Aakash
Medical | IIT-JEE | Foundations

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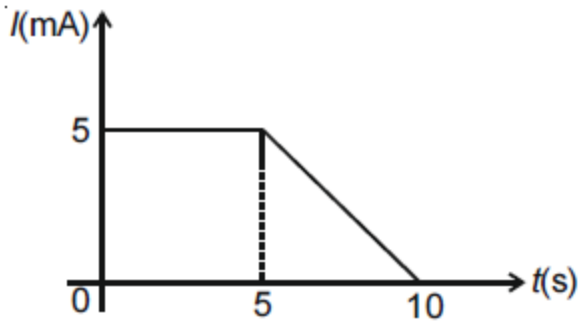
MM : 720 **Final Test Series(P1)_NEET2026_Test-06B** **Time : 180 Min.**

Topics Covered:
Physics: Current Electricity, Moving Charges and Magnetism, Magnetism and Matter, Electromagnetic Induction
Chemistry: Equilibrium, Redox Reactions, The p-Block Elements (Group-13 & 14)
Botany: Cell: The Unit of Life, Cell Cycle and Cell Division
Zoology: Reproductive Health, Evolution

General Instructions :
Duration of Test is 3 hrs.
The Test consists of 180 questions. The maximum marks are 720.
There are four parts in the question paper consisting of Physics, Chemistry, Botany and Zoology having 45 questions in each part of equal weightage.
Each question carries +4 marks. For every wrong response, –1 mark shall be deducted from the total score. Unanswered/unattempted questions will be given no marks.
Use blue/black ballpoint pen only to darken the appropriate circle.
Mark should be dark and completely fill the circle.
Dark only one circle for each entry.
Dark the circle in the space provided only.
Rough work must not be done on the Answer sheet and do not use white fluid or any other rubbing material on the Answer sheet.
Some parts of this question paper have been masked to maintain its integrity. The missing information will be announced during/before the test.

PHYSICS

1. For a conductor, current (I) versus time (t) graph is shown in figure. The total charge flown through the conductor in 10 second is



(1) 37.5 mC

(2) 50 mC

(3) 25 mC

(4) 57.5 mC

2. A cell has emf E and internal resistance r. The terminal voltage across cell may be equal to

(1) $E - ir$

(2) E

(3) $E + ir$

(4) All of these

3. The internal resistance of a 4.2 V cell which gives a current of 0.4 A through a resistance of 10 Ω is

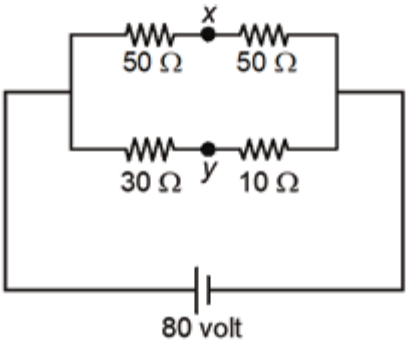
(1) 0.5 Ω

(2) 1 Ω

(3) 0.2 Ω

(4) 0.8 Ω

4. The potential difference between points *x* and *y* in the circuit shown below is



(1) 10 volt

(2) 20 volt

(3) 30 volt

(4) 40 volt

5. The temperature coefficient of resistance of tungsten is $4.5 \times 10^{-3}\ ^\circ C^{-1}$ and that of germanium is $-5 \times 10^{-2}\ ^\circ C^{-1}$. A tungsten wire of resistance 100 Ω is connected in series with a germanium wire of resistance *R*. The value of *R* for which the resistance of combination does not change with temperature is

(1) 9 Ω

(2) 1111 Ω

(3) 0.9 Ω

(4) 111.1 Ω

6. A hollow cylindrical wire of inner radius '*a*' and outer radius '*b*' carries a constant current of magnitude *I*. The magnitude of current density in the wire is

(1) $\frac{I}{4\pi(b^2-a^2)}$

(2) $\frac{I}{\pi(b^2-a^2)}$

(3) $\frac{a^2}{b^2}I$

(4) $\sqrt{\frac{b}{a}}I$

7. A straight wire of mass $\frac{1}{2}$ kg and length 2 m carries a current of *I* ampere. If it is suspended in mid air where uniform magnetic field of 1 T exist perpendicular to length of wire, then value of *I* will be (g = 10 m/s^2)

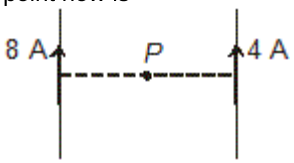
(1) 5 A

(2) 2.5 A

(3) 2 A

(4) 0.5 A

8. Two infinite straight wires carrying currents 8 A and 4 A respectively in the same direction produce a net magnetic field of 36 T at midpoint of the line joining them. When 4 A current wire is switched off, then the magnetic field at mid point now is



(1) 36T

(2) 54T

(3) 72T

(4) 60T

9. Two identical charge A and B are projected with same speed in same uniform magnetic field at angle of 30° and 60° respectively with the direction of magnetic field. The ratio of respective pitch of the charges will be

(1) 3 : 1

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

(3) 1 : 2

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

10. Some quantities are given in Column-I and their expression are given in column-II. Match the quantities with their respective expression and choose the correct option. (Symbol have their usual meaning)

	Column-I		**Column-II**
(A)	Lorentz-force equation	(p)	$\vec{F} = \vec{q}(\vec{v} \times \vec{B})$
(B)	Condition for the velocity selector arrangement to work	(q)	$\vec{F} = q(\vec{E} + \vec{v} \times \vec{B})$
(C)	Force on a charge in magnetic field	(r)	$\vec{v}, \vec{E}$ and $\vec{B}$ are mutually perpendicular
(D)	Magnetic moment due to a moving charge on a circular path	(s)	$\frac{q}{2m}$ times angular momentum

(1) A(q), B(r), C(p), D(s)

(2) A(r), B(p), C(q), D(s)

(3) A(s), B(r), C(q), D(p)

(4) A(p), B(q), C(s), D(r)

11. Magnetic induction at the centre of a current carrying circular coil of radius 15 cm is $5\sqrt{5}$ times the magnetic induction at a point on its axis. Distance of this point from the centre of the coil (in cm) is

(1) 30

(2) 15

(3) 20

(4) 35

12. A galvanometer of resistance 60 Ω is shunted by a 0.3 Ω resistor. The fraction of the main current that flows through the galvanometer is

(1) $\frac{1}{201}$

(2) $\frac{1}{101}$

(3) $\frac{1}{50}$

(4) $\frac{1}{100}$

13. The 'hysteresis curve' is made for

(1) Diamagnetic substance

(2) Paramagnetic substance

(3) Ferromagnetic substances

(4) All of these

14. **Assertion (A) :** A bar magnet creates non-uniform magnetic field.
Reason (R) : Net magnetic force on a bar magnet placed in an uniform magnetic field is zero.

(1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion.

(2) Both Assertion & Reason are true but the reason is not the correct explanation of the assertion.

(3) Assertion is true statement but Reason is false.

(4) Both Assertion and Reason are false statements.

15. A bar magnet has coercivity of 4000 A m^{-1}. It is desired to be demagnetised by inserting it inside a solenoid 20 cm long and having 500 turns. The current which will be required for this ideal solenoid is

(1) 4.8 A

(2) 0.4 A

(3) 0.8 A

(4) 1.6 A

16. A bar magnet suspended in stable equilibrium in a uniform magnetic field, requires $\sqrt{5}\,\mathrm{J}$ of work to turn it through 53°. The torque needed to maintain the needle in this new position will be

(1) $\frac{3\sqrt{5}}{2}\,\mathrm{N\,m}$

(2) $2\sqrt{5}\,\mathrm{N\,m}$

(3) $3\sqrt{5}\,\mathrm{N\,m}$

(4) $\frac{5\sqrt{5}}{2}\,\mathrm{N\,m}$

17. A square loop (of wire) of side length 10 cm is placed at angle of 45° with a magnetic field that changes uniformly from 0.1 T to zero in 0.7 second. The induced emf in the loop is

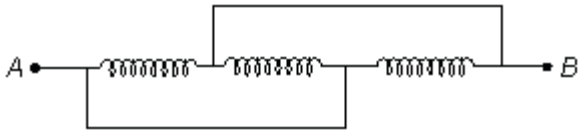
(1) 25 mV

(2) 1 mV

(3) 4 mV

(4) Zero

18. Ideal inductors of inductance 6.0 H each are connected as shown in the figure. The equivalent inductance of the circuit between *A* and *B* is



(1) 1 H

(2) 18 H

(3) 0 H

(4) 2 H

19. The self inductance (*L*) of a solenoid of length *l* and cross-sectional area *A*, with a fixed number of turns *N*, would surely increase, if

(1) Both *l* and *A* increase

(2) *l* decreases and *A* increases

(3) *l* increases and *A* decreases

(4) Both *l* and *A* decrease

20. In a coil with resistance 2 ohm, the magnetic flux changes from 2 weber to 8 weber in 0.3 second. The charge that flows in the coil during this time is

(1) 1 C

(2) 2 C

(3) 3 C

(4) 4 C

21. A coil of resistance 30 Ω and inductance 5 H is connected to a battery of emf 60 V. The energy stored in the coil in steady state is

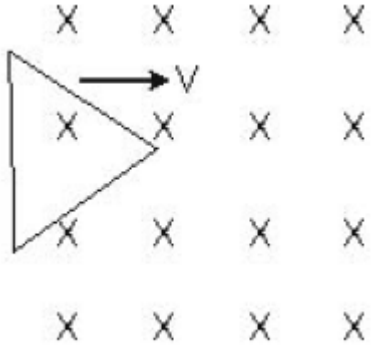
(1) 50 J

(2) 10 J

(3) 100 J

(4) 25 J

22. Magnetic field is directed inward in a region. A triangular loop is entering in the magnetic field as shown with constant speed. The current induced in loop till it enters the loop is (seen from above)



(1) Clockwise and increasing

(2) Anticlockwise and decreasing

(3) Anticlockwise and increasing

(4) Clockwise and decreasing

23. A uniform metallic wire is connected to a battery of constant voltage *V*. If the length of the wire is doubled while keeping its cross-sectional area unchanged, which of the following statements is correct?

