

NEET 2024 R1 Question Paper

Time Allowed :200 minutes	Maximum Marks :720	Total questions :200
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General Instructions

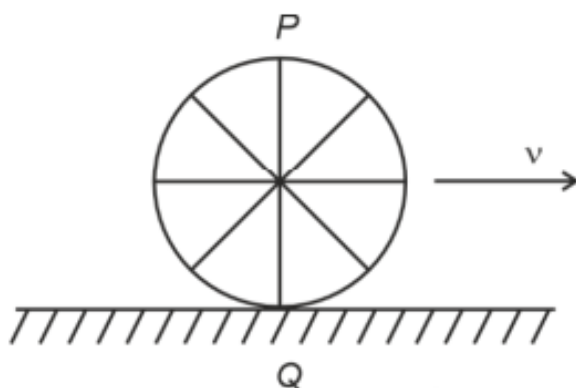
Read the following instructions very carefully and strictly follow them:

1. The test is of 3 hours 20 minutes duration.
2. The question paper consists of 200 questions out of which 180 MCQs must be answered. The maximum marks are 720.
3. There are four parts in the question paper consisting of Biology, Physics, Chemistry and Mathematics.
4. Each subject will be divided into two sections, A and B which will have 35 and 15 questions respectively. Candidates will have to answer only 10 questions in Section B.
5. 4 marks are awarded for each correct answer and 1 mark is deducted for each wrong answer

Physics

Section A

1. A wheel of a bullock cart is rolling on a level road as shown in the figure below. If its linear speed is v in the direction shown, which one of the following options is correct (P and Q are any highest and lowest points on the wheel, respectively)?



- (A) Point P moves faster than point Q
- (B) Both the points P and Q move with equal speed
- (C) Point P has zero speed
- (D) Point P moves slower than point Q

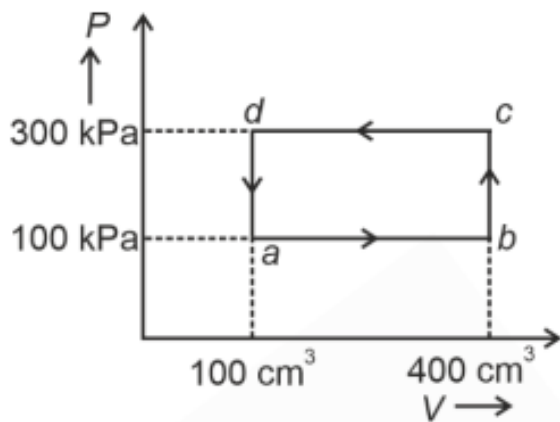
2. Match List I with List II:

	List I (Spectral Lines of Hydrogen for transitions from)		List II (Wavelengths (nm))
A.	$n_2 = 3$ to $n_1 = 2$	I.	410.2
B.	$n_2 = 4$ to $n_1 = 2$	II.	434.1
C.	$n_2 = 5$ to $n_1 = 2$	III.	656.3
D.	$n_2 = 6$ to $n_1 = 2$	IV.	486.1

- (A) A-III, B-IV, C-II, D-I
- (B) A-IV, B-III, C-I, D-II
- (C) A-I, B-II, C-III, D-IV

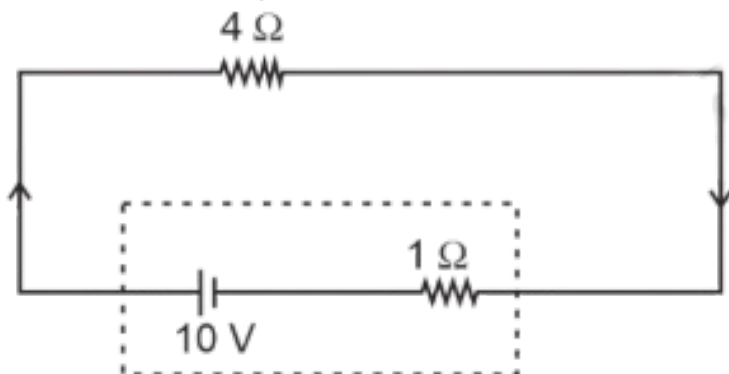
(D) A-II, B-I, C-IV, D-III

3. A thermodynamic system is taken through the cycle $abcd$. The work done by the gas along the path bc is:



- (A) 30 J
 - (B) -90 J
 - (C) -60 J
 - (D) 0
-

4. The terminal voltage of the battery, whose emf is 10 V and internal resistance $1\ \Omega$, when connected through an external resistance of $4\ \Omega$ as shown in the figure is:



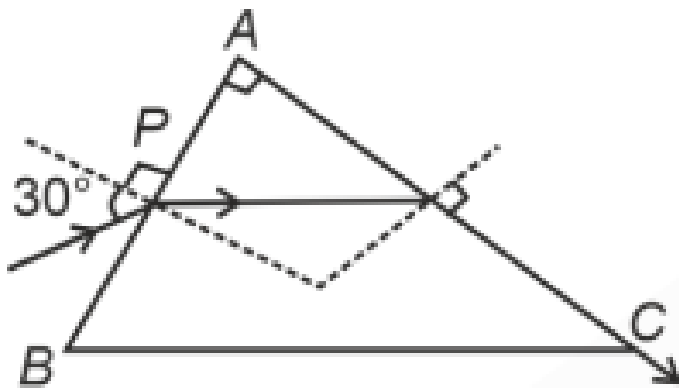
- (A) 6 V
 - (B) 8 V
 - (C) 10 V
 - (D) 4 V
-

5. In an ideal transformer, the turns ratio is $\frac{N_P}{N_S} = \frac{1}{2}$. The ratio $V_S : V_P$ is equal to (the

symbols carry their usual meaning):

- (A) 2 : 1
 - (B) 1 : 1
 - (C) 1 : 4
 - (D) 1 : 2
-

6. A light ray enters through a right-angled prism at point P with an angle of incidence 30° as shown in the figure. It travels through the prism parallel to its base BC and emerges along the face AC . The refractive index of the prism is:



- (A) $\frac{\sqrt{5}}{2}$
 - (B) $\frac{\sqrt{3}}{4}$
 - (C) $\frac{\sqrt{3}}{2}$
 - (D) $\frac{\sqrt{5}}{4}$
-

7. The quantities that have the same dimensions as those of a solid angle are:

- (A) stress and angle
 - (B) strain and arc
 - (C) angular speed and stress
 - (D) strain and angle
-

8. A thin flat circular disc of radius 4.5 cm is placed gently over the surface of water. If the surface tension of water is 0.07 N/m, then the excess force required to take it away from the surface is:

- (A) 198 N
- (B) 1.98 mN
- (C) 99 N
- (D) 19.8 mN

9. Given below are two statements:

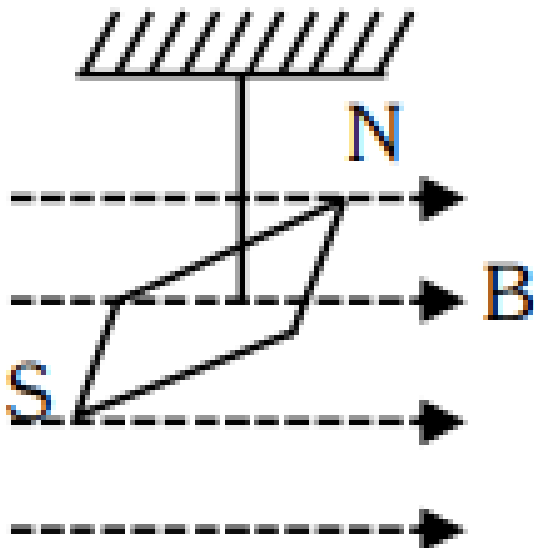
Assertion A: The potential (V) at any axial point, at 2 m distance (r) from the center of a dipole with dipole moment vector P of magnitude $4 \times 10^{-6} \text{ C} \cdot \text{m}$, is $\pm 9 \times 10^3 \text{ V}$.

Reason R: $V = \pm \frac{2P}{4\pi\epsilon_0 r^2}$, where r is the distance of the axial point.

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

- (A) Both A and R are true and R is NOT the correct explanation of A
- (B) A is true but R is false
- (C) A is false but R is true
- (D) Both A and R are true and R is the correct explanation of A

10. In a uniform magnetic field of 0.049 T, a magnetic needle performs 20 oscillations in 5 seconds. The moment of inertia of the needle is $9.8 \times 10^{-6} \text{ kg} \cdot \text{m}^2$. If the magnitude of the magnetic moment of the needle is $x \times 10^{-5} \text{ Am}^2$, the value of x is:



- (A) $128\pi^2$
- (B) $50\pi^2$

(C) $1280\pi^2$

(D) $5\pi^2$

11. If the monochromatic source in Young's double slit experiment is replaced by white light, then:

(A) There will be a central dark fringe surrounded by a few coloured fringes

(B) There will be a central bright white fringe surrounded by a few coloured fringes

(C) All bright fringes will be of equal width

(D) Interference pattern will disappear

12. Given below are two statements:

Statement I: Atoms are electrically neutral as they contain equal numbers of positive and negative charges.

Statement II: Atoms of each element are stable and emit their characteristic spectrum.

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

(A) Both Statement I and Statement II are incorrect

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

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

(D) Both Statement I and Statement II are correct

13. The maximum elongation of a steel wire of 1 m length if the elastic limit of steel and its Young's modulus are $8 \times 10^8 \text{ N/m}^2$ and $2 \times 10^{11} \text{ N/m}^2$, respectively, is:

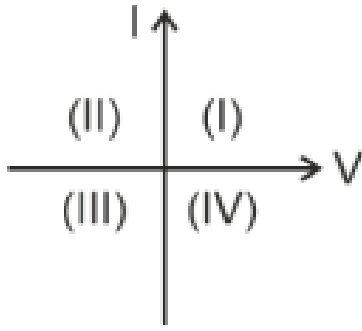
(A) 0.4 mm

(B) 40 mm

(C) 8 mm

(D) 4 mm

14. Consider the following statements:



A: For a solar cell, the I-V characteristics lie in the IV quadrant of the given graph. **B:** In a reverse-biased *pn* junction diode, the current measured (in μA) is due to majority charge carriers.

- (A) A is incorrect but B is correct
- (B) Both A and B are correct
- (C) Both A and B are incorrect
- (D) A is correct but B is incorrect

15. A particle moving with uniform speed in a circular path maintains:

- (A) Constant acceleration
- (B) Constant velocity but varying acceleration
- (C) Varying velocity and varying acceleration
- (D) Constant velocity

16. If c is the velocity of light in free space, the correct statements about photons are:

A: The energy of a photon is $E = h\nu$.

B: The velocity of a photon is c .

C: The momentum of a photon, $p = \frac{h\nu}{c}$.

D: In a photon-electron collision, both total energy and total momentum are conserved.

E: Photon possesses positive charge.

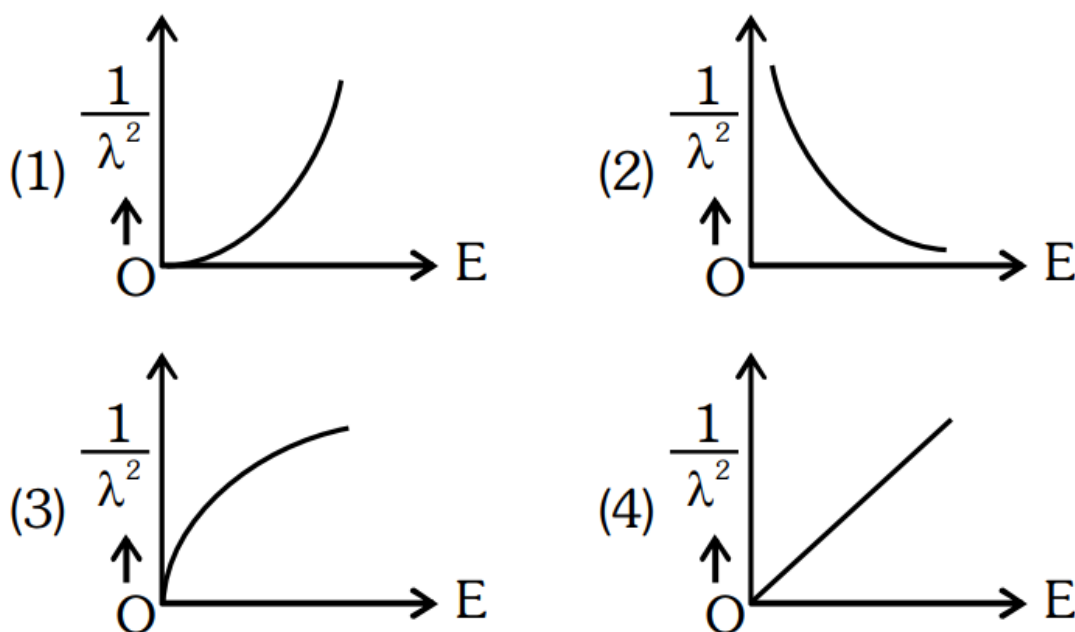
- (A) A, B, C and D only
- (B) A, C and D only
- (C) A, B, D and E only
- (D) A and B only

17. Two bodies A and B of the same mass undergo completely inelastic one-dimensional collision. Body A moves with velocity v_1 while body B is at rest. After collision, the velocity ratio $v_1 : v_2$ is:

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

18.

