# TEST SERIES - 10

## Topics Covered

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## Instructions

1. The paper contains 180 objective type questions (45 each in Physics, Chemistry, Botany & Zoology). Four alternatives are given for each question out of which only one is correct. Darken the correct alternative on the given answer-sheet, with a pencil or pen.
2. All the questions carry **four marks** each.
3. For each incorrect answer **1 mark** will be deducted.
4. For unattempted questions the award is neither positive nor negative.
5. No student is permitted to leave examination hall before the time is complete.
6. Use of calculator is not permitted.
7. Use of unfair means shall invite cancellation of the test.

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Name of the Student: __________________________________________________________

Centre: _____________________________________________________________________

Invigilator’s Signature: _____________________________________________________
1. A metallic rod of 1 m length is rotated with a frequency of 50 rev/s, with one end hinged at the centre and the other end at the circumference of a circular metallic ring of radius 1 m, about an axis passing through the centre and perpendicular to plane of ring. A constant and uniform magnetic field of 1 T parallel to the axis is present everywhere. The emf between the centre and the metallic ring is

(1) 157 V  (2) 15.7 V
(3) 1.57 V  (4) 0.157 V

2. In which of the following cases eddy current is not used for advantage?

(1) Magnetic braking in trains  
(2) Electromagnetic damping  
(3) Induction furnace  
(4) Cyclotron

3. Two concentric circular coils, one of small radius \( r_1 \) and the other of large radius \( r_2 \), such that \( r_1 < r_2 \), are placed co-axially with centres coinciding. The mutual inductance is

\[
(1) \frac{\mu_0 \pi r_1^2}{2r_2}  \quad (2) \frac{\mu_0 \pi r_2^2}{r_1} \\
(3) \frac{2\mu_0 \pi r_1^2}{r_2^2}  \quad (4) \frac{\mu_0 \pi r_1}{2r_2^2}
\]

4. The magnetic energy per unit volume in a solenoid of area A, length l and magnetic field B is

\[
(1) \frac{B}{\mu_0}  \quad (2) \frac{B^2}{\mu_0} \\
(3) \frac{B^2}{2\mu_0}  \quad (4) \frac{B^2}{2\mu_0}
\]

5. Askha peddles a stationary bicycle. The pedals of the bicycle are attached to a 100 turn coil of area 0.10 m². The coil rotates at half a revolution per second and it is placed in a uniform magnetic field of 0.01 T perpendicular to the axis of rotation of the coil. The maximum voltage generated in the coil is

(1) 314 V  (2) 31.4 V
(3) 31.3 V  (4) 0.314 V

6. A horizontal straight wire 10 m long extending from east to west is falling with a speed of 5.0 m s⁻¹, at right angles to the horizontal component of earth's magnetic field \( 0.30 \times 10^{-4} \text{ Wb m}^{-2} \). The instantaneous value of emf induced in the wire is

(1) \( 1.5 \times 10^{-4} \text{ V} \)  (2) \( 1.5 \times 10^{-3} \text{ V} \)
(3) \( 1.5 \times 10^{-2} \text{ V} \)  (4) \( 1.5 \times 10^{-1} \text{ V} \)

7. A pair of adjacent coils has a mutual inductance of 1.5 H. If the current in one coil changes from 0 to 20 A in 0.5 s, the change in flux linkage with the other coil is

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

8. Current in a circuit falls from 5.0 A to 0 A in 0.1 s. If an average emf of 200 V is induced, the self- inductance of the circuit is

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

9. AC voltage can be easily and efficiently converted from voltage to the other value by means of

(1) capacitor  (2) resistor
(3) inductor  (4) transformer

10. To express ac power in the same form as DC power, a special value of current is defined as

(1) root mean square current  (2) average current
(3) instantaneous current  (4) none of above

11. A lamp is connected in series with a capacitor with an AC source. If the capacitance of the capacitor is reduced, the lamp will

(1) not shine  (2) will shine less brightly than before
(3) will shine more brightly than before  (4) shine as earlier
12. In an LCR ac circuit at resonance, maximum power is dissipated in the circuit through
(1) \( L \)
(2) \( C \)
(3) \( R \)
(4) equally through each of \( L, C, R \)

13. A well designed transformer may have efficiency
(1) always less than 25%
(2) only 25% to 50%
(3) only 60% to 70%
(4) more than 95%

14. A series LCR circuit with \( L = 0.12 \, \text{H}, \ C = 480 \, \text{nF}, \ R = 23 \, \Omega \) is connected to a 230V variable frequency supply. The source frequency for which current amplitude is maximum is
(1) 663 Hz
(2) 66.3 Hz
(3) 6.63 Hz
(4) 6630 Hz

15. At a null point, the period of vibration of a bar magnet in the vibration magnetometer is
(1) infinity
(2) zero
(3) 1 sec
(4) none of these

16. To shield an instrument from the external magnetic field, it is placed inside a cabin made from
(1) wood
(2) ebonite
(3) iron
(4) diamagnetic substance

17. A ferromagnetic substance is essentially
(1) crystalline
(2) amorphous
(3) liquid
(4) gas

18. In hydrogen atom, the electron is making \( 6.5 \times 10^{15} \, \text{r.p.s} \). If the radius of the orbit is \( 0.53 \times 10^{-10} \, \text{metre} \), then magnetic field produced at the centre of the orbit is
(1) 6.15 Tesla
(2) 12.3 Tesla
(3) 1.23 Tesla
(4) 4.1 Tesla

19. Two long straight parallel conductors, 10 cm apart, carry currents of 5 ampere each in opposite directions. Then the magnetic induction at a point midway between them is
(1) \( 4 \times 10^{-5} \, \text{tesla} \)
(2) \( 2 \times 10^{-5} \, \text{tesla} \)
(3) \( 10^{-5} \, \text{tesla} \)
(4) zero tesla

20. A current of 5 ampere is passed through a straight wire of length 6 cm. Then the magnetic induction at a point 5 cm from either end of the wire is
(1) \( 2.5 \times 10^{-5} \, \text{T} \)
(2) \( 1.25 \times 10^{-5} \, \text{T} \)
(3) \( 1.5 \times 10^{-5} \, \text{T} \)
(4) \( 3.0 \times 10^{-5} \, \text{T} \)

