1. A seat marked with Reg. No. will be allotted to each student. The student should ensure that he/she occupies the correct seat only. If any student is found to have occupied the seat of another student, both the students shall be removed from the examination and shall have to accept any other penalty imposed upon them.

2. Duration of Test is 3 Hours and Questions Paper Contains 180 Questions. The Max. Marks are 720.

3. Student can not use log tables and calculators or any other material in the examination hall.

4. Student must abide by the instructions issued during the examination, by the invigilators or the centre incharge.

5. Before attempting the question paper ensure that it contains all the pages and that no question is missing.

6. Each correct answer carries 4 marks, while 1 mark will be deducted for every wrong answer. Guessing of answer is harmful.

7. A candidate has to write his / her answers in the OMR sheet by darkening the appropriate bubble with the help of Blue / Black Ball Point Pen only as the correct answer(s) of the question attempted.

8. Use of Pencil is strictly prohibited.

Note: In case of any Correction in the test paper, please mail to dlpcorrect@allen.ac.in within 2 days along with Paper code and Your Form No.
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1. Four particles of equal mass \( M \) move along a circle of radius \( R \) under the action of their mutual gravitational attraction. The speed of each particle is:
   
   (1) \( \frac{GM}{R} \)
   
   (2) \( \sqrt{2\sqrt{2} \frac{GM}{R}} \)
   
   (3) \( \sqrt{\frac{GM}{R} (2\sqrt{2} + 1)} \)
   
   (4) \( \sqrt{\frac{GM}{R} \left( \frac{2\sqrt{2} + 1}{4} \right)} \)

2. Two point charges \((+Q)\) and \((-2Q)\) are fixed on the X-axis at positions \( a \) and \( 2a \) from origin respectively. At what positions on the axis, the resultant electric field is zero -
   
   (1) only \( x = \sqrt{2} a \)  
   (2) only \( x = -\sqrt{2} a \)
   
   (3) both \( x = \pm \sqrt{2} a \)  
   (4) \( x = \frac{3a}{2} \) only

3. A hollow cylinder has a charge \( q \) coulomb at its center. If \( \phi \) is the electric flux associated with the curved surface \( B \), the flux linked with the plane surface \( A \) will be:

   \[
   \phi = \frac{q}{2\varepsilon_0} - \phi
   \]

   (1) \( \frac{q}{2\varepsilon_0} - \phi \)
   
   (2) \( \frac{1}{2} \left( \frac{q}{\varepsilon_0} - \phi \right) \)
   
   (3) \( \frac{q}{2\varepsilon_0} \)
   
   (4) \( \phi \frac{3}{\varepsilon_0} \)

4. To get maximum current in a resistance of \( 3\Omega \) one can use \( n \) rows of \( m \) cells connected in parallel. If the total no. of cells is 24 and the internal resistance of a cell is 0.5 then
   
   (1) \( m = 12, n = 2 \)
   
   (2) \( m = 8, n = 4 \)
   
   (3) \( m = 2, n = 12 \)
   
   (4) \( m = 6, n = 4 \)
5. Figure shows a square loop ABCD with edge length a. The resistance of the wire ABC is r and that of ADC is 2r. The value of magnetic field at the centre of the loop O is:

\[ \frac{2\mu_0 i}{3\pi a} \]

\[ \frac{2\mu_0 i}{\pi a} \]

\[ \frac{2\mu_0 i}{\pi a} \]

\[ \frac{2\mu_0 i}{\pi a} \]

6. Suppose the gravitational force varies inversely as the nth power of the distance. Then, the time period of a planet in circular orbit of radius R around the sun will be proportional to:

(1) \( R^n \)

(2) \( R^{(n+1)/2} \)

(3) \( R^{(n-1)/2} \)

(4) \( R^{-n} \)

7. Electric potential at any point is \( V = -5x + 3y + \sqrt{15}z \), then the magnitude of the electric field is:

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

(2) \( 4\sqrt{2} \)

(3) \( 5\sqrt{2} \)

(4) \( 7 \)

8. If a potential of 60V is applied between A and B, then (Where \( V_A = 60V, V_B = 0 \))

(1) \( V_D = 15V \)

(2) \( q_{SF} = 75C \)

(3) \( q_{7F} = 105C \)

(4) All of these

9. Consider the circuit shown in the figure. The current \( i_3 \) is equal to

(1) 5 amp

(2) 3 amp

(3) – 3 amp

(4) – 5/6 amp
10. A proton of mass $1.67 \times 10^{-27}$ kg and charge $1.6 \times 10^{-19}$ C is projected with a speed of $2 \times 10^6$ m/s at an angle of 60° from the X-axis. If a uniform magnetic field of 0.104 Tesla is applied along Y-axis, the path of proton is

(1) A circle of radius = 0.2 m and time period $\pi \times 10^{-7}$ s
(2) A circle of radius = 0.1 m and time period $2\pi \times 10^{-7}$ s
(3) A helix of radius = 0.1 m and time period $2\pi \times 10^{-7}$ s
(4) A helix of radius = 0.2 m and time period $4\pi \times 10^{-7}$ s

11. The speed of the earth's rotation about its axis is $\omega$. Its speed is increased to $x$ times to make the effective acceleration due to gravity equal to zero at the equator. Then $x$ is:

(1) 1 (2) 8.5 (3) 17 (4) 34

12. For the arrangement of charges shown in the figure, potential is zero at -

(1) A, B and C (2) D, B and E (3) B only (4) A, B, C, D, and E

13. A capacitor of capacitance $C_1 = 1\mu F$ can withstand maximum voltage $V_1 = 6$ kV (kilo-volt) and another capacitor of capacitance $C_2 = 3\mu F$ can withstand maximum voltage $V_2 = 4$ kV. When the two capacitors are connected in series, the combined system can withstand a maximum voltage of :-

(1) 4 kV (2) 6 kV (3) 8 kV (4) 10 kV

14. Water boils in an electric kettle in 15 minutes after switching on. If the length of the heating wire is decreased to 2/3 of its initial value, then the same amount of water will boil with the same supply voltage in

(1) 15 minutes (2) 12 minutes (3) 10 minutes (4) 8 minutes
15. A wire abc is carrying current i. It is bent as shown in fig and is placed in a uniform magnetic field of magnetic induction \( \vec{B} \). Length ab = \( \ell \) and \( \angle abc = 45^\circ \). The ratio of force on ab and on bc is

\[
\frac{1}{\sqrt{2}} \quad (1) \quad \frac{2}{3} \quad (3) \quad \frac{2}{3} \quad (4)
\]

16. If mass M is split into two parts m and \( (M-m) \) which are then separated by a distance, the ratio of mass \( m/M \) that maximises the gravitational force between the two parts is:

\[
(1) \quad 1 : 2 \quad (2) \quad 1 : 1 \quad (3) \quad 2 : 1 \quad (4) \quad 1 : 4
\]

17. A semicircular ring of radius R is given a uniform charge Q. Then the electric field and electric potential at its centre will be -

\[
1. \quad \frac{Q}{4\pi \varepsilon_0 R^2}, \quad \frac{Q}{4\pi \varepsilon_0 R} \quad (1) \quad \frac{Q}{2\varepsilon_0 \pi R^2}, \quad \frac{Q}{4\pi \varepsilon_0 R} \quad (2) \quad \frac{Q}{4\pi \varepsilon_0 R}, \quad \frac{Q}{2\varepsilon_0 R} \quad (3) \quad \text{zero, zero} \quad (4)
\]

18. A capacitor of 4\( \mu \)F is connected as shown in the circuit. The internal resistance of the battery is 0.5\( \Omega \). The amount of charge on the capacitor plates will be:

\[
(1) \quad 0 \quad (2) \quad 4\mu \text{C} \quad (3) \quad 16\mu \text{C} \quad (4) \quad 8\mu \text{C}
\]
19. A wire has a non-uniform cross-sectional area as shown in figure. A steady current $i$ flows through it. Which one of the following statements is correct?