The graph showing the variation of $\frac{1}{\lambda^2}$ with kinetic energy E of a free particle is:



19. An unpolarised light beam strikes a glass surface at Brewster's angle. Then: (1)

The refracted light will be completely polarised.

(2) Both the reflected and refracted light will be completely polarised.

(3) The reflected light will be completely polarised, but the refracted light will be partially polarised.

(4) The reflected light will be partially polarised.

20. At any instant of time t , the displacement of a particle is given by $x = 2t - 1$ (SI unit) under the influence of a force of 5 N. The instantaneous power is: (1) 5

(2) 7

(3) 6

(4) 10

21. A tightly wound 100-turn coil of radius 10 cm carries a current of 7 A. The magnetic field at the centre is: (Take $\mu_0 = 4\pi \times 10^{-7}$ SI units)

(A) 4.4 T

(B) 4.4 mT

(C) 44 T

(D) 44 mT

22. The moment of inertia of a thin rod about an axis passing through its midpoint and perpendicular to the rod is 2400 g cm^2 . The length of the rod is:

(A) 17.5 cm

(B) 20.7 cm

(C) 72.0 cm

(D) 8.5 cm

23. A bob is whirled in a horizontal plane at an initial speed ω . The tension in the string is T . If the speed doubles, the tension becomes:

(A) $4T$

(B) $\frac{T}{4}$

(C) $\sqrt{2}T$

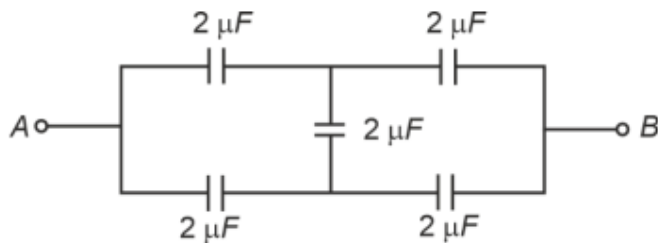
(D) T

24. Match List-I with List-II:

List-I (Material)	List-II (Susceptibility (χ))
A. Diamagnetic	I. $\chi = 0$
B. Ferromagnetic	II. $0 > \chi \geq -1$
C. Paramagnetic	III. $\chi \gg 1$
D. Non-magnetic	IV. $0 < \chi < \varepsilon$ (a small positive number)

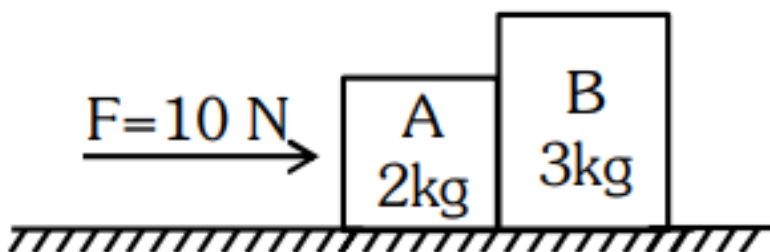
- (A) A-II, B-I, C-III, D-IV
 (B) A-III, B-II, C-I, D-IV
 (C) A-IV, B-I, C-II, D-I
 (D) A-II, B-III, C-IV, D-I

25. In the circuit, the equivalent capacitance between terminals A and B is:



- (A) $1 \mu F$
 (B) $0.5 \mu F$
 (C) $4 \mu F$
 (D) $2 \mu F$

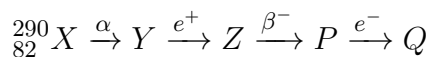
26. A horizontal force 10 N is applied to a block A as shown. The mass of blocks A and B are 2 kg and 3 kg respectively. The blocks slide over a frictionless surface. The force exerted by block A on block B is:



- (A) 4 N
 (B) 6 N

- (C) 10 N
(D) Zero

27. In the nuclear emission stated, the mass number and atomic number of the product Q are:



1. 286, 80
2. 288, 82
3. 286, 81
4. 280, 81

28. In a vernier calliper, $(N + 1)$ divisions of the vernier scale coincide with N divisions of the main scale. If 1 MSD represents 0.1 mm, the vernier constant (in cm) is:

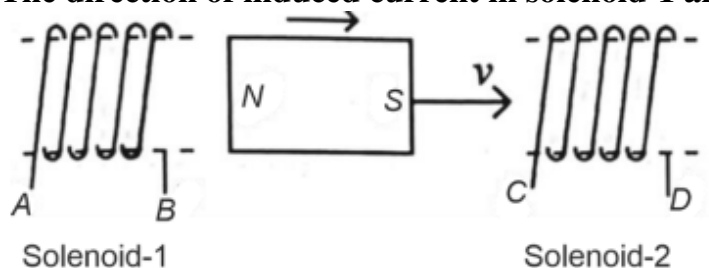
- (A) $\frac{1}{100(N+1)}$
 (B) $\frac{100}{N}$
 (C) $10(N + 1)$
 (D) $\frac{1}{10N}$

29. If $x = 5 \sin \left(\pi t + \frac{\pi}{3} \right)$ represents the motion of a particle executing SHM, the amplitude and time period of motion, respectively, are:

- (A) 5 m, 2 s
 (B) 5 cm, 1 s
 (C) 5 m, 1 s
 (D) 5 cm, 2 s

30. In the diagram, a strong bar magnet is moving towards solenoid-2 from solenoid-1.

The direction of induced current in solenoid-1 and solenoid-2, respectively, are:



- (A) BA and CD
 - (B) AB and CD
 - (C) BA and DC
 - (D) AB and DC
-

31. A logic circuit provides the output Y as per the truth table:

A	B	Y
0	0	1
0	1	0
1	0	1
1	1	0

The expression for the output Y is:

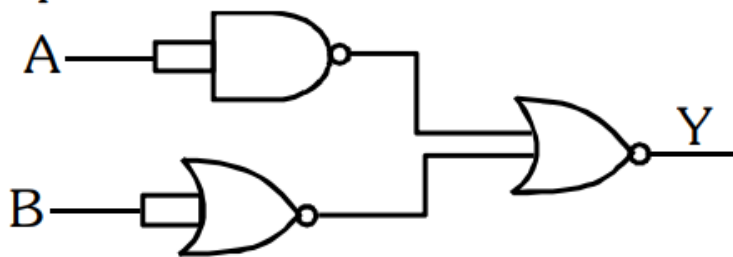
- (A) $A\bar{B} + \bar{A}$

- (B) $\overline{B}$
 (C) B
 (D) $A\overline{B} + \overline{A}$
-

32. A wire of length l and resistance $100\ \Omega$ is divided into 10 equal parts. The first 5 parts are connected in series, while the next 5 parts are connected in parallel. The two combinations are again connected in series. The resistance of this final combination is:

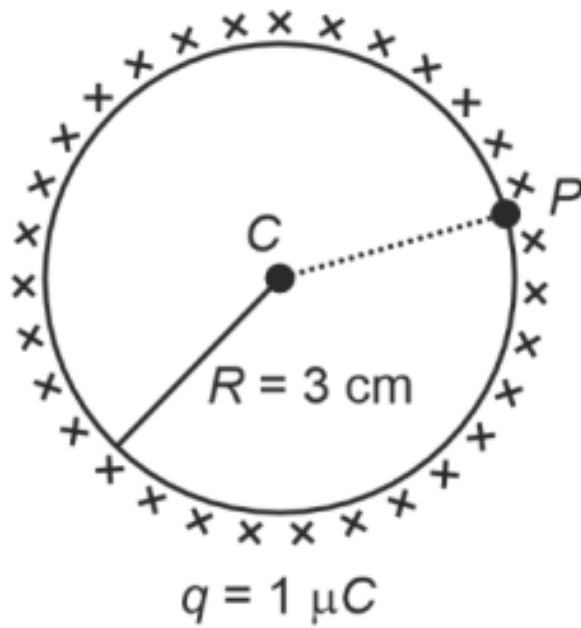
- (A) $52\ \Omega$
 (B) $55\ \Omega$
 (C) $60\ \Omega$
 (D) $26\ \Omega$
-

33. The output (Y) of the given logic gate is similar to the output of an:



- (A) NOR gate
 (B) OR gate
 (C) AND gate
 (D) NAND gate
-

34. A thin spherical shell is charged by some source. The potential difference between two points C and P (in V) is:



- (A) 1×10^5
- (B) 0.5×10^5
- (C) Zero
- (D) 3×10^5

35. The mass of a planet is $\frac{1}{10}$ that of Earth, and its diameter is half that of Earth. The acceleration due to gravity is:

- (A) 9.8 m/s^2
- (B) 4.9 m/s^2
- (C) 3.92 m/s^2
- (D) 19.6 m/s^2

36. The minimum energy required to launch a satellite into a circular orbit at $2R$ altitude is:

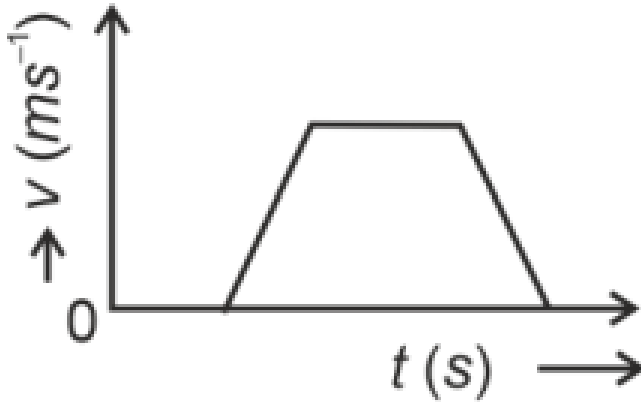
- (A) $\frac{2GMm}{3R}$
- (B) $\frac{GMm}{2R}$
- (C) $\frac{GMm}{3R}$
- (D) $\frac{5GMm}{6R}$

37. A telescope with an objective focal length of 140 cm and eyepiece focal length 5 cm has

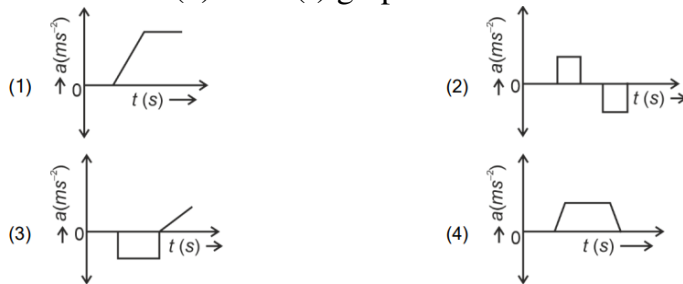
magnifying power:

- (A) 28
 - (B) 17
 - (C) 32
 - (D) 34
-

38. The velocity (v)-time (t) plot of a body is shown.



The acceleration (a)-time (t) graph is:



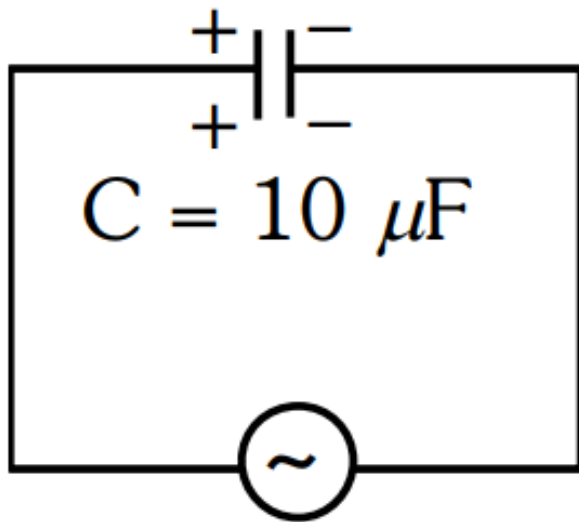
39. Two heaters A and B have power ratings of 1 kW and 2 kW, respectively. They are connected in series and then in parallel. The power ratio is:

- (A) 2 : 9
 - (B) 1 : 2
 - (C) 2 : 3
 - (D) 1 : 1
-

40. A force defined by $F = \alpha t^2 + \beta t$ acts on a particle at time t . The factor which is dimensionless, if α and β are constants, is:

- (A) $\frac{\alpha t}{\beta}$
(B) $\alpha\beta t$
(C) $\frac{\alpha\beta}{t}$
(D) $\frac{\beta t}{\alpha}$
-

41. A $10\ \mu\text{F}$ capacitor is connected to a $210\ \text{V}$, $50\ \text{Hz}$ source. The peak current in the circuit is:



$210\ \text{V}$, $50\ \text{Hz}$

- (A) $0.93\ \text{A}$
(B) $1.20\ \text{A}$
(C) $0.35\ \text{A}$
(D) $0.58\ \text{A}$
-

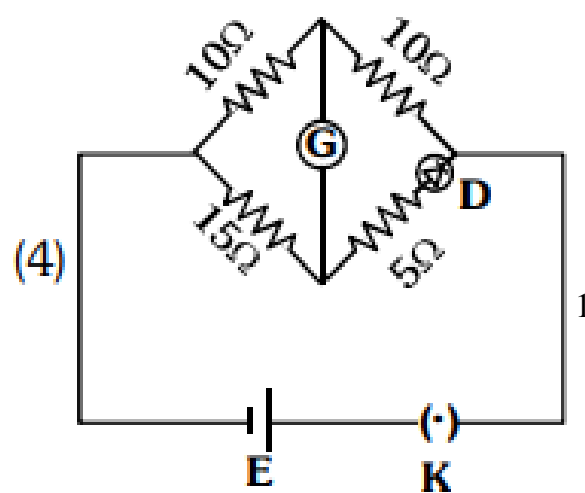
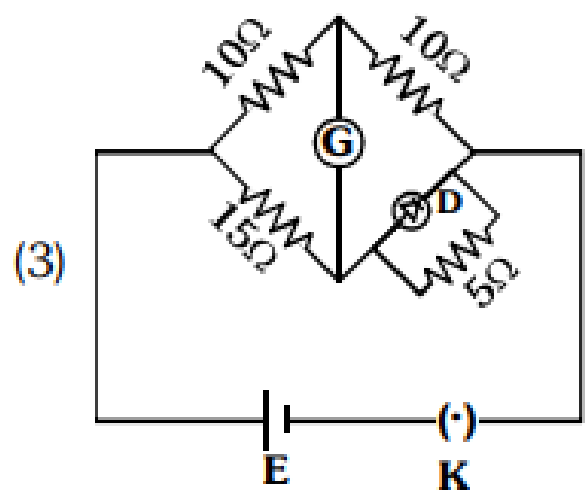
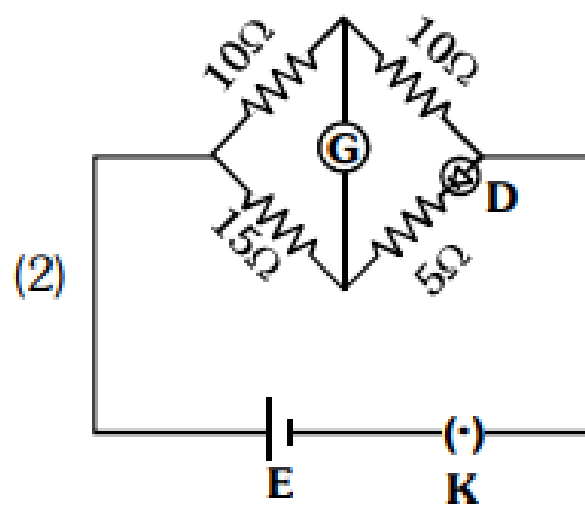
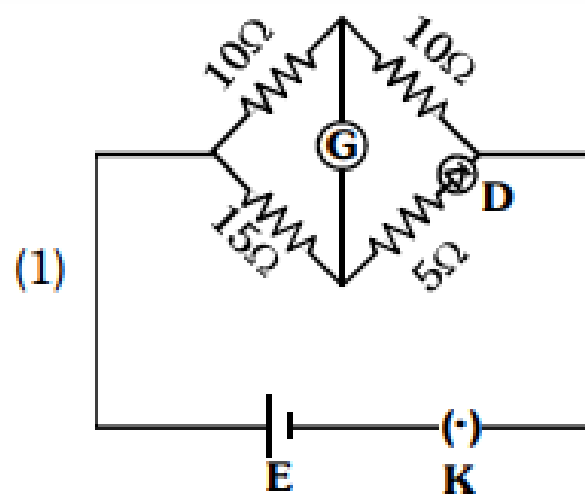
42. A metallic bar of Young's modulus $0.5 \times 10^{11}\ \text{N/m}^2$ and coefficient of linear expansion $10^{-5}, ^\circ\text{C}^{-1}$, heated from 0°C to 100°C . The compressive force developed is:

- (A) $50 \times 10^3\ \text{N}$
(B) $100 \times 10^3\ \text{N}$
(C) $2 \times 10^3\ \text{N}$
(D) $5 \times 10^3\ \text{N}$
-

43. A parallel plate capacitor is charged through a resistor. If I is the current, then in the gap between the plates:

- (A) Displacement current of magnitude equal to I flows in the same direction as I .
 - (B) Displacement current of magnitude equal to I flows in the opposite direction.
 - (C) Displacement current greater than I flows in any direction.
 - (D) There is no current.
-

44. Choose the correct circuit which achieves bridge balance:



45. A sheet is placed near a magnetic pole. A force is needed to:

- A. hold the sheet there if it is magnetic.
- B. hold the sheet there if it is non-magnetic.
- C. move the sheet away from the pole with uniform velocity if it is conducting.
- D. move the sheet away from the pole with uniform velocity if it is both, non-conducting and non-polar.

Choose the correct statement(s) from the options given below:

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

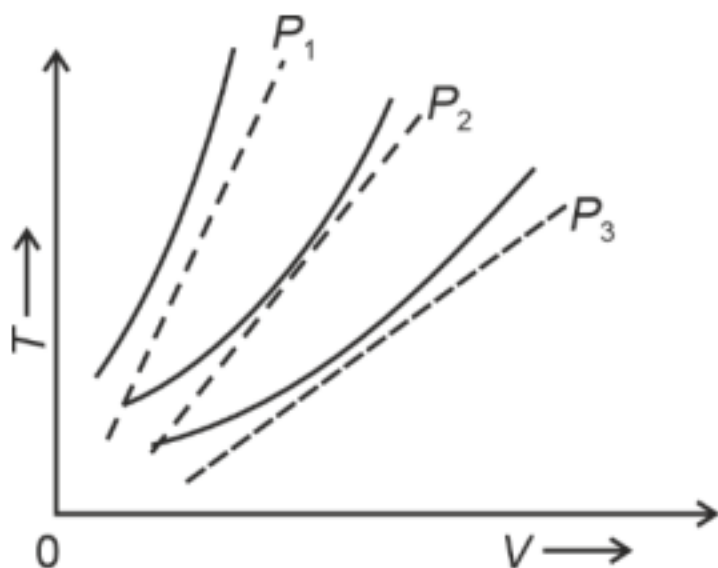
46. If plates of a parallel plate capacitor connected to a battery are moved closer:

- A. the charge stored in it, increases.
- B. the energy stored in it, decreases.
- C. its capacitance increases.
- D. the ratio of charge to its potential remains the same.
- E. the product of charge and voltage increases.

Choose the most appropriate answer from the options given below:

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

47. The following graph represents the $T - V$ curves of an ideal gas (where T is the temperature and V the volume) at three pressures P_1 , P_2 , and P_3 , compared with Charles's law (dotted lines). Then the correct relation is:



- (A) $P_1 > P_3 > P_2$
 (B) $P_2 > P_1 > P_3$
 (C) $P_1 > P_2 > P_3$
 (D) $P_3 > P_2 > P_1$

48. The property which is not of an electromagnetic wave travelling in free space is:

- (A) The energy density in the electric field is equal to the energy density in the magnetic field.
 (B) They travel with a speed equal to $\frac{1}{\sqrt{\mu_0 \epsilon_0}}$.
 (C) They originate from charges moving with uniform speed.
 (D) They are transverse in nature.

49. An iron bar of length L has magnetic moment M . It is bent at the middle to make two arms at an angle 60° . The magnetic moment of this new magnet is:

- (A) $\frac{M}{2}$
 (B) $2M$
 (C) $\frac{M}{\sqrt{3}}$
 (D) M

50. If the mass of a simple pendulum's bob is increased to thrice its original mass, and

its length is halved, the new time period is $\frac{x}{2}$ times the original. Find x :

- (A) $\sqrt{2}$
 - (B) $2\sqrt{3}$
 - (C) 4
 - (D) $\sqrt{3}$
-

Chemistry

51. The reagents with which glucose does not react to give the corresponding tests/products are: A. Tollen's reagent B. Schiff's reagent C. HCN D. NH_2OH E. NaHSO_3

(1) A and D

(2) B and E

(3) E and D

(4) B and C

52. The energy of an electron in the ground state ($n = 1$) for He^+ ion is $-x$ J. Then, that for an electron in $n = 2$ state for Be^{3+} ion in J is:

(1) $-\frac{x}{9}$

(2) $-4x$

(3) $-\frac{4x}{9}$

(4) $-x$

53. Which reaction is NOT a redox reaction? (1) $2\text{KClO}_3 + \text{I}_2 \rightarrow 2\text{KIO}_3 + \text{Cl}_2$

(2) $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$

(3) $\text{BaCl}_2 + \text{Na}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{NaCl}$

(4) $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu}$

54. Match List-I with List-II:

List-I (Process)	List-II (Conditions)
A. Isothermal process	I. No heat exchange
B. Isochoric process	II. Carried out at constant temperature
C. Isobaric process	III. Carried out at constant volume
D. Adiabatic process	IV. Carried out at constant pressure

(1) A-IV, B-II, C-III, D-I

(2) A-I, B-II, C-III, D-IV

(3) A-II, B-III, C-IV, D-I

(4) A-IV, B-III, C-II, D-I

55. For the reaction $2A \rightleftharpoons B + C$, $K_c = 4 \times 10^{-3}$. At a given time,

$[A] = [B] = [C] = 2 \times 10^{-3}$. Which of the following is correct?

(1) Reaction has a tendency to go in forward direction.

(2) Reaction has a tendency to go in backward direction.

(3) Reaction has gone to completion in forward direction.

(4) Reaction is at equilibrium.

56. Match List I with List II:

List I (Complex)

A. $[\text{Co}(\text{NH}_3)_5(\text{NO}_2)]\text{Cl}_2$

B. $[\text{Co}(\text{NH}_3)_5(\text{SO}_4)]\text{Br}$

C. $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$

D. $[\text{Co}(\text{H}_2\text{O})_6]\text{Cl}_3$

List II (Type of isomerism)

I. Solvate isomerism

II. Linkage isomerism

III. Ionization isomerism

IV. Coordination isomerism

(1) A-I, B-III, C-II, D-II

(2) A-I, B-IV, C-III, D-II

(3) A-II, B-IV, C-III, D-I

(4) A-II, B-III, C-IV, D-I

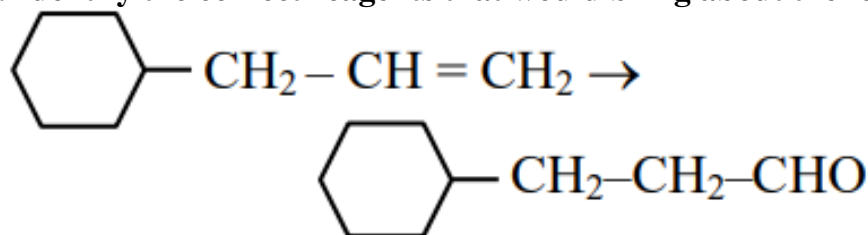
57. In which of the following processes entropy increases?

