NEET 2024 Q1 Question Paper

Time Allowed :200 minutes	**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.
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: 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:

Choose the most appropriate answer from the options given below:

(1) Both Statement I and Statement II are correct

(2) Both Statement I and Statement II are incorrect

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

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

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

(1) 5 cm, 2 s

(2) 5 m, 2 s

(3) 5 cm, 1 s

(4) 5 m, 1 s

3: 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 the speed becomes** 2ω **while keeping the same radius, the tension in the string becomes:**

(1) T

(2) $4T$

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

(4) $\sqrt{2}T$

4: 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):

(1) 1 : 2

(2) 2 : 1

(3) 1 : 1

(4) 1 : 4

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5. 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. $A \cdot B + \overline{A}$
2. $A \cdot \overline{B} + \overline{A}$
3. $\overline{B}$
4. B

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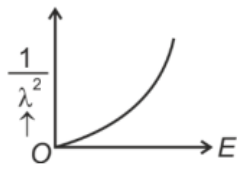
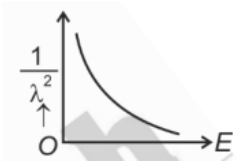
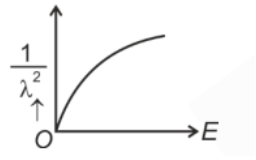
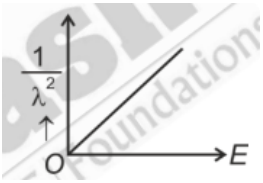
6. The graph below shows the variation of $\frac{1}{\lambda 2}$ and its kinetic energy E, where λ is the de Broglie wavelength of a free particle:

Choose the correct graph:

(1) 

(2) 

(3) 

(4) 

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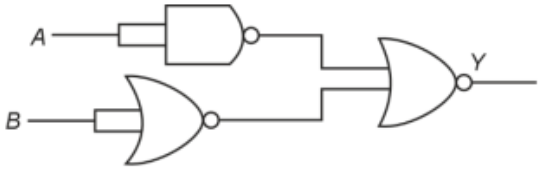
7. The output (Y) of the given logic gate is similar to the output of an/a:



(1) NAND gate

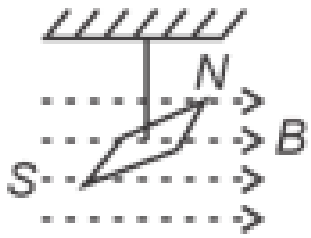
(2) NOR gate

(3) OR gate

(4) AND gate

---

8. 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 $\cdot$ 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) $5\pi^2$

(2) $128\pi^2$

(3) $50\pi^2$

(4) $1280\pi^2$

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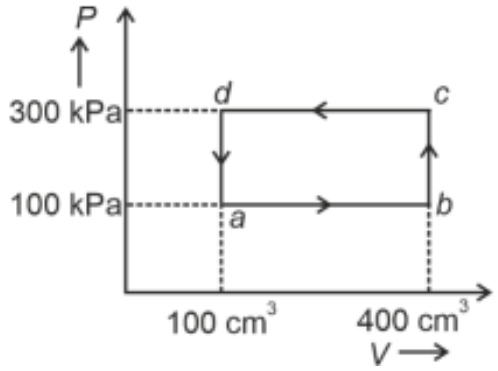
9. A thermodynamic system is taken through the cycle abcda. The work done by the gas along the path bc is:



(1) Zero

(2) 30 J

(3) -90 J

(4) -60 J

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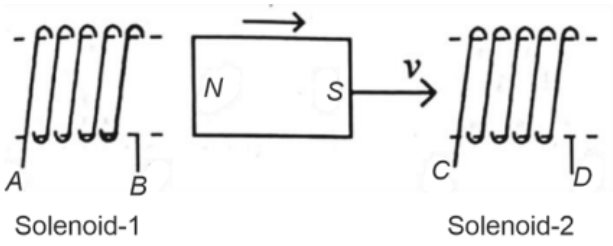
10. In the above diagram, a strong bar magnet is moving towards solenoid-2 from solenoid-1. The direction of induced current in solenoid-1 and that in solenoid-2, respectively, are through the directions:



(1) AB and DC

(2) BA and CD

(3) AB and CD

(4) BA and DC

11: An unpolarised light beam strikes a glass surface at Brewster's angle. Then:

(1) The reflected light will be partially polarised.