1. The drift speed of electron is constant
2. The drift speed increases on moving from A to B
3. The drift speed decreases on moving from A to B
4. The drift speed varies randomly

20. An infinitely long conductor PQR is bent to form a right angle as shown. A current $I$ flows through PQR. The magnetic field due to this current at the point M is $H_1$. Now another infinitely long straight conductor QS is connected at Q so that the current is $I/2$ in QR as well as in QS, the current in PQ remaining unchanged. The magnetic field at M is now $H_2$. The ratio $H_1/H_2$ is given by

1. $\frac{1}{2}$
2. $1$
3. $\frac{2}{3}$
4. $2$

21. A planet revolves in an elliptical orbit around the sun. The linear speed of the planet will be maximum at:

1. A
2. B
3. C
4. D

22. Some equipotential surfaces are shown in the figure. The magnitude and direction of the electric field is:

1. 100 V/m making angle $120^\circ$ with the x-axis
2. 100 V/m making angle $60^\circ$ with the x-axis
3. 200 V/m making angle $120^\circ$ with the x-axis
4. None of the above
23. An uncharged capacitor with a solid dielectric is connected to a similar air capacitor charged to a potential of \( V_0 \). If the common potential after sharing of charges becomes \( V \), then the dielectric constant of the dielectric must be

\[
\begin{align*}
(1) \quad & \frac{V_0}{V} \\
(2) \quad & \frac{V}{V_0} \\
(3) \quad & \frac{(V_0 - V)}{V} \\
(4) \quad & \frac{(V_0 - V)}{V_0}
\end{align*}
\]

24. Two resistances \( R_1 \) and \( R_2 \) provide series to parallel equivalents as \( \frac{n}{1} \) then the correct relationship is

\[
\begin{align*}
(1) \quad & \left( \frac{R_1}{R_2} \right)^2 + \left( \frac{R_2}{R_1} \right)^2 = n^2 \\
(2) \quad & \left( \frac{R_1}{R_2} \right)^{3/2} + \left( \frac{R_2}{R_1} \right)^{3/2} = n^{3/2} \\
(3) \quad & \left( \frac{R_1}{R_2} \right)^{1/2} + \left( \frac{R_2}{R_1} \right)^{1/2} = n^{1/2}
\end{align*}
\]

25. A charge particle, having charge \( q \) accelerated through a potential difference \( V \) enters in a perpendicular magnetic field in which it experiences a force \( F \). If \( V \) is increased to 5\( V \), the particle will experience a force :-

\[
\begin{align*}
(1) \quad & F \\
(2) \quad & 5F \\
(3) \quad & \frac{F}{5} \\
(4) \quad & \sqrt{5}F
\end{align*}
\]

26. A satellite is orbiting around the earth with a period \( T \). If the earth suddenly shrinks to half its radius without change in mass, the period of revolution of the satellite will be:

\[
\begin{align*}
(1) \quad & \frac{T}{\sqrt{2}} \\
(2) \quad & \frac{T}{2} \\
(3) \quad & T \\
(4) \quad & 2T
\end{align*}
\]
27. Three charges $Q$, $+q$ and $+q$ are placed at the vertices of a right-angled isosceles triangle as shown. The net electrostatic energy of the configuration is zero if $Q$ is equal to -

\[ (1) \frac{-q}{1+\sqrt{2}} \quad (2) \frac{-2q}{2+\sqrt{2}} \quad (3) -2q \quad (4) +q \]

28. In an isolated parallel plate capacitor of capacitance $C$, the four surface have charges $Q_1$, $Q_2$, $Q_3$ and $Q_4$ as shown. The potential difference between the plates is:

\[ (1) \frac{Q_1 + Q_2 + Q_3 + Q_4}{2C} \quad (2) \frac{Q_2 + Q_3}{2C} \quad (3) \frac{Q_2 - Q_3}{2C} \quad (4) \frac{Q_1 + Q_4}{2C} \]

29. Figure represents a part of the closed circuit. The potential difference between points $A$ and $B$ ($V_A - V_B$) is

\[ (1) + 9 \text{ V} \quad (2) - 9 \text{ V} \quad (3) + 3 \text{ V} \quad (4) + 6 \text{ V} \]

30. A small bar magnet $A$ oscillates in a horizontal plane with a period $T$ at a place where the angle of dip is $60^\circ$. When the same needle is made to oscillate in a vertical plane coinciding with the magnetic meridian, its period will be

\[ (1) \frac{T}{\sqrt{2}} \quad (2) T \quad (3) \sqrt{2T} \quad (4) 2T \]
31. According to Kepler's law, the period of revolution of a planet (T) and its mean distance from the sun (R) are related by the equation:

(1) \( T^2R = \text{constant} \)
(2) \( T^2R^{-3} = \text{constant} \)
(3) \( TR^3 = \text{constant} \)
(4) \( T^2R^3 = \text{constant} \)

32. The magnitude of work done in placing four charges at the corners of a square of side 'a' as shown in the figure, will be -

\[
(1) \frac{(4-\sqrt{2})Kq^2}{a} \quad (2) \frac{(4+\sqrt{2})Kq^2}{a} \\
(3) \frac{(4-\sqrt{2})Kq^2}{a^2} \quad (4) \frac{(4+\sqrt{2})Kq^2}{a^2}
\]

33. The capacity of a parallel plate condenser is \( C_0 \). If a dielectric of relative permittivity \( \varepsilon_r \) and thickness equal to one fourth the plate separation is placed between the plates, then its capacity becomes \( C \). The value of \( \frac{C}{C_0} \) will be -

\[
(1) \frac{5\varepsilon_r}{4\varepsilon_r+1} \quad (2) \frac{4\varepsilon_r}{3\varepsilon_r+1} \\
(3) \frac{3\varepsilon_r}{2\varepsilon_r+1} \quad (4) \frac{2\varepsilon_r}{\varepsilon_r+1}
\]

34. The resistivity of a potentiometer wire is \( 40 \times 10^{-8} \) \( \Omega \) m and its area of cross section is \( 8 \times 10^{-6} \) m\(^2\). If 0.2 amp. Current is flowing through the wire, the potential gradient will be

\[
(1) 10^{-2} \text{ volt/m} \quad (2) 10^{-1} \text{ volt/m} \\
(3) 3.2 \times 10^{-2} \text{ volt/m} \quad (4) 1 \text{ volt/m}
\]
35. The coil of a galvanometer consists of 100 turns and effective area of 1 square cm. The restoring couple is $10^{-8}$ N-m. The magnetic field between the pole pieces is 5 T. The current sensitivity of this galvanometer will be
   (1) $5 \times 10^4$ rad/µA  
   (2) $5 \times 10^{-6}$ per amp  
   (3) $2 \times 10^{-7}$ per amp  
   (4) 5 rad./µA

36. The given figure shows the motion of a planet around the sun S in an alliptical orbit with the sun at the focus. The shaded areas A and B are also shown in the figure which can be assumed to be equal. If $t_1$ and $t_2$ represent the time taken for the planet to move from a to b and c to d respectively, then:

   (1) $t_1 < t_2$
   (2) $t_1 > t_2$
   (3) $t_1 = t_2$
   (4) from the given information the relation between $t_1$ and $t_2$ cannot be determined

37. A dipole with dipole moment p is placed in an electric field E. The dipole is displaced from its equilibrium position AB to A'B' as shown in fig. Now what will be the work required, so that the point A' coincides with B.

   (1) $\frac{2pE(2 + \sqrt{3})}{2}$
   (2) $\frac{pE(2 + \sqrt{3})}{2}$
   (3) $\frac{2pE(2 - \sqrt{3})}{2}$
   (4) $\frac{pE(2 - \sqrt{3})}{2}$
38. Four plates are arranged as shown in the diagram. If area of each plate is A and the distance between two neighbouring parallel plates is d, then the capacitance of this system between A and B will be:

\[ \frac{4 \varepsilon_0 A}{d} \]  
\[ \frac{3 \varepsilon_0 A}{d} \]  
\[ \frac{2 \varepsilon_0 A}{d} \]  
\[ \frac{\varepsilon_0 A}{d} \]

39. Two wires of equal diameters of resistivity \( \rho_1 \) and \( \rho_2 \) and length \( x_1 \) and \( x_2 \) respectively are joined in series. The equivalent resistivity is –

\[ \frac{\rho_1 x_1 + \rho_2 x_2}{x_1 + x_2} \]  
\[ \frac{\rho_1 x_1 - \rho_2 x_2}{x_1 - x_2} \]  
\[ \frac{\rho_1 x_2 + \rho_2 x_2}{x_1 + x_2} \]  
\[ \frac{\rho_1 x_1 - \rho_2 x_2}{x_1 - x_2} \]

40. What will be the resultant magnetic field at origin due to four infinite length wires. If each wire produces magnetic field ‘B’ at origin

\[ 4B \]  
\[ \sqrt{2}B \]  
\[ 2\sqrt{2}B \]  
\[ 0 \]
41. Orbital velocity of an object of mass m is proportional to:

(1) \( m^0 \)  
(2) m  
(3) \( m^2 \)  
(4) \( \frac{1}{m} \)

42. Mark the wrong statement:

(1) Equipotential surface never cross each other
(2) For a uniformly charged nonconducting sphere, the electric potential at the centre of the sphere is 1.5 times that at the surface
(3) If potential in a certain region is non zero constant, then the electric field in that region will also be non zero constant
(4) Inside a spherical charged shell, the electric field is zero but the electric potential is the same as that at the surface.