21. An electron of mass \( 0.90 \times 10^{-30} \, \text{kg} \) under the action of a magnetic field moves in a circle of 2.0 cm radius at a speed of \( 3.0 \times 10^{6} \, \text{metre per sec} \).
If proton of mass \( 1.8 \times 10^{-27} \, \text{kg} \) were to move in circle of the same radius in the same magnetic field, then its speed will be
(1) \( 3.0 \times 10^{6} \, \text{m/s} \)
(2) \( 1.5 \times 10^{3} \, \text{m/s} \)
(3) \( 6.0 \times 10^{4} \, \text{m/s} \)
(4) \( 1.5 \times 10^{4} \, \text{m/s} \)

22. A long thick metallic cylinder of radius \( R \) has a current of \( i \) ampere uniformly distributed over its circular cross-section. Then magnetic induction \( B \) away from the axis at a distance \( r \) from the axis varies as shown in the figure

23. If electron velocity is \( 2\hat{j} + 3\hat{k} \) and it is subjected to magnetic field of \( 4\hat{k} \), then its
(1) speed will change
(2) path will change
(3) both 1 and 2
(4) none of these

24. The susceptibility of a diamagnetic substance is
(1) \( \infty \)
(2) zero
(3) small but negative
(4) small but positive

25. A magnetic dipole is placed at right angles to the direction of lines of force of magnetic induction \( B \).
If it is rotated through an angle of 180°, then the work is done is
(1) MB  (2) 2 MB
(3) – 2 MB  (4) zero

26. Two thin long parallel wires separated by a distance \( b \) are carrying a current \( I \) each. The magnitude of the force per unit length exerted by one wire on the other is
(1) \( \frac{\mu_0 I}{2\pi b} \)
(2) \( \frac{\mu_0 I^2}{2\pi b} \)
(3) \( \frac{\mu_0 I}{2\pi b^2} \)
(4) \( \frac{\mu_0 I}{2\pi \sqrt{2}b} \)

27. Which of the following particles will describe the largest circle when projected with the same velocity perpendicular to a uniform field of same magnetic induction?
(1) electron  (2) proton
(3) He\(^+\)  (4) Li\(^{++}\)

28. A horizontal straight conductor (otherwise placed in a closed circuit) along east-west direction falls under gravity. Then there is
(1) no induced e.m.f. along the length
(2) no induced current along the length
(3) an induced current from west to east
(4) an induced current from east to west

29. A dynamo dissipates 20 watt when it supplies a current of 4 amp through it. If the terminal potential difference is 220 volt, then the e.m.f. produced is
(1) 220 volt  (2) 225 volt
(3) 215 volt  (4) 300 volt

30. A conductor rod \( AC \) is moved with constant velocity \( v \) in a region of magnetic field induction \( B \). The emf induced in the rod does not depend upon
(1) magnetic flux density of the magnetic field
(2) the angle which the velocity \( v \) of the rod makes with field \( B \)
(3) length of the rod
(4) none of the above

31. A coil of wire of a certain radius has 600 turns and a self-inductance of 108 mH. The self inductance of a second similar coil of 500 turns will be
(1) 90 mH  (2) 75 mH
(3) 60 mH  (4) 108 mH

32. If \( L, \) Q, \( R \) represent inductance, charge and capacitance respectively, the units of
(1) \( QR/L \) will be those of current
(2) \( Q^2R^2/R^2 \) will be those of energy
(3) \( QL/R \) will be those of current
(4) \( Q^3L^3/R \) will be those of power

33. In a transformer, if the ratio of number of turns of primary coil and secondary coil is 5 : 4 and 240 V is applied to primary coil, then the ratio of currents in primary and secondary coils is
(1) 4 : 5  (2) 5 : 4
(3) 5 : 10  (4) 8 : 12

34. In an LCR series circuit, if \( \omega^2 > \frac{1}{LC} \), then
(1) applied voltage leads the current
(2) applied voltage lags behind the current
(3) applied voltage is in phase with the current
(4) no relation of phase, between applied voltage and the current, can be established from the given relation

35. An inductance has a high resistance to ac and low to dc. When a dc voltage source having some ac component superimposed on it sends current through an inductance to a load resistance, then
(1) the dc voltage falls appreciably across the load and ac component falls only a small amount
(2) the ac and dc voltage fall by the same small percentage
(3) the ac voltage falls appreciably across the load and dc voltage falls by only a small amount
(4) both ac and dc voltage fall to nearly zero

36. A wire placed vertically between the poles of a horse-shoe magnet, with its north pole to your right, carries a direct current flowing upwards. The wire will experience a force tending to deflect it
(1) to your left  (2) to your right
(3) away from you  (4) towards you
37. Two different coils have self-inductance $L_1 = 8 \, \text{mH}$ and $L_2 = 2 \, \text{mH}$. In both the coils, energy stored is same. At that instant, the currents $I_1$ and $I_2$ in the two coils are related as $I_1/I_2$ equal to
   (1) 1
   (2) 1/4
   (3) 4/1
   (4) 1/2

38. A metal rod moves at a constant velocity in a direction perpendicular to its length. A constant, uniform magnetic field exists in space in a direction perpendicular to the rod as well as its velocity. Select the correct statement from the following:
   (1) The entire rod is at the same potential
   (2) There is an electric field in the rod
   (3) The electric potential is highest at the centre of the rod and decreases towards its ends
   (4) The electric potential is lowest at the centre of the rod and increases towards its ends

39. Two coils have a mutual inductance 0.005 H. The current changes in the first coil according to equation $I = I_0 \sin \omega t$, where $I_0 = 10 \, \text{A}$ and $\omega = 100 \pi \, \text{rad/s}$. The maximum value of e.m.f. induced in the second coil is
   (1) 0.5$\pi$\,V
   (2) 5$\pi$\,V
   (3) 0.05$\pi$\,V
   (4) (5/10000$\pi$)$\,\text{V}$

40. The network shown in fig. is a part of a complete circuit. What is the potential difference $V_A - V_B$, when the current $I$ is 5A and is decreasing at a rate of $10^3 \, \text{A/s}$?
   (1) 20\,V
   (2) −25\,V
   (3) −15\,V
   (4) 15\,V

