NEET 2024 Question Paper Set R3

Time Allowed :3 Hours 20 min	**Maximum Marks :**720	**Total Questions :**200

General Instructions

Read the following instructions very carefully and strictly follow them:

1. The test is of 3 hours 20 minutes duration and the Test Booklet contains 200 multiple-choice questions (four options with a single correct answer) from Physics, Chemistry and Biology (Botany and Zoology). 50 questions in each subject are divided into two Sections (A and B) as per details given below:
(a) **Section-A** shall consist of 35 (Thirty-five) Questions in each subject (Question Nos-1 to 35, 51 to 85, 101 to 135 and 151 to 185). All Questions are compulsory.
(b) **Section-B** shall consist of 15 (Fifteen) questions in each subject (Question Nos- 36 to 50, 86 to 100, 136 to 150 and 186 to 200).
In Section B, a candidate needs to attempt any 10 (Ten) questions out of 15 (Fifteen) in each subject.
2. Candidates are advised to read all 15 questions in each subject of Section B before they start attempting the question paper. In the event of a candidate attempting more than ten questions, the first ten questions answered by the candidate shall be evaluated.
3. Each question carries 4 marks. For each correct response, the candidate will get 4 marks. For each incorrect response, one mark will be deducted from the total scores. The maximum marks are 720.
4. Use Blue / Black Ball Point Pen only for writing particulars on this page / marking responses on Answer Sheet.
5. Rough work is to be done in the space provided for this purpose in the Test Booklet only.
6. The CODE for this Booklet is R4. Make sure that the CODE printed on the Original Copy of the Answer Sheet is the same as that on this Test Booklet.

Physics

Section A

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

(1) 5

(2) 7

(3) 6

(4) 10

---

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

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

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

(3) All bright fringes will be of equal width

(4) Interference pattern will disappear

---

3. The nuclear reaction given below:

$$^{290}_{82}X \xrightarrow{\alpha} Y \xrightarrow{e^+} Z \xrightarrow{\beta^-} P \xrightarrow{e^-} Q$$

The mass number and atomic number of the product Q respectively, are:

(1) 286, 80

(2) 288, 82

(3) 286, 81

(4) 280, 81

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4. Match List-I with List-II:

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

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

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

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

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

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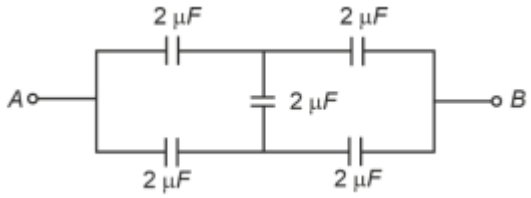
5. In the following circuit, the equivalent capacitance between terminal A and terminal B is:



(1) $1\,\mu F$

(2) $0.5\,\mu F$

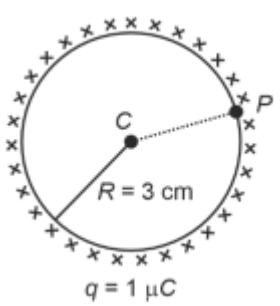
(3) $4\,\mu F$

(4) $2\,\mu F$

---

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

(Take $\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9$ SI units)



(1) 1×10^5

(2) 0.5×10^5

(3) Zero

(4) 3×10^5

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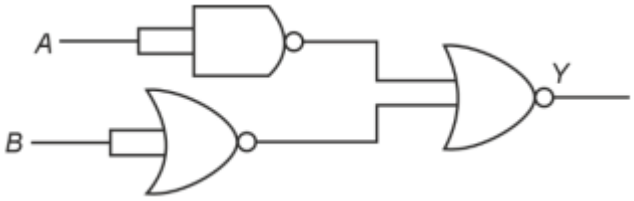
7. The output (Y) of the given logic gate is similar to the output of an/a:



(1) NOR gate

(2) OR gate

(3) AND gate

(4) NAND gate

---

8. An unpolarized 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.

---

9. A tightly wound 100 turns coil of radius 10 cm carries a current of 7 A. The magnitude of the magnetic field at the centre of the coil is (Take permeability of free space as $4\pi \times 10^{-7}$ SI units):

(1) 4.4 T

(2) 4.4 mT

(3) 44 T

(4) 44 mT

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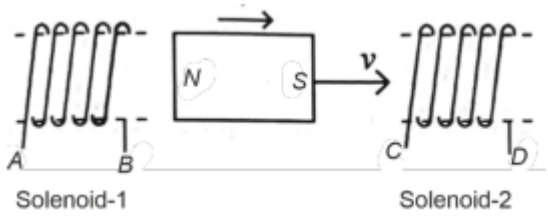
10. In the above diagram, a strong bar magnet is moving towards solenoid-2 from solenoid-1. The direction of induced current in solenoid-1 and that in solenoid-2, respectively, are through the directions:



(1) BA and CD

(2) AB and CD

(3) BA and DC

(4) AB and DC

---

11. Two bodies A and B of same mass undergo completely inelastic one-dimensional collision. The body A moves with velocity v_1 while body B is at rest before collision. The velocity of the system after collision is v_2. The ratio $v_1 : v_2$ is:

(1) 2 : 1

(2) 4 : 1

(3) 1 : 4

(4) 1 : 2

---

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

Assertion A: The potential (V) at any axial point, at 2 m distance (r) from the centre of the dipole of dipole moment vector P of magnitude, 4×10^{-6} C m, is $\pm 9 \times 10^3$ V. (Take $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9$ SI units.)

Reason R:

$V = \dfrac{P}{4\pi\epsilon_0 r^2}$, where r is the distance of any axial point, situated at 2 m from the centre of the dipole.

(1) Both A and R are true and 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.