43. The V-i graph for a conductor at temperature \( T_1 \) and \( T_2 \) are as shown in the figure. \((T_2 - T_1)\) is proportional to:

(1) \( \cos \theta \)  
(2) \( \sin \theta \)  
(3) \( \cot \theta \)  
(4) \( \tan \theta \)

44. A uniform wire connected across a supply produces heat \( H \) per second. If the wire is cut into \( n \) equal parts and all the parts are connected in parallel across the same supply, the heat produced per second will be

(1) \( \frac{H}{n^2} \)  
(2) \( n^2H \)  
(3) \( nH \)  
(4) \( \frac{H}{n} \)

45. A coil of 50 turns is situated in a magnetic field \( B = 0.25 \text{ weber/m}^2 \) as shown in figure. A current of 2A is flowing in the coil. Torque acting on the coil will be

(1) 0.15 N-m  
(2) 0.3 N-m  
(3) 0.45 N-m  
(4) 0.6 N-m
46. The IUPAC name of \( \text{CH}_3\text{CH}(\text{CH}_2\text{CH}_3)\text{CH}(\text{CH}_2\text{CH}_3)\text{CH}_3 \) is

(1) 1, 1-Diethyl-2, 2-dimethylpentane
(2) 4, 4-Dimethyl-5, 5-diethylpentane
(3) 5, 5-Diethyl-4, 4-dimethylpentane
(4) 3-Ethyl-4, 4-dimethylheptane

47. The probable structure of ‘X’ is

(1) \( \text{CH}_3\text{CH}(\text{CH}_2\text{CH}_3)\text{CH}(\text{CH}_2\text{OH})\text{OH} \)
(2) \( \text{CH}_3\text{CH}(\text{CH}_2\text{CH}_3)\text{CH}(\text{CH}_2\text{OH})\text{OH} \)
(3) \( \text{CH}_3\text{CH}(\text{CH}_2\text{CH}_3)\text{CH}(\text{CH}_2\text{OH})\text{OH} \)
(4) \( \text{CH}_3\text{CH}(\text{CH}_2\text{CH}_3)\text{CH}(\text{CH}_2\text{OH})\text{OH} \)

48. Which one of the following reactions would produce secondary alcohol

(1) \( \text{C}_6\text{H}_5\text{C} = \text{C} - \text{CH}_3 \xrightarrow{1. \text{CH}_3\text{MgBr} \ 2. \text{H}^+} \)
(2) \( \text{C}_6\text{H}_5\text{C} = \text{C} - \text{CH}_3 \xrightarrow{1. \text{LiAlH}_4 \ 2. \text{H}^+} \)
(3) \( \text{CH}_3\text{CHO} \xrightarrow{1. \text{LiAlH}_4 \ 2. \text{H}^+} \)
(4) \( \text{CH}_3 - \text{C} = \text{CH}_3 \xrightarrow{1. \text{OH} \ 2. \text{Br}_2} \)

49. In the given reaction:

\( \text{CH}_3 - \text{C} = \text{C} - \text{CH}_3 \xrightarrow{\text{HIO}_3} (\text{P}) + (\text{Q}) \)

(P) and (Q) respectively be:

(1) \( \text{CH}_3\text{CHO} \) and \( \text{CH}_3\text{CHO} \)
(2) \( \text{CH}_3\text{COCH}_3 \) and \( \text{CH}_3\text{CHO} \)
(3) \( \text{CH}_3\text{COCH}_3 \) and \( \text{CH}_3\text{COCH}_3 \)
(4) \( \text{CH}_3\text{COOH} \) and \( \text{CH}_3\text{COCH}_3 \)
50. In which of the following compounds x-atom can be easily substituted by a stronger nucleophile: -

(1) X
(2) X
(3) X
(4) X

51. The IUPAC name of the compound

\[
\text{OH} \quad \text{CH}_3
\]

is -

(1) 4-Methylcyclopent-1-en-2-ol
(2) 5-Methylcyclopent-2-en-1-ol
(3) 2-Methylcyclopent-4-en-1-ol
(4) 3-Methylcyclopent-1-en-2-ol

52. Benzene on reaction with ‘A’ in \( \text{AlCl}_3 \) forms

\[
\text{O} \quad \text{Cl}
\]

which on reaction with

‘B’ forms

‘A’ and ‘B’ are

(1) \( \text{Zn (Hg)} + \text{conc. HCl} \)
(2) \( \text{LiAlH}_4 \)
(3) \( \text{NaBH}_4 \)
(4) \( \text{Zn (Hg)} + \text{conc. HCl} \)
53. What is the compound C in the following sequence of:

\[
\text{Phenol} \xrightarrow{\text{NaOH}} A \xrightarrow{\text{CO}_2, 410K} B \xrightarrow{\text{HCl}} C
\]

(1) Benzoic acid  (2) Salicylic acid  (3) Benzaldehyde  (4) Salicyladehyde

54. Rossemaund reduction cannot be used for the preparation of:

(1) \( C_6H_5CHO \)  (2) \( CH_3CHO \)  (3) \( 3\text{C}H\text{C}H\text{C}H\text{O} \)  (4) \( HCHO \)

55. \( CH_3\text{Br} + Nu \xrightarrow{\Theta} CH_3\text{Nu} + Br^\Theta \)

The decreasing order of the rate of the above reaction with nucleophiles \( \Theta \) a to d is:

(a) \( \text{PhO}^\Theta \)  (b) \( \text{AcO}^- \)  (c) \( \text{HO}^\Theta \)  (d) \( \text{NH}_2^\Theta \)

(1) \( d \succ c \succ a \succ b \)  (2) \( a \succ b \succ c \succ d \)  (3) \( c \succ d \succ a \succ b \)  (4) \( d \succ b \succ c \succ a \)

56. Which of the following on enolisation give aromatic compound?

(1) \( \text{ } \)  (2) \( \text{ } \)  (3) \( \text{ } \)  (4) \( \text{ } \)

57. In an SN1 reaction on chiral centres. There is:

(1) Inversion more than retention leading to partial racemization.
(2) 100% Inversion
(3) 100% Retention
(4) 100% Racemization

58. Ethanol reacts with \( H_2SO_4 \) at 140º to form:

(1) Ethene  (2) Ethyl hydrogen sulphate  (3) Ethoxy ethane  (4) None

59. The correct order of reactivity of following alcohols with HBr is:

(I) 1-Phenylpropan-1-ol  (II) 1-Phenylpropan-2-ol  (III) 3-Phenylpropan-1-ol

(1) \( I \succ II \succ III \)  (2) \( III \succ II \succ I \)  (3) \( I \succ III \succ II \)  (4) \( III \succ I \succ II \)
60. Which of the following forms acetaldehyde when heated with aqueous KOH:

- (1) CH₂Cl₂CH₂Cl
- (2) CH₃C₂H₂ Cl₂
- (3) CH₃–COCl
- (4) CH₃CH₂Cl

61. Which of the following compound has ‘S’ configuration?

- (1) CH₃OH
- (2) CH₃OH
- (3) OHCH₃
- (4) BrCH₃HO

62. In the reaction

\[\text{CH}_3\text{CH}_2\text{CHBrCH}_3 + (\text{CH}_3)_2\text{COK} \rightarrow \text{main product}\]

- (1) CH₃CH₂CH₂CH₃OC(CH₃)₃
- (2) CH₃CH₂CH₂CH₃OH
- (3) CH₂CH₂CH=CH₂
- (4) CH₃CH=CHCH₃

63. In favour of benzaldehyde which of the following statement is incorrect?

- (1) –CHO group of benzaldehyde is meta directing
- (2) Benzaldehyde undergoes Claisen condensation
- (3) Benzaldehyde on oxidation gives phenyl acetic acid
- (4) Benzaldehyde on reduction gives benzyl alcohol

64. Which order is correct?

- (1) tendency of ester formation: OH > OH > OH
- (2) boiling point: Pentan-1-ol > Pentan-2-ol > 2,2-Dimethylpropanol
- (3) acidic strength: 3-Nitrophenol > Phenol > 4-Methylphenol > Propan-1-ol
- (4) All of these
65. \[ \text{Br} \quad \text{Br} \xrightarrow{?} \text{H} \rightarrow \text{H} \]