(2) The refracted light will be completely polarised.

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

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

12: A wire of length 'l' and resistance 100 Ω 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) 26 Ω

(2) 52 Ω

(3) 55 Ω

(4) 60 Ω

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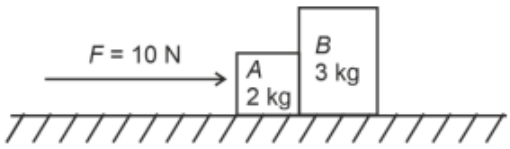
13. A horizontal force of 10 N is applied to a block A as shown in the figure. The masses of blocks A and B are 2 kg and 3 kg, respectively. The blocks slide over a frictionless surface. The force exerted by block A on block B is:



(1) Zero

(2) 4 N

(3) 6 N

(4) 10 N

14: 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 the collision. The velocity of the system after the collision is v_2. The ratio $v_1 : v_2$ is:

(1) 1 : 2

(2) 2 : 1

(3) 4 : 1

(4) 1 : 4

15: Given below are two statements: one is labelled as Assertion A and the other is labelled 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:

$$V = \pm \frac{2}{4\pi\epsilon_0} \frac{P}{r^2}$$

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 the correct explanation of A.

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

(3) A is true but R is false.

(4) A is false but R is true.

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16. Match List-I with List-II.

List-I	**List-II**
(Spectral Lines of Hydrogen for transitions from)	(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

Choose the correct answer from the options given below:

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

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

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

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

17: In a vernier callipers, $(N+1)$ 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:

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

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

(3) $100N$

(4) $10(N+1)$

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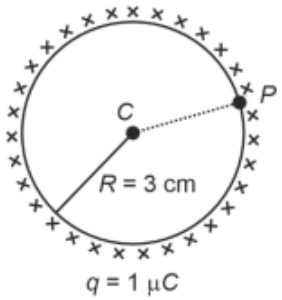
18. A thin spherical shell is charged by some source. The potential difference between the two points C and P (in V) shown in the figure is:



(1) 3×10^5

(2) 1×10^5

(3) 0.5×10^5

(4) Zero

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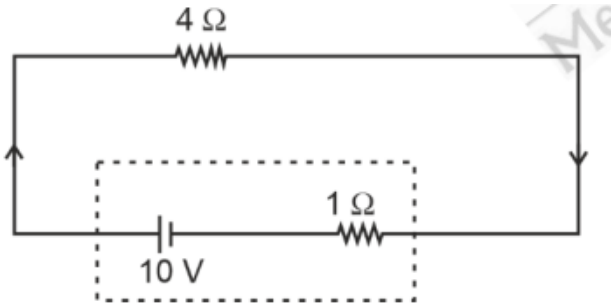
19. The terminal voltage of the battery, whose emf is 10 V and internal resistance 1 Ω, when connected through an external resistance of 4 Ω as shown in the figure, is:



(1) 4 V

(2) 6 V

(3) 8 V

(4) 10 V

20: 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 is $p = \frac{h}{\nu c}$.

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 and B only

(2) A, B, C and D only

(3) A, C and D only

(4) A, B, D and E only

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

(1) Constant velocity

(2) Constant acceleration

(3) Constant velocity but varying acceleration

(4) Varying velocity and varying acceleration

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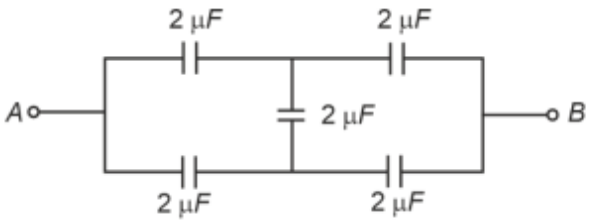
22. In the following circuit, the equivalent capacitance between terminal A and terminal B is:



(1) $2\,\mu$F

(2) $1\,\mu$F

(3) $0.5\,\mu$F

(4) $4\,\mu$F

23: A thin flat circular disc of radius 4.5 cm is placed gently over the surface of water. If surface tension of water is 0.07 N m^{-1}, then the excess force required to take it away from the surface is:

(1) 19.8 mN

(2) 198 N

(3) 1.98 mN

(4) 99 N

24: 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) 4 mm

(2) 0.4 mm

(3) 40 mm

(4) 8 mm

25.

