye sight is a strong evidence for Darwin's Theory

(3) Darwin and Wallace work was jointly published in the proceedings of Linnean Society of London

(4) Survival of fittest, means that those individuals that survive and reproduce in their environment are called fit

107. Which of the following is not applicable to Neo-lamarkism?
(1) Some acquired variations can be passed on to next generation
(2) Appentency has no role in evolution
(3) Environment does affect an organism and its germ cells
(4) Internal vital force and doctrine of desires play role in evolution

108. How many of the following are not related to theory of Darwinism?
Branching Descent, Saltation, Prodigality, Interspecific competition, Appetency, Natural selection, Evening primrose.
(1) One (2) Two
(3) Three (4) Four

109. A scientist kept 72 generations of *Drosophila* in darkness. Even after that the flies had normal eyes. This disapproves
(1) Synthetic theory
(2) Mutation theory
(3) Theory of inheritance of acquired characters
(4) Darwin and Wallace theory

110. How many of the following observations are related to Darwin's theory of Natural selection?
a. Natural resources are limited
b. Inheritance of useful variations
c. Most of the populations are stable in size except for seasonal fluctuations.
d. Members of population vary in characteristics.
(1) Two (2) Three
(3) Four (4) One

111. If mating is random, population is large and mutation does not occur then gene frequencies of population from generation to generation remain constant. This was put forward by
(1) Lederberg and Lederberg
(2) Darwin, Wallace and Malthus
(3) Hugo De Vries
(4) Hardy and Weinberg

112. How many of the following can lead to gene recombinations?
a. Dual parentage
b. Random union of gametes
c. Chance seperation of chromosomes
d. Crossing over during gametogenesis
(1) 4 (2) 3
(3) 2 (4) 1

113. Even though a had talked of b influencing phenotype, c either ignored these observations or kept silence. a, b and c are respectively
(1) Mendel, Mutations, Lamarck
(2) Darwin, inheritable 'factors', Mendel
(3) Mendel, inheritable 'factors', Darwin
(4) deVries, Mutations, Mendel

114. Which of the following go against the mutation theory?
a. Most mutations are negative
b. Mutations cannot explain development of mimicry and interdependence of organisms
c. Theory does not explain the role of nature
d. Mutations are generally recessive while traits taking part in evolution are usually dominant
(1) a, b, c (2) a and c
(3) a, b, c, d (4) b, c, d

115. Identify incorrect statement
(1) In the first decade of 20th century Hugo de Vries based on his work on Evening primrose brought forth the idea of mutations
(2) Hardy Weinberg principle says that sum total of all the allelic frequencies is 1
(3) Microbial experiments show that pre-existing advantageous mutations when selected will result in observation of new phenotypes
(4) Saltation is single step small mutation

116. **Assertion** : One of the pre-condition for adaptive radiation is development of geographial barrier.
Reason : Geographical barriers prevent the free movement of organisms
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

117. According to Darwin, the most potent force for organic evolution is
(1) intraspecific competition
(2) interspecific competition
(3) competition within closely related species
(4) due to reduced feeding efficiency in one species due to the presence of interfering species.

118. An incorrect statement is
(1) the rate of appearance of new forms is linked to life span of the organisms
(2) there must be a genetic basis for any trait to be selected naturally in order to evolve
(3) new alleles added to a population by genetic recombination always enhance the effect of selection
(4) sampling errors often reduce the genetic variability of the population

119. **Assertion** : The theory proposed by August Weismann uprooted the theory of Lamarck.
Reason : August Weismann performed an experiment on mice and proved that acquired characters are not inheritable until they affect the germ cells.
(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. Two key concepts of Darwin's theory of evolution was
(1) Branching descent and natural selection
(2) Branching descent and homology
(3) Natural selection and reproductive fitness
(4) Reproductive fitness and adaptations

121. **Statement-I** : The novelty and brilliant insight of Darwin was this: he asserted that variations, which are heritable and which make resource utilisation better for few will enable only those to reproduce and leave more progeny.
Statement-II : Variations due to mutations, recombinations, gene flow and genetic drift results in changed frequency of genes and alleles in future generation.
(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

122. Match List-I with List-II

	List-I		**List-II**
A.	Gene pool	I.	Stable within a generation
B.	Genetic drift	II.	Change in gene frequency by chance
C.	Gene flow	III.	Transfer of genes into or out of population
D.	Gene frequency	IV.	Total number of genes and their alleles

Choose the correct answer from the options given below:
(1) A-III, B-II, C-I, D-IV
(2) A-IV, B-II, C-III, D-I
(3) A-I, B-II, C-III, D-IV
(4) A-II, B-III, C-IV, D-I

123. Genetic drift operates in
(1) small isolated population
(2) large isolated population
(3) non-reproductive population
(4) slow reproductive population

124. Which of the following statement is incorrect regarding Lamarck's theory of inheritance of aquired characters ?
(1) Evolution of life forms is driven by use and disuse of organs
(2) Giraffe had to adapt by elongation of neck to forage foliage
(3) Over the years giraffes acquired long necks
(4) Change in environment does not bring about a conscious reaction in animals.