41. The magnetic field energy in an inductor changes from maximum value to minimum value in 5.0 ms when connected to an AC source. The frequency of the source is
   (1) 20\,Hz
   (2) 50\,Hz
   (3) 200\,Hz
   (4) 500\,Hz

42. In the circuit below, the AC source has voltage $20 \cos (\omega t)$ volt with $\omega = 2000 \, \text{rad/s}$. The amplitude of the current will be nearest to
   (1) 2\,A
   (2) 3.3\,A
   (3) $2/\sqrt{5}$\,A
   (4) $\sqrt{5}$\,A

43. In a circuit containing a capacitor, an inductor and a resistor in series, $V_C$, $V_L$ and $V_R$ represent the potential differences across those components and $I$ represents the current through them. Which of the following statements is true?
   I. $V_C$ and $I$ are $180^\circ$ out of phase
   II. $V_R$ and $I$ are $90^\circ$ out of phase
   III. $V_L$ and $V_C$ are $180^\circ$ out of phase
   (1) if I, II, III are correct
   (2) if I, II are correct
   (3) if I only
   (4) if III only

44. In the circuit shown below, what will be the reading of the voltmeter $V_3$ and ammeter $A$?
   (1) 800\,V, 2\,A
   (2) 300\,V, 2\,A
   (3) 220\,V, 2.2\,A
   (4) 100\,V, 2\,A

45. In the following circuit current through inductor is 0.9 A, while the current through capacitor is 0.4 A. The current delivered by a.c. source is
   (1) 0.9 A
   (2) 1.3 A
   (3) 0.5 A
   (4) approx. 1 A
46. What mass of hydrazine (N\textsubscript{2}H\textsubscript{4}) can be oxidized to N\textsubscript{2} by 20 g of K\textsubscript{2}CrO\textsubscript{4} which is reduced to Cr(OH)\textsubscript{3}\textsuperscript{−}?

(1) 3.97 g  
(2) 2.464 g  
(3) 2.644 g  
(4) 2.87 g

47. For the cell

\[ \text{Tl}[\text{Tl}^+ (0.001 M) \| \text{Cu}^{2+} (0.01 M)/\text{Cu}, E_{\text{cell}} \text{ at 298K} \text{ is 0.83 V. This can be increased by} \]

(1) Increasing [Cu\textsuperscript{2+}]
(2) Increasing \([\text{Tl}^+]\]
(3) Decreasing [Cu\textsuperscript{2+}]
(4) Decreasing [Tl\textsuperscript{+}]

48. Zn amalgam is prepared by electrolysis of aqueous ZnCl\textsubscript{2} using Hg cathode (9 gm). How much current is to be passed through ZnCl\textsubscript{2} solution for 1000 seconds to prepare a Zn amalgam with 25% Zn by wt. (Zn = 65.4)

(1) 5.6 amp  
(2) 7.2 amp  
(3) 8.85 amp  
(4) 11.2 amp

49. The solubility of \([\text{Co(NH}_3\text{)}_4\text{Cl}_2]\text{ClO}_4\) if the \( \lambda\text{Co(NH}_3\text{)}_4\text{Cl} = 50, \lambda\text{ClO}_4 = 70 \) and the measured resistance was 33.5 Ω in a cell with cell constants of 0.20 is

(1) 59.7 mmol/L  
(2) 49.7 mmol/L  
(3) 39.7 mmol/L  
(4) 29.7 mmol/L

50. A hydrogen electrode is immersed in a solution with pH = 0 (HCl). By how much will the potential (reduction) change if an equivalent amount of NaOH is added to the solution. (Take \( p_{H_2} = 1 \text{ atm} \), \( T = 298 \text{ K} \))

(1) increase by 0.41 V  
(2) increase by 59 mV  
(3) decrease by 0.41 V  
(4) decrease by 59 mV

51. A current of 0.1 A was passed for 2 hr through a solution of cuprocyanide and 0.3745 g of copper was deposited on the cathode. Calculate the current efficiency for the copper deposition. (Cu –63.5)

(1) 79%  
(2) 39.5%  
(3) 63.25%  
(4) 63.5%

52. During the electrolysis of 0.1 M CuSO\textsubscript{4} solution using copper electrodes, a depletion of [Cu\textsuperscript{2+}] occurs near the cathode with a corresponding excess near the anode, owing to inefficient stirring of the solution. If the local concentrations of [Cu\textsuperscript{2+}] near the anode and cathode are respectively 0.12 M and 0.08 M, calculate the back e.m.f. developed. temperature = 298 K

(1) 22 mV  
(2) 5.2 mV  
(3) 29 mV  
(4) 59 mV

53. Calculate the useful work of the reaction Ag(s) + 1/2Cl\textsubscript{2}(g) \( \longrightarrow \) AgCl(s)

Given \( E^o_{\text{Cl}_2/\text{Cl}^-} = +1.36 \text{ V, } E^{o}_{\text{AgCl/AgCl}} = 0.22 \text{ V} \)

if \( P_{\text{Cl}_2} = 1 \text{ atm and } T = 298 \text{ K} \)

(1) 110 kJ/mol  
(2) 220 kJ/mol  
(3) 55 kJ/mol  
(4) 1000 kJ/mol

54. Select the correct statement if

\( \text{Mg}^{2+}/\text{Mg}_\text{0} \text{; } E^o = -2.4 \text{ V; } \text{Sn}^{4+}+2\text{I}^-\longrightarrow \text{Sn}^{2+}+\text{I}_2 \text{ is a spontaneous reaction.} \)

(1) MnO\textsubscript{4} is the strongest oxidizing agent and Mg is the strongest reducing agent.
(2) MnO\textsubscript{4} + 2I\textsuperscript{−}→ MnO\textsubscript{2} + I\textsubscript{2} is a spontaneous reaction.
(3) Mg\textsuperscript{2+} + Sn\textsuperscript{2+}→ Mg + Sn\textsuperscript{4+} is a spontaneous reaction.
(4) Here, Weakest oxidizing agent is Sn\textsuperscript{4+} and weakest reducing agent is Mn\textsuperscript{2+}