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

In the nuclear emission stated above, the mass number and atomic number of the product Q respectively, are:

(1) 280, 81

(2) 286, 80

(3) 288, 82

(4) 286, 81

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

(1) 10

(2) 5

(3) 7

(4) 6

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

(1) strain and angle

(2) stress and angle

(3) strain and arc

(4) angular speed and stress

28: The moment of inertia of a thin rod about an axis passing through its mid point and perpendicular to the rod is 2400 g cm². The length of the 400 g rod is nearly:

(1) 8.5 cm

(2) 17.5 cm

(3) 20.7 cm

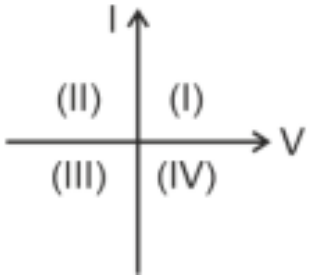
(4) 72.0 cm

---

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

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.



(1) A is correct but B is incorrect

(2) A is incorrect but B is correct

(3) Both A and B are correct

(4) Both A and B are incorrect

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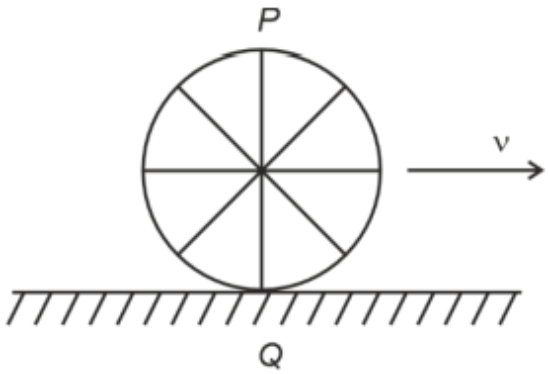
30. A wheel of a bullock cart is rolling on a level road as shown in the figure below. If its linear speed is v in the direction shown, which one of the following options is correct (P and Q are any highest and lowest points on the wheel, respectively)?



1. Point P moves slower than point Q
2. Point P moves faster than point Q
3. Both the points P and Q move with equal speed
4. Point P has zero speed

31: 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 $4\pi \times 10^{-7}$ S.$Iunits$):

(1) 44 mT

(2) 4.4 T

(3) 4.4 mT

(4) 44 T

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

(1) Interference pattern will disappear

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

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

(4) All bright fringes will be of equal width

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33. Match List-I with List-II.

Material	**Susceptibility** χ
Diamagnetic	$\chi = 0$
Ferromagnetic	$0 \geq \chi \geq -1$
Paramagnetic	$\chi \gg 1$
Non-magnetic	$0 < \chi < \epsilon$ (a small positive number)

Table 1: Material and Their Susceptibility

Choose the correct answer from the options given below:

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

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

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

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

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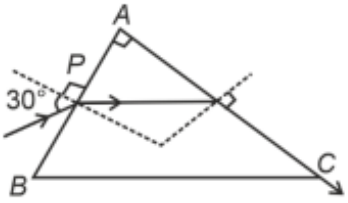
34. A light ray enters through a right-angled prism at point P with the angle of incidence 30° as shown in figure. It travels through the prism parallel to its base BC and emerges along the face AC. The refractive index of the prism is:



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

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

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

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

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

(1) 19.6 m/s²

(2) 9.8 m/s²

(3) 4.9 m/s²

(4) 3.92 m/s²

Section B

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

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

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

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

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

37: 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) 5×10^3 N

(2) 50×10^3 N

(3) 100×10^3 N

(4) 2×10^3 N

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

(1) 34

(2) 28

(3) 17

(4) 32

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

(1) 0.58 A

(2) 0.93 A

(3) 1.20 A

(4) 0.35 A

40: 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 $\frac{x}{2}$ times its original time period. Then the value of x is:

(1) $\sqrt{3}$

(2) $\sqrt{2}$

(3) $2\sqrt{3}$

(4) 4

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

(1) They are transverse in nature

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

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

(4) They originate from charges moving with uniform speed

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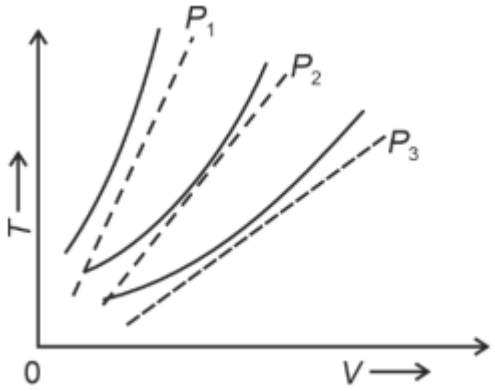
42. The following graph represents the T-V curves of an ideal gas (where T is the temperature and V the volume) at three pressures P_1, P_2 and P_3 compared with those of Charles's law represented as dotted lines.

Then the correct relation is:



(1) $P_3 > P_2 > P_1$

(2) $P_1 > P_3 > P_2$

(3) $P_2 > P_1 > P_3$

(4) $P_1 > P_2 > P_3$

43: 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) $\frac{\beta t}{\alpha}$

(2) $\frac{\alpha t}{\beta}$

(3) $\alpha \beta t$

(4) $\frac{\alpha \beta}{t}$

45: Two heaters A and B have power ratings of 1 kW and 2 kW, respectively. These 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) 1 : 1

(2) 2 : 9

(3) 1 : 2

(4) 2 : 3

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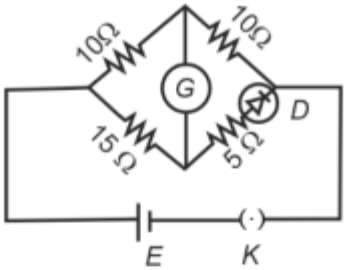
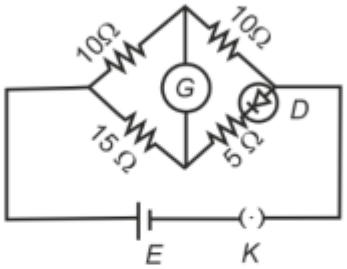
46. Choose the correct circuit which can achieve the bridge balance.

(1)



(2)



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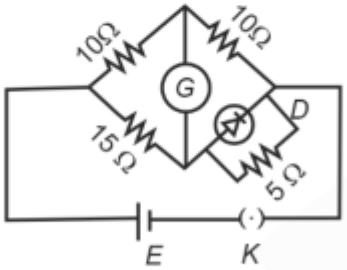
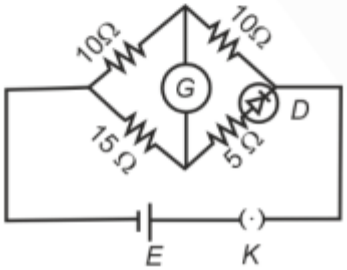


(4)



Correct Answer: (1)

Solution: In a Wheatstone bridge, the bridge is balanced when the ratio of resistances in one diagonal is equal to the ratio of resistances in the other diagonal. The correct circuit that

achieves this balance must have the correct arrangement of resistors where the ratio of the resistances in opposite arms are equal. By analyzing the circuit diagrams, we find that Circuit diagram A satisfies this condition, making it the correct option.

Quick Tip

To balance a Wheatstone bridge, the ratio of resistances in one diagonal should equal the ratio in the other diagonal. This ensures no current flows through the galvanometer.

47: 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) B and D only

(2) A and C only

(3) A, C and D only

(4) C only

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, B and E only

(2) A, C and E only

(3) B, D and E only

(4) A, B and C only

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49. 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 of 60° with each other. The magnetic moment of this new magnet is:

(1) M

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

(3) $2M$

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

50: 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) There is no current

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

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

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

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CHEMISTRY

Section A

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

(1) Crystallization

(2) Sublimation

(3) Distillation

(4) Chromatography

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52. Match List I with List II:

List I	List II
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

Choose the correct answer from the options given below:

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

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

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

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

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

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

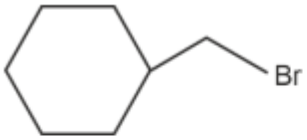
(2) $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$

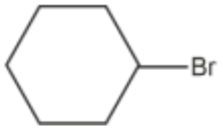
(3) $CO(g) + H_2(g) \rightleftharpoons CO_2(g) + H_2O(g)$