125. Match Column-I and Column-II and select the correct option

	Column-I		**Column-II**
i.	T.R. Malthus	a.	Species and varieties and their origin by mutation
ii.	Charles Lyell	b.	Principles of Population
iii.	Charles Darwin	c.	Principles of geology
iv.	Hugo de vries	d.	Origin of species by means of natural selection

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

126. **Assertion**: Population that survives a genetic bottleneck may not be able to adapt to new selection pressures of the environment.
Reason : Genetic bottleneck leads to the formation of less diverse and simplified population.
(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

127. Choose the incorrect statement
(1) According to mutation theory, evolution is a jerky process
(2) Natural selection is based on certain observations which are factual
(3) Ability to adapt is the end result of fitness and getting selected by the nature
(4) Evolution by natural selection would have started when cellular forms of life with difference in metabolic capabilities originated on earth.

128. Darwin failed to explain all of the following except
(1) arrival of fittest (2) cause of variations
(3) sterlity of hybrids (4) entomophily

129. Theory of continuity of germplasm was given by
(1) de Vries (2) August Weisman
(3) Malthus (4) Wallace

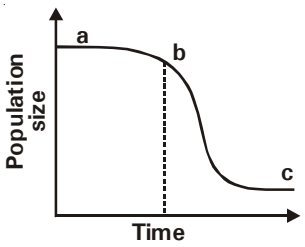
130. Choose the correct statement from the following
(1) Habitat fragmentation and genetic drift may accentuate variations leading to appearance of new species & hence evolution
(2) Homology is accounted for by the idea of branching descent
(3) Theoretically population size will grow exponentially if everybody reproduced maximally but the fact is that population sizes in reality are limited
(4) All are correct

131. **Statement-I** : Genetic bottle neck often prevents the species from reversing the path of extinction.
Statement-II : Genetic drift is binomial sampling error of the gene pool
(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

132. A person moving in a jungle puts his feet unknowingly on a mould where ants were living. A number of ants died due to this; choose the correct statement about the inference which we can draw from this incident
(1) It certainly led to the elimination of those ants which were weak
(2) The surviving ants certainly possess better genes/alleles which led to their survival
(3) Nothing can be predicted about the fact that genes/alleles which are left/fixed are better than those which are eliminated
(4) The incident would not bring about any change in the gene pool of the surviving population of ants

133. All of the given statements are correct except
(1) In Human Genographic project specific genes/ chromosomes/mitochondrial DNA is used to trace evolutionary history and migratory patterns of humans
(2) Genetic bottleneck lead to formation of more diverse and complex population
(3) Adaptive ability is inherited and has genetic basis
(4) Appearance of antibiotic resistance in bacteria is an example of pre-existing variations in a population

134. **Assertion** : When migration of a section of population to another place and population occurs, gene frequencies change in the original as well as in the new population.
Reason : There would be a gene migration, if gene flow happens multiple times.
(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

135. 

The graph illustrates changing population size in a small population of a certain species due to chance events. What is true for population at 'c'?
(1) Reduced genetic variation
(2) Increased homozygosity
(3) Genetic drift
(4) All of these

136. Moustaches in human males is
(1) sex limited trait (2) sex-influenced trait
(3) X-linked trait (4) maternal trait

137. Exchange of genes between different linkage groups is called
(1) Crossing over (2) Translocation
(3) Inversion (4) Deletion

138. Which of the following is the genetic constitution of human male showing gynaecomastia condition?
(1) AAA + XYY (2) AA + XO
(3) AA + XXY (4) AA + XXX

139. In Edward's syndrome, there is a trisomy of _____chromosome
(1) 11 (2) 16
(3) 21 (4) 18

140. A disease caused by an autosomal non-disjunction is
(1) Down's syndrome
(2) Klinefelter's syndrome
(3) Turner's syndrome
(4) Sickle cell anaemia