- A. A liquid evaporates to vapour.
- B. Temperature of a crystalline solid lowered from 130 K to 0 K.
- C. $2\text{NaHCO}_{3(s)} \rightarrow \text{Na}_2\text{CO}_{3(s)} + \text{CO}_{2(g)} + \text{H}_2\text{O}_{(g)}$
- D. $\text{Cl}_{2(g)} \rightarrow 2\text{Cl}_{(g)}$

Choose the correct answer from the options given below:

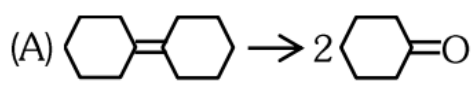
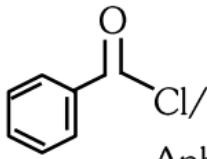
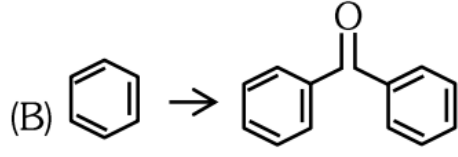
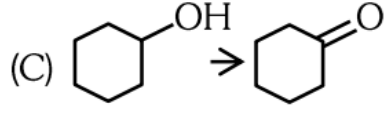
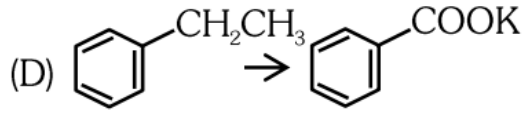
- (1) A, B and D
- (2) A, C and D
- (3) C and D
- (4) A and C

58. Identify the correct reagents that would bring about the following transformation:



- (1) (i) BH_3 , (ii) $\text{H}_2\text{O}_2/\text{OH}^-$, (iii) PCC
- (2) (i) BH_3 , (ii) $\text{H}_2\text{O}_2/\text{OH}^-$, (iii) alk. KMnO_4 , (iv) H_3O^+
- (3) (i) $\text{H}_2\text{O}/\text{H}^+$, (ii) PCC
- (4) (i) $\text{H}_2\text{O}/\text{H}^+$, (ii) CrO_3

59. Match List I with List II:

List I (Reaction)	List II (Reagents/Condition)
(A) 	(I)  Anhyd. AlCl_3
(B) 	(II) CrO_3
(C) 	(III) $\text{KMnO}_4/\text{KOH}, \Delta$
(D) 	(IV) (i) O_3 (ii) $\text{Zn-H}_2\text{O}$

- (1) A-III, B-I, C-II, D-IV
 (2) A-IV, B-I, C-II, D-III
 (3) A-I, B-IV, C-III, D-II
 (4) A-IV, B-III, C-II, D-I

60. In which of the following equilibria, K_p and K_c are NOT equal?

- (1) $\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \rightleftharpoons 2\text{HI}(\text{g})$
 (2) $\text{CO}(\text{g}) + \text{H}_2\text{O}(\text{g}) \rightleftharpoons \text{CO}_2(\text{g}) + \text{H}_2(\text{g})$
 (3) $2\text{BrCl}(\text{g}) \rightleftharpoons \text{Br}_2(\text{g}) + \text{Cl}_2(\text{g})$
 (4) $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$

61. Which one of the following alcohols reacts instantaneously with Lucas reagent?

- (1) $\text{CH}_3 - \text{CH}_2 - \underset{\text{CH}_3}{\text{CH}} - \text{OH}$ (2) $\text{CH}_3 - \underset{\text{CH}_3}{\text{CH}} - \text{CH}_2\text{OH}$
 (3) $\text{CH}_3 - \underset{\text{CH}_3}{\overset{\text{CH}_3}{\text{C}}} - \text{OH}$ (4) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2\text{OH}$

62. Given below are two statements:

Statement I: The boiling point of three isomeric pentanes follows the order: *n*-pentane > isopentane > neopentane.

Statement II: When branching increases, the molecule attains a spherical shape, reducing surface area and intermolecular forces, thereby lowering the boiling point.

In light of the above statements, choose the correct option:

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

63. Given below are two statements:

Statement I: Aniline does not undergo Friedel-Crafts alkylation.

Statement II: Aniline cannot be prepared through Gabriel synthesis.

Choose the correct answer:

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

64. The E° value for the $\text{Mn}^{3+}/\text{Mn}^{2+}$ couple is more positive than $\text{Cr}^{3+}/\text{Cr}^{2+}$ or $\text{Fe}^{3+}/\text{Fe}^{2+}$ due to:

- (1) $d^5 \rightarrow d^2$ configuration.
 - (2) $d^4 \rightarrow d^5$ configuration.
 - (3) $d^3 \rightarrow d^5$ configuration.
 - (4) $d^5 \rightarrow d^4$ configuration.
-

65. On heating, some solid substances change directly to vapor without passing through the liquid state. This technique is called:

- (1) Sublimation.
- (2) Distillation.

- (3) Chromatography.
(4) Crystallization.
-

66. Fehling's solution 'A' is:

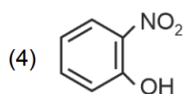
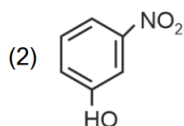
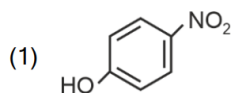
- (1) Alkaline copper sulfate.
(2) Alkaline solution of sodium potassium tartrate (Rochelle's salt).
(3) Aqueous sodium citrate.
(4) Aqueous copper sulfate.
-

67. Match List I with List II:

List I (Molecule)	List II (Number and types of bond/s between two carbon atoms)
A. ethane	I. one σ -bond and two π -bonds
B. ethene	II. two π -bonds
C. carbon molecule, C_2	III. one σ -bond
D. ethyne	IV. one σ -bond and one π -bond

- (1) A-IV, B-III, C-II, D-I.
(2) A-III, B-IV, C-II, D-I.
(3) A-III, B-IV, C-I, D-II.
(4) A-I, B-IV, C-II, D-III.
-

68. Intramolecular hydrogen bonding is present in:



69. The highest number of helium atoms is in:

- (1) 4 u of helium.
(2) 4 g of helium.
(3) 2.271098 L of helium at STP.
(4) 4 mol of helium.

70. Match List I with List II:

List I (Conversion)	List II (Number of Faraday required)
A. 1 mol of H_2O to O_2	I. 3F
B. 1 mol of MnO_4^- to Mn^{2+}	II. 2F
C. 1.5 mol of Ca from molten CaCl_2	III. 1F
D. 1 mol of FeO to Fe_2O_3	IV. 5F

(1) A-III, B-IV, C-I, D-II.

(2) A-II, B-III, C-I, D-IV.

(3) A-III, B-IV, C-II, D-I.

(4) A-II, B-IV, C-I, D-III.

71. Among Group 16 elements, which one does NOT show -2 oxidation state?

(1) Se

(2) Te

(3) Po

(4) O

72. 'Spin-only' magnetic moment is the same for which of the following ions?

A. Ti^{3+}

B. Cr^{2+}

C. Mn^{2+}

D. Fe^{2+}

E. Sc^{3+}

Choose the correct answer:

(1) A and E only

(2) B and C only

(3) A and D only

(4) B and D only

73. A compound with a molecular formula of C_6H_{14} has two tertiary carbons. Its

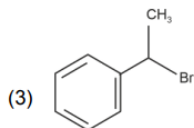
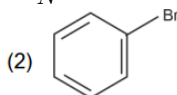
IUPAC name is:

- (1) 2-methylpentane
 - (2) 2,3-dimethylbutane
 - (3) 2,2-dimethylbutane
 - (4) *n*-hexane
-

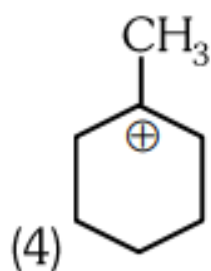
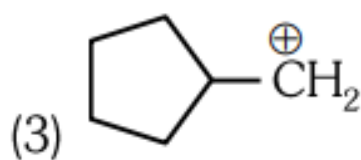
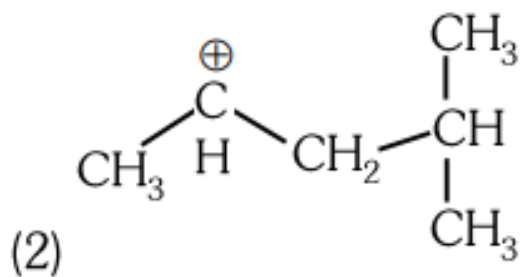
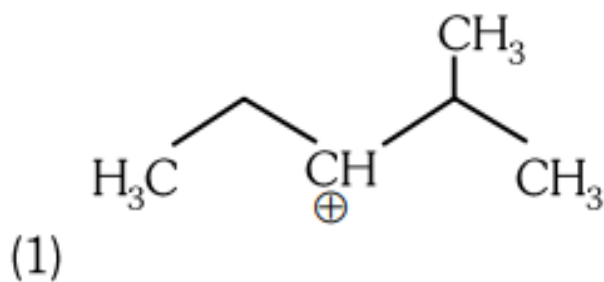
74. The Henry's law constant (K_H) values of three gases (A, B, C) in water are 145, 2×10^{-5} , and 35 kbar, respectively. The solubility of these gases in water follows the order:

- (1) $B > C > A$
 - (2) $A > C > B$
 - (3) $A > B > C$
 - (4) $B > A > C$
-

75. The compound that will undergo S_N1 reaction with the fastest rate is:



76. The most stable carbocation among the following is:



77. Given below are two statements:

Statement I: Both $[Co(NH_3)_6]^{3+}$ and $[CoF_6]^{3-}$ complexes are octahedral but differ in their magnetic behavior.

Statement II: $[Co(NH_3)_6]^{3+}$ is diamagnetic, whereas $[CoF_6]^{3-}$ is paramagnetic.

Choose the correct answer:

- (1) Both Statement I and Statement II are false
- (2) Statement I is true but Statement II is false
- (3) Statement I is false but Statement II is true
- (4) Both Statement I and Statement II are true

78. 1 gram of sodium hydroxide was treated with 25 mL of 0.75 M HCl solution. The mass of sodium hydroxide left unreacted is equal to:

- (1) 250 mg
 - (2) Zero mg
 - (3) 200 mg
 - (4) 750 mg
-

79. Given below are two statements: Statement I: The boiling point of hydrides of Group 16 elements follows the order $H_2O > H_2Te > H_2Se > H_2S$.

Statement II: H_2O has the highest boiling point due to extensive hydrogen bonding.

Choose the correct answer:

- (1) Both Statement I and Statement II are false
 - (2) Statement I is true but Statement II is false
 - (3) Statement I is false but Statement II is true
 - (4) Both Statement I and Statement II are true
-

80. Arrange the following elements in increasing order of first ionization enthalpy:

Li, Be, B, C, N .

- (1) $Li < B < Be < C < N$
 - (2) $Li < Be < C < B < N$
 - (3) $Li < Be < N < B < C$
 - (4) $Li < Be < B < C < N$
-

81. Activation energy of any chemical reaction can be calculated if one knows the value of:

- (1) probability of collision
 - (2) orientation of reactant molecules during collision
 - (3) rate constant at two different temperatures
 - (4) rate constant at standard temperature
-

82. Arrange the following elements in increasing order of electronegativity:

N, O, F, C, Si .