55. What is the value of \( pK_b \) (CH\textsubscript{3}COO\textsuperscript{−}) if \( \lambda_m = 390 \) and \( \lambda_m = 7.8 \) for 0.04 of a CH\textsubscript{3}COOH at 25°C

(1) 9.3  
(2) 9.2  
(3) 4.7  
(4) 4.8

56. A cell Ag |Ag\textsuperscript{+} |Cu\textsuperscript{++} |Cu initially constants 2M Ag\textsuperscript{+} and 2MCu\textsuperscript{++} ions. The change in cell potential after the passage of 10 amp current for 4825 sec is

(1) –0.00738 V  
(2) –1.00738 V  
(3) –0.0038 V  
(4) none of these

57. During an electrolysis of conc. H\textsubscript{2}SO\textsubscript{4}, perdisulphuric acid (H\textsubscript{2}S\textsubscript{2}O\textsubscript{8}) and O\textsubscript{2} form in equimolar amount. The amount of H\textsubscript{2} that will form simultaneously will be (2H\textsubscript{2}SO\textsubscript{4} → H\textsubscript{2}S\textsubscript{2}O\textsubscript{8} + 2H\textsuperscript{+} + 2e\textsuperscript{−})

(1) thrice that of O\textsubscript{2} in moles  
(2) twice that of O\textsubscript{2} in moles  
(3) equal to that of O\textsubscript{2} in moles  
(4) half of that of O\textsubscript{2} in moles
58. The cell reaction taking place in hearing acids is 
\[ Zn + Ag_2O + H_2O \rightarrow 2Ag + 2OH^- + Zn^{2+} \] 
give the \( E^{0}_{Zn/Zn^{2+}} = -0.76 \text{ V} \) \( E^{0}_{Ag^+/Ag} = 0.80 \text{ V} \) 
The \( E^0 \) of the cell is 
(1) 0.42 V  
(2) 1.56 V  
(3) 0.84 V  
(4) None of these

59. A current of 2.0 A passed for 5 hours through a molten metal salt deposits 22.2 g of metal (At. wt. = 177). The oxidation state of the metal in the metal salt is 
(1) + 1  
(2) + 2  
(3) + 3  
(4) None of these

60. The standard electrode potential (\( E^0 \)) for \( OCIO^-/Cl^- \) and \( Cl^-/\frac{1}{2} Cl_2 \) respectively are 0.94 V and -1.36 V. The \( E^0 \) value for \( OCIO^-/\frac{1}{2} Cl_2 \) will be 
(1) - 0.42 V  
(2) - 2.20 V  
(3) 0.52 V  
(4) 1.04 V

61. \( E^0 \) of Fe/Fe\(^{2+} \) is + 0.44 V ; \( E^0 \) of Cu/Cu\(^{2+} \) is - 0.32 V. Then in the cell 
(1) Cu reduces Fe\(^{2+} \) ion  
(2) Cu\(^{2+} \) oxidises Fe\(^{2+} \) ion  
(3) Cu reduces Fe\(^{2+} \) ion  
(4) None of these

62. The conductivity of an aqueous solution of strong electrolyte 
(1) Bears no relationship with concentration  
(2) Decreases with increase in dilution  
(3) Remains constant at all concentration  
(4) Increases slightly with dilution

63. \( Zn | Zn^{2+} (C_i ) | | Zn^{2+} (C_j ) | Zn \). For this cell \( \Delta G \) is negative if 
(1) \( C_1 = C_2 \)  
(2) \( C_1 > C_2 \)  
(3) \( C_2 < C_1 \)  
(4) None of these

64. \( Zn + Cu^{2+} (aq) \rightleftharpoons Cu + Zn^{2+} (aq) \) 
Reaction quotient is \( Q = \frac{[Zn^{2+}]}{[Cu^{2+}]} \). Variation of \( E_{cell} \) with log Q is of the type with OA = 1.10 V. \( E_{cell} \) will be : 1.1591 V when

(1) \( [Cu^{2+}] / [Zn^{2+}] = 0.01 \)  
(2) \( [Zn^{2+}] / [Cu^{2+}] = 0.01 \)  
(3) \( [Zn^{2+}] / [Cu^{2+}] = 0.1 \)  
(4) \( [Zn^{2+}] / [Cu^{2+}] = 1 \)

65. Hydrogen-oxygen fuel cells are used in space-crafts to supply 
(1) Power for heat and light  
(2) Power for pressure  
(3) Oxygen  
(4) Water

66. Each metal possesses: 
(1) Primary valencies satisfied anion only  
(2) Secondary valencies satisfied by donor molecules  
(3) Coordination number  
(4) All of the above

67. The colour of \( [Ti(H_2O)_6]^{3+} \) is due to 
(1) transfer of an electron from one ti to another  
(2) Presence of water molecules  
(3) Excitation of electron from d-d  
(4) Intramolecular vibration

68. Chlorophyll is a coordination compound having central atom of 
(1) Ca  
(2) Mg  
(3) Na  
(4) K

69. Exchange of coordination group by a water molecule in complex molecules result in 
(1) ionization isomerism  
(2) hydration isomerism  
(3) linkage isomerism  
(4) geometrical isomerism

Rough Work
70. An imperfect complex of a complex compound is 100% ionized the compound is called
(1) double salt (2) complex salt
(3) acid salt (4) normal salt

71. EDTA is a ........ligand
(1) monodentate (2) hexadentate
(3) bidentate (4) tridentate

72. For which transition metal ions are low spin complexes impossible.
(1) Zn^{2+} (2) Zr^{2+}
(3) Ag^{+} (4) all are correct

73. The formula of a carbonyl complex of (CO)_{n} Co – Co(CO)_{n} is which there is a single covalent Co – Co bond is
(1) Co_{2}(CO)_{4} (2) Co_{2}(CO)_{8}
(3) Co_{2}(CO)_{10} (4) Co_{2}(CO)_{6}