141. Choose the incorrect match.
(1) PKU–autosomal recessive Mendelian disorder.
(2) Haemophilia—valine substitutes glutamic acid in beta globin chain.
(3) Colour blindness —Sex linked recessive disorder .
(4) Cystic fibrosis — autosomal recessive disorder

142. β -thalassemia is due to mutations in HBB gene present on
(1) chromosome 16 (2) chromosome 5
(3) chromosome 11 (4) chromosome 21

143. **Statement- I** : Wheat and american cotton are artificially produced allopolyploids.
Statement- II : Thalassemia is an autosomal recessive blood disease transmitted from parent to the offsprings when both the parents are heterozygous.
(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

144. If a colour blind female marries a man whose mother was also colour blind, what are the chances of her progeny having colour blindness ?
(1) 25% (2) 50%
(3) 75% (4) 100%

145. Criss cross inheritance means
(1) X chromosome from female will pass to female of next-generation
(2) X chromosome from a male will pass to a female of next generation
(3) X chromosome from male will pass to a male of next generation
(4) none of the above

146. In phenylketonuria, the affected person lacks an enzyme that converts
(1) Tyrosine into phenylalanine
(2) Oxidase into tyrosine
(3) Homogentisic acid into tyrosine
(4) Phenylalanine into tyrosine

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

148. Identify True (T) or False (F) statements select the correct option
a. Dominant sex- linked trait if present in father will always appear in daughters
b. Polyploidy is often seen in plants
c. The term mutation was coined by Hugo de Vries
d. 23 pairs of chromosomes can assort in 6.8 million ways in gametes

	a	b	c	d
(1)	T	T	F	T
(2)	T	T	T	F
(3)	F	T	T	F
(4)	F	F	F	T

149. Match the following and select the correct option

	Column-I	Column-II
a.	Autopolyploidy	i. Autoallopolyploids
b.	Monosomy	ii. Allopolyploids
c.	*Helianthus tuberosus*	iii. Turner's syndrome
d.	Triticale	iv. Gigas effect

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

150. Select the correct statement
(1) Thalassaemia is connected to the deletion of the 12th chromosome
(2) Colourblindness occurs in about 8 percent of females and only 0.4 percent of males
(3) Chromosomal disorders can be traced in a family by the pedigree analysis
(4) Sickle cell anaemia is a qualitative problem of synthesising an incorrectly functioning globin

151. Pattern baldness in humans and horns in sheep are
(1) sex- influenced traits
(2) sex- limited traits
(3) X-Y linked traits
(4) X linked traits

152. XO chromosomal abnormality in humans causes
(1) Turner's syndrome
(2) Down's syndrome
(3) Morphan's syndrome
(4) Klinefelter's syndrome

153. In a *Drosophila*, the haploid number, number of chromosomes in monosomy and number of chromosomes in trisomy are respectively
(1) 7, 9 and 4 (2) 4, 7 and 9
(3) 4, 9 and 7 (4) 8, 7 and 9

154. Which of the following statement is not true w.r.t sex- linked inheritance in humans
(1) Majority of sex-linked traits are recessive
(2) Mother passes sex- linked alleles to sons only
(3) It shows criss- cross inheritance
(4) Father passes X-linked alleles only to daughters

155. *Brassica juncea* is an allopolyploid between *Brassica campestris* (2n = 18) and *Brassica nigra* (2n = 16). Its chromosome number is
(1) 68 (2) 17
(3) 34 (4) 52

156. Which of the following couples cannot have female progeny suffering from the disorder found in them?
a. Thalassemic male and Thalassemic female
b. Normal male and colourblind female
c. Colourblind male and normal female with colourblind father
d. Colourblind male and haemophilic female
(1) b only (2) a and d only
(3) b, c and d only (4) b and d only

157. **Assertion :** Holandric traits are not inherited by the female child.

Reason : Holandric traits are Y-linked.

(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

158. Broad palm with characteristic palm crease is visible in a person suffering from

(1) Klinefelter's syndrome

(2) Thalassemia

(3) Down's syndrome

(4) Turner's syndrome

159. How many barr bodies would be expected in an extreme Klinefelter's syndrome with XXXXY condition?

(1) One (2) Two

(3) Four (4) Three

160. Which of the following could be an amphidiploid?

(1) AAABB (2) AABBCC

(3) AACC (4) BBBCC

161. Before a deletion occurred, the gene sequence was ABCDEF, now it is

(1) ABDCEF (2) FEDCBA

(3) ABDEF (4) ABEDCF

162. How many of genetic disorders given below are not because of aneuploidy?

Colourblindness, Haemophilia, Turner's syndrome, Down's syndrome, Klinefelter's syndrome, Phenyl ketonuria, Thalassemia