(1) $Si < C < O < N < F$

(2) $O < F < N < C < Si$

(3) $F < O < N < C < Si$

(4) $Si < C < N < O < F$

83. Match List I with List II:

List I	List II
(Quantum Number)	(Information provided)
A. m_l	I. Shape of orbital
B. m_s	II. Size of orbital
C. l	III. Orientation of orbital
D. n	IV. Orientation of spin of electron

(1) A-III, B-IV, C-I, D-II

(2) A-III, B-IV, C-II, D-I

(3) A-II, B-I, C-IV, D-III

(4) A-I, B-III, C-II, D-IV

84. Match List I with List II:

List I	List II
(Compound)	(Shape/geometry)
A. NH_3	I. Trigonal Pyramidal
B. BrF_5	II. Square Planar
C. XeF_4	III. Octahedral
D. SF_6	IV. Square Pyramidal

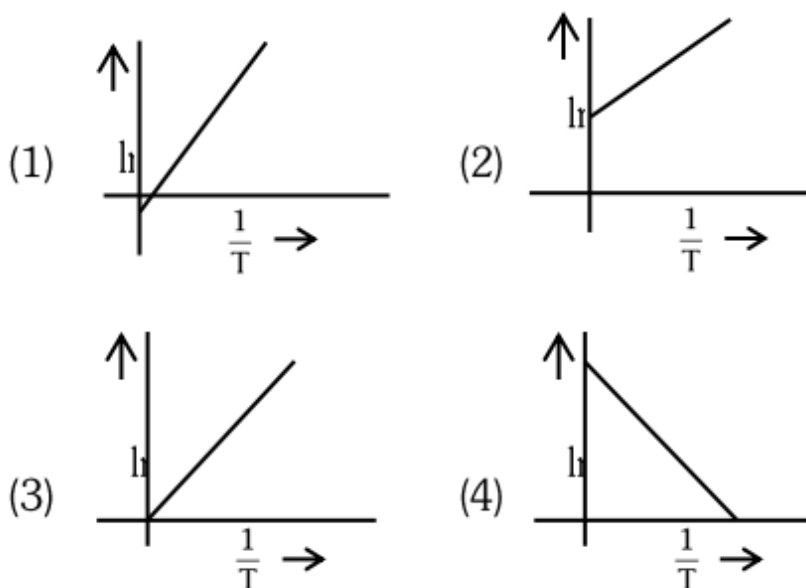
(1) A-II, B-IV, C-III, D-I

(2) A-III, B-IV, C-I, D-II

(3) A-II, B-I, C-IV, D-III

(4) A-I, B-IV, C-II, D-III

85. Which plot of $\ln k$ vs $\frac{1}{T}$ is consistent with the Arrhenius equation?



86. The work done during reversible isothermal expansion of one mole of hydrogen gas at 25°C from a pressure of 20 atm to 10 atm is:

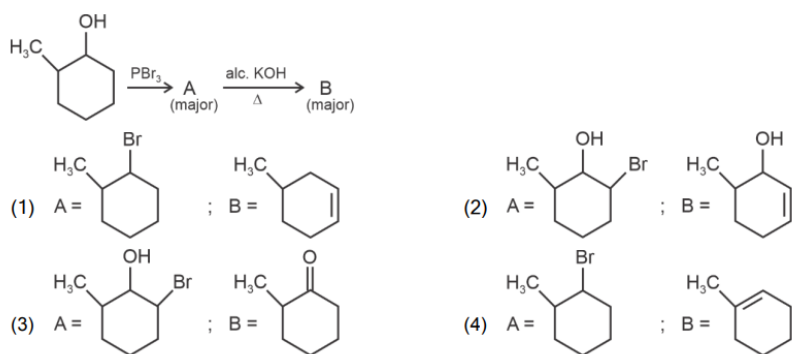
(Given $R = 2.0 \text{ cal K}^{-1} \text{ mol}^{-1}$)

- (1) -413.14 calories
 - (2) 413.14 calories
 - (3) 100 calories
 - (4) 0 calorie
-

87. Identify the correct answer:

- (1) BF_3 has non-zero dipole moment
 - (2) Dipole moment of NF_3 is greater than that of NH_3
 - (3) Three canonical forms can be drawn for CO_3^{2-} ion
 - (4) Three resonance structures can be drawn for ozone
-

88. Major products A and B formed in the following reaction sequence are:



89. The pair of lanthanoid ions which are diamagnetic is:

- (1) Ce^{3+} and Eu^{2+}
- (2) Gd^{3+} and Eu^{3+}
- (3) Pm^{3+} and Sm^{3+}
- (4) Ce^{4+} and Yb^{2+}

90. A compound X contains 32% of A, 20% of B, and the remaining percentage of C.

The empirical formula of X is:

(Given atomic masses of $A = 64$, $B = 40$, $C = 32$)

- (1) ABC_3
- (2) AB_2C_2
- (3) ABC_4
- (4) A_2BC_2

91. Given below are certain cations. Arrange them in increasing group number from 0 to VI.

- A. Al^{3+}
- B. Cu^{2+}
- C. Ba^{2+}
- D. Co^{2+}
- E. Mg^{2+}

Choose the correct answer from the following// (1) B, C, A, D, E

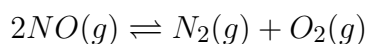
- (2) E, C, D, B, A

(3) E, A, B, C, D

(4) B, A, D, C, E

92. Consider the following reaction in a sealed vessel at equilibrium with concentrations of

$$N_2 = 3.0 \times 10^{-3} \text{ M}, O_2 = 4.2 \times 10^{-3} \text{ M}, \text{ and } NO = 2.8 \times 10^{-3} \text{ M}.$$



If 0.1 mol L^{-1} of NO is taken in a closed vessel, what will be the degree of dissociation (α) of NO(g) at equilibrium?

(1) 0.0889

(2) 0.8889

(3) 0.717

(4) 0.0089

93. The rate of a reaction quadruples when temperature changes from 27°C to 57°C .

Calculate the energy of activation.

(1) 380.4 kJ/mol

(2) 3.80 kJ/mol

(3) 3804 kJ/mol

(4) 38.04 kJ/mol

94. During the preparation of Mohr's salt solution (Ferrous ammonium sulphate), which of the following acid is added to prevent hydrolysis of Fe^{2+} :

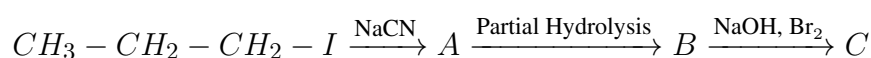
(1) Concentrated H_2SO_4

(2) Dilute HNO_3

(3) Dilute H_2SO_4

(4) Dilute HCl

95. Identify the major product C formed in the following reaction sequence:



(1) Butylamine

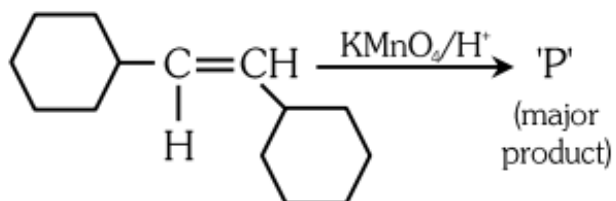
- (2) Butanamide
 - (3) α -bromobutanoic acid
 - (4) Propylamine
-

96. Mass of copper deposited by passing 9.6487 A of current through copper sulfate solution for 100 seconds is:

Given: Molar mass of Cu = 63 g/mol, 1 F = 96487 C

- (1) 0.315 g
 - (2) 31.5 g
 - (3) 0.0315 g
 - (4) 3.15 g
-

97. For the given reaction:



'P' is

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

98. Given statements: Statement I: $[Co(NH_3)_6]^{3+}$ is homoleptic, while $[Co(NH_3)_4Cl_2]^+$ is heteroleptic.

Statement II: $[Co(NH_3)_6]^{3+}$ has one type of ligand, whereas $[Co(NH_3)_4Cl_2]^+$ has more than one type.

- (1) Both false
- (2) Statement I true, Statement II false
- (3) Statement I false, Statement II true
- (4) Both true

99. The plot of osmotic pressure (π) vs concentration (mol L^{-1}) for a solution gives a straight line with slope $25.73 \text{ L bar mol}^{-1}$. The temperature at which the osmotic pressure measurement is done is

(Use $R = 0.083 \text{ L bar mol}^{-1} \text{ K}^{-1}$)

- (1) 310°C
- (2) 25.73°C
- (3) 12.05°C
- (4) 37°C

100. Reaction sequence:



- (1) $POCl_3$ and H_3PO_4
 - (2) H_3PO_4 and $POCl_3$
 - (3) H_3PO_3 and $POCl_3$
 - (4) $POCl_3$ and H_3PO_3
-

Botany

Section A

101. Auxin is used by gardeners to prepare weed-free lawns. But no damage is caused to grass as auxin:

- (1) promotes abscission of mature leaves only.
 - (2) does not affect mature monocotyledonous plants.
 - (3) can help in cell division in grasses, to produce growth.
 - (4) promotes apical dominance.
-

102. Lecithin, a small molecular weight organic compound found in living tissues, is an example of:

- (1) Phospholipids
 - (2) Glycerides
 - (3) Carbohydrates
 - (4) Amino acids
-

103. Match List I with List II:

List I	List II
A. Two or more alternative forms of a gene	I. Back cross
B. Cross of F_1 progeny with homozygous recessive parent	II. Ploidy
C. Cross of F_1 progeny with any of the parents	III. Allele
D. Number of chromosome sets in plant	IV. Test cross

- (1) A-II, B-I, C-III, D-IV
 - (2) A-III, B-IV, C-I, D-II
 - (3) A-IV, B-III, C-II, D-I
 - (4) A-I, B-II, C-III, D-IV
-

104. Identify the set of correct statements:

- A. The flowers of Vallisneria are colourful and produce nectar.
- B. The flowers of water lily are not pollinated by water.
- C. In most water-pollinated species, the pollen grains are protected from wetting.

- D. Pollen grains of some hydrophytes are long and ribbon-like.
E. In some hydrophytes, the pollen grains are carried passively inside water.

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

105. The list of endangered species was released by:

- (1) WWF
(2) FOAM
(3) IUCN
(4) GEAC
-

106. What is the fate of a piece of DNA carrying only the gene of interest which is transferred into an alien organism?

- (A) The piece of DNA would be able to multiply itself independently in the progeny cells of the organism.
(B) It may get integrated into the genome of the recipient.
(C) It may multiply and be inherited along with the host DNA.
(D) The alien piece of DNA is not an integral part of the chromosome.
(E) It shows the ability to replicate.

Choose the correct answer from the options given below:

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

107. Which of the following are required for the dark reaction of photosynthesis?

- A. Light
B. Chlorophyll
C. CO₂

D. ATP

E. NADPH

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

108. The type of conservation in which the threatened species are taken out from their natural habitat and placed in a special setting where they can be protected and given special care is called:

- (1) Biodiversity conservation
 - (2) Semi-conservative method
 - (3) Sustainable development
 - (4) In-situ conservation
-

109. Given below are two statements:

Statement I: Bt toxins are insect group-specific and coded by the gene cry IAc.

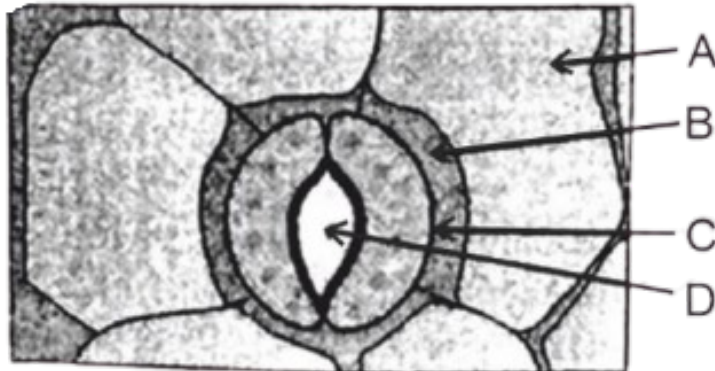
Statement II: Bt toxin exists as inactive protoxin in *B. thuringiensis*. However, after ingestion by the insect, the inactive protoxin gets converted into its active form due to the acidic pH of the insect gut.

- (1) Both Statement I and Statement II are false
 - (2) Statement I is true but Statement II is false
 - (3) Statement I is false but Statement II is true
 - (4) Both Statement I and Statement II are true
-

110. A transcription unit in DNA is defined primarily by three regions in DNA and these are with respect to upstream and downstream ends:

- (1) Structural gene, Transposons, Operator gene
- (2) Inducer, Repressor, Structural gene
- (3) Promoter, Structural gene, Terminator
- (4) Repressor, Operator gene, Structural gene

111. In the given figure, which component has thin outer walls and highly thickened



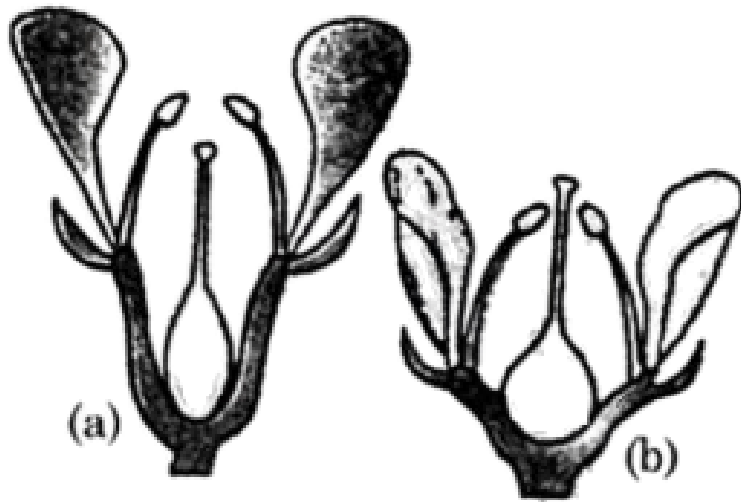
inner walls?