(1) The drift velocity of electrons becomes half

(2) The drift velocity remains unchanged

(3) The drift velocity becomes double

(4) The current remains unchanged.

24. A cell of emf $12\ \text{V}$ and internal resistance $3\ \Omega$ is connected to an external resistance *R*. The maximum power delivered to the external resistance will be

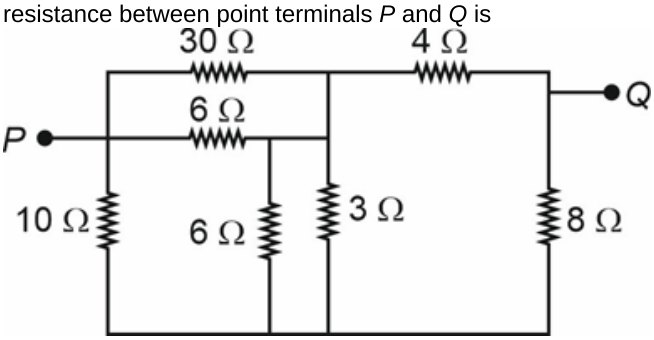
(1) 48 W

(2) 36 W

(3) 12 W

(4) 18 W

25. A network of resistors is shown below. The equivalent resistance between point terminals *P* and *Q* is



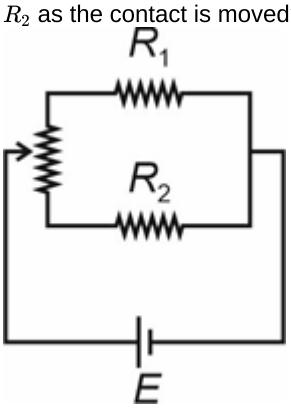
(1) 18 Ω

(2) $\frac{19}{3}\ \Omega$

(3) 6 Ω

(4) $\frac{17}{3}\ \Omega$

26. In the circuit shown, *a* sliding contact can be moved along *a* uniform resistance wire. To increase the current through resistor R_1, in which direction should the sliding contact be moved? Also, what happens to the current through resistor R_2 as the contact is moved?



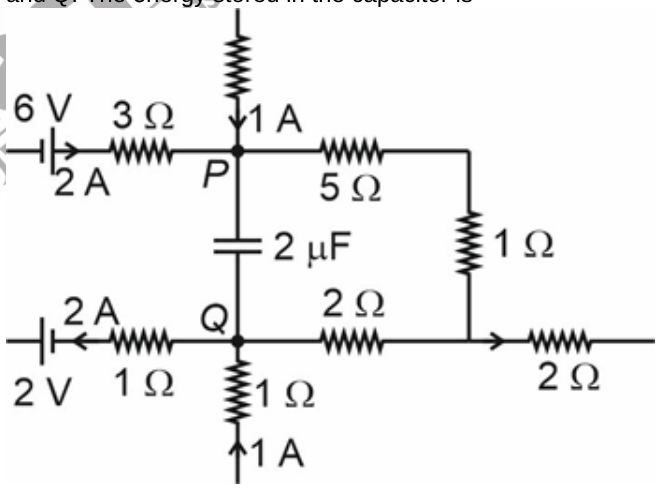
(1) Move the contact up; current through R_2 increases

(2) Move the contact up; current through R_2 decreases

(3) Move the contact down; current through R_2 increases

(4) Move the contact down; current through R_2 decreases

27. In the circuit shown, the system has reached a steady state. The values of the resistances and the currents flowing through various branches are as indicated in the figure. A capacitor of capacitance 2 μF is connected between points *P* and *Q*. The energy stored in the capacitor is



(1) 400 μJ

(2) 200 μJ

(3) 180 μJ

(4) Zero

28. A charged particle enters a region of uniform magnetic field with velocity making an angle θ with the field direction. A weak uniform electric field is also present parallel to the magnetic field. Choose the correct option.

(1) Motion remains circular with constant speed.

(2) Motion becomes helical with constant pitch

(3) Speed increases linearly with time.

(4) Radius of circular component remains constant but pitch changes.

29. In which of the following situations, magnetic field can be calculated using Ampere's circuital law?

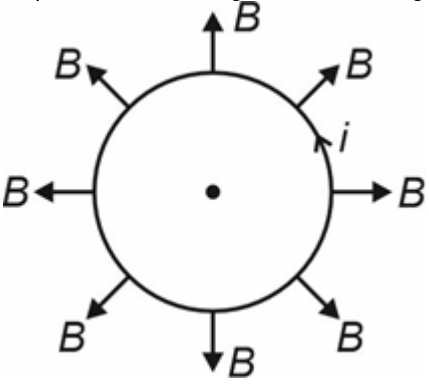
(1) Infinite straight current carrying wire

(2) Toroid

(3) Long solenoid

(4) All of these

30. Consider a circular loop of radius *a*, carrying a steady current *i*, is placed in a two-dimensional magnetic field such that the centre of the loop coincides with the centre of the magnetic field, as shown in the figure. The magnitude of the magnetic field at every point on the circumference of the loop is *B*. The net magnetic force acting on the loop is



(1) $2\pi iaB$

(2) πiaB

(3) $2aiB$

(4) Zero

31. A charged particle is accelerated through a potential difference of 12 kV and acquires a speed of $1 \times 10^6\ \mathrm{m\ s^{-1}}$. It is then injected perpendicular to a uniform magnetic field of strength 0.2 T. The radius of the circular path described by the particle is

(1) 24 cm

(2) 12 cm

(3) 6 cm

(4) 3 cm

32. A charged particle of charge q and mass m moves in a uniform magnetic field B in a circular path with speed v. Match the physical quantities in column I with their correct dependence on the speed v given in column II.

	Column I		**Column II**
(a)	Equivalent current associated with the circular motion of the charged particle	(p)	Proportional to *v*
(b)	Magnetic dipole moment of the orbiting charged particle	(q)	Proportional to v^2
(c)	Magnetic field at the centre of the circular path due to the moving charge	(r)	Independent of *v*
(d)	Radius of the circular path of the charged particle	(s)	Inversely proportional to *v*

(1) (a)-(p); (b)-(q); (c)-(s); (d)-(r)

(2) (a)-(r); (b)-(q); (c)-(p); (d)-(s)

(3) (a)-(r); (b)-(q); (c)-(s); (d)-(p)

(4) (a)-(q); (b)-(s); (c)-(p); (d)-(r)

33. A ferromagnetic rod is placed in a uniform external magnetic field B_0. The rod is then cut into two equal halves along its length, and both halves are placed parallel to the original field. Consider the following statements:
(A) Magnetisation of each half becomes half
(B) Magnetisation of each half remains unchanged.
(C) Magnetic susceptibility of each half changes.
(D) Magnetic susceptibility of each half remains same.
The correct statement(s) is/are

(1) Both (A) and (C)

(2) Both (B) and (C)

(3) Both (B) and (D)

(4) Both (A) and (D)

34. The magnetic scalar potential due to a magnetic dipole at a point on its axis situated at a distance of $10\ \mathrm{cm}$ from its centre is found to be $1.2 \times 10^{-4}\ \mathrm{T\ m}$. The magnetic moment of the dipole is

(1) 12 A m^2

(2) 4.8 A m^2

(3) 10.4 A m^2

(4) 14 A m^2

35. Choose the correct statement among the following.

(1) Paramagnetic behaviour is exhibited by all materials.

(2) The magnetic field produced by an induced magnetic moment opposes the applied magnetic field.

(3) The magnetising field intensity *H* is always zero in free space.

(4) Diamagnetism arises due to partial alignment of permanent magnetic moments.