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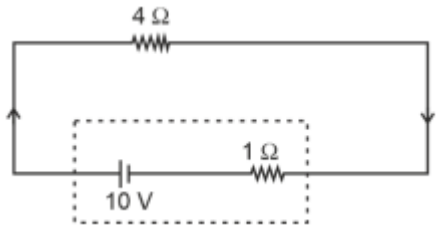
13. The terminal voltage of the battery, whose emf is 10 V and internal resistance 1 Ω, when connected through an external resistance of 4 Ω as shown in the figure is:



(1) 6 V

(2) 8 V

(3) 10 V

(4) 4 V

---

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

(1) Constant acceleration

(2) Constant velocity but varying acceleration

(3) Varying velocity and varying acceleration

(4) Constant velocity

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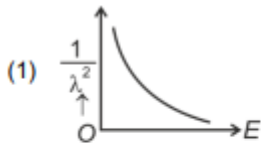
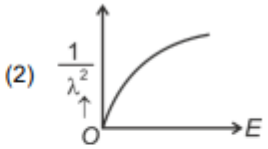
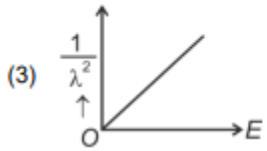
15. The graph which shows the variation of $\frac{1}{\lambda^2}$ and kinetic energy, E, is (where λ is the de Broglie wavelength of a free particle):

(1) 

(2) 

(3) 

(4) 

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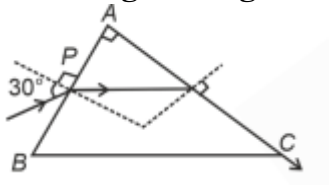
16. A light ray enters through a right-angled prism at point P with an angle of incidence 30° as shown in the figure. It travels through the prism parallel to its base BC and emerges along the face AC. The refractive index of the prism is:



(1) $\frac{5}{2}$

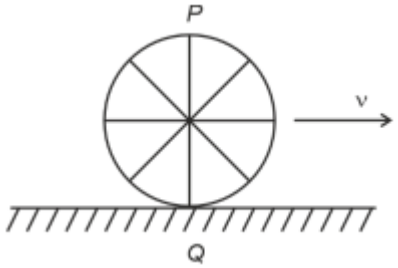
(2) $\frac{3}{4}$

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

(4) $\frac{5}{4}$

---

17. 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)?



(1) Point P moves faster than point Q

(2) Both the points P and Q move with equal speed

(3) Point P has zero speed

(4) Point P moves slower than point Q

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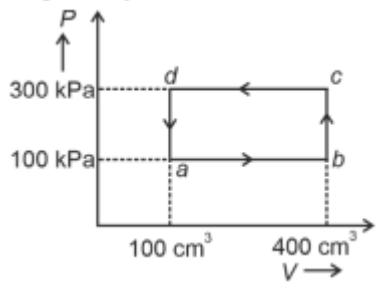
18. A thermodynamic system is taken through the cycle abcda. The work done by the gas along the path bc is:



(1) 30 J

(2) –90 J

(3) –60 J

(4) Zero

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19. In an ideal transformer, the turns ratio is $\frac{N_P}{N_S} = 2$. The ratio $V_S : V_P$ is equal to (the symbols carry their usual meaning):

(1) 2 : 1

(2) 1 : 1

(3) 1 : 4

(4) 1 : 2

---

20. 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:

(1) 198 N

(2) 1.98 mN

(3) 99 N

(4) 19.8 mN

---

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

(1) 0.4 mm

(2) 40 mm

(3) 8 mm

(4) 4 mm

---

22. The mass of a planet is $\frac{1}{10}$ that of the earth and its diameter is half that of the earth. The acceleration due to gravity on that planet is:

(1) 9.8 m/s^2

(2) 4.9 m/s^2

(3) 3.92 m/s^2

(4) 19.6 m/s^2

---

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

(1) $\frac{1}{100(N+1)}$

(2) $\frac{100}{N}$

(3) $10(N+1)$

(4) $\frac{1}{10N}$

---

24. Given below are two statements:

Statement I: Atoms are electrically neutral as they contain equal number 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 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

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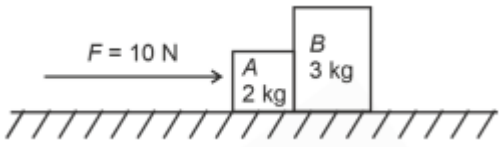
25. A horizontal force 10 N is applied to a block A as shown in the figure. The mass of blocks A and B are 2 kg and 3 kg respectively. The blocks slide over a frictionless surface. The force exerted by block A on block B is:



(1) 4 N

(2) 6 N

(3) 10 N

(4) Zero

---

26. The quantities which have the same dimensions as those of solid angle are:

(1) Stress and angle

(2) Strain and arc

(3) Angular speed and stress

(4) Strain and angle

---

27. 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 400 g rod is nearly:

(1) 17.5 cm

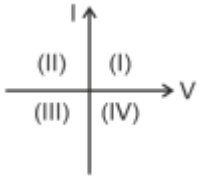
(2) 20.7 cm

(3) 72.0 cm

(4) 8.5 cm

---

28. Consider the following statements A and B and identify the correct answer:



A. For a solar-cell, the I-V characteristics lies 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.

Choose the correct answer from the options given below:

(1) A is incorrect but B is correct

(2) Both A and B are correct

(3) Both A and B are incorrect

(4) A is correct but B is incorrect

---

29. 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:

(1) 52 Ω

(2) 55 Ω

(3) 60 Ω

(4) 26 Ω

---

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

(1) 5 m, 2 s

(2) 5 cm, 1 s

(3) 5 m, 1 s

(4) 5 cm, 2 s

---

31. If c is the velocity of light in free space, the correct statements about photon among the following 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.