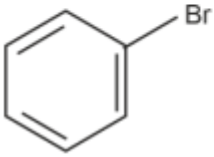
(4) $Br_2(g) \rightleftharpoons 2Br(g)$

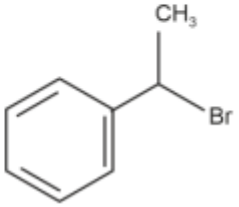
---

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

(1) 

(2) 

(3) 

(4) 

55. A compound with a molecular formula of C_6H_{14} has two tertiary carbons. Its IUPAC name is:

(1) n-hexane

(2) 2-methylpentane

(3) 2,3-dimethylbutane

(4) 2,2-dimethylbutane

---

56. 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.

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

(1) Both Statement I and Statement II are true

(2) Both Statement I and Statement II are false

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

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

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

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

Then, which of the following is correct?

(1) Reaction is at equilibrium.

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

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

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

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

(1) rate constant at standard temperature

(2) probability of collision

(3) orientation of reactant molecules during collision

(4) rate constant at two different temperatures

---

59. 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 behaviour.

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

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

(1) Both Statement I and Statement II are true

(2) Both Statement I and Statement II are false

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

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

60: The highest number of helium atoms is in:

(1) 4 mol of helium

(2) 4 u of helium

(3) 4 g of helium

(4) 2.271098 L of helium at STP

---

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

Li, Be, B, C, N

Choose the correct answer from the options given below:

(1) Li $<$ Be $<$ B $<$ C $<$ N

(2) Li < B < Be < C < N

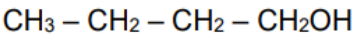
(3) Li < Be < C < B < N

(4) Li < Be < N < B < C

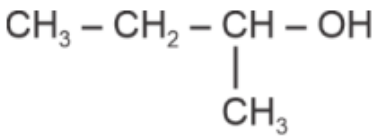
---

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

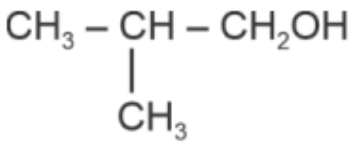
A.



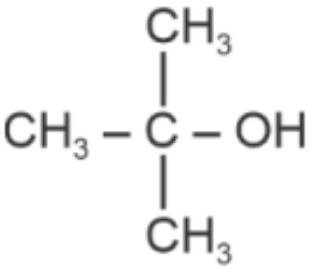
B.



C.



D.



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63. '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) B and D only

(2) A and E only

(3) B and C only

(4) A and D only

---

64. 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. $NaHSO_3$

Choose the correct options from the given below:

(1) B and C

(2) A and D

(3) B and E

(4) E and D

---

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.

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

(1) Both statement I and Statement II are true

(2) Both statement I and Statement II are false

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

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

66. 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) $-x$

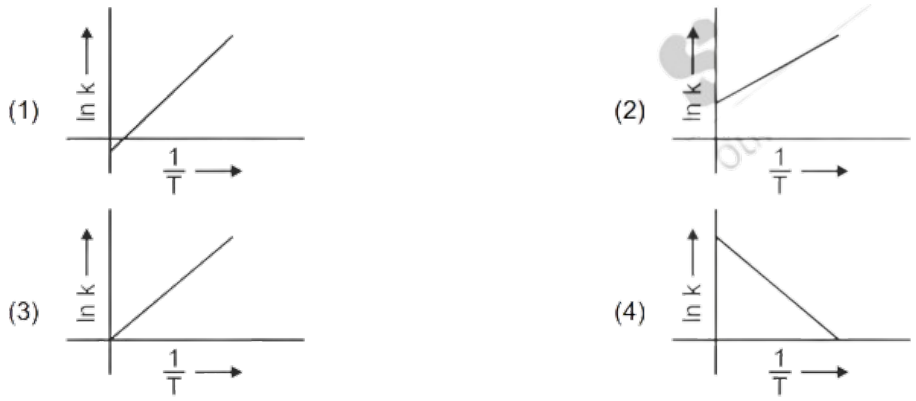
(2) -$\frac{x}{9}$

(3) $-4x$

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

---

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



---

69. 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 the change of:

(1) d^5 to d^4 configuration

(2) d^5 to d^2 configuration

(3) d^4 to d^5 configuration

(4) d^3 to d^2 configuration

Answer: (3) d^4 to d^5 configuration

Solution:

The standard electrode potential (E°) is affected by the electronic configuration of the ion. The E° value is generally more positive when the configuration of the ion is more stable. For Mn^3+/Mn^2+ couple: - Mn^3+ has a d^4 configuration (since Mn has an atomic number of 25, and Mn^3+ has lost three electrons, leaving a d^4 configuration). - Mn^2+ has a d^5 configuration.