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

112. Hind II always cuts DNA molecules at a particular point called recognition sequence and it consists of:

- (1) 6 bp
- (2) 4 bp
- (3) 10 bp
- (4) 8 bp

113. Identify the type of flowers based on the position of calyx, corolla and androecium with respect to the ovary from the given figures (a) and (b).



- (1) (a) Hypogynous; (b) Epigynous
- (2) (a) Perigynous; (b) Epigynous
- (3) (a) Perigynous; (b) Perigynous
- (4) (a) Epigynous; (b) Hypogynous

114. Which of the following is an example of an actinomorphic flower?

- (1) Cassia
- (2) Pisum
- (3) Sesbania
- (4) Datura

115. Which one of the following is not a criterion for classification of fungi?

- (1) Mode of nutrition
- (2) Mode of spore formation
- (3) Fruiting body
- (4) Morphology of mycelium

116. The equation of Verhulst-Pearl logistic growth is

$$\frac{dN}{dt} = rN \left(\frac{K - N}{K} \right)$$

From this equation, K indicates:

- (1) Biotic potential

- (2) Carrying capacity
 - (3) Population density
 - (4) Intrinsic rate of natural increase
-

117. Which one of the following can be explained on the basis of Mendel's Law of Dominance?

- A. Out of one pair of factors, one is dominant and the other is recessive.
- B. Alleles do not show any expression and both the characters appear as such in F_2 generation.
- C. Factors occur in pairs in normal diploid plants.
- D. The discrete unit controlling a particular character is called factor.
- E. The expression of only one of the parental characters is found in a monohybrid cross.

Choose the correct answer from the options given below:

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

118. Match List I with List II:

	List-I		List-II
A.	<i>Rhizopus</i>	I.	Mushroom
B.	<i>Ustilago</i>	II.	Smut fungus
C.	<i>Puccinia</i>	III.	Bread mould
D.	<i>Agaricus</i>	IV.	Rust fungus

- (1) A-II, B-I, C-III, D-IV
 - (2) A-IV, B-III, C-II, D-I
 - (3) A-I, B-II, C-III, D-IV
 - (4) A-III, B-II, C-IV, D-I
-

119. Inhibition of succinic dehydrogenase enzyme by malonate is a classical example of:

- (1) Feedback inhibition
 - (2) Competitive inhibition
 - (3) Enzyme activation
 - (4) Cofactor inhibition
-

120. Formation of interfascicular cambium from fully developed parenchyma cells is an example of:

- (1) Redifferentiation
 - (2) Dedifferentiation
 - (3) Maturation
 - (4) Differentiation
-

121. A pink flowered Snapdragon plant was crossed with a red flowered Snapdragon plant. What type of phenotype/s is/are expected in the progeny?

- (1) Red flowered as well as pink flowered plants
 - (2) Only pink flowered plants
 - (3) Red, Pink as well as white flowered plants
 - (4) Only red flowered plants
-

122. In a plant, black seed color (BB/Bb) is dominant over white seed color (bb). In order to find out the genotype of the black seed plant, with which of the following genotype will you cross it?

- (1) bb
 - (2) Bb
 - (3) BB/Bb
 - (4) BB
-

123. Match List I with List II:

List I

- A. *Clostridium butylicum*
- B. *Saccharomyces cerevisiae*
- C. *Trichoderma polysporum*
- D. *Streptococcus sp.*

List II

- I. Ethanol
- II. Streptokinase
- III. Butyric acid
- IV. Cyclosporin-A

- (1) A-II, B-IV, C-III, D-I
- (2) A-III, B-I, C-IV, D-II
- (3) A-IV, B-I, C-III, D-II
- (4) A-III, B-I, C-II, D-IV

124. How many molecules of ATP and NADPH are required for every molecule of CO₂ fixed in the Calvin cycle?

- (1) 2 molecules of ATP and 2 molecules of NADPH
- (2) 3 molecules of ATP and 3 molecules of NADPH
- (3) 3 molecules of ATP and 2 molecules of NADPH
- (4) 2 molecules of ATP and 3 molecules of NADPH

125. The capacity to generate a whole plant from any cell of the plant is called:

- (1) Micropropagation
- (2) Differentiation
- (3) Somatic hybridization
- (4) Totipotency

126. Tropical regions show greatest level of species richness because:

- A. Tropical latitudes have remained relatively undisturbed for millions of years, hence more time was available for species diversification.
- B. Tropical environments are more seasonal.
- C. More solar energy is available in tropics.
- D. Constant environments promote niche specialization.
- E. Tropical environments are constant and predictable.

Choose the correct answer from the options given below:

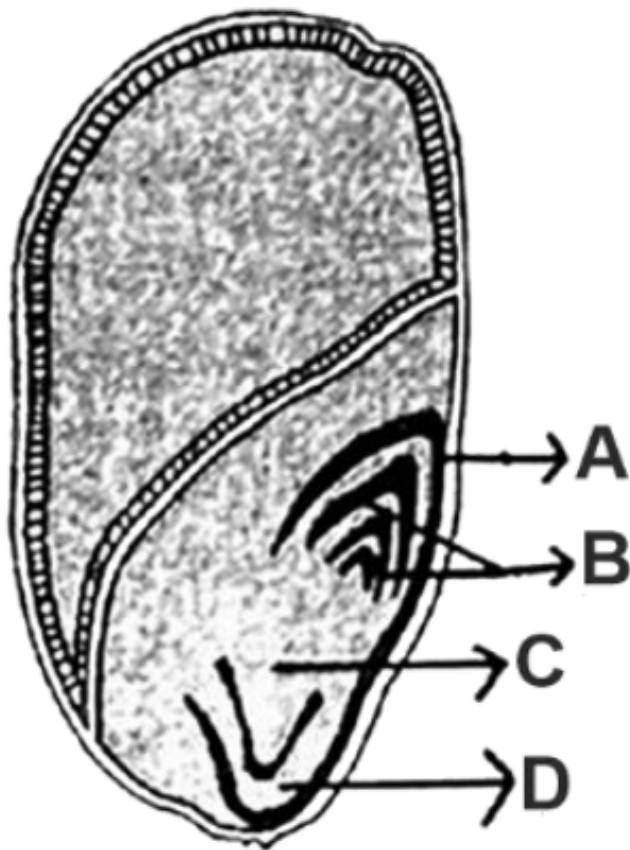
- (1) A and B only
- (2) A, B, and E only
- (3) A, B, and D only
- (4) A, C, D, and E only

127. Match List I with List II:

	List-I		List-II
A.	Nucleolus	I.	Site of formation of glycolipid
B.	Centriole	II.	Organization like the cartwheel
C.	Leucoplasts	III.	Site for active ribosomal RNA synthesis
D.	Golgi apparatus	IV.	For storing nutrients

- (1) A-II, B-III, C-I, D-IV
- (2) A-III, B-IV, C-II, D-I
- (3) A-I, B-II, C-III, D-IV
- (4) A-III, B-II, C-IV, D-I

128. Identify the part of the seed from the given figure which is destined to form root when the seed germinates.



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

129. Spindle fibers attach to kinetochores of chromosomes during:

- (1) Metaphase
- (2) Anaphase
- (3) Telophase
- (4) Prophase

130. Given below are two statements:

Statement I: Chromosomes become gradually visible under light microscope during leptotene stage.

Statement II: The beginning of diplotene stage is recognized by dissolution of

synaptonemal complex.

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

- (1) Both Statement I and Statement II are false
 - (2) Statement I is true but Statement II is false
 - (3) Statement I is false but Statement II is true
 - (4) Both Statement I and Statement II are true
-

131. Given below are two statements:

Statement I : Parenchyma is living but collenchyma is dead tissue.

Statement II : Gymnosperms lack xylem vessels but presence of xylem vessels is the characteristic of angiosperms.

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

- (1) Both Statement I and Statement II are false
 - (2) Statement I is true but Statement II is false
 - (3) Statement I is false but Statement II is true
 - (4) Both Statement I and Statement II are true
-

132. These are regarded as major causes of biodiversity loss:

- A. Over exploitation
- B. Co-extinction
- C. Mutation
- D. Habitat loss and fragmentation
- E. Migration

Choose the correct option:

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

133. The lactose present in the growth medium of bacteria is transported to the cell by the action of:

- (1) Acetylase
 - (2) Permease
 - (3) Polymerase
 - (4) Beta-galactosidase
-

134. Bulliform cells are responsible for:

- (1) Protecting the plant from salt stress
 - (2) Increased photosynthesis in monocots
 - (3) Providing large spaces for storage of sugars
 - (4) Inward curling of leaves in monocots
-

135. The cofactor of the enzyme carboxypeptidase is:

- (1) Niacin
 - (2) Flavin
 - (3) Haem
 - (4) Zinc
-

136. Read the following statements and choose the set of correct statements:

In the members of Phaeophyceae:

- A. Asexual reproduction occurs usually by biflagellate zoospores.
- B. Sexual reproduction is by oogamous method only.
- C. Stored food is in the form of carbohydrates which is either mannitol or laminarin.
- D. The major pigments found are chlorophyll a, c and carotenoids and xanthophyll.
- E. Vegetative cells have a cellulosic wall, usually covered on the outside by gelatinous coating of algin.

Choose the correct answer from the options given below:

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

137. Match List I with List II:

List I	List II
A. Robert May	I. Species-Area relationship
B. Alexander von Humboldt	II. Long term ecosystem experiment using out door plots
C. Paul Ehrlich	III. Global species diversity at about 7 million
D. David Tilman	IV. Rivet popper hypothesis

Choose the correct answer from the options given below:

- (1) A-III, B-I, C-IV, D-II
 - (2) A-I, B-III, C-II, D-IV
 - (3) A-III, B-IV, C-II, D-I
 - (4) A-II, B-III, C-I, D-IV
-

138. Given below are two statements:

Statement I: In C3 plants, some O₂ binds to RuBisCO, hence CO₂ fixation is decreased.

Statement II: In C4 plants, mesophyll cells show very little photorespiration while bundle sheath cells do not show photorespiration.

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

- (1) Both Statement I and Statement II are false
 - (2) Statement I is true but Statement II is false
 - (3) Statement I is false but Statement II is true
 - (4) Both Statement I and Statement II are true
-

139. The DNA present in chloroplast is:

- (1) Circular, double stranded
 - (2) Linear, single stranded
 - (3) Circular, single stranded
 - (4) Linear, double stranded
-

140. In an ecosystem if the Net Primary Productivity (NPP) of the first trophic level is 100x (kcal m⁻² yr⁻¹), what would be the GPP (Gross Primary Productivity) of the third trophic level of the same ecosystem?

- (1) x(kcal m⁻² yr⁻¹)
- (2) 10x (kcal m⁻² yr⁻¹)

(3) $\frac{100x}{3x} (\text{kcal } m^{-2} yr^{-1})$

(4) $\frac{x}{10} \text{kcal } m^{-2} yr^{-1}$

141. Which of the following are fused in somatic hybridization involving two varieties of plants?

- (1) Somatic embryos
- (2) Protoplasts
- (3) Pollens
- (4) Callus

142. Match List I with List II:

	List I		List II
A.	Citric acid cycle	I.	Cytoplasm
B.	Glycolysis	II.	Mitochondrial matrix
C.	Electron transport system	III.	Intermembrane space of mitochondria
D.	Proton gradient	IV.	Inner mitochondrial membrane

Choose the correct answer from the options given below:

- (1) A-II, B-I, C-IV, D-III
- (2) A-III, B-IV, C-I, D-II
- (3) A-IV, B-III, C-II, D-I
- (4) A-I, B-II, C-III, D-IV

143. Match List I with List II:

List I	List II
A. Frederick Griffith	I. Genetic code
B. Francois Jacob & Jacques Monod	II. Semi-conservative mode of DNA replication
C. Har Gobind Khorana	III. Transformation
D. Meselson & Stahl	IV. <i>Lac</i> operon

Choose the correct answer from the options given below:

- (1) A-III, B-IV, C-I, D-II
- (2) A-II, B-III, C-IV, D-I
- (3) A-IV, B-I, C-II, D-III
- (4) A-III, B-II, C-I, D-IV

144. Match List I with List II:

List I (Types of Stamens)	List II (Example)
A. Monadelphous	I. Citrus
B. Diadelphous	II. Pea
C. Polyadelphous	III. Lily
D. Epiphyllous	IV. China-rose

Choose the correct answer from the options given below:

- (1) A-IV, B-I, C-II, D-III
- (2) A-I, B-II, C-IV, D-III
- (3) A-III, B-I, C-IV, D-II
- (4) A-IV, B-II, C-I, D-III

145. Identify the correct description about the given figure:



- (1) Water pollinated flowers showing stamens with mucilaginous covering.
- (2) Cleistogamous flowers showing autogamy.
- (3) Compact inflorescence showing complete autogamy.
- (4) Wind pollinated plant inflorescence showing flowers with well-exposed stamens.