74. The hybridization of [PtCl_{6}]^{2–} ion is
(1) d^{2}sp^{3} (2) sp^{2}d^{1}
(3) sp^{3}d (4) sp^{2}d^{3}

75. Which is low spin complex?
(1) [Fe(CN)_{6}]^{3–} (2) [Co(NO_{2})_{6}]^{3–}
(3) [Mn(CN)_{6}]^{3–} (4) All of these

76. The tetrahedral crystal field splitting is only ...... of the octahedral splitting.
(1) 1/9 (2) 2/9
(3) 4/9 (4) 5/9

77. Which is high spin complex?
(1) [CoCl]^{3–} (2) [FeF_{6}]^{3–}
(3) [Co(NH_{3})_{6}]^{2+} (4) All are correct

78. The fraction of chlorine precipitated by AgNO_{3} solution from [Cu(NH_{3})_{4}Cl]Cl_{2} is
(1) 1/2 (2) 2/3
(3) 1/3 (4) 1/4

79. From the stability constant given below, predict which is the strongest diganol?
(1) Cu^{2+} + 2NH_{3} \[\overset{\text{NH}_{3}}{\cdot} \cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\·

80. The phenomenon of optical activity will be shown by

81. Which is considered to be an anticancer species.

Rough Work

(3) Cu^{2+} + 2en \[\overset{\text{en}}{\cdot} \cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\·

(4) Cu^{2+} + 4H_{2}O \[\overset{\text{H}_{2}O}{\cdot} \cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot\·

(\text{K} = 9.5 \times 10^{6})

(\text{K} = 3.0 \times 10^{9})

(\text{K} = 4.5 \times 10^{11})

(\text{K} = 2.0 \times 10^{8})

(\text{K} = 3.0 \times 10^{11})

\[\text{K} = 9.5 \times 10^{8}\]
82. [Cr(H₂O)_₆]Cl₃ has a magnetic moment of 3.83 BM. The correct distribution of 3d electron in the chromium complex

(1) 3dₓ⁽²⁾, 3dᵧ⁽²⁾, 3dᵢₓᶻ (2) 3dₓ, 3dᵧ, 3dᵢₓᶻ (3) 3dᵢₓ, 3dᵢᵧ (4) 3dᵢₓ, 3dᵢᵧ, 3dᵢₓᶻ

83. Crystal field stabilizing energy for high spin d⁴ octahedral complex is

(1) −1.8 Δ₀ (2) 1.6 −1.8 Δ₀ + P (3) −1.2 Δ₀ (4) −0.6 Δ₀

84. The existence of two different coloured complex with the compositon of [Co(NH₃)₄Cl₂]²⁺ is due to

(1) Linkage isomerism (2) Geometrical isomerism (3) Coordination isomerism (4) Ionisation isomerism

85. In complexes, metal atom act as

(1) Lewis base (2) Bronsted base (3) Bronsted acid (4) Lewis acid

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

(1) Sc³⁺, Co²⁺ (2) Ni²⁺, Cu⁺ (3) Ni⁴⁺, Ti³⁺ (4) Sc³⁺, Ti⁺

(Atomic number, Sc = 21, Ti = 22, Ni = 28, Cu = 29, Co = 27)

87. K₂Cr₂O₇ reacts with NH₄Cl in presence of H₂SO₄, the product formed is

(1) Chromyl chloride with green vapour (2) Chromous chloride with white vapours (3) Chromous chloride with blue vapours (4) Chromyl chloride with deep red colour

88. Indetify the incorrect statement among the followings

(1) 4f and 5f orbitals are equally shielded (2) d-block elements show irregular and erratic chemical properties among themselves (3) La and Lu have partially filled d-orbitals and no other partly filled orbitals (4) The chemistry of various lanthanoids is very similar

89. Which one of the following ions has a magnetic moment of 5.93 BM?

(At. no; V = 23; Cr = 24; Mn = 25; Fe = 26)

(1) Mn²⁺ (2) Fe²⁺ (3) Cr³⁺ (4) V³⁺

90. When hydrogen peroxide is added to acidified potassium dichromate, a blue colour is produced due to formation of

(1) CrO₃ (2) Cr₅O₇²⁻ (3) CrO₅ (4) Cr₂O₇²⁻

91. Which of the following statements is incorrect?

(1) The presence of introns in the split genes is reminiscent of antiquity (2) The process of splicing represents the dominance of RNA world (3) The split gene arrangement represent probably an ancient feature of the genome (4) None of these

92. Who was the first person to predict that genetic code should be a group of three nucleotides?

(1) Harbind Khorana (2) George Gamow (3) Nirenberg (4) Kornberg

93. Match the correct pairs.

(1) Poly-AAA = Poly-his (2) Poly-UUU = Poly-phe (3) Poly-CCC = Poly - phe (4) Poly-GGG = Poly - lys

94. Which code is actually for valine but acts for methylated methionine as well?

(1) AUG (2) CAU (3) ACG (4) GUG

95. Nobel Prize for deciphering the genetic codes was awarded to

(1) Mathei and Nirenberg (2) Nirenberg and Kornberg (3) Nirenberg and Khorana (4) Crick and Khorana

96. Nobel Prize for discovering the structure of tRNA was awarded to

(1) Holley (2) Kornberg (3) Crick (4) Gamow
97. Who predicted the presence of adapter tRNA for the purpose of protein synthesis?
   (1) Watson  (2) Griffith  (3) Crick  (4) Khorana

98. tRNA appears to be
   (1) V-shaped  (2) L-shaped  (3) R-shaped  (4) T-shaped

99. tRNA has how many recognition sites?
   (1) 1  (2) 2  (3) 3  (4) 4

100. Aminoacylation of tRNA means
   (1) Charging of tRNA with an aminoacid
   (2) Activation of an aminoacid
   (3) RNA reacting with ATP
   (4) The role of the enzyme amino-acyl synthetase

101. The peptide bond between two amino acids on the larger subunit of ribosome during the process of translation in bacteria in formed by
   (1) Peptidyl transferase
   (2) Peptidyl synthetase
   (3) 23s rRNA acting as ribozyme
   (4) Translocase

102. The total number genes in human genome is
   (1) 20,000  (2) 30,000  (3) 40,000  (4) 50,000

103. Maximum and minimum number of genes are
   (1) 2968 on chromosome number 1 and 231 on Y chromosome
   (2) 3100 on chromosome number 1 and 194 on X chromosome
   (3) 1927 on chromosome number 2 and 134 on chromosome number 22
   (4) 1800 on chromosome number 1 and 203 on X chromosome