Suitable reagent for above conversion will be:
(1) Alc. KOH
(2) Alc. KOH and NaNH₂
(3) Aq. KOH and NaNH₂
(4) Zn/CH₃OH

66. How many Sigma and Pi bond are present in \( \text{C}_6\text{H}_5\text{CN} \)?
(1) 13 \( \sigma \) and 4 \( \pi \)
(2) 13 \( \sigma \) and 5 \( \pi \)
(3) 12 \( \sigma \) and 8 \( \pi \)
(4) 12 \( \sigma \) and 5 \( \pi \)

67. \[ \text{CH}_3 - \text{C} \equiv \text{C} - \text{CH}_3 \xrightarrow{\text{H}^+ / \text{Hg}^{++} / \text{H}_2\text{O}} \text{A} \]

\[ \text{CH}_3 - \text{CH}_2 - \text{C} \equiv \text{CH} \xrightarrow{\text{H}^+ / \text{Hg}^{++} / \text{H}_2\text{O}} \text{B} \]

The compounds ‘A’ and ‘B’ are related as:
(1) Identical compounds
(2) Tautomer
(3) Position isomer
(4) Functional group isomer

68. Which of the following gives negative iodoform test?
(1) \( \text{CH}_3\text{CH}_2\text{OH} \)
(2) \( \text{CH}_3\text{CH}_2\text{CH}_2\text{OH} \)
(3) \( \text{C}_6\text{H}_5 - \text{CH} - \text{CH}_3 \)

OH
(4) \( \text{CH}_3 - \text{CH} - \text{CH}_3 \)

OH

69. Which of the following will not give Hoffmann Bromamide reaction?
(1) \( \text{CH}_3 - \text{C} - \text{NH}_2 \)
(2) \( \text{O} \quad \text{C} - \text{NH}_2 \)
(3) \( \text{CH}_3 - \text{C} - \text{NH} - \text{Br} \)
(4) \( \text{Ph} - \text{C} - \text{NH} - \text{CH}_3 \)
70. Which form of ethylene glycol will be most stable
   (1) Gauche
   (2) Anti form
   (3) Fully eclipsed
   (4) Partially eclipsed

71. Which of the following is ortho-para director towards electrophilic substitution reaction?
   (1) CN
   (2) NO$_2$
   (3) SO$_3$H
   (4) CH$_3$

72. Which of the following will react with Na:
   (1) CH = CH
   (2) CH$_3$OH
   (3) CH$_3$–COOH
   (4) All of above

73. Which of the following is the product formed when phenol is treated with dilute nitric acid
   (1) o-Nitrophenol
   (2) p-Nitrophenol
   (3) 2,4,6-Trinitrophenol
   (4) 1& 2 both

74. P give positive test with
   (1) Ceric ammonium nitrate
   (2) aq. NaHCO$_3$
   (3) Neutral FeCl$_3$
   (4) Fehling solution
75. \( \text{Ph–MgCl} \xrightarrow{\text{Hydrolysis}} \text{Product} \)

Product will be :-

(1) \( \text{OH} \)
(2) \( \text{CH}_3 \)
(3) \( \text{H} \)
(4) \( \text{CH}_3 \)

76. Which is a example of electrophile?

(1) \( \text{NO}_2^- \)
(2) \( \text{CCl}_2 \)
(3) \( \text{CH}_3 \)
(4) \( \text{NH}_3 \)

77. Arrange in decreasing order of reactivity with electrophilic addition reaction :-

(I) \( \text{CH}_2=\text{CH}_2 \)  
(II) \( \text{CH}_3–\text{CH}=\text{CH}_2 \)  
(III) \( \text{CH}_2=\text{CH}=\text{CH}_2 \)  
(IV) \( \text{CH}_3–\text{CH}=\text{CH}–\text{CH}_3 \)  
(1) \( \text{III} > \text{I} > \text{II} > \text{IV} \)  
(2) \( \text{III} > \text{IV} > \text{II} > \text{I} \)  
(3) \( \text{II} > \text{IV} > \text{III} > \text{I} \)  
(4) \( \text{I} > \text{II} > \text{III} > \text{IV} \)

78. \( \text{C}_6\text{H}_5\text{CHO} \) and \( \text{HCHO} \) react with \( \text{NaOH} \) to give -

(1) \( \text{C}_6\text{H}_5\text{CH}_2\text{OH} + \text{HCOONa} \)  
(2) \( \text{C}_6\text{H}_5\text{COONa} + \text{CH}_3\text{OH} \)  
(3) \( \text{C}_6\text{H}_5\text{COOH} + \text{CH}_4 \)  
(4) None of these

79. Hinsberg reagent is

(1) Ammonical solution of \( \text{AgNO}_3 \)  
(2) Neutral \( \text{FeCl}_3 \)  
(3) Benzene sulphonyl chloride  
(4) para- toluene sulphonyl chloride (Tosyl)

80. When benzyl toluene sulphonyl chloride (Tosyl) then products will be :-

(1) \( \text{CH}_2–\text{OH} + \text{CH}_3–\text{I} \)
(2) \( \text{CH}_2–\text{I} + \text{CH}_3–\text{I} \)
(3) \( \text{CH}_2–\text{I} + \text{CH}_3–\text{OH} \)
(4) \( \text{CH}_2–\text{OH} + \text{CH}_3–\text{OH} \)
81. Which of the following is most acidic

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>(1)</td>
<td>CH_2 - COOH NO_2</td>
</tr>
<tr>
<td>(2)</td>
<td>CH_2 - COOH F</td>
</tr>
<tr>
<td>(3)</td>
<td>CH_2 - COOH OCH_3</td>
</tr>
<tr>
<td>(4)</td>
<td>CH_2 - COOH CH</td>
</tr>
</tbody>
</table>

82. CH\_2 = CHCH\_2CH = CH\_2 \rightarrow \text{NBS} \rightarrow X (\text{Major})

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<tbody>
<tr>
<td>(1)</td>
<td>CH_2 = CH - CH = CH - CH_2</td>
</tr>
<tr>
<td>(2)</td>
<td>CH_2 = CH - CH = CH - CH_2 - Br</td>
</tr>
<tr>
<td>(3)</td>
<td>CH_2 = CHCH_2CH = CHBr</td>
</tr>
<tr>
<td>(4)</td>
<td>CH_2 = CHCH_2C = CH</td>
</tr>
</tbody>
</table>

83. Which of the following doesn't reduce Fehling's solution?

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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>(1)</td>
<td>CH_3 - CHO</td>
</tr>
<tr>
<td>(2)</td>
<td>H - CHO</td>
</tr>
<tr>
<td>(3)</td>
<td>H - C - OH</td>
</tr>
<tr>
<td>(4)</td>
<td>CH_3 - C - CH_3</td>
</tr>
</tbody>
</table>

84. Ethyl isocyanide on hydrolysis in acidic medium generates

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<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Ethylamine and methanoic acid</td>
</tr>
<tr>
<td>(2)</td>
<td>Propanoic acid and ammonium salt.</td>
</tr>
<tr>
<td>(3)</td>
<td>Ethanolic acid and ammonium salt.</td>
</tr>
<tr>
<td>(4)</td>
<td>Methyl amine and ethanoic acid.</td>
</tr>
</tbody>
</table>

85. In which of the following benzoic acid will not be formed as a major product:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>CH_2 - CH_2 - CH_3</td>
</tr>
<tr>
<td>(2)</td>
<td>Ph - MgX + CO_2 \rightarrow (1) \text{dry ether} (2) H_2O^{15}</td>
</tr>
<tr>
<td>(3)</td>
<td>CH_2 = CH - CH = CH</td>
</tr>
<tr>
<td>(4)</td>
<td>NaOH/Br_2</td>
</tr>
</tbody>
</table>

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81. निम्न नमूने से कौन सा खास घटक का आँक ली जा चुका है?

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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>(1)</td>
<td>CH_2 - COOH NO_2</td>
</tr>
<tr>
<td>(2)</td>
<td>CH_2 - COOH F</td>
</tr>
<tr>
<td>(3)</td>
<td>CH_2 - COOH OCH_3</td>
</tr>
<tr>
<td>(4)</td>
<td>CH_2 - COOH CH</td>
</tr>
</tbody>
</table>

82. CH\_2 = CHCH\_2CH = CH\_2 \rightarrow \text{NBS} \rightarrow X (युक्ति)

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>(1)</td>
<td>CH_2 = CH - CH = CH - CH_2</td>
</tr>
<tr>
<td>(2)</td>
<td>CH_2 = CH - CH = CH - CH_2 - Br</td>
</tr>
<tr>
<td>(3)</td>
<td>CH_2 = CHCH_2CH = CHBr</td>
</tr>
<tr>
<td>(4)</td>
<td>CH_2 = CHCH_2C = CH</td>
</tr>
</tbody>
</table>

83. निम्न में से कौन सी हलिंग गिल्ली के अपवादों नहीं करता है?