36. A bar magnet having a magnetic moment of 120 A m^2 is set into small angular oscillations in a uniform magnetic field of strength 0.4×10^{-4} T. If the time period of oscillations is 2 s, then the moment of inertia of the magnet about its axis of rotation is (take $\pi^2 = 10$)

(1) 4.8×10^{-4} kg m^2

(2) 4.8×10^{-3} kg m^2

(3) 1.2×10^{-4} kg m^2

(4) 1.2×10^{-3} kg m^2

37. The susceptibility of magnesium at 300 K is 1.2×10^{-5}. The temperature at which the susceptibility will become 1.5×10^{-5} is

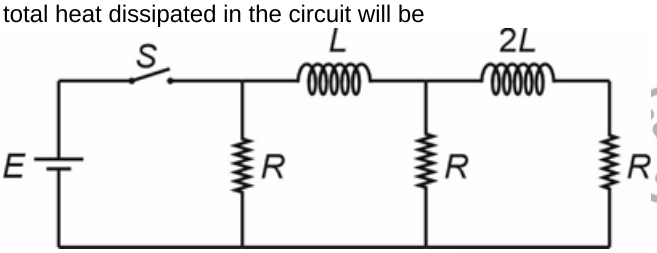
(1) 240 K

(2) 340 K

(3) 600 K

(4) 150 K

38. Initially, the switch is closed and the equilibrium has been established in the circuit. If the switch is opened, then the total heat dissipated in the circuit will be



(1) $\frac{LE^2}{R^2}$

(2) $\frac{3LE^2}{2R^2}$

(3) $\frac{2LE^2}{R^2}$

(4) $\frac{3LE^2}{R^2}$

39. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R).**
Assertion: Two identical conducting loops, one made of copper and the other of aluminium, are rotated with the same angular velocity in the same magnetic field about their respective diameter. The induced emf in both loops is same.
Reason: The induced emf depends on the rate of change of magnetic flux.
In the light of the above statements, choose the **correct** answer from the options given below:

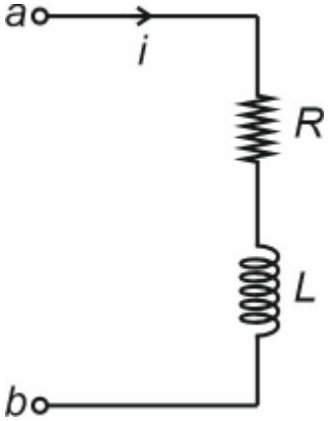
(1) Both A and R are true and R is the correct explanation of A.

(2) Both A and R are true but R is NOT the correct explanation of A.

(3) A is true but R is false.

(4) A is false but R is true.

40. In the circuit shown, a resistor R is connected in series with an inductor L between points a and b. When the current in the circuit is 3 A and increasing at the rate of 2 A s^{-1}, the measured potential difference between points a and b is 18 V. However, when the current is 7 A and decreasing at the rate of 2 A s^{-1} the measured potential difference 'between' a and b is 6 V. The respective values of the resistance R and inductance L are (Assume $V_a > V_b$)



(1) 1.2 Ω and 3.6 H

(2) 2.4 Ω and 5.4 H

(3) 1.6 Ω and 2.4 H

(4) 1.8 Ω and 5.4 H

41. The magnetic flux linked with a closed conducting loop is increasing. The direction of induced current in the loop will be such that it

(1) Enhances the increase in magnetic flux

(2) Opposes the increase in magnetic flux

(3) Has no effect on the magnetic flux

(4) Always flows clockwise

42. A straight conductor is moved with constant speed v perpendicular to a uniform magnetic field *B*. The induced emf in the conductor is *E*. If the speed of the conductor is doubled, the induced emf becomes

(1) E

(2) $\frac{E}{2}$

(3) $2E$

(4) $4E$

43. Consider the following statements:
Statement (A): Two conducting coils A and B are placed coaxially near each other. If the current in coil A is changing with time, an emf is induced in coil B.
Statement (B): Two coaxial conducting rings are placed in space. The mutual inductance of both the rings is maximum if the rings are coplanar.

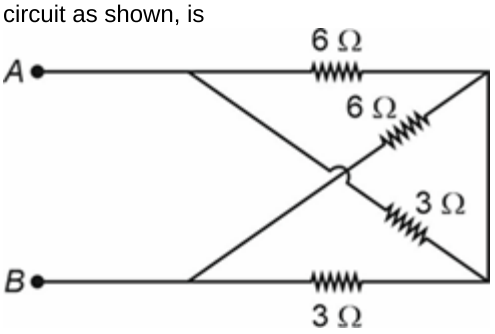
(1) Only statement (A) is correct

(2) Only statement (B) is correct

(3) Both statements (A) and (B) are correct

(4) Both statements (A) and (B) are incorrect

44. The equivalent resistance between terminals *A* and *B* of the circuit as shown, is



(1) 4 Ω

(2) 1 Ω

(3) 6 Ω

(4) 9 Ω

45. Two long straight wires each are parallel to each other and separated by 2 cm. When the current flowing in them is 2 A and $\frac{3}{2}$ A, then the force per unit length experienced by either of the wires is

(1) $3 \times 10^{-5} \frac{\text{N}}{\text{m}}$

(2) $2 \times 10^{-5} \frac{\text{N}}{\text{m}}$

(3) $1 \times 10^{-5} \frac{\text{N}}{\text{m}}$

(4) $1.8 \times 10^{-5} \frac{\text{N}}{\text{m}}$

CHEMISTRY

46. Element of group 14 which decomposes steam to form its dioxide and dihydrogen gas is

(1) Carbon

(2) Silicon

(3) Germanium

(4) Tin

47. Given below are two statements.
Statement I: B_2H_6 molecule contains four two centre-two electron bonds and two three centre-two electron bonds.
Statement II: Diborane is produced on an industrial scale by the oxidation of sodium borohydride with iodine.
In the light of above statements, choose the correct answer from the options given below.

(1) Both statement I and statement II are correct

(2) Both statement I and statement II are incorrect

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

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

48. When anhydrous borax is subjected to heating produces transparent liquid which solidifies into glassy bead. The composition of glassy bead is

(1) $Na_3BO_3 + B_2O_3$

(2) $NaBO_2 + B_2O_3$

(3) $NaBO_2 + BO_2$

(4) $Na_2O + B_2O_3$

49. Which among the following has similar structure like benzene?

(1) AlN

(2) BN

(3) B_4C

(4) $B_3N_3H_6$

50. Aluminium reacts with aqueous alkali (NaOH) to form

(1) Aluminium oxide and water

(2) Aluminium oxide and hydrogen

(3) Sodium tetrahydroxoaluminate(III) and hydrogen

(4) Sodium tetrahydroxoaluminate(III) and water

51. Which of following statement is/are correct regarding borax?
(I) It contains the tetranuclear units $[B_4O_5(OH)_4]^{2-}$
(II) It dissolves in water to give an acidic solution
(III) It is a white crystalline solid

(1) I only

(2) II only

(3) I and III only

(4) I, II and III

52. Silica on reaction with NaOH and HF respectively forms

(1) Na_2SiO_3 and Na_2SiF_6

(2) Na_2SiO_3 and SiF_4

(3) Na_2SiO_3 and Na_2SiF_4

(4) Na_2SiO_4 and SiF_4

53. Given below are two statements:
Statement I : The group oxidation state of group 13 and group 14 elements are +3 and +4 respectively.
Statement II : The general outer electronic configuration of group 13 and group 14 elements are $ns^2\ np^2$ and $ns^2\ np^1$ respectively.
In the light of above statements, choose the correct answer from the options given below.

(1) Both statement I and statement II are correct

(2) Both statement I and statement II are incorrect

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

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

54. Consider the following statements:
(i) Pb^{2+} is more stable than Pb^{4+}.
(ii) PbF_4 and SnF_4 are ionic in nature .
(iii) $SiCl_4$ and CCl_4 do not hydrolyse.
Choose the incorrect statement(s)

(1) (i) and (iii) only

(2) (ii) only

(3) (iii) only

(4) (ii) and (iii) only

55. Identify the **correct** statements from the following.
(a) ZSM-5, a type of zeolite, is used to convert alcohols into gasoline.
(b) CO is highly poisonous in nature.
(c) CO_2 is used as fire extinguisher.
(d) The basic structural unit of silicates is SiO_4^{4-}.

(1) (a) and (b) only

(2) (a) and (c) only

(3) (b) and (c) only

(4) (a), (b), (c) and (d)

56. Water gas among the following is

(1) $CO_2 + H_2$

(2) $CO + H_2$

(3) $CO + N_2$

(4) $CO_2 + N_2$

57. Given below are two statements:
Statement I : Fullerenes are the only pure form of carbon.
Statement II : Fullerenes have smooth structure without having 'dangling' bonds.
In the light of the above statements, choose the correct answer from the options below.