The $Mn^{2}+$ ion has a stable d^5 configuration, which is half-filled and thus more stable. When $Mn^{3}+$ accepts an electron to become $Mn^{2}+$, the electron configuration changes from d^4 to d^5, making the $Mn^{2}+$ ion more stable and the E° value more positive.
This is in contrast to the other metal couples like $Cr^{3}+/Cr^{2}+$ and $Fe^{3}+/Fe^{2}+$, where the changes in electronic configurations do not lead to such a stable half-filled d^5 configuration.
Hence, the correct answer is **(3)** d^4 to d^5 configuration.

Quick Tip

In transition metal complexes, the stability of the ion and the value of the electrode potential are often related to the stability of its electronic configuration. Half-filled (d^5) and fully-filled (d^{10}) configurations are particularly stable, which is why $Mn^{2}+$ with a d^5 configuration is more stable than $Mn^{3}+$ with a d^4 configuration.

---

70. In which of the following processes does entropy increase?

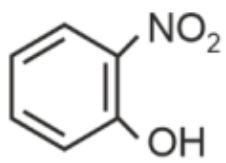
A. A liquid evaporates to vapour.
B. The temperature of a crystalline solid is lowered from 130 K to 0 K.
C. $2NaHCO_3(s) \rightarrow Na_2CO_3(s) + CO_2(g) + H_2O(g)$
D. $Cl_2(g) \rightarrow 2Cl(g)$

Choose the correct answer from the options given below:
(1) A and C
(2) A, B and D
(3) A, C and D
(4) C and D

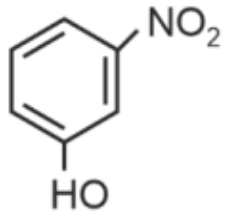
---

71. Intramolecular hydrogen bonding is present in:

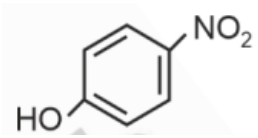
1.



2.



3.



(4) HF

72: 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 < N < O < F

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

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

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

---

73. Which reaction is NOT a redox reaction?

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

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

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

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

---

74. Match List I with List II:

Choose the correct answer from the options given below:

List I	List II
A. 1 mol of H_2O to O_2	I. 3F
B. 1 mol of $4MnO_4^-$ 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-II, B-IV, C-I, D-III

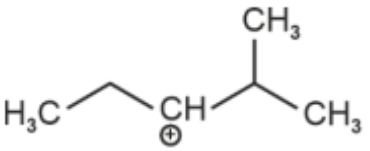
(2) A-III, B-IV, C-I, D-II

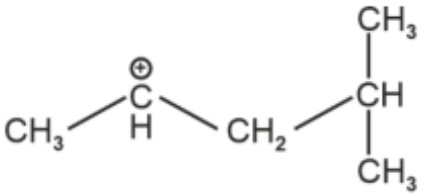
(3) A-II, B-III, C-I, D-IV

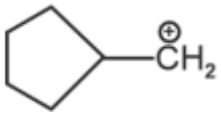
(4) A-III, B-IV, C-II, D-I

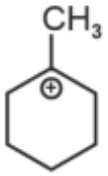
---

75. The most stable carbocation among the following is:

(1) 

(2) 

(3) 

(4) 

76. 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

Choose the correct answer from the options given below:

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

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

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

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

---

77. Among Group 16 elements, which one does NOT show –2 oxidation state?

(1) O

(2) Se

(3) Te

(4) Po

---

78. 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 follow the order:

(1) B $>$ A $>$ C

(2) B $>$ C $>$ A

(3) A $>$ C $>$ B

(4) A $>$ B $>$ C

---

79. Fehling's solution 'A' is:

(1) aqueous copper sulphate

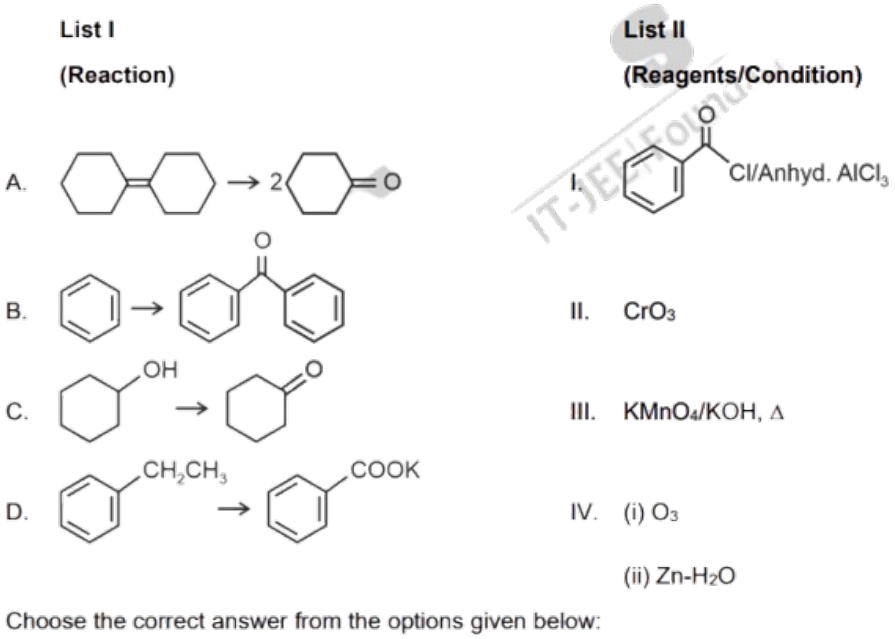
(2) alkaline copper sulphate

(3) alkaline solution of sodium potassium tartrate (Rochelle's salt)

(4) aqueous sodium citrate

---

80. Match List I with List II.



Choose the correct answer from the options given below:

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

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

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

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

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

Solution:

Let's analyze the reactions and corresponding reagents/conditions:

1. A. Cyclohexene $\rightarrow$ 2 O: - The reaction of cyclohexene with ozone (O_3) followed by reduction with Zn-H_2O typically leads to the cleavage of the double bond and formation of two oxygen-containing products. This reaction corresponds to IV (O_3 and Zn-H_2O).

2. B. Benzene $\rightarrow$ Phenol: - The conversion of benzene to phenol involves oxidation with chromium trioxide (CrO_3) in acidic conditions, which is known as the Jones oxidation. This

reaction corresponds to II (CrO_3).

3. C. Benzyl alcohol $\rightarrow$ Benzoic acid: - Benzyl alcohol can be oxidized to benzoic acid using potassium permanganate ($KMnO_4$) in a basic medium (KOH) under heating conditions. This corresponds to III ($KMnO_4$/KOH, Δ).

4. D. Toluene $\rightarrow$ Benzophenone: - Toluene undergoes oxidation under the action of ozone (O_3) to form benzophenone. This corresponds to I (Cl/Anhyd. $AlCl_3$).

Hence, the correct matching is: - A-IV (Cyclohexene reacts with O_3 and Zn-H_2O), - B-I (Benzene to phenol with CrO_3), - C-II (Benzyl alcohol to benzoic acid with $KMnO_4$/KOH), - D-III (Toluene to benzophenone with O_3).

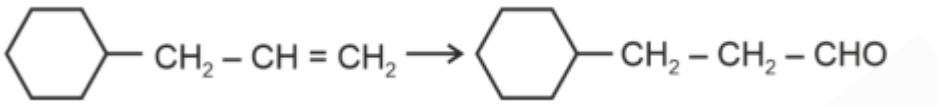
Thus, the correct answer is (3) A-IV, B-I, C-II, D-III.

Quick Tip

- Remember the key reagents for common organic reactions: - CrO_3 is used for oxidation of alcohols to carbonyl compounds (e.g., phenol from benzene). - $KMnO_4$ is used for oxidation of alcohols or side chains to carboxylic acids (e.g., benzyl alcohol to benzoic acid). - Ozone (O_3) is used for cleavage of carbon-carbon double bonds (e.g., cyclohexene) or oxidation of toluene to benzophenone.