Choose the correct answer from the options given below:

(1) A, B, C and D only

(2) A, C and D only

(3) A, B, D and E only

(4) A and B only

---

32. Match List I with List II.

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

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

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

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

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

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

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

The expression for the output Y is:

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

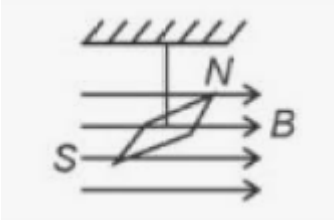
(2) $\bar{B}$

(3) B

(4) $\bar{A}B + AB$

---

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



(1) $128\pi^2$

(2) $50\pi^2$

(3) $1280\pi^2$

(4) $5\pi^2$

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35. A bob is whirled in a horizontal plane by means of a string with an initial speed of ω rpm. The tension in the string is T. If speed becomes 2ω while keeping the same radius, the tension in the string becomes:

(1) $4T$

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

(3) $2T$

(4) T

Section B

36. A metallic bar of Young's modulus, 0.5×10^{11} N m^{-2} and coefficient of linear thermal expansion 10^{-5} °C^{-1}, length 1 m and area of cross-section 10^{-3} m^2 is heated from $0°C$ to $100°C$ without expansion or bending. The compressive force developed in it is:

(1) 50×10^3 N

(2) 100×10^3 N

(3) 2×10^3 N

(4) 5×10^3 N

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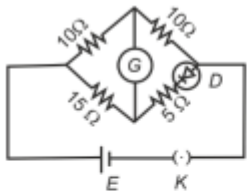
37. Choose the correct circuit which can achieve the bridge balance.

(1)



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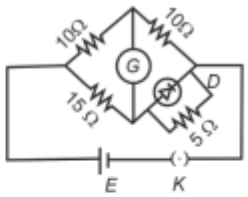

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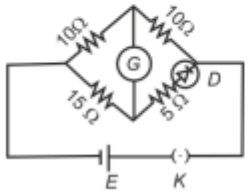
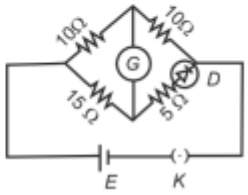


(4)



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38. A small telescope has an objective of focal length 140 cm and an eye piece of focal length 5.0 cm. The magnifying power of telescope for viewing a distant object is:

(1) 28

(2) 17

(3) 32

(4) 34

---

39. An iron bar of length L has magnetic moment M. It is bent at the middle of its length such that the two arms make an angle $60°$ with each other. The magnetic moment of this new magnet is:

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

(2) $2M$

(3) $\frac{M}{\sqrt{3}}$

(4) M

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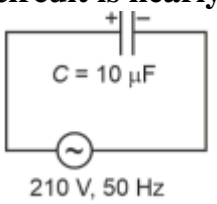
40. A 10 μF capacitor is connected to a 210 V, 50 Hz source. The peak current in the circuit is nearly ($\pi = 3.14$):



(1) 0.93 A

(2) 1.20 A

(3) 0.35 A

(4) 0.58 A

---

41. Two heaters A and B have power rating of 1 kW and 2 kW, respectively. Those two are first connected in series and then in parallel to a fixed power source. The ratio of power outputs for these two cases is:

(1) 2 : 9

(2) 1 : 2

(3) 2 : 3

(4) 1 : 1

---

42. If the mass of the bob in a simple pendulum is increased to thrice its original mass and its length is made half its original length, then the new time period of oscillation is $\frac{2}{x}$ times its original time period. Then the value of x is:

(1) 2

(2) $2\sqrt{3}$

(3) 4

(4) 3

---

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

(1) The energy density in the electric field is equal to the energy density in the magnetic field

(2) They travel with a speed equal to $\frac{1}{\sqrt{\mu_0 \epsilon_0}}$

(3) They originate from charges moving with uniform speed

(4) They are transverse in nature

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44. A sheet is placed on a horizontal surface in front of a strong 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

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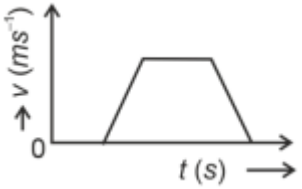
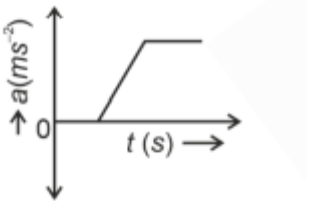
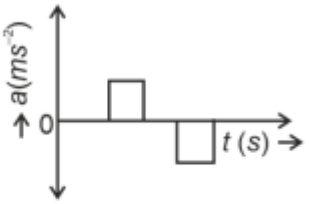
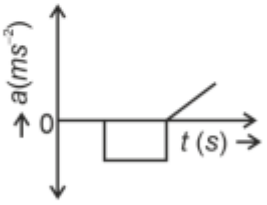
45. The velocity (v) – time (t) plot of the motion of a body is shown below.

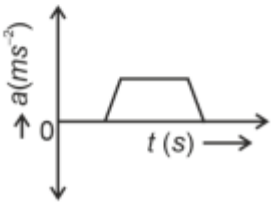


The acceleration (a) – time (t) graph that best suits this motion is:

(1) 

(2) 

(3) 

(4) 

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46. A parallel plate capacitor is charged by connecting it to a battery through a resistor. If I is the current in the circuit, then in the gap between the plates:

(1) Displacement current of magnitude equal to I flows in the same direction as I

(2) Displacement current of magnitude equal to I flows in a direction opposite to that of I

(3) Displacement current of magnitude greater than I flows but can be in any direction

(4) There is no current

---

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

(1) $\alpha t/\beta$

(2) $\alpha\beta t$

(3) $t/\alpha\beta$

(4) $\beta t/\alpha$

---

48. If the plates of a parallel plate capacitor connected to a battery are moved close to

each other, then:

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

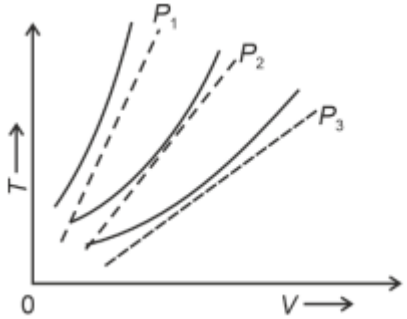
(2) B, D and E only

(3) A, B and C only

(4) A, B and E only

---

49. 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 those of Charles's law represented as dotted lines.