(1) Statement I is false but statement II is true

(2) Both statement I and statement II are true

(3) Both statement I and statement II are false

(4) Statement I is true but statement II is false

58.
$2RCl + Si \xrightarrow[\Delta]{\text{Cu powder}} R_2SiCl_2 \xrightarrow{H_2O} R_2Si(OH)_2 \xrightarrow{\Delta}$ Product.
Product is

(1) Cross linked silicone

(2) Linear silicone

(3) Cyclic silicate

(4) Linear silicate

59. Which of the following is not an acidic oxide?

(1) CO_2

(2) SiO_2

(3) GeO_2

(4) SnO_2

60. The correct order of covalent radii of group 14 elements is

(1) C < Si < Ge < Sn

(2) C < Si < Sn < Ge

(3) C < Ge < Si < Sn

(4) C < Sn < Ge < Si

61. The number of moles of $Cr_2O_7^{2-}$ required to react with two moles of sulphite ion in acidic solution is

(1) 1/3

(2) 1

(3) 2/3

(4) 2/5

62. The oxidation state of Cr in CrO_5 is

(1) + 10

(2) + 8

(3) + 5

(4) + 6

63. Reaction(s) in which H_2O_2 works as an oxidising agent is/are
(a) $H_2O_2 + I_2 \rightarrow H_2O + O_2 + HI$
(b) $H_2O_2 + Ag_2O \rightarrow 2Ag + H_2O + O_2$
(c) $H_2O_2 + PbS \rightarrow PbSO_4 + H_2O$
The **correct** option is

(1) (a) and (b) only

(2) (a) and (c) only

(3) (c) only

(4) (a), (b) and (c)

64. Match the 'reactions' given is List I with "types of redox reactions" in List II.

	List-I		List-II
a.	$TiCl_4$ + 2Mg → Ti + $2MgCl_2$	(i)	Non-metal displacement reaction
b.	Ca + $2H_2O$ → $Ca(OH)_2$ + H_2	(ii)	Metal displacement reaction
c.	Cl_2 + $2OH^-$ → ClO^- + Cl^- + H_2O	(iii)	Decomposition reaction
d.	2NaH $\xrightarrow{\Delta}$ 2Na + H_2	(iv)	Disproportionation reaction

The correct match is

(1) a(ii), b(i), c(iv), d(iii)

(2) a(i), b(ii), c(iii), d(iv)

(3) a(iv), b(iii), c(ii), d(i)

(4) a(iii), b(iv), c(i), d(ii)

65. Which of the given reactions is an example of disproportionation?

(1) $2\,Pb\,(NO_3)_2 \xrightarrow{Heat} 2PbO + 4\,NO_2 + O_2$

(2) $CH_4 + 2O_2 \xrightarrow{\Delta} CO_2 + 2H_2O$

(3) $CaC\,O_3 \xrightarrow{Heat} CaO + CO_2$

(4) $2H_2O_2 \xrightarrow{Sunlight} 2H_2O + O_2$

66. Which among the following act as a self indicator in the estimation of oxalate ions in solution?

(1) $KMnO_4$

(2) $K_2Cr_2O_7$

(3) I_2

(4) Starch

67. Based on given data

$Au^{3+} + 3e^- \rightarrow Au(s)$ E° = 1.40V

$Ag^+ + e^- \rightarrow Ag(s)$ E° = 0.80V

$Cu^{2+} + 2e^- \rightarrow Cu(s)$ E° = 0.34V

The correct order of oxidising power is

(1) $Au^{3+} > Cu^{2+} > Ag^+$

(2) $Cu^{2+} > Ag^+ > Au^{3+}$

(3) $Au^{3+} > Ag^+ > Cu^{2+}$

(4) $Cu^{2+} > Au^{3+} > Ag^+$

68. If the equilibrium constant for $H_2(g) + Cl_2(g) \rightleftharpoons 2\,HCl(g)$ is K, then the equilibrium constant for $HCl(g) \rightleftharpoons \frac{1}{2}H_2(g) + \frac{1}{2}Cl_2(g)$ will be

(1) $K^{1/2}$

(2) K

(3) $\frac{1}{2K}$

(4) $\left(\frac{1}{K}\right)^{1/2}$

69. If K_a of a weak acid HA is 10^{-5} then the K_h for NaA will be

(1) 10^{-4}

(2) 10^{-10}

(3) 10^{-9}

(4) 10^{-5}

70. The ratio of concentration of base to salt is 1 : 10 for a basic buffer. If pK_b of base is 4, then the pOH of buffer solution will be

(1) 8

(2) 7

(3) 6

(4) 5

71. pH of 0.02 M calcium acetate solution is (pK_a of $CH_3\,COOH = 4.74$)

(1) 8.67

(2) 5.33

(3) 9.12

(4) 4.88

72. The salt which does not undergo hydrolysis is

(1) $CH_3\,COONa$

(2) $HCOONa$

(3) $NH_4\,Cl$

(4) KCl

73. Consider the following statements.

Statement I: All measurable properties of the system remain constant at equilibrium.

Statement II: The equilibrium involving physical processes is attained in a closed system at a given temperature.

In the light of the above statements, choose the most appropriate answer from the options given below :

(1) Statement I is true but Statement II is false

(2) Statement I is false but Statement II is true

(3) Both Statement I and Statement II are true

(4) Both Statement I and Statement II are false

74. Which among the following is not an example of homogeneous equilibrium?

(1) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

(2) $CH_3COOC_2H_5(aq) + H_2O(l) \rightleftharpoons CH_3COOH(aq) + C_2H_5OH(aq)$

(3) $Ca(OH)_2(s) + (aq) \rightleftharpoons Ca^{2+}(aq) + 2OH^-(aq)$

(4) $Fe^{3+}(aq) + SCN^-(aq) \rightleftharpoons Fe(SCN)^{2+}(aq)$

75. For the equilibrium, $N_2O_4(g) \rightleftharpoons 2NO_2(g)$; the value of equilibrium constant K_P is 47.9 at $400\ K$. The value of K_c at the same temperature is [R = 0.0821 L atm/Kmol^{-1}]

(1) 1592.19

(2) 1.458

(3) 2.381

(4) 1293.38

76. Consider the following statements.
Statement I: A catalyst does not appear in the balanced chemical equation or in the equilibrium constant expression.
Statement II: The equilibrium constant for the reverse reaction is equal to the inverse of the equilibrium constant for the forward reaction.
In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Statement I is true but Statement II is false

(2) Statement I is false but Statement II is true

(3) Both Statement I and Statement II are true

(4) Both Statement I and Statement II are false

77. Consider the following statements.
(a) Bronsted Lowry bases are substances capable of accepting a hydrogen ion.
(b) Lewis acids are species which accepts electron pair.
(c) NH_3, OH^- can act as Lewis acids.
The correct statements are

(1) (a) and (c) only

(2) (a) and (b) only

(3) (a), (b) and (c)

(4) (b) and (c) only

78. The conjugate acid and conjugate base of $H_2PO_4^-$ ion respectively are

(1) HPO_4^{2-} and PO_4^{3-}

(2) H_3PO_4 and PO_4^{3-}

(3) H_3PO_4 and HPO_4^{2-}

(4) HPO_4^{2-} and H_3PO_4

79. Consider the following equation.
$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3$, $\Delta H = -198\ kJ$ and $K_p = 4 \times 10^{24}$.
The incorrect statement is

(1) Increase in Pressure shifts the reaction in forward direction.

(2) Value of K_p increases with increase in temperature.

(3) Increasing amount of SO_2 increases the formation of SO_3.

(4) Addition of inert gas at constant volume does not affect equilibrium.

80. The pH of a solution is increased from 3 to 6, its H^+ concentration will be

(1) Reduced to half

(2) Doubled

(3) Reduced to 1000 times

(4) Increased by 1000 times

81. If the equilibrium constant for the reaction is 10^3, then the value of ΔG° at 300 K will be

(1) $-300R$

(2) $-2.303 \times 900R$

(3) $-2.303 \times 600R$

(4) $-2.303 \times 300R$

82. The solubility of AgCl in 0.01 M aqueous solution of NaCl is (K_{sp} of $AgCl = 1.8 \times 10^{-10}$)

(1) $1.8 \times 10^{-9}\ M$

(2) $1.8 \times 10^{-12}\ M$

(3) $1.8 \times 10^{-10}\ M$

(4) $1.8 \times 10^{-8}\ M$

83. Given below are two statements:
Assertion (A): The first ionisation constant of H_2S is larger than second ionisation constant of H_2S.
Reason (R): It is difficult to remove H^+ from negatively charged HS^-.
In the light of the above statements, choose the correct answer from the options given below:

(1) (A) is true but (R) is false

(2) (A) is false but (R) is true

(3) Both (A) and (R) are true and (R) is the correct explanation of (A)

(4) Both (A) and (R) are true but (R) is not the correct explanation of (A)

84. The pair in which common ion effect will be observed is

(1) $HCl + NaCl$

(2) $KCl + NaCl$

(3) $NaCl + AgCN$

(4) $HCN + KCN$

85. Solid ammonium carbamate dissociated according to the given reaction $NH_2COONH_4(s) \rightleftharpoons 2NH_3(g) + CO_2(g)$. If the total pressure of the gases at equilibrium is 6 atm, then the K_p will be