146. Match List I with List II:

List-I

- A. GLUT-4
- B. Insulin
- C. Trypsin
- D. Collagen

List-II

- I. Hormone
- II. Enzyme
- III. Intercellular ground substance
- IV. Enables glucose transport into cells

Choose the correct answer from the options given below:

- (1) A-I, B-II, C-III, D-IV
- (2) A-II, B-III, C-IV, D-I
- (3) A-III, B-IV, C-I, D-II
- (4) A-IV, B-I, C-II, D-III

147. Identify the step in the tricarboxylic acid cycle that does not involve oxidation of the substrate:

- (1) Succinic acid → Malic acid
- (2) Succinyl-CoA → Succinic acid
- (3) Isocitrate → -ketoglutaric acid
- (4) Malic acid → Oxaloacetic acid

148. Spraying sugarcane crops with which plant growth regulator increases the length of stems, thereby enhancing yield?

- (1) Gibberellin
- (2) Cytokinin
- (3) Abscissic acid
- (4) Auxin

149. Match List I with List II:

List I

- A. Rose
- B. Pea
- C. Cotton
- D. Mango

List II

- I. Twisted aestivation
- II. Perigynous flower
- III. Drupe
- IV. Marginal placentation

Choose the correct answer from the options given below:

- (1) A-I, B-II, C-III, D-IV

- (2) A-IV, B-III, C-II, D-I
 (3) A-II, B-III, C-IV, D-I
 (4) A-II, B-IV, C-I, D-III

150. Which of the following statements is correct regarding the process of replication in E.coli?

- (1) The DNA-dependent RNA polymerase catalyzes polymerization in one direction, 5' → 3'.
 (2) The DNA-dependent DNA polymerase catalyzes polymerization in both 5' → 3' and 3' → 5' directions.
 (3) The DNA-dependent DNA polymerase catalyzes polymerization in the 5' → 3' direction.
 (4) The DNA-dependent DNA polymerase catalyzes polymerization in one direction, 3' → 5'.

151. Match List I with List II:

	List I		List II
A.	Pons	I.	Provides additional space for Neurons, regulates posture and balance.
B.	Hypothalamus	II.	Controls respiration and gastric secretions.
C.	Medulla	III.	Connects different regions of the brain.
D.	Cerebellum	IV.	Neuro secretory cells

Choose the correct answer from the options given below:

- (1) A-III, B-IV, C-II, D-I
 (2) A-I, B-III, C-II, D-IV
 (3) A-II, B-I, C-III, D-IV
 (4) A-II, B-III, C-I, D-IV

152. Which of the following is not a component of Fallopian tube?

- (1) Isthmus
 (2) Infundibulum
 (3) Ampulla
 (4) Uterine fundus

153. The “Ti plasmid” of *Agrobacterium tumefaciens* stands for:

- (1) Tumor independent plasmid
 - (2) Tumor inducing plasmid
 - (3) Temperature independent plasmid
 - (4) Tumor inhibiting plasmid
-

154. Match List I with List II:

	List I		List II
A.	Expiratory capacity	I.	Expiratory reserve volume + Tidal volume + Inspiratory reserve volume
B.	Functional residual capacity	II.	Tidal volume + Expiratory reserve volume
C.	Vital capacity	III.	Tidal volume + Inspiratory reserve volume
D.	Inspiratory capacity	IV.	Expiratory reserve volume + Residual volume

Choose the correct answer from the options given below:

- (1) A-III, B-II, C-IV, D-I
 - (2) A-II, B-I, C-IV, D-III
 - (3) A-I, B-III, C-II, D-IV
 - (4) A-II, B-IV, C-I, D-III
-

155. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: FSH acts upon ovarian follicles in females and Leydig cells in males.

Reason R: Growing ovarian follicles secrete estrogen in females while interstitial cells secrete androgen in male human beings.

Choose the correct answer from the options given below:

- (1) Both A and R are true but R is NOT the correct explanation of A
 - (2) A is true but R is false
 - (3) A is false but R is true
 - (4) Both A and R are true and R is the correct explanation of A
-

156. Match List I with List II:

	List-I		List-II
A.	Lipase	I.	Peptide bond
B.	Nuclease	II.	Ester bond
C.	Protease	III.	Glycosidic bond
D.	Amylase	IV.	Phosphodiester bond

Choose the correct answer from the options given below:

- (1) A-III, B-II, C-I, D-IV
 - (2) A-II, B-IV, C-I, D-III
 - (3) A-IV, B-I, C-III, D-II
 - (4) A-IV, B-II, C-III, D-I
-

157. Given below are some stages of human evolution. Arrange them in correct sequence (Past to Recent):

- A. Homo habilis
- B. Homo sapiens
- C. Homo neanderthalensis
- D. Homo erectus

Choose the correct sequence of human evolution from the options given below:

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

158. Which of the following are Autoimmune disorders?

- A. Myasthenia gravis
- B. Rheumatoid arthritis
- C. Gout
- D. Muscular dystrophy
- E. Systemic Lupus Erythematosus (SLE)

Choose the most appropriate answer from the options given below:

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

159. Match List I with List II:

List I

- A. Common cold
- B. Haemozoin
- C. Widal test
- D. Allergy

List II

- I. *Plasmodium*
- II. Typhoid
- III. Rhinoviruses
- IV. Dust mites

Choose the correct answer from the options given below:

- (1) A-I, B-III, C-II, D-IV
 - (2) A-III, B-I, C-II, D-IV
 - (3) A-IV, B-II, C-III, D-I
 - (4) A-II, B-IV, C-III, D-I
-

160. Match List I with List II:

List I

- A. Axoneme
- B. Cartwheel pattern
- C. Crista
- D. Satellite

List II

- I. Centriole
- II. Cilia and flagella
- III. Chromosome
- IV. Mitochondria

Choose the correct answer from the options given below:

- (1) A-IV, B-II, C-III, D-I
 - (2) A-II, B-IV, C-I, D-III
 - (3) A-II, B-I, C-IV, D-III
 - (4) A-IV, B-III, C-II, D-I
-

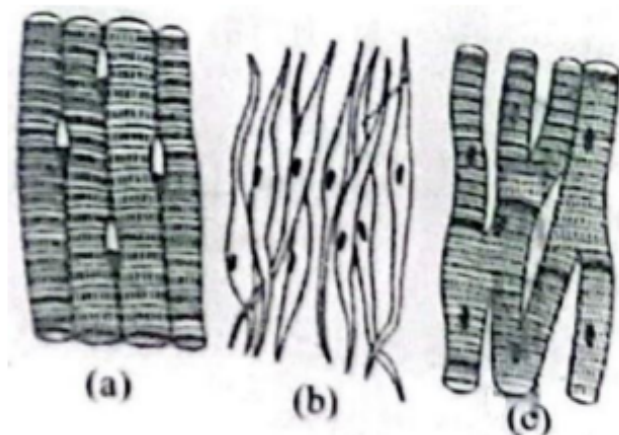
161. Match List I with List II:

	List I		List II
A.	Pleurobrachia	I.	Mollusca
B.	Radula	II.	Ctenophora
C.	Stomochord	III.	Osteichthyes
D.	Air bladder	IV.	Hemichordata

Choose the correct answer from the options given below:

- (1) A-II, B-I, C-IV, D-III
- (2) A-II, B-IV, C-I, D-III
- (3) A-IV, B-III, C-II, D-I
- (4) A-IV, B-II, C-III, D-I

162. Three types of muscles are given as a, b, and c. Identify the correct matching pair along with their location in the human body:



- (1) (a) Skeletal - Triceps
(b) Smooth – Stomach
(c) Cardiac – Heart
- (2) (a) Skeletal - Biceps
(b) Involuntary – Intestine
(c) Smooth – Heart
- (3) (a) Involuntary – Nose tip
(b) Skeletal – Bone

- (c) Cardiac – Heart
- (4) (a) Smooth - Toes
- (b) Skeletal – Legs
- (c) Cardiac – Heart

163. Match List I with List II:

	List I (Sub Phases of Prophase I)		List II (Specific Characters)
A.	Diakinesis	I.	Synaptonemal complex formation
B.	Pachytene	II.	Completion of terminalisation of chiasmata
C.	Zygotene	III.	Chromosomes look like thin threads
D.	Leptotene	IV.	Appearance of recombination nodules

Choose the correct answer from the options given below:

- (1) A-I, B-II, C-IV, D-III
- (2) A-II, B-IV, C-I, D-III
- (3) A-IV, B-III, C-II, D-I
- (4) A-IV, B-II, C-III, D-I

164.

	List I		List II
A.	Down's syndrome	I.	11 th chromosome
B.	α -Thalassemia	II.	'X' chromosome
C.	β -Thalassemia	III.	21 st chromosome
D.	Klinefelter's syndrome	IV.	16 th chromosome

Choose the correct answer from the options given below:

- (1) A-II, B-III, C-IV, D-I
- (2) A-III, B-IV, C-I, D-II
- (3) A-IV, B-I, C-II, D-III
- (4) A-I, B-II, C-III, D-IV

165. Which of the following statements is incorrect?

- (1) Most commonly used bio-reactors are of stirring type
- (2) Bio-reactors are used to produce small-scale bacterial cultures

- (3) Bio-reactors have an agitator system, an oxygen delivery system, and a foam control system
- (4) A bio-reactor provides optimal growth conditions for achieving the desired product
-

166. Match List I with List II:

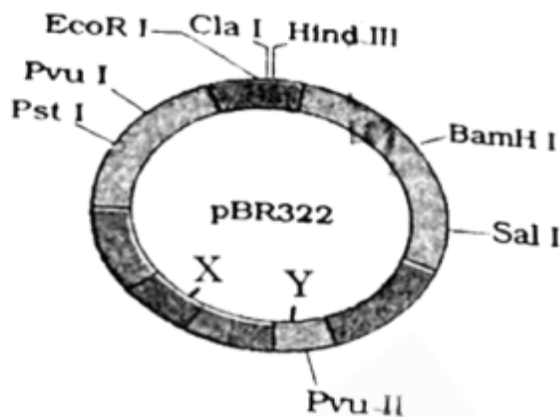
List I	List II
A. <i>Pterophyllum</i>	I. Hag fish
B. <i>Myxine</i>	II. Saw fish
C. <i>Pristis</i>	III. Angel fish
D. <i>Exocoetus</i>	IV. Flying fish

Choose the correct answer from the options given below:

- (1) A-III, B-I, C-II, D-IV
- (2) A-IV, B-I, C-II, D-III
- (3) A-III, B-II, C-I, D-IV
- (4) A-II, B-I, C-III, D-IV
-

167. The following diagram shows restriction sites in *E. coli* cloning vector pBR322.

Find the role of 'X' and 'Y' genes:



- (1) The gene 'X' is responsible for controlling the copy number of the linked DNA, and 'Y' for the protein involved in the replication of plasmid.
- (2) The gene 'X' is for the protein involved in the replication of plasmid, and 'Y' for resistance to antibiotics.
- (3) Gene 'X' is responsible for recognition sites, and 'Y' is responsible for antibiotic resistance.

(4) The gene 'X' is responsible for resistance to antibiotics, and 'Y' for the protein involved in the replication of plasmid.

168. Given below are two statements:

Statement I: The presence or absence of hymen is not a reliable indicator of virginity.

Statement II: The hymen is torn during the first coitus only.

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

- (1) Both Statement I and Statement II are false
 - (2) Statement I is true but Statement II is false
 - (3) Statement I is false but Statement II is true
 - (4) Both Statement I and Statement II are true
-

169. Consider the following statements:

- A. Annelids are true coelomates
- B. Poriferans are pseudocoelomates
- C. Aschelminthes are acoelomates
- D. Platyhelminthes are pseudocoelomates

Choose the correct answer from the options given below:

- (1) A only
 - (2) C only
 - (3) D only
 - (4) B only
-

170. Given below are two statements:

Statement I: In the nephron, the descending limb of the loop of Henle is impermeable to water and permeable to electrolytes.