Then the correct relation is:

(1) $P_1 > P_3 > P_2$

(2) $P_2 > P_1 > P_3$

(3) $P_1 > P_2 > P_3$

(4) $P_3 > P_2 > P_1$

---

50. The minimum energy required to launch a satellite of mass m from the surface of the Earth (of mass M and radius R) into a circular orbit at an altitude of $2R$ from the surface of the Earth is:

(1) $\frac{2}{3}\frac{GmM}{R}$

(2) $\frac{2GmM}{R}$

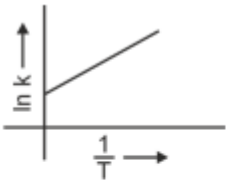
(3) $\frac{3GmM}{R}$

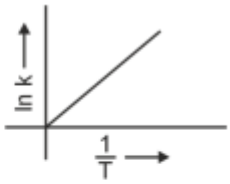
(4) $\frac{5}{6}\frac{GmM}{R}$

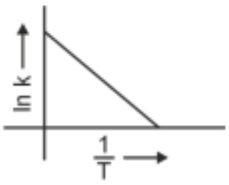
Chemistry

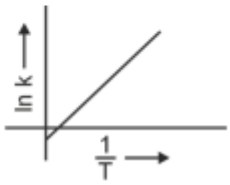
Section A

51. The most stable carbocation among the following is:

(1) 

(2) 

(3) 

(4) 

---

52. For the reaction $2A \rightleftharpoons B + C$, $K_C = 4 \times 10^{-3}$. At a given time, the composition of the reaction mixture is:

$$[A] = [B] = [C] = 2 \times 10^{-3} M$$

Then, 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.

---

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

A. Ti^{3+}

B. Cr^{2+}

C. Mn^{2+}

D. Fe^{2+}

E. Sc^{3+}

Choose the most appropriate answer from the options given below.

(1) A and E only

(2) B and C only

(3) A and D only

(4) B and D only

---

54. 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) $-x$

---

55. Which reaction is NOT a redox reaction?

(1) $2KClO_3 + I_2 \rightarrow 2KIO_3 + Cl_2$

(2) $H_2 + Cl_2 \rightarrow 2HCl$

(3) $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$

(4) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

---

56. 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
B. Ethene	II. One σ-bond and one π-bond
C. Carbon molecule, C_2	III. Two π-bonds
D. Ethyne	IV. One σ-bond and two π-bonds

Choose the correct answer from the options given below:

(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

---

57. Match List I with List II.

List I (Complex)	List II (Type of isomerism)
A. $[Co(NH_3)_5(NO_2)]Cl_2$	I. Linkage isomerism
B. $[Co(NH_3)_5(SO_4)]Br$	II. Ionization isomerism
C. $[Co(NH_3)_6][Cr(CN)_6]$	III. Coordination isomerism
D. $[Co(H_2O)_6]Cl_3$	IV. Solvate isomerism

---

58. The E° value for the Mn^{3+}/Mn^{2+} couple is more positive than that of Cr^{3+}/Cr^{2+} or Fe^{3+}/Fe^{2+} due to change of

(1) d^5 to d^2 configuration

(2) d^4 to d^5 configuration

(3) d^3 to d^5 configuration

(4) d^5 to d^4 configuration

---

59. The highest number of helium atoms is in

(1) 4 u of helium

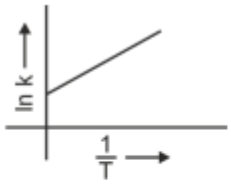
(2) 4 g of helium

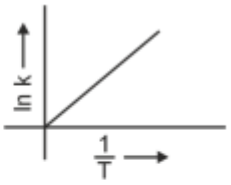
(3) 2.271098 L of helium at STP

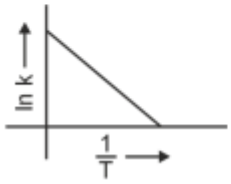
(4) 4 mol of helium

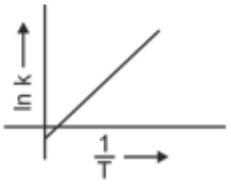
---

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

(1) 

(2) 

(3) 

(4) 

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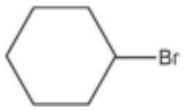
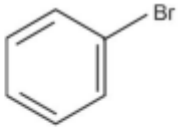
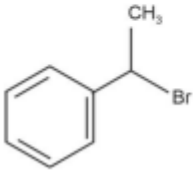
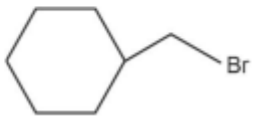
61. The compound that will undergo SN1 reaction with the fastest rate is

(1) 

(2) 

(3) 

(4) 

---

62. Match List I with List II (Quantum Number and Information Provided)

List I (Quantum Number)	List II (Information Provided)
$A.m_l$	$I.Shapeoforbital$
$B.m_s$	$I.Sizeoforbital$
$C.l$	$III.Orientationoforbital$
$D.n$	$IV.Orientationofspinofelectron I$

Choose the correct answer from the options given below :

(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

---

63. 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

---

64. 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. $2NaHCO_3(s) \rightarrow Na_2CO_3(s) + CO_2(g) + H_2O(g)$

D. $Cl_2(g) \rightarrow 2Cl(g)$

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

---

65. Given below are two statements:

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

Statement II: Aniline cannot be prepared through Gabriel synthesis.

(1) Both statements are false

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

(3) Statement I is incorrect but Statement II is true

(4) Both statements are true

---

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. 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

---

68. 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

---

69. 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

---

70. 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

---

71. Given below are two statements:

Statement I: The boiling point of three isomeric pentanes follows the order

$$n\text{-pentane} > \text{isopentane} > \text{neopentane}$$

Statement II: When branching increases, the molecule attains a shape of a sphere. This results in a smaller surface area for contact, reducing intermolecular forces and lowering the boiling point.