(1) 2

(2) 4

(3) 32

(4) 12

86. The solubility product of $CuCO_3$, $CuCl$ and FeS is 1.4×10^{-10}, 1.7×10^{-6} and 6.3×10^{-18} respectively. The correct order of solubility is

(1) $FeS > CuCO_3 > CuCl$

(2) $CuCl > CuCO_3 > FeS$

(3) $CuCO_3 > FeS > CuCl$

(4) $FeS > CuCl > CuCO_3$

87. If ionic product of water at $310\ K$ is 2.7×10^{-14}. Then the pH of pure water at the same temperature will be

(1) 7

(2) 6.78

(3) 7.42

(4) 6

88. If the equilibrium constant for $\frac{1}{2}N_2(g) + \frac{1}{2}O_2(g) \leftrightharpoons NO(g)$ is K, then the equilibrium constant for 2NO(g) $\leftrightharpoons$ $N_2(g)$ + $O_2(g)$ will be

(1) K^2

(2) $\frac{1}{K}$

(3) $K^{1/2}$

(4) $\frac{1}{K^2}$

89. Which of the following salt solution will give highest pH?

(1) $0.1M\ CH_3COONa$

(2) $0.1M\ KCl$

(3) $0.1M\ NH_4Cl$

(4) $0.1M\ NaNO_3$

90. For the redox reaction
$aFe^{2+} + Cr_2O_7^{2-} + bH^+ \longrightarrow Fe^{3+} + cCr^{3+} + dH_2O$
the correct coefficient a, b, c, d in the balanced equation are

	a	b	c	d
(A)	6	7	2	14
(B)	6	14	2	7
(C)	1	2	1	4
(D)	6	7	2	7

(1) (A)

(2) (B)

(3) (C)

(4) (D)

BOTANY

91. Categorise the following structures/features that are concerned with mitochondria or chloroplasts and select the option accordingly.
(i) Oxidative phosphorylation
(ii) 70S ribosomes
(iii) Stroma
(iv) Circular dsDNA
(v) Photophosphorylation
(vi) Cristae

	Mitochondria	Chloroplast
(1)	(i), (ii), (iv), (vi)	(ii), (iii), (iv), (v)
(2)	(i), (ii), (iii), (vi)	(ii), (iv), (v), (vi)
(3)	(ii), (iii), (iv), (v), (vi)	(i), (ii), (iv)
(4)	(iii), (iv), (v), (vi)	(i), (ii), (iii), (v)

(1) (1)

(2) (2)

(3) (3)

(4) (4)

92. The interval between mitosis and initiation of DNA replication in actively dividing cell is

(1) G_1 phase

(2) G_0 phase

(3) G_2 phase

(4) M phase

93. Match the following columns and select the **correct** option.

	Column I		**Column II**
a.	Primary constriction	(i)	Kinetochores
b.	Part of chromosome beyond Secondary constriction	(ii)	Satellite
c.	Disc shaped structures on the sides of primary constriction	(iii)	Telomere
d.	End of the chromosome	(iv)	Centromere

(1) a(iv), b(ii), c(i), d(iii)

(2) a(iv), b(ii), c(iii), d(i)

(3) a(ii), b(iv), c(i), d(iii)

(4) a(ii), b(iv), c(iii), d(i)

94. Read the following Assertion (A) and Reason (R) and choose the **correct** option.
Assertion (A): Concentration of ions is significantly higher in the vacuole than in the cytoplasm.
Reason (R): Tonoplast facilitates the transport of a number of ions and other materials against the concentration gradient into the vacuole.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) (A) is true but (R) is false

(3) Both (A) and (R) are false

(4) Both (A) and (R) are true but (R) is not the correct explanation of (A)

95. Read the following statements and choose the **correct** option.
Statement A: Outer chloroplast membrane is relatively less permeable as compared to the inner chloroplast membrane.
Statement B: All single and double membrane bound organelles contain a non-membranous organelle.

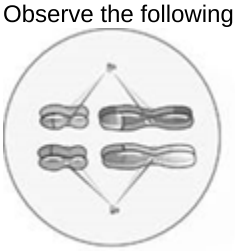
(1) Both statements A and B are correct

(2) Both statements A and B are incorrect

(3) Only statement A is correct

(4) Only statement B is correct

96. Observe the following figure



Select the option that **correctly** depicts about the figure.

(1) The chiasmata move to the middle of chromosome

(2) Shortening of spindle fibres present between centromeres of sister chromatids

(3) The univalent align themselves at the equator

(4) Microtubules of the spindle fibres from opposite poles attach to the kinetochore of the chromosome facing towards it

97. Read the following statements (A – D) and select the **correct** option.
(A) Mitochondria are the main sites of aerobic respiration.
(B) Golgi apparatus is the important site of formation of glycoprotein and glycolipids.
(C) Synthetic product of SER passes into Golgi complex through RER.
(D) ER, Golgi complex, mitochondria and lysosomes are included in endomembrane system.

(1) Only (B) is correct

(2) (A), (B) and (C) are correct

(3) Only (D) is correct

(4) Only (A) and (B) are correct

98. The nuclear pores are complex structure which are formed by the

(1) Disintegration of nuclear membrane

(2) Fusion of outer and inner membranes of nucleus

(3) Enzymatic action of lysosome

(4) Movement of RNA and protein molecules

99. The APC (Anaphase Promoting Complex) if fails to work in a typical human cell, then

(1) Cell will not enter S-phase

(2) There will be no separation of sister chromatids

(3) DNA replication will be halted

(4) DNA damage will not be repaired

100. Select the **incorrect** match from the following.
(1) Perinuclear space – The space around the nucleus
(2) Chromatin – Contains DNA and RNA
(3) Nucleoli – Present in nucleoplasm
(4) Nuclear pore – Passage for RNA and proteins

(1) (1)

(2) (2)

(3) (3)

(4) (4)

101. Which of the given cell organelles is common to both prokaryotic and eukaryotic cell?

(1) True vacuole

(2) Ribosome

(3) Lysosome

(4) Golgi complex

102. Gas vacuole in purple and green photosynthetic bacteria is

(1) A part of endomembrane system

(2) Not bound by any membrane system

(3) Important for excretion

(4) A type of microbody

103. The function of polysome in bacterial cell is to

(1) Translate the mRNA into protein

(2) Store reserve food materials

(3) Synthesize pigments

(4) Help in buoyancy

104. The shape of mesophyll cells is

(1) Branched and long

(2) Round and oval

(3) Amoeboid

(4) Round and biconcave

105. Select the **odd** one w.r.t. plant cell wall

(1) Cellulose

(2) Hemicellulose

(3) Pectin

(4) Chitin

106. Choose the **incorrect** option w.r.t. functions performed by the cytoskeleton of a cell.

(1) Maintenance of cell shape

(2) Help in anaphasic movement of chromosomes

(3) Motility

(4) Protein synthesis

107. Metaphase I differs from metaphase II as in the metaphase I

(1) Microtubules attach to the kinetochores

(2) Bivalents arrange on the equatorial plate

(3) Each chromosome has two chromatids

(4) There is half number of chromosomes as compared to metaphase II

108. Find the **correctly** matched pair.

(1) Carotenoid : fat soluble

(2) Amyloplast : stores fat

(3) *Chlamydomonas* : blue green alga

(4) Lysosome : membrane-less vesicular structure

109. What will be the amount of DNA in a somatic cell of a diploid organism at G_2 phase, if its haploid cell has 40 pg of DNA?

(1) 80 pg

(2) 160 pg

(3) 40 pg

(4) 120 pg

110. Which of the given is/are **not** true for lipid component of plasma membrane?

a. Tail is made up of saturated hydrocarbons

b. Head is hydrophobic

c. It gives quasi fluid nature to plasmamembrane

d. In human erythrocyte membrane, lipid fraction is more than proteins

(1) Only b

(2) Only b & d

(3) Only a & b

(4) Only a & c

111. How many generations of mitosis are required to produce 256 cells from one cell, if all the daughter cells formed in each generation undergo mitosis?

(1) 8

(2) 255

(3) 128

(4) 32

112. In oocytes of some vertebrates, which stage of meiosis I can last for months or years?

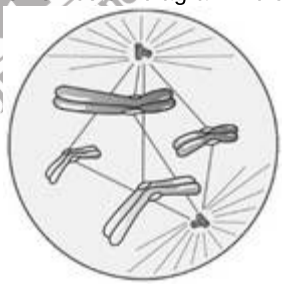
(1) Zygotene

(2) Diplotene

(3) Diakinesis

(4) Pachytene

113. Given below diagram indicates



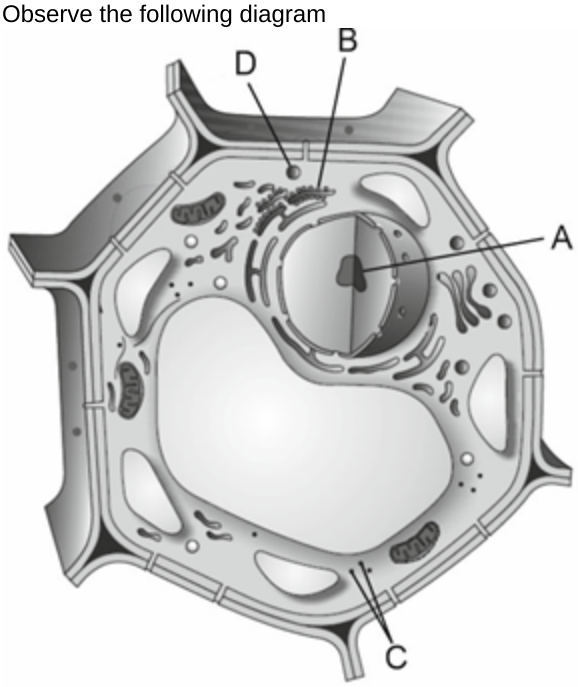
(1) Early prophase

(2) Metaphase

(3) Transition to metaphase

(4) Anaphase

114. Observe the following diagram



Based on the above given diagram, match the labels given in column-I to their respective description given in column-II.