104. Single base DNA differences (SNPs-single nucleotide polymorphism) are at how many locations is human genome?
   (1) 1.4 million  (2) 1.6 million  (3) 1.2 million  (4) 1.7 million

105. In Escherchia coli according to Operon concept an operator gene combines with
   (1) Inducer gene to “switch on” structural gene transcription
   (2) Regulator gene to “switch off” structural gene transcription
   (3) Regulator protein to “switch off” structural gene transcription
   (4) None of these

106. Operon consists of
   (1) Regulator, operator, and repressor genes
   (2) Regulator, structural and operator genes
   (3) Structural, operator, and promoter genes
   (4) Regulator, operator and promoter genes

107. “Degenerate” codes are when
   (1) The codes degenerate soon after the synthesis of polypeptide chain
   (2) A code can code for more than one amino acid
   (3) A code is non-functional and is also known as nonsense code
   (4) The same amino acid can be coded by more than one code

108. The best evidence that DNA is the genetic material comes from
   (1) The fact that chromosomes are made of DNA
   (2) Studies on transformation of bacterial cell
   (3) The knowledge that DNA is present in nucleus
   (4) The finding that DNA is not present in cytoplasm

109. Which of the following is not correct?
   (1) DNA polymerase I can do polymerisation activity in 5’ to 3’ direction, and exonuclease activity in 3’ to 5’ as well as in 5’ to 3’ direction
   (2) DNA polymerase II can do polymerase activity in 5’ to 3’ direction and exonuclease, activity in both 3’ to 5’, as well as in 5’ to 3’ direction
   (3) DNA polymerase III can do polymerisation in 5’ to 3’ direction and exonuclease activity in only 3’ to 5’ direction
   (4) None of these
110. The replication of DNA differs in prokaryotes and eukaryotes in which of the following

(1) The replication is undirectional in prokaryotes and bidirectional in eukaryotes
(2) There is a single point of origin in prokaryotic DNA whereas there are several points of origin in eukaryotic DNA
(3) The enzymes involved in the replication of DNA are different in prokaryotes and eukaryotes
(4) Both (2) and (3)

111. DNA is made up of 4 types of bases A, C, T and G. What could be the possible number of base substitutions in amino acid codons?

(1) 576    (2) 549
(3) 256    (4) 253

112. Select odd one w.r.t four levels of biological organisation concerned to ecology.

(1) Populations    (2) Communities
(3) Biomes         (4) Ecosystem

113. All the statement given below are correct except:

(1) Mango trees cannot grow in temperature countries like Canada & Germany.
(2) The salt concentration is less than 5% in inland water and 30-35% in the sea.
(3) Plants do not maintain internal temperatures and many zooplankton species in lake enter diapause.
(4) Mammals from colder climates have larger limbs and ear. This is called Allen’s rule.

114. Select odd statement w.r.t shrews and humming birds:

(1) Thermoregulation is energetically expensive for small animals like shrews and humming birds.
(2) heat loss or heat gain is a function of surface area
(3) Small animals have a large surface area relative to their volume
(4) Shrews and humming birds have to expand less energy to generate body heat through metabolism

115. Which of the following statement is incorrect for Altitude sickness?

(1) Rohtangpass near Manali and Manasarovar Tibet in China may exhibits the experiences of altitude sickness.
(2) The symptoms of altitude sickness includes nausea, fatigue and hear palpitation
(3) The body compensates by increasing red blood cell production and increasing the binding affinity of haemoglobin and by decreasing breathing rate.
(4) Due to low atmosphere pressure of high altitudes, the body does not get enough oxygen

116. If in a pond there are 20 lotus plants last year and through reproduction 8 new plants are added, taking the current population to 28, what will be the birth rate of offspring per lotus per year.

(1) 0.4    (2) 0.1
(3) 36     (4) 40

117. If 4 individuals in a laboratory population of 40 fruit flies died during a specified time internal a week, the death rate in the population during the period is

(1) 0.4    (2) 0.1
(3) 36     (4) 80

118. Select wrong statement w.r.t. population growth:

(1) Population density can be calculated by 
\[ N_{t+1} = N_t + [(B + I) - (D + E)] \]
(2) Verhulst Pearl logistic growth is described by 
\[ \frac{dN}{dt} = rN \left( \frac{K - N}{K} \right) \]
(3) The integral form of exponential growth equation is 
\[ N_t = N_0 e^{rt} \]
(4) When responses are not limiting the growth, plot is exponential and can be expressed by 
\[ \frac{dN}{dt} = \frac{K - N}{K} \]

119. Which of the following organism, does not breed only once in their life time?

(1) Pacific Salmon fish    (2) Bamboo
(3) Wheat                  (4) Mammals
120. Ecotone is
(1) A polluted area
(2) The bottom of a lake
(3) A zone of transition between two communities
(4) A zone of developing community

121. Ecological niche is
(1) The surface area of the ocean
(2) An ecological adapted zone
(3) The physical position and functional role of a species within the community
(4) Formed of all plants and animals living at the bottom of a lake

122. Salt concentration (salinity) of the sea measured in parts per thousand is
(1) 10–15
(2) 30–70
(3) 0–5
(4) 30–35

123. If a population of 50 *paramoecium* present in a pool increases to 150 after an hour, what would be the growth rate of population?
(1) 50 % per hour
(2) 200 % per hour
(3) 5 % per hour
(4) 100 % per hour

124. Which of the following forest plants control the light conditions at the ground?
(1) Lianas and climbers
(2) Shrubs
(3) Tall trees
(4) Herbs

125. According to Allen’s rule, the mammals from colder climates have
(1) Shorter ears and longer limbs
(2) Long ears and shorter limbs
(3) Longer ears and longer limbs
(4) Shorter ears and shorter limbs

126. Which of the following is a partial root parasite?
(1) *Sandal wood*
(2) *Mistle toe*
(3) *Orobanche*
(4) *Ganoderma*

127. A protozoan reproduces by binary fission. What will be the number of protozoans in its population after six generation
(1) 128
(2) 24
(3) 64
(4) 32

128. Which of the following would necessarily decrease the density of a population in a given habitat?
(1) Natality > mortality
(2) Immigration > emigration
(3) Mortality and emigration
(4) Natality and immigration