(1) Both statements are incorrect

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

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

(4) Both statements are correct

---

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

(1) $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$

(2) $CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g)$

(3) $BrCl(g) \rightleftharpoons Br_2(g) + Cl_2(g)$

(4) $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$

---

73. 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. NH2OH

E. NaHSO3

(1) A and D

(2) B and E

(3) E and D

(4) B and C

---

74. Match List I with List II.

List I (Compound)	**List II (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-III, C-IV, D-I

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

---

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

(1) Se

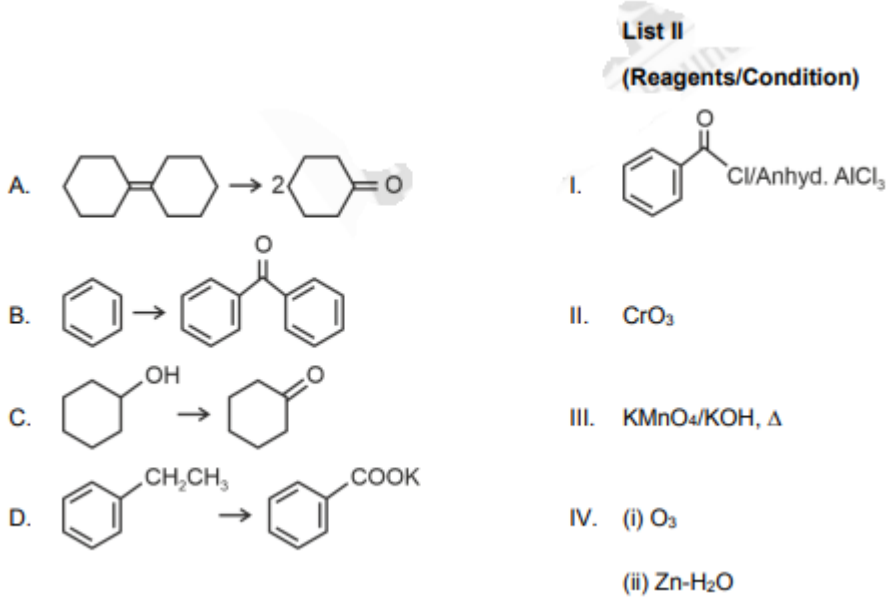
(2) Te

(3) Po

(4) O

---

76. Match List I with List II.



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

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

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

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

---

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

N, O, F, C, Si

Choose the correct answer from the options given below:

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

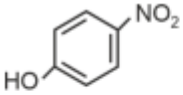
(2) O < F < N < C < Si

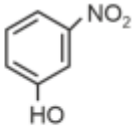
(3) F < O < N < C < Si

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

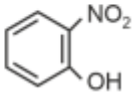
---

78. Intramolecular hydrogen bonding is present in:

(1) 

(2) 

(3) HF

(4) 

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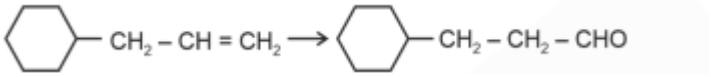
79. Identify the correct reagents that would bring about the following transformation.



(1) (i) BH_3

(ii) H_2O_2/OH^-

(iii) PCC

(2) (i) BH_3

(ii) H_2O_2/OH^-

(iii) alk. $KMnO_4$

(iv) H_3O^+

(3) (i) H_2O/H^+

(ii) PCC

(4) (i) H_2O/H^+

(ii) CrO_3

---

80. 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. $5F$

Choose the correct answer from the options given below:

(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

---

81. Given below are two statements:

Statement I: The boiling point of hydrides of Group 16 elements follow the order:

$$H_2O > H_2Te > H_2Se > H_2S.$$

Statement II: On the basis of molecular mass, H_2O is expected to have a lower boiling point than the other members of the group, but due to the presence of extensive hydrogen bonding in H_2O, it has a higher boiling point.

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

---

82. 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 from the options given below:

(1) Both Statement I and Statement II are false

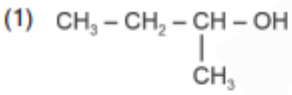
(2) Statement I is true but Statement II is false

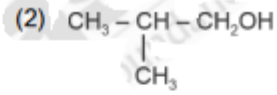
(3) Statement I is false but Statement II is true

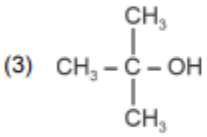
(4) Both Statement I and Statement II are true

---

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

(1) 

(2) 

(3) 

(4) $CH_3 - CH_2 - CH_2 - CH_2OH$

---

84. 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

---

85. On heating, some solid substances change from solid to vapour state without passing through the liquid state. The technique used for the purification of such solid substances based on the above principle is known as:

(1) Sublimation

(2) Distillation

(3) Chromatography

(4) Crystallization

Section B

86. The products A and B obtained in the following reactions, respectively, are

$$3ROH + PCl_3 \rightarrow 3RCl + A$$

$$ROH + PCl_5 \rightarrow RCl + HCl + B$$

(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

---

87. Mass in grams of copper deposited by passing 9.6487 A current through a voltmeter containing 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

---

88. Consider the following reaction in a sealed vessel at equilibrium with concentrations of N_2 = 3.0 $\times$ 10^{-3} M, O_2 = 4.2 $\times$ 10^{-3} M, and NO = 2.8 $\times$ 10^{-3} M.

$$2NO(g) \leftrightarrow N_2(g) + O_2(g)$$

If 0.1 mol/L of NO(g) 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) 0.00889

---

89. Given below are two statements:

Statement I: $[Co(NH_3)_6]^{3+}$ is a homoleptic complex whereas $[Co(NH_3)_4Cl_2]^{+}$ is a heteroleptic complex.