	Column-I		**Column-II**
(i)	A	(P)	It is present abundantly in the cells which are actively involved in protein synthesis and secretion.
(ii)	B	(Q)	These are formed by the process of packaging in golgi apparatus
(iii)	C	(R)	It is a non-membrane bound structure that is surrounded by highly extended and elaborated nucleoprotein fibre.
(iv)	D	(S)	Composed of r-RNA and proteins and are not surrounded by any membrane.

(1) (i)-(R); (ii)-(S); (iii)-(P); (iv)-(Q)

(2) (i)-(Q); (ii)-(P); (iii)-(R); (iv)-(S)

(3) (i)-(S); (ii)-(P); (iii)-(R); (iv)-(Q)

(4) (i)-(R); (ii)-(P); (iii)-(S); (iv)-(Q)

115. Identify the pairs which are **not** matched correctly.

I. Early prophase - Ends of chromatids are not separately visible

II. Karyokinesis - Can be delayed to form the liquid endosperm in coconut.

III. Significance of mitosis - Reproduction in unicellular organisms.

IV. Metacentric chromosome - Has distinguishable short and long arm.

V. Leptotene - Chromosomes are fully condensed and the meiotic spindle is assembled.

(1) II, IV and V

(2) I, III and IV

(3) Only III and V

(4) Only II and IV

116. Reductional division can be seen in

(1) Diploid cells

(2) Only haploid cells

(3) Both haploid and diploid cell

(4) All somatic cells

117. Select the **odd** one out w.r.t significance of meiosis.

(1) Helps to restore original diploid number in zygote

(2) Responsible for continuous growth of plants throughout their life

(3) Increase the genetic variability

(4) Essential for evolution

118. In animal cells the phase that lasts more than 90% of the duration of cell cycle is similar to the phase which is present between meiosis I and meiosis II as in both of them

(1) Replication of DNA occurs.

(2) Cells remain metabolically inactive but do not proliferate.

(3) Chromosomes are elongated and form chromatin fibre.

(4) Duplication of centriole occurs.

119. The completion of the first stage of karyokinesis is marked by the

(1) Complete disintegration of nuclear envelope.

(2) Condensation of chromosomal material to form most compact mitotic chromosome.

(3) Movement of duplicated centromeres towards opposite poles.

(4) Event in which each centromere radiates out microfilament called aster.

120. At the starting of mitosis in human somatic cell, the number of kinetochores to which the microtubules of the spindle attach are

(1) 23

(2) 46

(3) 92

(4) 44

121. Structure that forms spindle fibre during cell division is similar to that of the axoneme of the locomotory structure that is found in *Paramoecium*, as both of them
(i) Are hair-like outgrowth of the cell membrane
(ii) Have radial spokes that arise from the central singlet fibril.
(iii) Are surrounded by pericentriolar satellite (MTG).
(iv) Are made up of solid, unbranched, rod-like microtubules that are evenly spaced at periphery.
(v) Have proteinaceous linkers that connect adjacent peripheral fibrils.
The **correct** one(s) is/are

(1) (i), (ii) and (iii) only

(2) All (i), (ii), (iii), (iv) and (v)

(3) (iv) and (v) only

(4) (v) only

122. Read the following statements of Assertion (A) and Reason (R) and choose the correct option.
Assertion (A): The reticular structures of endomembrane system remain in close association with each other.
Reason (R): Products of ER are modified during their transit from concave to convex face of golgi apparatus.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A).

(3) (A) is true but (R) is false.

(4) (A) is false but (R) is true.

123. Given below are two statements
Statement-I: During metaphase II, chromosomal pair appears four threaded at equatorial plate.
Statement-II: A normal chromosome in a dividing cell cannot have more than two telomeres.
In the light of the above statements, choose the most appropriate answer from the options given below.

(1) Statement I is correct but Statement II is incorrect

(2) Statement I is incorrect but Statement II is correct

(3) Both statement I and statement II are correct

(4) Both statement I and statement II are incorrect.

124. After crossing over between non-sister chromatids of homologous chromosomes, the resultant daughter cells of meiosis I would have

(1) Same amount of DNA as in the parent cell upon completing S phase

(2) Same amount of DNA as in comparison to haploid gamete.

(3) Double the amount of DNA as in the parent cell in S phase.

(4) Twice the amount of DNA in comparison to haploid gamete.

125. Identify the events that are common to both mitosis and meiosis and arrange them in **correct** order.
a. Chromosomes uncoil and elongate.
b. Nucleolus and nuclear membrane disappear.
c. Crossing over leads to recombination of genetic material which involves mutual exchange of the corresponding segment.
d. Chiasmata disappear from the chromosome.
e. Condensed chromatin material moves towards the opposite pole.
Choose the **correct** answer from the options given below.

(1) a → c → d

(2) b → c → d

(3) b → e → a

(4) e → b → c → d

126. Which of the following plastids stores fat?

(1) Chromoplast

(2) Elaioplast

(3) Aleuroplast

(4) Amyloplast

127. ER divides the intracellular space into two distinct compartments, luminal $\underline{\quad(a)\quad}$ and extra luminal $\underline{\quad(b)\quad}$ compartments.
Choose the **correct** option to fill (a) and (b) respectively.

(1) (Cytoplasm), (outside ER)

(2) (Inside nucleus), (towards cytoplasm)

(3) (Inside ER), (cytoplasm)

(4) (Inside ER), (nucleus)

128. Fluidity of cell membrane is due to

(1) Its lipid component

(2) Presence of pectin

(3) Sugar molecules

(4) Presence of transmembrane proteins

129. Chromosomes show characteristic shapes most distinctly during anaphase because

(1) Centriole duplication occur at this stage

(2) Nuclear membrane, ER and mitochondria disappears

(3) Chromosomes are loosely packed

(4) Centromeres move towards opposite pole and their arms trail behind them

130. Identify the following statements as True (T) or False (F) and choose the **correct** option.
A. Endoplasmic reticulum contains tubules or cisternae as in golgi bodies.
B. Presence of extrachromosomal DNA is the defining feature of prokaryotic cell.
C. In a young plant cell, secondary wall is formed on the outer side of the primary cell wall.
D. Cyanobacteria has membranous extensions into the cytoplasm called chromatophores which contain pigments.

	A	B	C	D
(1)	T	T	F	F
(2)	T	F	F	T
(3)	F	F	F	T
(4)	F	T	T	T

(1) (1)

(2) (2)

(3) (3)

(4) (4)

131. Cells at G_0 phase of cell cycle are characterized by its

(1) Active metabolism and fast proliferation

(2) Dormant stage and lack of metabolism

(3) Active metabolism but lack of proliferation unless they are called on to do so

(4) Division with slow metabolism

132. The cytoplasm is the main arena of cellular activities in
(a) Plant cell
(b) Animal cell
(c) Prokaryotic cell
(d) Eukaryotic cell
The **correct** one(s) is/are

(1) (a) and (b) only

(2) (a), (b) and (d) only

(3) All (a), (b), (c) and (d)

(4) (d) only

133. Match list-I with list-II.

	List-I		**List-II**
a.	Elongated tubular structure made of a special protein	(i)	Fimbriae
b.	Movement of water across membrane from its higher to the lower concentration	(ii)	Active transport
c.	Movement of polar molecule requiring protein pumps	(iii)	Passive transport
d.	Small bristle like fibres sprouting out of the cell	(iv)	Pili

Choose the **correct** answer from the following options.

(1) a(ii), b(iii), c(iv), d(i)

(2) a(i), b(iii), c(ii), d(iv)

(3) a(i), b(ii), c(iii), d(iv)

(4) a(iv), b(iii), c(ii), d(i)

134. Which of the following statements is **not** correct?

(1) Both mitochondria and chloroplast possess the components that are required for the synthesis of protein.

(2) Thylakoids are arranged in stacks, like the piles of coins, called cisternae.

(3) 16S rRNA is the RNA component of the 30S subunit of a prokaryotic ribosome.