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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>(1)</td>
<td>CH_3 - CHO</td>
</tr>
<tr>
<td>(2)</td>
<td>H - CHO</td>
</tr>
<tr>
<td>(3)</td>
<td>H - C - OH</td>
</tr>
<tr>
<td>(4)</td>
<td>CH_3 - C - CH_3</td>
</tr>
</tbody>
</table>

84. एथिल लाइट ह्याने भारी हद की अली घाट घण्य घण्य में सब अभिक्रिया से उत्पाद नहीं होता है।

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<table>
<thead>
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</thead>
<tbody>
<tr>
<td>(1)</td>
<td>एथिल लाइट मीहल्ला में थे नाई हैं क आँक ला</td>
</tr>
<tr>
<td>(2)</td>
<td>परं वे नाई हैं एकः एकः निम्न लिप्य</td>
</tr>
<tr>
<td>(3)</td>
<td>ऐसे नाई हैं एकः अकः निम्न लिप्य</td>
</tr>
<tr>
<td>(4)</td>
<td>मे एकः लाइट चेयर्स ऐसे नाई हैं क आँक ला</td>
</tr>
</tbody>
</table>

85. निम्न में कौन सी अभिक्रिया में वे - ज सब अक लग उस नहीं बनाने जा गई?
86. Which possess maximum heat of hydrogenation.
   (1) CH$_2$=CH$_2$
   (2) CH$_2$–CH=CH$_2$
   (3) CH$_3$C=CH
   (4) CH$_3$C=C

87. Which one of the following compounds will be most reactive for $S_N$1 reactions:
   (1) OI
   (2) OCl
   (3) OBr
   (4) OCl

88. $\text{CH}_3 - C = N + \text{H}_2\text{O} \xrightarrow{\text{H}^+} \text{A} \xrightarrow{\text{NaOH} + \text{CaO} \Delta} \text{B}$. 
   B is?
   (1) CH$_3$ – C – NH$_2$
   (2) CH$_3$ – C – OH
   (3) CH$_3$ – C – ONa
   (4) CH$_4$

89. Nitrobenzene gives N-phenyl hydroxylamine by
   (1) Sn/HCl
   (2) Zn/NaOH
   (3) H$_2$/Pd-C
   (4) Zn/NH$_4$Cl

90. $\xrightarrow{(\text{CH}_3\text{CO})_2\text{O}}$ B $\xrightarrow{\text{HNO}_2 + \text{H}_2\text{SO}_4 \ 258K}$ C $\xrightarrow{\text{H}_2\text{O}^+}$ P-Nitroaniline
   Identify A
   (1) Acetanilide
   (2) Nitrobenzene
   (3) Aniline
   (4) Acetophenone
91. All of the following statements are correct, except:-
(1) In mammals allantois is not excretory in function.
(2) Yolk sac is an extra embryonic membrane that helps in the nourishment of embryo in general.
(3) Chorioallantoic membrane develops villi and contribute much to the development of placenta.
(4) Amnion is the outermost layer containing amniotic fluid that acts as a shock absorber to the soft embryo.

92. What is the main key concept of Darwinian theory of evolution :-
(A) Natural selection
(B) Branching descent
(C) Mutation
(D) Genetic variation

93. Which of the following factors help in biological evolution but is not considerd the basic factor for evolution?
(A) Adaptation
(B) Natural selection
(C) Mutation
(D) Variations
(1) A, B and D (2) B and C, D (3) A, B, C and D (4) Only C

94. Match the following and choose the correct combination from the option given :

<table>
<thead>
<tr>
<th>Column–I</th>
<th>Column–II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Rr × Rr</td>
<td>(i) 1 : 1</td>
</tr>
<tr>
<td>(B) Rr × rr</td>
<td>(ii) 3 : 1</td>
</tr>
<tr>
<td>(C) RrYy × RrYy</td>
<td>(iii) 1 : 1 : 1 : 1</td>
</tr>
<tr>
<td>(D) RrYy × rryy</td>
<td>(iv) 9 : 3 : 3 : 1</td>
</tr>
</tbody>
</table>

(1) A–ii, B–iv, C–iii, D–i
(2) A–i, B–iii, C–ii, D–iv
(3) A–iv, B–iii, C–ii, D–i
(4) A–ii, B–i, C–iv, D–iii
95. Select the statement, which is not correct?
(1) Polygenic character is controlled by multiple alleles.
(2) In case of polygenic inheritance, many intermediate phenotypes are found between two extreme phenotypes.
(3) Human height and skin colour are polygenic.
(4) The expression of polygenic characters is also regulated by environment.

96. Given figure is a highly simplified representation of human sex chromosomes from a karyotype. The gene a and b could be for:-
(1) Colour blindness and body height
(2) Attached ear lobe and rhesus blood group
(3) Haemophilia and sry gene
(4) Phenyl ketonuria and haemophilia

97. In a dihybrid cross, 2000 individuals are produced in F₂ generation. Approximately, how many will be phenotypically different from parents?
(1) 1250 (2) 1000
(3) 1500 (4) 750

98. In Lac-operon three types of enzymes are formed, which of the following enzyme is not formed in Lac operon?
(1) β-galactosidase (2) permease
(3) Transacetylase (4) Alkaline phosphatase

99. Match the following

<table>
<thead>
<tr>
<th>Column I</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Aspergillus niger</td>
<td>(i) Acetic acid</td>
</tr>
<tr>
<td>(B) Acetobacter aceti</td>
<td>(ii) Butyric acid</td>
</tr>
<tr>
<td>(C) Clostridium butylicum</td>
<td>(iii) Lactic acid</td>
</tr>
<tr>
<td>(D) Lactobacillus</td>
<td>(iv) Citric acid</td>
</tr>
</tbody>
</table>

   (1) A-(iii), B-(i), C-(ii), D-(iv)
   (2) A-(iv), B-(i), C-(ii), D-(iii)
   (3) A-(iv), B-(ii), C-(i), D-(iii)
   (4) A-(i), B-(ii), C-(iii), D-(iv)
100. How many of following statements are not incorrect?
   A. In over 60 percent of angiosperms, pollen grains are shed at 2 celled stage.
   B. Each cell of sporogenous tissue is a potential pollen or microspore mother cell.
   C. A multicarpellary apocarpous gynoecium is present in Michelia.
   D. Pollination by water is quite rare in flowering plants is limited to about 30 genera mostly dicotyledons.
   E. Chasmogamous flowers produce assured seed-set even in absence of pollinators.
   (1) Three (2) Two (3) Four (4) One

101. After menopause there is rise in urinary excretion of :-
   (1) FSH (2) LH (3) Progesterone (4) Estrogens

102. The process of evolution of different species in a given geographical area starting from a point and literally radiating to other area of geography (habitat) is called :-
   (1) Convergent evolution (2) Parallel evolution (3) Adaptive radiation (4) Both (1) and (2)

103. During evolution the animal which evolved in to the first amphibian that lived on both land and water were :-
   (1) Sauropsids (2) Synapsids (3) Lobefins (4) Therapsids

104. A test cross is carried out to :-
   (1) Assess the number of alleles of a gene (2) Determine whether two species or varieties will breed successfully (3) Determine the genotype of a plant. (4) Predict whether two traits are linked
105. Given below is the diagram related to sickle-cell anaemia, which is an autosomal recessive trait. In this identify X, Y and Z:

Normal Hb (A)gene →CTC... →GAG...
mRNA →GAG...

HbA peptide

<table>
<thead>
<tr>
<th>Val</th>
<th>His</th>
<th>Leu</th>
<th>Thr</th>
<th>Pro</th>
<th>Glu</th>
<th>Glu</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

Sickle-cell Hb (S)gene ......X...... ......Y......

mRNA →GUG...