Statement II: Complex $[Co(NH_3)_6]^{3+}$ has only one kind of ligands but $[Co(NH_3)_4Cl_2]^{+}$ has more than one kind of ligands.

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

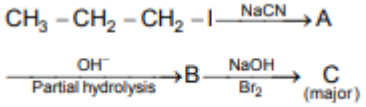
(2) Statement I is true but Statement II is false

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

(4) Both Statement I and Statement II are true

---

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



(1) Butylamine

(2) Butanamide

(3) α–Bromobutanoic acid

(4) Propylamine

---

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

(1) Ce^{3+} and Eu^{2+}

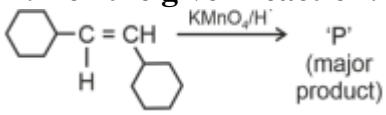
(2) Gd^{3+} and Eu^{3+}

(3) Pm^{3+} and Sm^{3+}

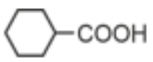
(4) Ce^{4+} and Yb^{2+}

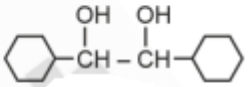
---

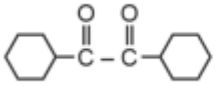
92. For the given reaction:

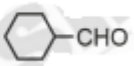


'P' is

(1) 

(2) 

(3) 

(4) 

---

93. A compound X contains 32% of A, 20% of B, and the remaining percentage of C. Then, the empirical formula of X is: (Given atomic masses of A = 64; B = 40; C = 32 u)

(1) ABC_3

(2) AB_2C_2

(3) ABC_4

(4) A_2BC_2

---

94. Given below are certain cations. Using inorganic qualitative analysis, 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 options given below:

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

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

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

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

---

95. The work done during reversible isothermal expansion of one mole of hydrogen gas at 25°C from a pressure of 20 atmosphere to 10 atmosphere is (Given $R = 2.0$ cal K^{-1} mol^{-1})

(1) –413.14 calories

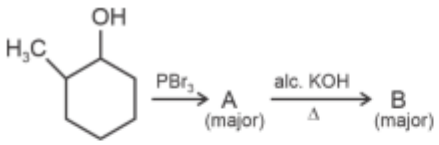
(2) 413.14 calories

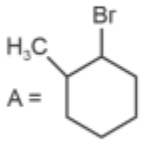
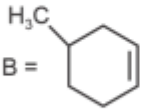
(3) 100 calories

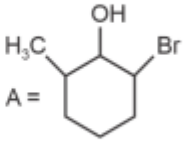
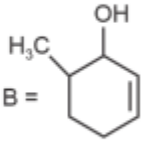
(4) 0 calorie

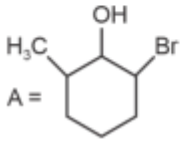
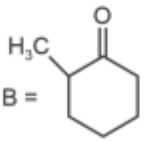
---

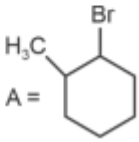
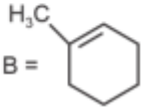
96. Major products A and B formed in the following reaction sequence, are:



(1) A =  ; B = 

(2) A =  ; B = 

(3) A =  ; B = 

(4) A =  ; B = 

---

97. The rate of a reaction quadruples when the temperature changes from 27°C to 57°C. Calculate the energy of activation.

(Given $R = 8.314$ **J K**$^{-1}$ **mol**$^{-1}$**,** $\log 4 = 0.6021$**)**

(1) 380.4 kJ/mol

(2) 3.80 kJ/mol

(3) 3804 kJ/mol

(4) 38.04 kJ/mol

---

98. During the preparation of Mohr's salt solution (Ferrous ammonium sulphate), which of the following acids is added to prevent hydrolysis of Fe^{2+} **ion?**

(1) Concentrated sulphuric acid

(2) Dilute nitric acid

(3) Dilute sulphuric acid

(4) Dilute hydrochloric acid

---

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

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

(1) 310°C

(2) 25.73°C

(3) 12.05°C

(4) 37°C

100. Identify the correct answer.

(1) BF_3 has a 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

Botany

Section A

101. A transcription unit in DNA is defined primarily by the three regions in DNA and these are with respect to upstream and downstream end;

(1) Structural gene, Transposons, Operator gene

(2) Inducer, Repressor, Structural gene

(3) Promotor, Structural gene, Terminator

(4) Repressor, Operator gene, Structural gene

---

102. 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 of 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

---

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

(1) Phospholipids

(2) Glycerides

(3) Carbohydrates

(4) Amino acids

---

104. 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 answer from the options given below:

(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

---

105. Match List I with List II

List I	List II
A. Clostridium butylicum	I. Ethanol
B. Saccharomyces cerevisiae	II. Streptokinase
C. Trichoderma polysporum	III. Butyric acid
D. Streptococcus sp.	IV. Cyclosporin-A

Choose the correct answer from the options given below:

(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

---

106. Match List I with List II

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

Choose the correct answer from the options given below:

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

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

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

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

---

107. 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

---

108. List of endangered species was released by

(1) WWF

(2) FOAM

(3) IUCN

(4) GEAC

---

109. How many molecules of ATP and NADPH are required for every molecule of CO_2 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

---

110. 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

---

111. 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

---

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

(1) Mode of nutrition

(2) Mode of spore formation

(3) Fruiting body

(4) Morphology of mycelium

---

113. Tropical regions show the 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

---

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

(1) Cassia

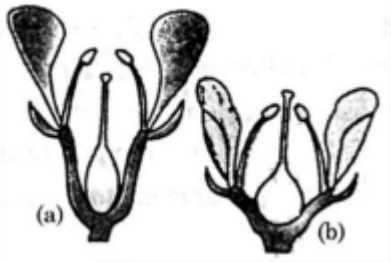
(2) Pisum

(3) Sesbania

(4) Datura

---

115. 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

---

116. Match List I with List II

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

Choose the correct answer from the options given below:

(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

117. What is the fate of a piece of DNA carrying only 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 chromosome.

E. It shows 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

---

118. 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

---

119. The cofactor of the enzyme carboxypeptidase is:

(1) Niacin

(2) Flavin

(3) Haem

(4) Zinc

---

120. 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

---

121. The type of conservation in which the threatened species are taken out from their natural habitat and placed in special settings 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

---

122. 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

Choose the correct answer from the options given below:

(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

---

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

(1) Redifferentiation

(2) Dedifferentiation

(3) Maturation

(4) Differentiation

---

124. Spindle fibers attach to kinetochores of chromosomes during:

(1) Metaphase

(2) Anaphase

(3) Telophase

(4) Prophase

---

125. 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

---

126. 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

---

127. Inhibition of Succinic dehydrogenase enzyme by malonate is a classical example of:

(1) Feedback inhibition

(2) Competitive inhibition

(3) Enzyme activation

(4) Cofactor inhibition

---

128. Given below are two statements: Statement I: Bt toxins are insect group specific

and coded by a 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 active form due to acidic pH of the insect gut.

Choose the correct answer from the options given below:

(1) Both Statement I and Statement II are false

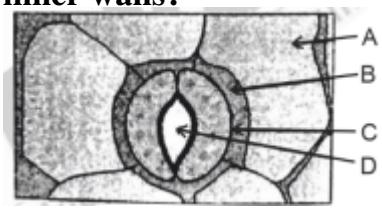
(2) Statement I is true but Statement II is false

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

(4) Both Statement I and Statement II are true

---

129. In the given figure, which component has thin outer walls and highly thickened inner walls?



(1) D

(2) A

(3) B

(4) C

---

130. 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 F2 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

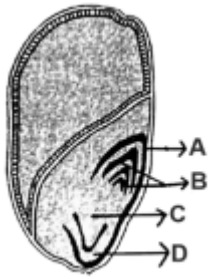
(2) B, C and D only

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

(4) A, B and C only

---

131. 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

---

132. 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.

---

133. 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

---

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

(1) Micropropagation

(2) Differentiation

(3) Somatic hybridization

(4) Totipotency

---

135. Given below are two statements:

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

Statement II: Gymnosperms lack xylem vessels but the presence of xylem vessels is a 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

Section B

136. Spraying sugarcane crop with which of the following plant growth regulators, increases the length of stem, thus, increasing the yield?

(1) Gibberellin

(2) Cytokinin

(3) Abscisic acid

(4) Auxin

---

137. 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.

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

---

138. Match List-I with List-II

List-I	Description	List-II	Category
A.	GLUT-4	I.	Hormone
B.	Insulin	II.	Enzyme
C.	Trypsin	III.	Intercellular ground substance
D.	Collagen	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

---

139. 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

---

140. Which of the following statement is correct regarding the process of replication in E.coli?

(1) The DNA dependent RNA polymerase catalyses polymerization in one direction, that is 5' $\rightarrow$ 3'

(2) The DNA dependent DNA polymerase catalyses polymerization in 5' $\rightarrow$ 3' as well as 3' $\rightarrow$ 5' direction

(3) The DNA dependent DNA polymerase catalyses polymerization in 5' $\rightarrow$ 3' direction

(4) The DNA dependent DNA polymerase catalyses polymerization in one direction that is 3' $\rightarrow$ 5'

---

141. Identify the step in tricarboxylic acid cycle, which does not involve oxidation of substrate.

(1) Succinic acid $\rightarrow$ Malic acid

(2) Succinyl-CoA $\rightarrow$ Succinic acid

(3) Isocitrate $\rightarrow$ -ketoglutaric acid

(4) Malic acid $\rightarrow$ Oxaloacetic acid

---

142. 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 outdoor 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

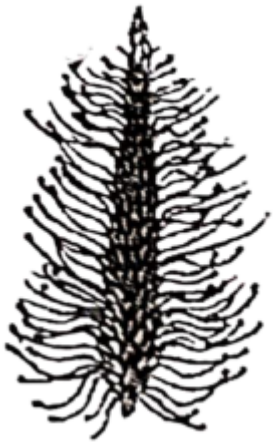
(2) A-I, B-III, C-II, D-IV

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

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

---

143. 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.

---

144. In an ecosystem if the Net Primary Productivity (NPP) of 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) $10x$ kcal m^{-2} yr^{-1}

(2) $100x$ kcal m^{-2} yr^{-1}

(3) $1000x$ kcal m^{-2} yr^{-1}

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

---

145. Match List I with List II

List I	List II
A. Rose	I. Twisted aestivation
B. Pea	II. Perigynous flower
C. Cotton	III. Drupe
D. Mango	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

---

146. Match List I with List II

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

(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

---

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

(1) Somatic embryos

(2) Protoplasts

(3) Pollens

(4) Callus

---

148. Match List I with List II

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

(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

---

149. The DNA present in chloroplast is:

(1) Circular, double stranded

(2) Linear, single stranded

(3) Circular, single stranded

(4) Linear, double stranded

---

150. 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

(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

Zoology

Section A

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

(1) Periodic abstinence

(2) Lactational amenorrhea

(3) Vaults

(4) Coitus interruptus

---

152. Match List I with List II

List-I	List-II
A. Common cold	I. Plasmodium
B. Haemozoin	II. Typhoid
C. Widal test	III. Rhinoviruses
D. Allergy	IV. Dust mites

(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

---

153. 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 foam control system

(4) A bio-reactor provides optimal growth conditions for achieving the desired product

---

154. 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 correct answer from the options given below:

(1) A, B and E only

(2) B, C and E only

(3) C, D and E only

(4) A, B and D only

---

155. Match List I with List II

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

---

156. Match List I with List II

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

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

---

157. 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

---

158. Which of the following factors are favourable for the formation of oxyhaemoglobin in alveoli?

(1) High pO2 and Lesser H+ concentration

(2) Low pCO2 and High H+ concentration

(3) Low pCO2 and High temperature

(4) High pO2 and High pCO2

---

159. Match List I with List II

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

Choose the correct answer from the options given below:

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

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

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

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

---

160. 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

---

161. 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

---

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

(1) Testosterone

(2) Progesterone

(3) Glucagon

(4) Cortisol

---

163. 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

---

164. 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 female and Leydig cells in male.