(4) Fungi and bacteria cannot be differentiated on the basis of presence or absence of cell wall but can be differentiated on the composition of cell wall.

135. In 80S ribosome
a. 'S' is Svedberg's unit
b. Two subunits are 50S and 30S
c. 'S' stands for sedimentation coefficient
Select the **incorrect** one(s)

(1) b and c

(2) a and c

(3) a and b

(4) b only

ZOOLOGY

136. Complete the analogy w.r.t. pathogens of venereal diseases.
Syphilis : Bacterial STI : : Trichomoniasis : _____ STI

(1) Viral

(2) Protozoan

(3) Bacterial

(4) Fungal

137. The Big Bang theory talks of a singular huge explosion unimaginable in physical terms which attempts to explain the origin of _____, which is almost _____ years old.
Select the option that fills the blanks **correctly**.

(1) Earth, 4 billion

(2) Universe, 20 million

(3) Universe, 13.8 billion

(4) Milky way galaxy, 14.8 million

138. Choose the **correct** option w.r.t. surrogacy.

(1) Surrogate mother should always be genetically identical to the foetus.

(2) Surgical retrieval of primary oocytes from the surrogate is always necessary.

(3) Fertilisation is always performed naturally in the biological mother in any case of surrogacy.

(4) Embryo transfer using IUT can be done in the surrogate.

139. Introduction of sex education in schools has been recommended as a part of the strategy under RCH programmes in India. Which of the following justifies this inclusion?
a. To increase adolescent pregnancy rates by encouraging early sexual experimentation.
b. To promote awareness regarding reproductive organs and sexually transmitted infections.
c. To reinforce the idea of early marriage that will lead to decline in population.
d. To discourage children from believing in myths and misconceptions about sex related aspects.
Select the **correct** option.

(1) a and b

(2) b and d

(3) a, b, c and d

(4) c and d

140. Multiload-375 and LNG-20 have different mechanism of action. Which of the following is the common feature of both the devices?

(1) Prevent fertilisation by blocking ovulation

(2) Release copper ions to suppress sperm motility

(3) Increase phagocytosis of sperms by promoting local inflammation

(4) Makes cervix hostile to sperms by increasing thickening of cervical mucus

141. For a human female having 32 days of menstrual cycle, the fertile period will range from

(1) Day 10 to 17

(2) Day 14 to 21

(3) Day 19 to 25

(4) Day 22 to 29

142. **Assertion (A):** Hepatitis-B and chlamydiasis are not completely curable, even if detected early and treated properly.
Reason (R): STDs like hepatitis-B and chlamydiasis have less-significant symptoms in the early as well as late stages of infection.
In the light of above statements, select the **correct** option.

(1) Both Assertion and Reason are true and Reason is the correct explanation of the Assertion

(2) Both Assertion and Reason are true but Reason is not the correct explanation of the Assertion

(3) Assertion is true statement but Reason is false

(4) Both Assertion and Reason are false statements

143. How many of the symptoms mentioned in box below are possible ill effects of using contraceptives in females?

Nausea, Abdominal pain, Breakthrough bleeding, Irregular menstrual bleeding, Breast cancer

Select the **correct** option.

(1) Four

(2) Two

(3) Three

(4) Five

144. Listed below are some chemical compounds:
(a) Water vapour (b) Carbon dioxide (c) Ammonia (d) Free oxygen (e) Methane
Which of the above were released from molten mass and covered the early Earth's surface?

(1) (a), (b), (c) and (d)

(2) (b), (c), (d) and (e)

(3) (a), (b), (c) and (e)

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

145. According to Charles Darwin, fitness of an individual refers ultimately and only to

(1) Physical fitness

(2) Emotional fitness

(3) Psychological fitness

(4) Reproductive fitness

146. Arrange the following in increasing order of their cranial capacities.
(a) *Homo habilis*
(b) *Australopithecines*
(c) Neanderthal man
(d) *Homo erectus*
Select the **correct** option.

(1) b < a < c > d

(2) c > a > d > b

(3) b < a < d < c

(4) b < c < d < a

147. **Assertion (A):** After industrialisation in England, the population of white-winged moth declined significantly while melanised moths flourish.
Reason (R): During post-industrialisation period, the tree trunk became dark due to deposition of industrial smoke and soot that helped predators to spot a white-winged moth against a contrasting background and not the dark-winged moths.
In the light of above statements, choose the correct answer from the options given below.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(3) (A) is true, (R) is false

(4) Both (A) and (R) false

148. Match column I and column II and choose the **correct** option w.r.t. STI and its causative organism.

	Column I		**Column II**
(a)	Gonorrhoea	(i)	Human papilloma virus
(b)	Syphilis	(ii)	*Neisseria* sp
(c)	Genital warts	(iii)	*Treponema pallidum*
		(iv)	Herpes simplex virus

(1) (a)-(iii), (b)-(iv), (c)-(i)

(2) (a)-(iv), (b)-(iii), (c)-(i)

(3) (a)-(ii), (b)-(iii), (c)-(i)

(4) (a)-(iv), (b)-(i), (c)-(iii)

149. Population of 1000 individuals is in Hardy-Weinberg equilibrium. If number of homozygous recessive individual is 10, then what will be the number of heterozygous individuals in this population?

(1) 180

(2) 360

(3) 90

(4) 720

150. Neanderthal man differs from modern *Homo sapiens* in

(1) Having higher cranial capacity

(2) Having lower cranial capacity

(3) Having erect posture

(4) Being a hominid

151. Read the following statements A and B and choose the **correct** option.
Statement A: Adaptive radiation is the process of evolution of different species in a given geographical area starting from a point and literally radiating to other areas of geography.
Statement B: Australian marsupial (Bobcat) and placental mammal (Tasmanian tiger cat) are example of divergent evolution.

(1) Statement A is correct but statement B is incorrect

(2) Statement A is incorrect but statement B is correct

(3) Both statements A and B are correct

(4) Both statements A and B are incorrect

152. **Assertion (A) :** Similarities in proteins and genes performing a given function among diverse organisms suggest homology.
Reason (R) : These biochemical similarities point to the same shared ancestry as structural similarities among diverse organisms.
In the light of above statements, choose the correct option.

(1) Both Assertion and Reason are false statements

(2) Assertion is true statement but Reason is false

(3) Both Assertion and Reason are true and the Reason is the correct explanation of the Assertion

(4) Both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion

153. About _____ mya, the first cellular forms of life appeared on Earth.
Select the **correct** option to fill in the blank.

(1) 2000

(2) 4000

(3) 5000

(4) 6000

154. The dinosaurs which had three horns on head and collared neck were

(1) *Tyrannosaurus*

(2) *Triceratops*

(3) *Stegosaurus*

(4) *Brachiosaurus*

155. Select the **correct** option w.r.t. the evolutionary history of crocodiles.

(1) Thecodonts are their direct living ancestors.

(2) Sauropsids are their indirect ancestors that also gave rise to therapsids.

(3) Birds are their closest living relatives.

(4) Lizards evolved parallelly to them from synapsids.

156. Match column I and column II w.r.t various theories of origin of life.

	Column I		Column II
a.	Theory of special creation	(i)	Disapproved by Louis Pasteur
b.	Theory of panspermia	(ii)	Diversity was always the same since creation and will be the same in future
c.	Theory of chemical evolution	(iii)	Life came from pre-existing non-living organic molecules
d.	Theory of spontaneous generation	(iv)	Units of life called spores were transferred to different planets including the Earth

Choose the **correct** option.

(1) a(iii), b(iv), c(i), d(ii)

(2) a(ii), b(iv), c(iii), d(i)

(3) a(iv), b(iii), c(i), d(ii)

(4) a(ii), b(iii), c(iv), d(i)

157. Select the incorrect statement w.r.t. Darwin's finches.

(1) They originated in South America and exhibit convergent evolution

(2) According to Darwin, all varieties, evolved on the island itself

(3) They evolved from the original seed eating finches

(4) They exhibit adaptive radiation and founder effect.

158. Choose the **correct** set of assisted reproductive technologies where gametes are transferred to female genital tract to assist the couples who are unable to produce children otherwise.

(1) ICSI, ZIFT, IUI

(2) IUI, IUT, AI

(3) ZIFT, GIFT, ICSI

(4) GIFT, IUI, AI

159. Select the option with **correct** set of sexually transmitted diseases that do not primarily affect reproductive organs.

(1) Trichomoniasis and Chlamydiasis

(2) Syphilis and Hepatitis-B

(3) Gonorrhoea and Trichomoniasis

(4) AIDS and Hepatitis-B

160. All of the following statements hold true for lactational amenorrhea, **except**

(1) Prolactin based cessation of menstrual cycle during the period of intense lactation following parturition.

(2) As a contraceptive method, side effects are almost nil as no medications or devices are used.

(3) This method has been reported to be effective only upto a maximum period of six months following parturition.

(4) High levels of lactogenic hormone gives positive feedback to pituitary gonadotropin.