HbS peptide

<table>
<thead>
<tr>
<th>Val</th>
<th>His</th>
<th>Leu</th>
<th>Thr</th>
<th>Pro</th>
<th>Z</th>
<th>Glu</th>
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</thead>
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<td>1</td>
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<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

(1) X – CAC ; Y – GTG ; Z – Val
(2) X – CAC ; Y – GTG ; Z – Phe
(3) X – GTG ; Y – CAC ; Z – Val
(4) X – CAC ; Y – GTG ; Z – His

106. Which of the given is not governed by mitochondrial genes?
(1) Kappa particles in Paramecium
(2) Petite in yeast
(3) Poky in Neurospora
(4) Cytoplasmic male sterility

107. Baldness in humans is a sex influenced trait & the gene is carried on autosomes. If both the parents are heterozygous for this gene, what will be the probability of getting normal daughters & normal sons respectively?
(1) \(\frac{1}{4}, \frac{1}{4}\)
(2) \(\frac{3}{4}, \frac{3}{4}\)
(3) \(\frac{3}{4}, \frac{3}{4}\)
(4) \(\frac{1}{4}, \frac{3}{4}\)

108. Select the incorrect statement.
(1) DNA from single cell is enough to perform DNA fingerprinting analysis
(2) DNA fingerprinting has much wider applications in determining population & genetic diversities
(3) The VNTR belongs to a class of non repetitive DNA
(4) DNA fingerprint differs from individual to individual in a population except in the case of monozygotic twins
109. In RNAi technique, which of the following will binds to the m-RNA & destroy it:-
(1) si RNA    (2) ds RNA
(3) RISC     (4) Dicer complex

110. If the number of chromosomes in megaspore mother cells is 28. What would be the number of chromosome in aleurone layer cells?
(1) 14    (2) 28
(3) 42    (4) 56

111. Sertoli cells are found:-
(1) between the seminiferous tubules
(2) in the germinial epithelium of ovary
(3) in the interstitium of testicular lobules
(4) in the germinal epithelium of seminiferous tubules

112. In Galapagos island, Darwin found different varieties of finches, originated from a common ancestor. The original variety of these finches was:-
(1) Insectivorous    (2) Vegetarian
(3) Seed-eating      (4) Cactus eating

113. Which of the following condition is true for co-dominance?
(1) Phenotype of F₁ resembled either of the two parents.
(2) Phenotype of F₁ did not resemble either of two parents.
(3) Phenotype of F₁ resembles both parents.
(4) Reported in flower colour of 4 o’ clock plant

114. Gene a, b and c assort independently and are recessive to their respective alleles. A, B & C. Two triple heterozygous AaBbCc individual are crossed. What is the probability of offspring will be phenotypically dominant for all the three genes?
(1) $\frac{2}{64}$    (2) $\frac{27}{64}$
(3) $\frac{1}{64}$    (4) $\frac{6}{64}$
116. Given Diagram represents: -

- Segregation
- Dominance
- Crossing over
- Linkage

117. Sex influenced genes are: -
(a) Autosomal which express in one sex only
(b) Expressed in both, but more frequently in one sex.
(c) Found on idiochromosomes
(d) Influenced by the sex of the bearer

- a and d are correct
- b and c are correct
- b and d are incorrect
- a and c are incorrect

118. Select the incorrect statement for RFLP: -
(1) It is the basis of DNA fingerprinting.
(2) It is due variable length of restricted fragments.
(3) It is due to variable number of minisatellites.
(4) It is same for all human beings.

119. The bread is soft and porous when the yeast cells are mixed in the lump of wheat flour because: -
(1) Yeast produces benzoic acid
(2) Evolution of CO₂ makes the bread spongy
(3) Yeast is soft so flour also becomes soft
(4) Yeast produces acetic acid & alcohol which give softness to the bread

120. In Zostera, pollination take place by: -
(1) Water
(2) Wind
(3) Insect
(4) Bat

121. Which of the following accessory genital glands occurs only in mammalian male?
(1) Seminal vesicles
(2) Perineal gland
(3) Bartholin gland
(4) Bulbourethral gland
122. Which one of the following phenomena supports Darwin's concept of natural selection in organic evolution –
(1) Production of 'Dolly', the sheep by cloning
(2) Development of organs from 'stem cells' for organ transplantation
(3) Development of transgenic animals
(4) Prevalence of pesticide resistant insects

123. What is the common site of implantation in ectopic pregnancy?
(1) Fundus part of uterus
(2) Fallopian tube
(3) Lower uterine segment
(4) Coelom

124. Which of the following is not an example of intergenic interaction?
(1) Duplicate gene
(2) Additive gene
(3) Collaborative gene
(4) Co-dominance

125. The gene, which results in a non viable progeny in homozygous conditions is called:
(1) Duplicate gene
(2) Linked gene
(3) Lethal gene
(4) Epistatic gene

126. The experiment shown in the figure has been carried out by Morgan to show the phenomenon of linkage and recombination. If in Cross I, genes are tightly linked and in Cross II, genes are loosely linked then what will be percentage of recombinants produced in Cross I and Cross II respectively?

**Cross I**

<table>
<thead>
<tr>
<th>Parents</th>
<th>$y^W$ $w$</th>
<th>$Y^w$ $W$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y$ $w$</td>
<td>Yellow body</td>
<td>White eyed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F$_1$ generation</th>
<th>$y^W$ $w$</th>
<th>$Y^w$ $W$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y^W$ $w$</td>
<td>Wild type</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parents</th>
<th>$y^W$ $w$</th>
<th>$Y^w$ $W$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y^W$ $w$</td>
<td>Yellow body</td>
<td>White eyed</td>
</tr>
</tbody>
</table>

**Cross II**

<table>
<thead>
<tr>
<th>Parents</th>
<th>$w^M$ $m$</th>
<th>$w^M$ $m$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$w^M$ $m$</td>
<td>White body</td>
<td>Miniature wings</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F$_1$ generation</th>
<th>$w^M$ $m$</th>
<th>$w^M$ $m$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$w^M$ $m$</td>
<td>Wild type</td>
<td></td>
</tr>
</tbody>
</table>

(1) 98.7% and 62.8%
(2) 1.3% and 37.2%
(3) 37.2 and 1.3%
(4) 62.8% and 98.7%

**Cross I**

<table>
<thead>
<tr>
<th>Parents</th>
<th>$y^W$ $w$</th>
<th>$Y^w$ $W$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y$ $w$</td>
<td>Yellow body</td>
<td>White eyed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F$_1$ generation</th>
<th>$y^W$ $w$</th>
<th>$Y^w$ $W$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y^W$ $w$</td>
<td>Wild type</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parents</th>
<th>$y^W$ $w$</th>
<th>$Y^w$ $W$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y^W$ $w$</td>
<td>Yellow body</td>
<td>White eyed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F$_1$ generation</th>
<th>$w^M$ $m$</th>
<th>$w^M$ $m$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$w^M$ $m$</td>
<td>Wild type</td>
<td></td>
</tr>
</tbody>
</table>

(1) 98.7% and 62.8%
(2) 1.3% and 37.2%
(3) 37.2 and 1.3%
(4) 62.8% and 98.7%
127. The possibility of a female becoming a haemophilic is extremely rare because :-
   (1) Mother of such female has to be at least carrier and the father should be haemophilic
   (2) Father of such female should be normal
   (3) Haemophilia is an autosomal recessive disorder
   (4) Both the parents of such female should essentially be diseased

128. EST in human genome are :-
   (1) Regulatory sequences
   (2) Genes that expressed as RNA
   (3) Repetative sequences
   (4) (1) & (3) both

129. How many mitotic divisions are required for the formation of mature male gametophyte in angiosperm?
   (1) 1 (2) 2 (3) 3 (4) 7

130. Apogamy is:-
   (1) Formation of fruit without fertilization
   (2) Formation of Archesporium
   (3) Formation of gametophyte without meiosis
   (4) Formation of sporophyte without fertilization

131. During cleavage, the cell division is very rapid. The daughter cells do not undergo any growth and the cells thus become gradually smaller in volume. Hence :-
   (1) The embryo remains static
   (2) The embryo becomes smaller in volume
   (3) The embryo grows in volume
   (4) There is no growth in the volume of embryo

132. Character which is closely related to human evolution-
   (1) Disappearance of tail
   (2) Reduction in size of jaws
   (3) Binocular vision
   (4) Flat nails

133. Which of the following make the uterus unsuitable for implantation :-
   (1) Diaphragm
   (2) IUD
   (3) Artificial insemination
   (4) ZIFT
134. In a cross between true red flowered (RR) and true breeding white flowered (rr), Snapdragon plant, the F₁ (Rr) was pink. When the F₁ was self pollinated the F₂ resulted in the following ratio 1(RR) red : 2(Rr) pink : 1(rr) white. Above condition can be explained by :-
(1) True dominance
(2) Incomplete dominance
(3) Lethal gene
(4) Independent assortment

135. Which of the following match is correct ?
(1) Sickle cell anaemia : Point mutation.
(2) Down Syndrome : trisomy of 5th chromosome.
(3) Cry-du-chat syndrome : Duplication of x chromosome.
(4) Polyploidy : increase in one or two chromosomes.