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

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

---

165. Match List I with List II

List-I (Pulmonary Volumes)	List-II (Corresponding Volumes)
A. Expiratory capacity	I. Expiratory reserve volume + Tidal vol + Inspiratory reserve vol
B. Functional residual capacity	II. Tidal vol + Expiratory reserve vol
C. Vital capacity	III. Tidal vol + Inspiratory reserve vol
D. Inspiratory capacity	IV. Expiratory reserve vol + Residual vol

Choose the correct answer from the options given below:

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

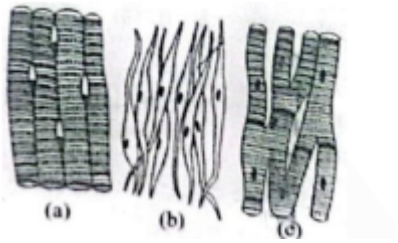
(2) A-II, B-I, C-IV, D-III

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

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

---

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

---

167. 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

---

168. The flippers of the Penguins and Dolphins are the example of the

(1) Natural selection

(2) Convergent evolution

(3) Divergent evolution

(4) Adaptive radiation

---

169. 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 answer 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

---

170. 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

---

171. 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 female and Leydig cells in male.

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

(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

---

172. 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

Choose the correct answer from the options given below:

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

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

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

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

---

173. 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 answer 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

---

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

(1) Isthmus

(2) Infundibulum

(3) Ampulla

(4) Uterine fundus

---

175. 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

---

176. Match List I with List II

List-I	List-II
A. Axoneme	I. Centriole
B. Cartwheel pattern	II. Cilia and flagella
C. Crista	III. Chromosome
D. Satellite	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

---

177. Match List I with List II

List I	List II
A. Pterophyllum	I. Hag fish
B. Myxine	II. Saw fish
C. Pristis	III. Angel fish
D. Exocoetus	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

---

178. 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

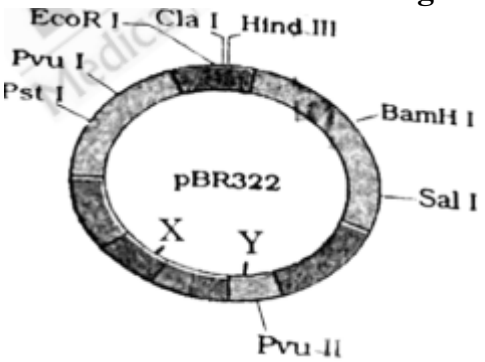
(3) A-II, B-I, C-III, D-IV

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

---

179. The following diagram showing 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 protein involved in the replication of Plasmid.

(2) The gene 'X' is for protein involved in replication of Plasmid and 'Y' for resistance to antibiotics.

(3) Gene 'X' is responsible for recognitions sites and 'Y' is responsible for antibiotic resistance.

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

---

180. Given below are two statements :

Statement I : In the nephron, the descending limb of 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 and increases the surface area for reabsorption.

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

---

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

Assertion A : Breast-feeding during initial period of infant growth is recommended by doctors for bringing a healthy baby.

Reason R : Colostrum contains several antibodies absolutely essential to develop resistance for the new born baby.

Choose the correct answer from the options given below:

(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

---

182. 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 answer 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

---

183. Which one is the correct product of DNA dependent RNA polymerase to the given template?

3'TACATGGCAAATATCCATTCA5'

(1) 5'AUGUAAAGUUUAUAGGUAAGU3'

(2) 5'AUGUACCGUUUAUAGGGAAGU3'

(3) 5'ATGTACCGTTTATAGGTAAGT3'

(4) 5'AUGUACCGUUUAUAGGUAAGU3'

---

184. Match List I with List II

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

Choose the correct answer from the options given below:

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

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

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

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

---

185. The "Ti plasmid" of Agrobacterium tumefaciens stands for

(1) Tumor independent plasmid

(2) Tumor inducing plasmid

(3) Temperature independent plasmid

(4) Tumour inhibiting plasmid

---

186. 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.

Choose the correct answer from the options given below:

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

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

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

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

---

187. 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.

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.

---

188. Given below are two statements:

Statement I: Mitochondria and chloroplasts both double membranes bound organelles.

Statement II: Inner membrane of mitochondria is relatively less permeable, as compared to chloroplast.

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.

---

189. Choose the correct statement given below regarding juxta medullary nephron.

(1) Renal corpuscle of juxta medullary nephron lies in the outer portion of the renal medulla.

(2) Loop of Henle of juxta medullary nephron runs deep into medulla.

(3) Juxta medullary nephrons outnumber the cortical nephrons.

(4) Juxta medullary nephrons are located in the columns of Bertini.

---

190. 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 eyeballs.
D. Cretinism	IV. Excessive secretion of growth hormone.

Choose the correct answer from the options given below:

(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

---

191. 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

Choose the correct answer from the options given below:

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

(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

192. 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

Choose the correct answer from the options given below:

(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

---

193. Identify the correct option (A), (B), (C), (D) with respect to 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.

---

194. Regarding 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.

Choose the correct answer from the options given below:

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

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

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

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

---

195. 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 correct answer from the options given below:

(1) A, B and D only

(2) B, D and E only

(3) B, C and D only

(4) A and C only

---

196. Match List I with List II related to digestive system of cockroach.

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

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-III, B-II, C-IV, D-I

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

---

197. Given below are two statements:

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

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

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. 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

Choose the correct answer from the options given below:

(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

---

199. 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

---

200. 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 micro environments for the development and maturation of T-lymphocytes.

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.