161. Select the **incorrect** match w.r.t. India.

(1)	1951	Family planning programme	Initiation of action plans and programme at national level to attain reproductive health as a social goal.
(2)	2011	Census report	The population growth rate was more than 2%.
(3)	1971	MTP	Government legalised MTP with some strict conditions to avoid its misuse.
(4)	2017	MTP (Amendment Act)	Intension of reducing the incidences of illegal abortion and consequent maternal mortality and morbidity.

(1) (1)

(2) (2)

(3) (3)

(4) (4)

162. A female with two children opts for a terminal contraceptive method. After the procedure, the woman continues to have normal menstruation, but conception does not occur because this procedure

(1) Prevents pregnancy by inhibiting ovulation due to altered hormonal regulation.

(2) Blocks the transport of ovum, while the ovaries and hormonal regulation of menstrual cycle remains intact.

(3) Always causes premature menopause due to hormonal imbalance.

(4) Involves removal of a portion of the vas deferens which prevents pregnancy.

163. In the course of plant evolution, the _____ were descendants of Psilophyton and ancestors of seed ferns. They originated during _____ period.
Choose the correct option to fill the respective blanks.

(1) Arborescent lycopods, Triassic

(2) Sphenopsids, Jurassic

(3) Progymnosperms, Devonian

(4) Tracheophyte ancestors, Silurian

164. Read the following w.r.t. infertility.
a. Causes of infertility may include physical, congenital, disease-related, drug-induced, immunological or psychological factors.
b. It is only a female-associated disorder in the Indian population.
c. Specialized infertility clinics play a role only in diagnosis but not in corrective treatment of disorders associated with it.
Choose the **correct** option w.r.t. infertility.

(1) a only

(2) a and b only

(3) a, b and c only

(4) c only

165. Both Lippes loop and Saheli

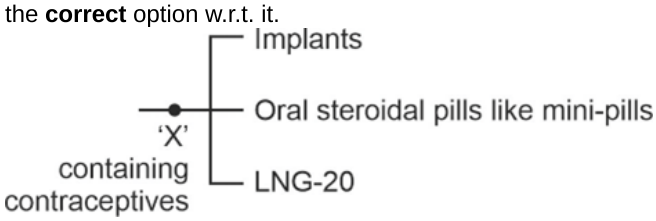
(1) Prevent implantation and make the cervix hostile to the sperms.

(2) Contain progestogens alone or in combination with estrogen.

(3) Are administered within 72 hours of coitus to prevent ovulation.

(4) Are reversible and non-steroidal contraceptives.

166. 'X' is responsible for maintenance of endometrium during pregnancy. Identify 'X' from the below given chart and select the **correct** option w.r.t. it.



(1) Suppresses sperm motility and their fertilising capacity

(2) Spermicidal in nature and increases phagocytosis of sperms.

(3) Alters the quality of cervical mucus and causes anovulation.

(4) Promotes release of secondary oocyte from Graafian follicle but prevents implantation.

167. Choose the **correct** option for assisted reproductive technologies w.r.t. embryo transfer.

(1) *In-vitro* formed embryo with more than 8 blastomeres $\rightarrow$ transferred to fallopian tube

(2) *In-vivo* formed embryos $\rightarrow$ can be transferred to fallopian tubes only

(3) Zygote or early embryo with upto 8 blastomeres $\rightarrow$ transferred to fallopian tube

(4) All embryo's formed in the laboratory $\rightarrow$ transferred to uterus irrespective of number of blastomeres

168. Read the following statements and choose the **correct** option.
Statement A: A rapid decline in death rate, MMR and IMR as well as an increase in number of people in reproducible age are probable reason for population explosion.
Statement B: Indian population was approximately 350 million at the time of independence.

(1) Statement A is correct but B is incorrect

(2) Statement A is incorrect but B is correct

(3) Both statements A and B are correct

(4) Both statements A and B are incorrect

169. Read the following statements
Statement I: Possibility of serious physical or mental abnormalities in the foetus is considered as one of the grounds sufficient for termination at any stage of pregnancy under MTP (Amendment) act 2017 of Government of India without opinion of any registered medical practitioner.
Statement II: Progestasert leads to increase in the thickness of cervical mucus, which inhibits sperm from entering the uterus and reaching the ovum.
Statement III: Risk of grave injury to the mental health of the pregnant woman is considered as a valid ground for termination of pregnancy under MTP (Amendment) act (2017) of Government of India.
Select the **correct** option.

(1) Both statements I and II are correct

(2) Only statement I is correct

(3) Both statements I and III are correct

(4) Both statements II and III are correct

170. How many of the below given features hold(s) true for Darwinian variation but not for mutation?
a. Single step large change
b. Random
c. Directional
d. Continuous
e. Gradual
Select the **correct** option

(1) One

(2) Two

(3) Three

(4) Five

171. According to Hardy-Weinberg principle,

(1) In a small and selectively mating population, the allelic frequencies are stable and is constant from generation to generation.

(2) In a large, randomly mating population, allele frequencies remain constant from generation to generation in the absence of evolutionary forces.

(3) Migration, mutation, genetic drift and recombination cannot alter the allelic frequencies in a population.

(4) Change in frequency of alleles in a population would be interpreted as genetic equilibrium.

172. Select the **correct** match.

(1) Adaptive radiation - Australian marsupials

(2) Divergent evolution - Wings of bat and of butterfly

(3) Convergent evolution - Wings of bat and forelimbs of human

(4) Convergent evolution - Heart of whale and of penguin

173. The intensive breeding programmes has created new breeds of dogs. It is an example of

(1) Artificial selection by anthropogenic action

(2) Natural selection without anthropogenic action

(3) Disruptive natural selection

(4) Balancing natural selection

174. Amniocentesis **cannot** be used for the diagnosis of /determining

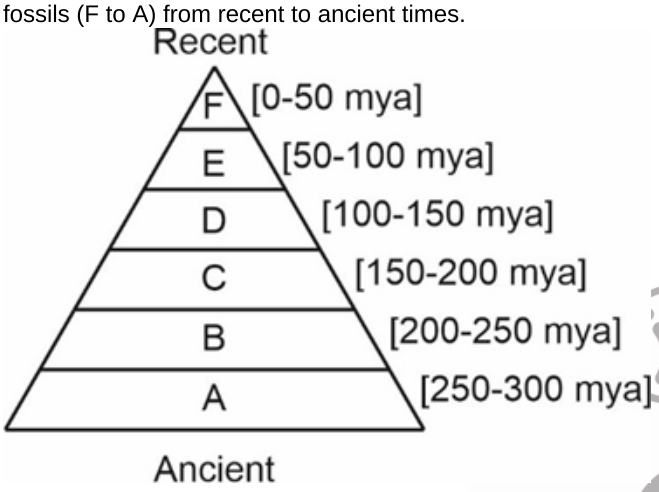
(1) Sickle cell anaemia

(2) Haemophilia

(3) Cleft lip

(4) Down syndrome

175. Observe the below given diagram of a sedimentary rock with fossils (F to A) from recent to ancient times.



Choose the **correct** statement w.r.t. labellings denoting fossils.

(1) The fossil 'A' found are of seed ferns that got extinct in Quaternary period.

(2) The fossil 'B' could be of tuataras that got extinct in Jurassic period.

(3) The fossil 'E' could be of dinosaurs that got extinct around 65 mya.

(4) The fossil 'C' could be of dicotyledons that got extinct in Carboniferous period.

176. Select the odd one w.r.t. divergent evolution.

(1) Marsupial mole, spotted cuscus, flying phalanger

(2) Lemur, flying squirrel, anteater

(3) Mole, bobcat, wolf

(4) Sugar glider, wombat, lemur

177. Organisms of a population possessed several heritable characters that did not confer any apparent advantage under existing environmental conditions. Following gradual and sustained environmental change, the frequency of one such character increased over successive generations, even though no new characteristic appeared during this period. Select the **correct** option that is the most appropriate conclusion.

(1) Environmental changes always directly induce the advantageous trait through mutation

(2) The increased frequency results from selection acting on pre-existing variations.

(3) The variation becomes non-directional due to random genetic drift.

(4) Probability of mutation always decreases in response to environmental stresses.

178. Select the **correct** statement.

(1) Humans evolved directly from gorilla.

(2) Chimpanzee represents a more advanced evolutionary stage than humans.

(3) The skull of a baby chimpanzee resembles that of an adult human more closely than that of an adult chimpanzee.

(4) Apes evolved directly from *Ramapithecus* about 50 mya.

179. **Assertion (A):** Embryological similarities among vertebrates provide stronger evidence for common ancestry than similarities among adults.
Reason (R): Certain features during embryonic stage are found common in all vertebrates which are either absent or not common in all adult vertebrates.
In the light of above given statements, choose the **correct** option.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(3) (A) is true but (R) is false

(4) (A) is false but (R) is true

180. Formation of a new species can occur in all of the following cases, **except**

(1) Accumulation of variations followed by natural selection over generations

(2) Change in frequency of genes and alleles

(3) Genetic drift and natural selection acting on isolated populations

(4) A population in Hardy-Weinberg equilibrium