129. What parameters are used for tiger census in our country’s national parks and sanctuaries?
(1) Pugmarks only
(2) Pugmarks and faecal pellets
(3) Faecal pellets only
(4) Actual head counts

130. Autoecology is the
(1) Relation of a population to its environment
(2) Relation of an individual to its environment
(3) Relation of a community to its environment
(4) Relation of a biome to its environment

131. Biosphere is
(1) A component in the ecosystem
(2) Composed of the plants present in the soil
(3) Life in the outer space
(4) Composed of all living organisms present on the earth which interact with the physical environment

132. A population has more young individuals compared to the older individuals. What would be the status of the population after some years?
(1) It will decline
(2) It will stabilise
(3) It will increase
(4) It will first decline and then stabilise

133. In 2005, for each of the 14 million people present in a country, 0.028 were born and 0.008 died during the year. Using exponential equation, the number of people present in 2015 is predicted as
(1) 25 millions
(2) 17 millions
(3) 20 millions
(4) 18 millions

134. Amensalism is an association between two species where
(1) One species is harmed and other is benefitted
(2) One species is harmed and other is unaffected
(3) One species is benefitted and other is unaffected
(4) Both the species are harmed

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*Rough Work*
135. Lichens are the associations of
(1) Bacteria and fungus
(2) Algae and bacterium
(3) Fungus and algae
(4) Fungus and virus

136. The chances of contacting bird flu from a properly cooked (above 100°C) chicken and egg are:
(1) very high
(2) high
(3) moderate
(4) none

137. Inbreeding is carried out in animal husbandry because it:
(1) increases vigour
(2) improves the breed
(3) increases heterozygosity
(4) increases homozygosity

138. Which one of the following products of apiculture is used in cosmetics and polishes:
(1) honey
(2) oil
(3) wax
(4) Royal jelly

139. The agriculture sector of India employs:
(1) 60 per cent of the population
(2) 70 per cent of the population
(3) 30 per cent of the population
(4) 62 per cent of the population.

140. A collection of all the alleles of all the genes of a crop plant is called:
(1) germplasm collection
(2) protoplasm collection
(3) herbarium
(4) somaclonal collection

141. The vitamin whose content increases following the conversion of milk into curd by lactic acid bacteria is:
(1) vitamin C
(2) vitamin D
(3) vitamin B₁₂
(4) vitamin E.

142. Methanogenic bacteria are not found in:
(1) rumen of cattle
(2) gobar gas plant
(3) bottom of water-logged paddy fields
(4) activated sludge.

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

<table>
<thead>
<tr>
<th>Bioactive Substance</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Statin</td>
<td>(a) Removal of oil stains</td>
</tr>
<tr>
<td>(ii) Cyclosporin A</td>
<td>(b) Removal of clots from blood vessels</td>
</tr>
<tr>
<td>(iii) Streptokinase</td>
<td>(c) Lowering of blood cholesterol</td>
</tr>
<tr>
<td>(iv) Lipase</td>
<td>(d) Immuno-suppressive agent</td>
</tr>
</tbody>
</table>

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

144. BOD of waste water is estimated by measuring the amount of:
(1) total organic matter
(2) biodegradable organic matter
(3) oxygen evolution
(4) oxygen consumption.

145. The technology of biogas production from cow dung was developed in India largely due to the efforts of:
(1) Gas Authority of India
(2) Oil and Natural Gas Commission
(3) Indian Agricultural Research Institute and Khadi & Village Industries Commission
(4) Indian Oil Corporation.

146. What would happen if oxygen availability to activated sludge flocs is reduced?
(1) It will slow down the rate of degradation of organic matter
(2) The center of flocs will become anoxic, which would cause death of bacteria and eventually breakage of flocs.
(3) Flocs would increase in size as anaerobic bacteria would grow around flocs.
(4) Protozoa would grow in large numbers.

147. Which one of the following is not a nitrogen-fixing organism?
(1) Anabaena    (2) Nostoc
(3) Azotobacter (4) Pseudomonas
148. The residue left after methane production from cattle dung is:
(1) burnt
(2) buried in landfills
(3) used as manure
(4) used in civil construction.

149. Activated sludge should have the ability to settle quickly so that it can:
(1) be rapidly pumped back from sedimentation tank to aeration tank
(2) absorb pathogenic bacteria present in waste water while sinking to the bottom of the settling tank
(3) be discarded and anaerobically digested
(4) absorb colloidal organic matter.

150. Which one is the most important role of microorganisms for the well being of humans?
(1) sewage treatment
(2) production of methane
(3) biological control of plant disease
(4) conversion of milk to curd

151. Which of the following are part of biotechnology?
(1) in vitro fertilisation leading to a ‘test-tube’ baby,
(2) synthesising a gene and using it,
(3) developing a DNA vaccine or correcting a defective gene,
(4) All of the above

152. Choose the correct statement(s)
a) The European Federation of Biotechnology (EFB) has given a definition of biotechnology that encompasses both traditional view and modern molecular biotechnology.
b) The definition given by EFB is as follows: ‘The integration of natural science and organisms, cells, parts thereof, and molecular analogues for products and services’.
(1) a only
(2) b only
(3) both a and b
(4) None of the above

153. Among many, the two core techniques that enabled birth of modern biotechnology are:
a) Genetic engineering: Techniques to alter the chemistry of genetic material (DNA and RNA), to introduce these into host organisms and thus change the phenotype of the host organism.
b) Maintenance of sterile (microbial contamination-free) ambience in chemical engineering processes to enable growth of only the desired microbe/eukaryotic cell in large quantities for the manufacture of biotechnological products like antibiotics, vaccines, enzymes, etc.

Which of the statements given above are not false?
(1) a only
(2) b only
(3) both a and b
(4) None of the above

154. Choose the incorrect statement
(1) a piece of DNA, which is somehow transferred into an alien organism, most likely, this piece of DNA would not be able to multiply itself in the progeny cells of the organism.
(2) When a piece of DNA gets integrated into the genome of the recipient, it may multiply and be inherited along with the host DNA.
(3) When the alien piece of DNA has become part of the host chromosome, it loses the ability to replicate.
(4) In a chromosome there is a specific DNA sequence called the origin of replication, which is responsible for initiating replication.