136. Which of the following statement is true ?
(1) Genes which are tightly linked show very low recombination
(2) Genes which are tightly linked showed higher recombination
(3) Genes which are loosely linked showed very low recombination
(4) Gene which are loosely linked do not show recombination

137. Which of the following is correct for human beings?
(1) A + Z + A+Z = 2A + ZZ - Female
(2) A + X + A+O = 2A + XO - Male
(3) A + X + A+Y = 2A + XY - Male
(4) A + X + A+Z = 2A + XZ - Female

138. Select the correct match with respect to findings of HGP.
(1) Largest gene → 2400 bp.
(2) Smallest gene → Holandric chromosome
(3) EST → 1.4 million locations
(4) Chromosome-1 → Largest gene.

139. Select the correct statement from the given statements
(1) Large holes in Roquefort cheese are due to production of large amount of CO₂
(2) Streptokinase is used to clarify the bottled juices
(3) The Ladybird Beetles & Dragonflies are useful to remove aphids & mosquitoes respectively
(4) In mycorrhiza, the fungi helps in absorption of water only
140. Consider the following Four statements (A - D) and select the option which includes all the incorrect ones only:

(A) A typical anther of Angiosperm is bisporangiate
(B) Sporogenous tissues is present in centre of microsporangium
(C) Microsporogenesis process takes place inside the pollen sac
(D) The pollen grains represent the sporophyte

**Option**

(1) Statements A, B, C
(2) Statements C, D
(3) Statements B, C
(4) Statements A, D

141. For successful implementation of various action plans to attain reproductive health requires:

(1) Infrastructural facility
(2) Professional expertise
(3) Material support
(4) Depriving common man of sex education

142. Based on observations made during a sea voyage in a sail ship called H.M.S. Beagle round the world, it was concluded that existing living forms share similarities to varying degrees not only among themselves but also with life forms that existed millions of years ago.

(1) Oparin (2) Wallace
(3) Charles Darwin (4) Miller

143. Identify A and B and their respective functions:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>Function of A</th>
<th>Function of B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Trophoblast</td>
<td>Inner cell mass</td>
<td>Attach to the Endometrium</td>
<td>Differentiated as embryo</td>
</tr>
<tr>
<td>2</td>
<td>Trophoblast</td>
<td>Inner cell mass</td>
<td>Differentiated as embryo</td>
<td>Attach to the Endometrium</td>
</tr>
<tr>
<td>3</td>
<td>Mesoderm</td>
<td>Inner cell mass</td>
<td>Attach to the Endometrium</td>
<td>Differentiated as embryo</td>
</tr>
<tr>
<td>4</td>
<td>Ectoderm</td>
<td>Mesoderm</td>
<td>Attach to the Endometrium</td>
<td>Differentiated as embryo</td>
</tr>
</tbody>
</table>

144. Consider the following Four statements (A - D) and select the option which includes all the incorrect ones only:

(A) A typical anther of Angiosperm is bisporangiate
(B) Sporogenous tissues is present in centre of microsporangium
(C) Microsporogenesis process takes place inside the pollen sac
(D) The pollen grains represent the sporophyte

**Option**

(1) Statements A, B, C
(2) Statements C, D
(3) Statements B, C
(4) Statements A, D
144. A person with blood group 'A' possesses
(1) Antigen 'A' and antibody 'b'
(2) Antigen 'B' and antibody 'a'
(3) Antigen 'A' and no antibody
(4) No antigen and no antibody

145. Which of the following condition will always have the same genotypic and phenotypic ratio?
(A) Test cross
(B) Incomplete dominance
(C) Codominance
(D) Epistatic gene
(E) Complementary gene

146. Gene for PTC paper taste is dominant, 'T' while its recessive gene is 't' that does not have taste capacity. Two parents which taste the PTC paper but their offspring is non taster. What is the possible genotype of parents :-
(1) TT, TT
(2) TT, Tt
(3) Tt, Tt
(4) tt, tt

147. Which of the following male animal is not heterogametic?

<table>
<thead>
<tr>
<th>Animal</th>
<th>Chromosome no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit fly</td>
<td>2n = 6 + XY</td>
</tr>
<tr>
<td>Fowl</td>
<td>2n = 14 + ZZ</td>
</tr>
<tr>
<td>Grasshopper</td>
<td>2n = 16 + XO</td>
</tr>
<tr>
<td>Human</td>
<td>2n = 44 + XY</td>
</tr>
</tbody>
</table>

148. A long lasting remedy, against ADA deficiency in patients can be :-
(1) Periodic infusion of genetically engineered lymphocytes in patients carrying ADA gene
(2) Introduction of ADA gene into the cells at early embryonic stages
(3) Bone marrow transplantation in early childhood
(4) Enzyme replacement therapy in early childhood

144. एक व्यक्ति का रक्त स्वात लाल है, उसके हो गए -
(1) एंटीजी एट्रैं एंटीजी ब'डी
(2) एंटीजी जब्र एंटीजी ब'डी
(3) एंटीजी एट्रैं एंटीजी ब'डी और अनु पूर्व नहीं
(4) एंटीजी जब्र एंटीजी ब'डी दोनों ने अनु पूर्व नहीं

145. निम्न में से किस रित्य जिज्ञासा प्रश्न संबंधित है?
(A) पूर्व प्रभाव सत्य
(B) अभाव प्रभाव निर्धार
(C) सहभाग बिनतियां
(D) फलक में रेत और
(E) एंटीजी जब्र रेत

146. PTC पेपर पेंट का प्रतिपाद के आ 111 वाले में प्रेशर की शाखा नहीं हो जा होता दो पेंट पेशर प्रेशर करने में कितने उन नेकें सुंडीले प्रेशर नहीं होते हैं? ऐसे पेंट प्रेशर वाला क्या प्रभाव बिनतियां में तिकबाब यह है?
(1) TT, TT
(2) TT, Tt
(3) Tt, Tt
(4) tt, tt

147. निम्न में से कौन नायक नया भी है? रोग में होती कहाँ?

<table>
<thead>
<tr>
<th>जगती</th>
<th>पुरुष सेक्स रंग</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) फल मक खेल</td>
<td>2n = 6 + XY</td>
</tr>
<tr>
<td>(2) पुरुष गाँव</td>
<td>2n = 14 + ZZ</td>
</tr>
<tr>
<td>(3) गिड डाटा</td>
<td>2n = 16 + XO</td>
</tr>
<tr>
<td>(4) मानव</td>
<td>2n = 44 + XY</td>
</tr>
</tbody>
</table>

148. ADA की कमी वाले रोग में एक रेत बिन्दु में स्थानीय रिक्यां नहीं है? -
(1) ADA जेन वालों रोग में गैथेजीशेन के स्वाभिषेक स्थानीय प्रभाव रेत नहीं है।
(2) ADA जेन की प्रारंभिक प्रभाव बिन्दु में रेत नहीं है।
(3) व्यवहार में अर्जित रेत नहीं है।
(4) व्यवहार में एंटीजी रेत नहीं है।
149. Which of following is correct:-
A. Filiform apparatus brings about opening of the pollen tube.
B. Pollen exine is resistant to enzyme action.
C. Male gametes in angiosperms are formed by the division of vegetative cell.
D. Treatment of seed at low temperature under moist condition to break its dormancy is called scarification.

(1) Only B  (2) B & D
(3) B & C  (4) B & A

150. How many of the following statements are correct for sexually reproducing flowering plants?
(A) Formation of diploid zygote is universal feature
(B) Zygote is formed inside the ovule
(C) Ovule develop into a embryo
(D) The ovary develop into a seed

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

151. Which phase of oogenesis runs during menstrual cycle in human being.
(1) Maturation phase
(2) Multiplication phase
(3) Growth phase
(4) Mitotic phase only

152. Which of the following are correct statements for fossils.
(A) Fossils are remains of hard parts of life-forms found in rocks
(B) Different-aged rock sediments contains fossils of different life forms who probably died during the formation of the particular sediment.
(C) Fossils represent extinct organisms eg dinosaurs
(D) A study of fossils in different sedimentary layers does not indicate the geological period in which they existed

(1) Only A and B  (2) Only B and C
(3) A, B and C  (4) All (A,B,C,D)
153. Choose the correct sequence for given diagrams (A,B,C and D) of human embryonic development events :-

(A) (B) (C) (D)

(1) A → B → C → D (2) B → C → A → D
(3) C → B → A → D (4) A → D → C → B

154. Read the following statement.

i. Multiple alleles can be detected in a population.
ii. Multiple alleles are mutant form of the same gene.
iii. Number of phenotypes in multiple alleles is calculated by formula \( \frac{n(n+1)}{2} \).
iv. ABO blood groups are not controlled by the gene I.