(1) 3 (2) 4

(3) 5 (4) 6

163. Select the incorrect statement w.r.t. Barr body in humans

(1) Females have one Barr body

(2) Formed by complete heterochromatisation of one of X chromosome in female

(3) Either maternal or paternal chromosome can form Barr body

(4) Heterochromatisation starts in the late blastocyst stage at 16th day of embryonic development

164. Colchicine is obtained from the corm of plant

(1) *Mangifera* (2) *Zea mays*

(3) *Colchicum* (4) *Oenothera*

165. If both parents are carriers for phenylketonuria, which is an autosomal recessive disorder, what are the chances of pregnancy resulting in an affected child?

(1) 50% (2) 25%

(3) 100% (4) 75%

166. If the chromosome number in pollen mother cells of pea is 14, what is the possible types of pollen grains it could produce due to independent assortment of its chromosomes during meiosis?

(1) 2^{14} (2) 128

(3) 14 (4) 7

167. Transfer of traits from female parent to grand - daughter through son is called

(1) diandric (2) diagynic

(3) holandric (4) androgenic

168. When a complete homologous pair is lost it is called

(1) monosomy (2) trisomy

(3) nullisomy (4) tetrasomy

169. **Statement- I** : Mendelian disorders are mainly determined by alteration or mutation in a single gene.

Statement- II : Cystic fibrosis and Down's syndrome are chromosomal disorders.

(1) Both statement -I and statement- II are correct

(2) Both statement-I and statement-II are incorrect

(3) Statement-I is correct but statement-II is incorrect

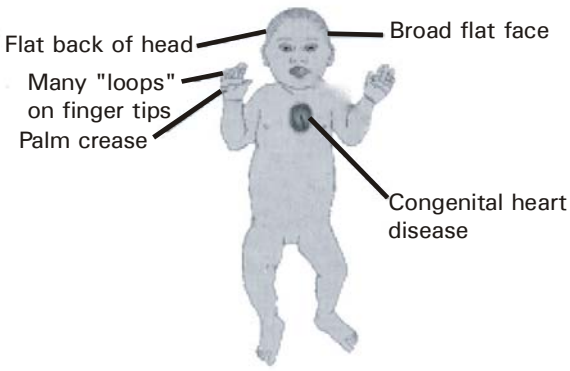
(4) Statement-I is incorrect but statement- II is correct

170. How many autosomal trisomics are possible in human beings?

(1) 23 (2) 24

(3) 22 (4) 48

171. Choose the correct option w.r.t the figure given below



(1) Monosomy of 21st chromosome

(2) Malformed ears and receding chin

(3) Genetic constitution = 2n + 1

(4) Lack of secondary sexual characters

172. A Y–linked gene is responsible for hypertrichosis (long hair on ears). When an affected man marries a normal woman, what percentage of their daughters would be expected to have hair on ears?

(1) 25% (2) 50%

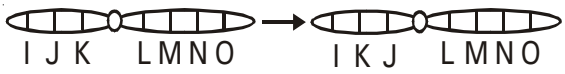
(3) 0% (4) 100%

173. If a genetic disease is transferred from a phenotypically normal but carrier female to only some of the male progeny, the disease is
(1) Autosomal dominant
(2) Autosomal recessive
(3) Sex-linked dominant
(4) Sex-linked recessive

174. The possibility of a female becoming a haemophiliac is extremely rare because
(1) mother should be carrier & father haemophilic
(2) mother normal & father should be haemophilics
(3) both mother & father should be carriers
(4) mother should be carrier & father normal.

175. Conditions of a karyotype $2n \pm 1$ and $2n \pm 2$ are called
(1) Aneuploidy (2) Polyploidy
(3) Allopolyploidy (4) Monosomy

176. Identify the kind of mutation represented



(1) duplication (2) inversion
(3) translocation (4) deletion

177. Which one is the odd one out w.r.t. phenylketonuria?
(1) A case of aneuploidy
(2) An example of pleiotropy
(3) An autosomal recessive trait
(4) A Mendelian disorder

178. What will be the number of Y spots in 150 androsperms of a human?
(1) 50 (2) zero
(3) 150 (4) 300

179. **Assertion**: Sex linked disorders are more frequently expressed in human males.
Reason: Males in human are hemizygous for X-lined 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

180. Which is not a Mendelian disorder?
(1) Down's syndrome
(2) Cystic fibrosis
(3) Colour blindness
(4) Sickle cell anaemia