155. Advancement in genetic engineering has been possible due to the discovery of
(1) Oncogenes
(2) Transposons
(3) Restriction endonuclease
(4) Exonucleases

156. Agarose extracted from sea weeds finds use in
(1) Gel electrophoresis
(2) Spectrophotometry
(3) Tissue culture
(4) PCR

157. Dolly, the first cloned mammal, was produced by
(1) Parthenogenesis
(2) Artificial fertilization
(3) Replacement of egg nucleus by somatic nucleus
(4) in vitro fertilization

158. Restriction endonucleases are used in genetic engineering, because
(1) they can degrade harmful proteins
(2) they can join DNA fragments
(3) they can cut DNA at specific base sequences
(4) they can cut DNA at variable sites
159. Which of the following is related to genetic engineering?
   (1) Mitochondrion  (2) Golgi apparatus  
   (3) Lysosome  (4) Plasmid

160. Which one is a true statement regarding DNA polymerase used in PCR?
   (1) It is isolated from a virus  
   (2) It remains active at high temperature  
   (3) It is used to ligate introduced DNA in recipient cells  
   (4) It serves as a selectable marker

161. For transformation, micro-particles coated with DNA to be bombarded with gene gun are made up of
   (1) Silicon or Platinum  (2) Gold or Tungsten  
   (3) Silver or Platinum  (4) Platinum or Zinc

162. Restriction endonucleases
   (1) Are synthesized by bacteria as part of their defense mechanism  
   (2) Are used for in vitro DNA synthesis  
   (3) Are used in genetic engineering for ligation of two DNA molecules  
   (4) Are present in mammalian cells for degradation of DNA when the cell dies

163. Plasmid has been used as vector because
   (1) Both ends show replication  
   (2) It can move between prokaryotic and eukaryotic cells  
   (3) It is circular DNA which have capacity to join to eukaryotic DNA  
   (4) It has antibiotic resistance gene

164. Which one of the following is used as vector for cloning genes into higher organisms?
   (1) Salmonella typhimurium  
   (2) Retrovirus  
   (3) Baculovirus  
   (4) Neurospora crassa

165. Plasmids are suitable vectors for gene cloning because
   (1) these can shuttle between prokaryotic and eukaryotic cells  
   (2) these are small circular DNA molecules with their own replication origin site  
   (3) these are small circular DNA molecules, which can integrate with host chromosomal DNA  
   (4) these often carry antibiotic resistance genes

166. Read the following four statements (A-D) about certain mistakes in two of them
   (A) The first transgenic buffalo Rosie produced milk which was human alpha-lactalbumin enriched  
   (B) Restriction enzymes are used in isolation of DNA from other macro-molecules  
   (C) Downstream processing is one of the steps of R-DNA technology  
   (D) Disarmed pathogen vectors are also used in transfer of R-DNA into the host
   Which are the two statements having mistakes?
   (1) Statements (A) and (C)  
   (2) Statements (A) and (B)  
   (3) Statements (B) and (C)  
   (4) Statements (C) and (D)

167. Rising of dough is due to:
   (1) Multiplication of yeast  
   (2) Production of CO2  
   (3) Emulsification  
   (4) Hydrolysis of wheat flour starch into sugars.

168. An enzyme catalysing the removal of nucleotides from the ends of DNA is:
   (1) endonuclease  
   (2) exonuclease  
   (3) DNA ligase  
   (4) Hind - II

169. Which of the given statement is correct in the context of observing DNA separated by agarose gel electrophoresis?
   (1) DNA can be seen in visible light  
   (2) DNA can be seen without staining in visible light  
   (3) Ethidium bromide stained DNA can be seen in visible light  
   (4) Ethidium bromide stained DNA can be seen under exposure to UV light
170. A recombinant DNA molecule can be produced in the absence of the following:
(1) Restriction endonuclease
(2) DNA ligase
(3) DNA fragments
(4) E. coli

171. The most important feature in a plasmid to be used as a vector is:
(1) Origin of replication (ori)
(2) Presence of a selectable marker
(3) Presence of sites for restriction endonuclease
(4) Its size

172. Which of the following has popularised the PCR (polymerase chain reactions)?
(1) Easy availability of DNA template
(2) Availability of synthetic primers
(3) Availability of cheap deoxyribonucleotides
(4) Availability of 'Thermostable' DNA polymerase

173. Significance of ‘heat shock’ method in bacterial transformation is to facilitate:
(1) Binding of DNA to the cell wall
(2) Uptake of DNA through membrane transport proteins
(3) Uptake of DNA through transient pores in the bacterial cell wall
(4) Expression of antibiotic resistance gene

174. The role of DNA ligase in the construction of a recombinant DNA molecule is:
(1) Formation of phosphodiester bond between two DNA fragments
(2) Formation of hydrogen bonds between sticky ends of DNA fragments
(3) Ligation of all purine and pyrimidine bases
(4) None of the above

175. Which of the following bacteria is not a source of restriction endonuclease?
(1) Haemophilus influenzae
(2) Escherichia coli
(3) Agrobacterium tumefaciens
(4) Bacillus amyloli

176. A bacterial cell was transformed with a recombinant DNA that was generated using a human gene. However, the transformed cells did not produce the desired protein. Reasons could be:
(1) Human gene may have intron which bacteria cannot process
(2) Amino acid codons for humans and bacteria are different
(3) Human protein is formed but degraded by bacteria
(4) All of the above

177. Who among the following was awarded the Nobel Prize for the development of PCR technique?
(1) Herbert Boyer  (2) Hargovind Khurana
(3) Kary Mullis  (4) Arthur Kornberg

178. Plasmids are vectors for gene cloning because they
(1) Self replicate in bacterial cells
(2) Replicate freely outside bacterial cells
(3) Can be multiplied in culture
(4) Can be multiplied in laboratories using enzymes

179. DNA fingerprinting is based on
(1) Occurrence of VNTR’s
(2) Knowledge of human karyotype
(3) Cloned DNA
(4) Recombinant DNA

180. VNTRs represents-
(1) New terminal regions in DNA
(2) Functional genes in the DNA
(3) Split genes in the sample DNA
(4) Specific non-coding sequences with unique tandem repeats
### PHYSICS

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### CHEMISTRY

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