How many of the above statements are correct.

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

155. Given pedigree show inheritance of autosomal dominant disorder (myotonic dystrophy) then what will be genotype of shaded symbol :-

(A) (B) (C) (D)

(1) AA (2) Aa (3) AA or Aa (4) aa

156. If crossing over is 10% in linked genes in a dihybrid "AaBb", which of the following gametes may be formed ?

(1) AB=50, ab=50%
(2) Aa=50%, Bb=50%
(3) ab=25%, Aa=25%
(4) AB=45%, aB = 45%

Ab = 5%, aB = 5%
157. If the frequency of an autosomal dominant allele is 0.6 calculate the frequency of recessive phenotype in a population of 10000.

(1) 1600  (2) 4000  
(3) 1200  (4) 1000

158. Mark the incorrect statement:

(1) Microinjection - Foreign DNA is directly injected into the nucleus of animal cell or plant cell by using biolistics
(2) Electroporation - Foreign DNA incorporated into the plant cells through transient pores of the plant cell membrane created by electrical impulses
(3) Gene gun - DNA coated onto microscopic pellets of gold or tungsten are shot with high velocity into target cells
(4) Transfection - DNA carried to the recipient host cells by using charged substances like calcium phosphate, cationic liposomes etc.

159. Match the followings:

i. Ovule where the embryo sac becomes horse shoe shaped and the funicle & micropyle are close to each other
ii. Inverted ovule
iii. Straight ovule
iv. Micropyle & chalaza are not in straight line

A. Orthotropous ovule
B. Campylotropous ovule
C. Amphitropous ovule
D. Anatropous ovule

(1) (i)–C , (ii)–D, (iii)–A, (iv)–B
(2) (i)–D, (ii)–A, (iii)–B, (iv)–C
(3) (i)–C , (ii)–A, (iii)–D, (iv)–B
(4) All of the above

Time Management is Life Management
160. Given below is the diagram of embryosac. In which of the option, all the four options A, B, C and D correct:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Antipodals</td>
<td>Synergids</td>
<td>Egg cell</td>
<td>Polar nuclei</td>
</tr>
<tr>
<td>2</td>
<td>Synergids</td>
<td>Antipodals</td>
<td>Central cell</td>
<td>Egg cell</td>
</tr>
<tr>
<td>3</td>
<td>Antipodals</td>
<td>Polar nuclei</td>
<td>Central cell</td>
<td>Egg cell</td>
</tr>
<tr>
<td>4</td>
<td>Synergids</td>
<td>Polar nuclei</td>
<td>Secondary nucleus</td>
<td>Egg cell</td>
</tr>
</tbody>
</table>

161. What is incorrect during cleavage.

1. Size of cell go on increasing
2. Number of blastomeres go on increasing
3. Karyoplasmic index go on increasing
4. G₁ and G₂ phases absent

162. Which of the following is not an example of convergent evolution:

1. The eyes of the octopus and mammals
2. Sweet potato and potato
3. Thorn of bougainvillea and tendrils of cucurbita
4. Flippers of penguins and dolphins

163. Match the column–A and B about the embryonic development of human:

<table>
<thead>
<tr>
<th>Column-A</th>
<th>Column-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>i End of one month</td>
<td>a Most of the major organ systems developed</td>
</tr>
<tr>
<td>ii End of second month</td>
<td>b The first movements of foetus</td>
</tr>
<tr>
<td>iii End of first trimester</td>
<td>c Heart formation</td>
</tr>
<tr>
<td>iv During fifth month</td>
<td>d Eye-lids separated</td>
</tr>
<tr>
<td>v End of second trimester</td>
<td>e Limbs and digits formation</td>
</tr>
</tbody>
</table>

(1) (i) – e, (ii) – b, (iii) – c, (iv) – a, (v) – d
(2) (i) – c, (ii) – e, (iii) – b, (iv) – a, (v) – d
(3) (i) – e, (ii) – c, (iii) – a, (iv) – b, (v) – d
(4) (i) – c, (ii) – e, (iii) – a, (iv) – b, (v) – d
164. If A and B are complementary genes, what would be the phenotypic ratio obtained, if AaBb is crossed with Aabb?

(1) 9 : 7  (2) 6 : 10
(3) 9 : 3 : 4  (4) 9 : 3 : 3 : 1

165. The pedigree can't be a :-

(I) Maternal imprinting  
(II) X–linkes recessive  
(III) Autosomal recessive  
(IV) Autosomal dominant

**Option**

(1) Only I  
(2) Both I and IV  
(3) Both I and II  
(4) I, III and IV

166. The map distance between A and C = 30 cM, B and C = 20 cM, A and B is 50 cM, B and D = 10 cM C and D = 30 cM. What is the arrangement of ABCD gene on chromosome

(1) ABCD  
(2) DBCA  
(3) BACD  
(4) CABD

167. In a cross in *Drosophila*, the heterozygous member with grey body (b+) and long wings (vg+) was crossed with black body and vestigial wings, the progeny had the following ratio ; grey vestigial - 24 ; grey long - 126 ; Black long-26, Black vestigial - 124. What is the frequency of recombinant in the population ?

(1) 15.8 %  
(2) 16.7 %  
(3) 17.5 %  
(4) 14.5 %
168. The figure below is the diagrammatic representation of the E.coli vector pBR322. Which one of the given options correctly identifies its certain component(s)?

- BamH-I, EcoRI - Selectable marker
- Ori - Original restriction enzyme
- rop - Codes for the protein involved in the replication of plasmid
- ampR, tetR - Site from where replication starts

169. Which of the following event is not involved in post fertilisation events?

- Endosperm & Embryo development
- Maturation of ovule into seed
- Maturation of ovary into fruit
- Degeneration of nucellus

170. Which of the group of crop plants are propagated by vegetative propagation?

- Potato, Papaya, Banana
- Onion, Coriander, Lime
- Groundnut, Cashewnut, Ginger
- Sugarcane, Ginger, Potato

171. Praying mantis is a good example of:

- Mullerian mimicry
- Warning colouration
- Social insect
- Camouflage

172. The first mammals were like:

- Hippopotamus
- Bear
- Rabbit
- Shrew

173. Which of the following conclusions of Mendel can be explained by dihybrid cross?

- Dominance
- Unit factor and segregation
- Independent assortment
- All the above
174. If a mulatto man marries with white woman, how many different types of phenotypes will be obtained?
(1) 4 (2) 3 (3) 2 (4) 5

175. Predict from the following chart:

(1) Character is x-linked dominant
(2) Character is x-linked recessive
(3) Character is Autosomal dominant
(4) Character is Autosomal recessive

176. A diseased man marries a normal woman. They get three daughter and five sons. All daughters were carrier for disease and sons were normal. The gene of this disease is:
(1) Sex linked dominant (2) Sex linked recessive
(3) Sex limited trait (4) Autosomal dominant

177. In Lac operon the mRNA of i-gene and Z, Y & A genes:
(1) May or may not be formed simultaneously
(2) Are-always formed simultaneously
(3) Are never formed simultaneously
(4) Are monocistronic

178. Why insulin is not administered orally to diabetic patient?
(1) It is bitter in taste
(2) It is peptide & can be digested
(3) It will lead to sudden decrease in blood sugar if given orally
(4) It leads to peptic ulcer if given orally

179. How many of followings plants in given list have albuminous seeds?
Pea, Wheat, Maize, groundnut, Beans, Barley, Castor, Coconut
(1) Four (2) Six (3) Five (4) Three
180. Match the column-A with the column-B and choose the correct answer:

<table>
<thead>
<tr>
<th>Column - A</th>
<th>Column - B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Autogamy</td>
<td>i Pollination in between two flower of same plant</td>
</tr>
<tr>
<td>(B) Chasmogamy</td>
<td>ii Pollination in closed flower</td>
</tr>
<tr>
<td>(C) Cleistogamy</td>
<td>iii Pollination in the same flower</td>
</tr>
<tr>
<td>(D) Geitonogamy</td>
<td>iv Pollination in opened flower</td>
</tr>
</tbody>
</table>

(1) A - i; B - iv; C - ii; D - iii
(2) A - iii; B - iv; C - i; D - ii
(3) A - iii; B - iv; C - ii; D - i
(4) A - ii; B - iv; C - iii; D - i