Statement II: The proximal convoluted tubule is lined by simple columnar brush border epithelium, which increases the surface area for reabsorption.

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

- (1) Both Statement I and Statement II are false
- (2) Statement I is true but Statement II is false

- (3) Statement I is false but Statement II is true
(4) Both Statement I and Statement II are true
-

171. Following are the stages of cell division:

- A. Gap 2 phase
- B. Cytokinesis
- C. Synthesis phase
- D. Karyokinesis
- E. Gap 1 phase

Choose the correct sequence of stages from the options given below:

- (1) E-B-D-A-C
 - (2) B-D-E-A-C
 - (3) E-C-A-D-B
 - (4) C-E-D-A-B
-

172. In both sexes of cockroach, a pair of jointed filamentous structures called anal cerci are present on:

- (1) 10th segment
 - (2) 8th and 9th segment
 - (3) 11th segment
 - (4) 5th segment
-

173. Match List I with List II:

List I		List II	
A.	Fibrous joints	I.	Adjacent vertebrae, limited movement
B.	Cartilaginous joints	II.	Humerus and Pectoral girdle, rotational movement
C.	Hinge joints	III.	Skull, don't allow any movement
D.	Ball and socket joints	IV.	Knee, help in locomotion

Choose the correct answer from the options given below:

- (1) A-I, B-III, C-II, D-IV
- (2) A-II, B-III, C-I, D-IV
- (3) A-III, B-I, C-IV, D-II
- (4) A-IV, B-II, C-III, D-I

174. Which of the following is not a steroid hormone?

- (1) Testosterone
- (2) Progesterone
- (3) Glucagon
- (4) Cortisol

175. Following are the stages of pathway for conduction of an action potential through the heart:

- A. AV bundle
- B. Purkinje fibres
- C. AV node
- D. Bundle branches
- E. SA node

Choose the correct sequence of pathway from the options given below:

- (1) A-E-C-B-D
- (2) B-D-E-C-A
- (3) E-A-D-B-C
- (4) E-C-A-D-B

176. Match List I with List II:

	List I		List II
A.	Non-medicated IUD	I.	Multiload 375
B.	Copper releasing IUD	II.	Progestogens
C.	Hormone releasing IUD	III.	Lippes loop
D.	Implants	IV.	LNG-20

Choose the correct answer from the options given below:

- (1) A-I, B-III, C-IV, D-II
- (2) A-IV, B-I, C-II, D-III
- (3) A-III, B-I, C-IV, D-II
- (4) A-III, B-I, C-II, D-IV

177. Which of the following is not a natural/traditional contraceptive method?

- (1) Periodic abstinence
 - (2) Lactational amenorrhea
 - (3) Vaults
 - (4) Coitus interruptus
-

178. Which one is the correct product of DNA-dependent RNA polymerase for the given template?

3'TACATGGCAAATATCCATTCA5'

- (1) 5'AUGUAAAGUUUAUAGGUAAGU3'
 - (2) 5'AUGUACCGUUUAUAGGGAAGU3'
 - (3) 5'ATGTACCGTTTATAGGTAAGT3'
 - (4) 5'AUGUACCGUUUAUAGGUAAGU3'
-

179. Which one of the following factors will not affect the Hardy-Weinberg equilibrium?

- (1) Genetic drift
 - (2) Gene migration
 - (3) Constant gene pool
 - (4) Genetic recombination
-

180. Match List I with List II:

List I	List II
A. Cocaine	I. Effective sedative in surgery
B. Heroin	II. <i>Cannabis sativa</i>
C. Morphine	III. <i>Erythroxylum</i>
D. Marijuana	IV. <i>Papaver somniferum</i>

Choose the correct answer from the options given below:

- (1) A-I, B-III, C-II, D-IV
- (2) A-IV, B-I, C-III, D-II
- (3) A-III, B-IV, C-I, D-II

(4) A-II, B-IV, C-III, D-I

181. Match List I with List II:

	List I		List II
A.	Typhoid	I.	Fungus
B.	Leishmaniasis	II.	Nematode
C.	Ringworm	III.	Protozoa
D.	Filariasis	IV.	Bacteria

(1) A-I, B-II, C-III, D-IV

(2) A-II, B-III, C-IV, D-I

(3) A-IV, B-I, C-II, D-III

(4) A-III, B-IV, C-I, D-II

182. Match List I with List II:

List I	List II
A. α -I antitrypsin	I. Cotton bollworm
B. Cry IAb	II. ADA deficiency
C. Cry IAc	III. Emphysema
D. Enzyme replacement therapy	IV. Corn borer

(1) A-III, B-I, C-II, D-IV

(2) A-III, B-IV, C-I, D-II

(3) A-II, B-I, C-IV, D-III

(4) A-II, B-I, C-III, D-IV

183. Assertion-Reason Question:

Assertion (A): Breastfeeding during the initial period of infant growth is recommended by doctors for a healthy baby.

Reason (R): Colostrum contains several antibodies essential for developing resistance in the newborn baby.

- (1) Both A and R are correct but R is NOT the correct explanation of A
(2) A is correct but R is not correct
(3) A is not correct but R is correct
(4) Both A and R are correct and R is the correct explanation of A
-

184. The flippers of Penguins and Dolphins are examples of:

- (1) Natural selection
(2) Convergent evolution
(3) Divergent evolution
(4) Adaptive radiation
-

185. Which of the following factors favor the formation of oxyhemoglobin in alveoli?

- (1) High pO_2 and lesser H^+ concentration
(2) Low pCO_2 and high H^+ concentration
(3) Low pCO_2 and high temperature
(4) High pO_2 and high pCO_2
-

186. Match List I with List II:

	List I		List II
A.	Unicellular glandular epithelium	I.	Salivary glands
B.	Compound epithelium	II.	Pancreas
C.	Multicellular glandular epithelium	III.	Goblet cells of alimentary canal
D.	Endocrine glandular epithelium	IV.	Moist surface of buccal cavity

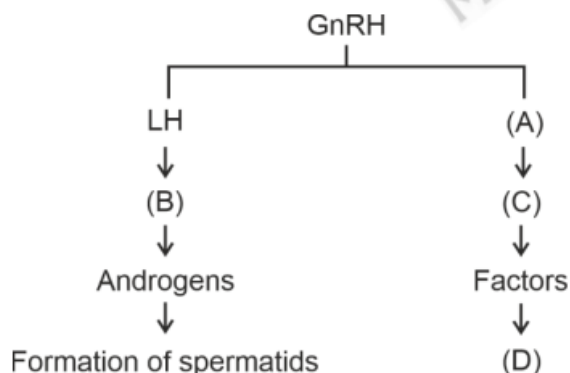
- (1) A-III, B-II, C-IV, D-I
(2) A-III, B-IV, C-I, D-II
(3) A-I, B-III, C-II, D-IV
(4) A-II, B-I, C-III, D-IV
-

187. Choose the correct statement regarding juxtamedullary nephrons:

- (1) Renal corpuscle of juxtamedullary nephron lies in the outer portion of the renal medulla.

- (2) Loop of Henle of juxtamedullary nephron runs deep into the medulla.
- (3) Juxtamedullary nephrons outnumber cortical nephrons.
- (4) Juxtamedullary nephrons are located in the columns of Bertini.

188. Identify the correct roles of components (A), (B), (C), and (D) in spermatogenesis:



- (1) ICSH, Interstitial cells, Leydig cells, spermiogenesis
- (2) FSH, Sertoli cells, Leydig cells, spermatogenesis
- (3) ICSH, Leydig cells, Sertoli cells, spermatogenesis
- (4) FSH, Leydig cells, Sertoli cells, spermiogenesis

189. Match List I with List II:

	List I		List II
A.	P wave	I.	Heart muscles are electrically silent.
B.	QRS complex	II.	Depolarisation of ventricles.
C.	T wave	III.	Depolarisation of atria.
D.	T-P gap	IV.	Repolarisation of ventricles.

- (1) A-I, B-II, C-III, D-IV
- (2) A-II, B-I, C-IV, D-III
- (3) A-III, B-II, C-IV, D-I
- (4) A-I, B-III, C-II, D-IV

190. Given below are two statements:

Statement I: Bone marrow is the main lymphoid organ where all blood cells, including lymphocytes, are produced.

Statement II: Both bone marrow and thymus provide microenvironments for the

development and maturation of T-lymphocytes.

- (1) Both Statement I and Statement II are false
 - (2) Statement I is true but Statement II is false
 - (3) Statement I is false but Statement II is true
 - (4) Both Statement I and Statement II are true
-

191. Given below are two statements:

Statement I: Gause's competitive exclusion principle states that two closely related species competing for different resources cannot exist indefinitely.

Statement II: According to Gause's principle, during competition, the inferior will be eliminated. This may be true if resources are limiting.

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

- (1) Both Statement I and Statement II are false
 - (2) Statement I is true but Statement II is false
 - (3) Statement I is false but Statement II is true
 - (4) Both Statement I and Statement II are true
-

192. Match List I with List II:

	List I		List II
A.	Exophthalmic goiter	I.	Excess secretion of cortisol, moon face & hyperglycemia.
B.	Acromegaly	II.	Hypo-secretion of thyroid hormone and stunted growth.
C.	Cushing's syndrome	III.	Hyper secretion of thyroid hormone & protruding eye balls.
D.	Cretinism	IV.	Excessive secretion of growth hormone.

- (1) A-IV, B-II, C-I, D-III
 - (2) A-III, B-IV, C-II, D-I
 - (3) A-III, B-IV, C-I, D-II
 - (4) A-I, B-III, C-II, D-IV
-

193. Match List I with List II related to the digestive system of cockroach:

	List I		List II
A.	The structures used for storing of food	I.	Gizzard
B.	Ring of 6-8 blind tubules at junction of foregut and midgut.	II.	Gastric Caeca
C.	Ring of 100-150 yellow coloured thin filaments at junction of midgut and hindgut.	III.	Malpighian tubules
D.	The structures used for grinding the food.	IV.	Crop

- (1) A-I, B-IV, C-II, D-III
(2) A-II, B-I, C-IV, D-III
(3) A-IV, B-II, C-III, D-I
(4) A-I, B-III, C-IV, D-II

194. As per ABO blood grouping system, the blood group of father is B+, mother is A+, and child is O+. Their respective genotype can be:

- (1) B only
(2) C & B only
(3) D & E only
(4) A only

195. Match List I with List II:

	List I		List II
A.	RNA polymerase III	I.	snRNPs
B.	Termination of transcription	II.	Promotor
C.	Splicing of Exons	III.	Rho factor
D.	TATA box	IV.	SnRNAs, tRNA

- (1) A-III, B-II, C-IV, D-I
(2) A-III, B-IV, C-I, D-II
(3) A-IV, B-III, C-I, D-II
(4) A-II, B-IV, C-I, D-III

196. Match List I with List II:

	List I		List II
A.	Mesozoic Era	I.	Lower invertebrates
B.	Proterozoic Era	II.	Fish & Amphibia
C.	Cenozoic Era	III.	Birds & Reptiles
D.	Paleozoic Era	IV.	Mammals

- (1) A-III, B-I, C-II, D-IV
- (2) A-I, B-II, C-IV, D-III
- (3) A-III, B-I, C-IV, D-II
- (4) A-II, B-I, C-III, D-IV

197. Given below are two statements:

Statement I: The cerebral hemispheres are connected by a nerve tract known as the corpus callosum.

Statement II: The brain stem consists of the medulla oblongata, pons, and cerebrum.

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

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

198. Regarding the catalytic cycle of an enzyme action, select the correct sequential steps:

- A. Substrate-enzyme complex formation.
- B. Free enzyme ready to bind with another substrate.
- C. Release of products.
- D. Chemical bonds of the substrate broken.
- E. Substrate binding to active site.

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

199. Given below are two statements:

Statement I: Mitochondria and chloroplasts are both double-membrane bound organelles.

Statement II: The inner membrane of mitochondria is relatively less permeable compared to chloroplasts.

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

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

200. The following are the statements about non-chordates:

- A. Pharynx is perforated by gill slits.
- B. Notochord is absent.
- C. Central nervous system is dorsal.
- D. Heart is dorsal if present.
- E. Post-anal tail is absent.

Choose the most appropriate answer from the options given below:

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