---

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



(1) (i) H_2O/H^+
(ii) CrO_3

(2) (i) BH_3
(ii) $H_2O_2 / \overset{\ominus}{O}H$
(iii) PCC

(3) (i) BH_3
(ii) $H_2O_2 / \overset{\ominus}{O}H$
(iii) alk.$KMnO_4$
(iv) $H_3O^{\oplus}$

(4) (i) H_2O/H^+
(ii) PCC

---

82. Match List I with List II:

	List I (Quantum Number)		**List II (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

Choose the correct answer from the options given below :

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

---

83. 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

Choose the correct answer from the options given below:

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

---

84. 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) 750 mg

(2) 250 mg

(3) Zero mg

(4) 200 mg

---

85. Match List I with List II.

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

Choose the correct answer from the options given below:

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

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

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

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

Section B

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

(1) dilute hydrochloric acid

(2) concentrated sulphuric acid

(3) dilute nitric acid

(4) dilute sulphuric acid

---

87. 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, A, D, C, E

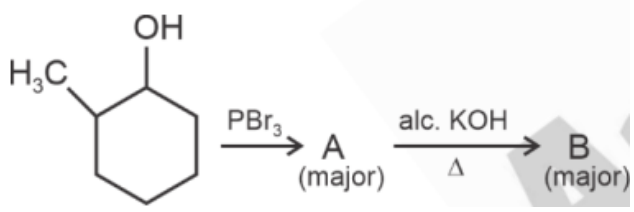
(2) B, C, A, D, E

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

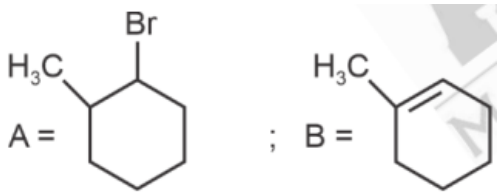
(4) E, A, B, C, D

---

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



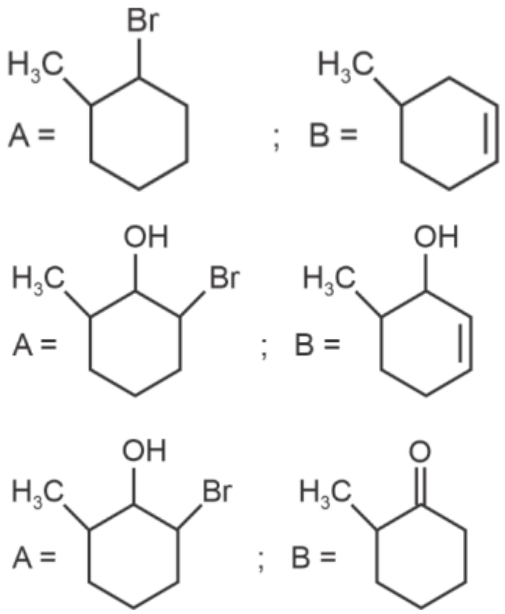
(1)



(2)

(3)

(4)



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89. The pair of lanthanoid ions which are diamagnetic is

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

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

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

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

---

90. Identify the correct answer.

(1) Three resonance structures can be drawn for ozone

(2) BF_3 has non-zero dipole moment

(3) Dipole moment of NF_3 is greater than that of NH_3

(4) Three canonical forms can be drawn for CO_3^{2-} ion

---

91. A compound X contains 32% of A, 20% of B, and the remaining percentage of C. Then, the empirical formula of X is:

(1) A_2BC_2

(2) ABC_3

(3) AB_2C_2

(4) ABC_4

---

92. The work done during reversible isothermal expansion of one mole of hydrogen gas at 25°C from pressure of 20 atmosphere to 10 atmosphere is

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

(1) 0 calorie

(2) -413.14 calories

(3) 413.14 calories

(4) 100 calories

---

93. Mass in grams of copper deposited by passing 9.6487 A current through a voltmeter containing copper sulphate solution for 100 seconds is

(Given: Molar mass of Cu = 63 g mol^{-1}, 1 F = 96487 C)

(1) 3.15 g

(2) 0.315 g

(3) 31.5 g

(4) 0.0315 g

---

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

N_2 = 3.0 × 10^{-3} M, O_2 = 4.2 × 10^{-3} M and NO = 2.8 × 10^{-3} M.

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

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

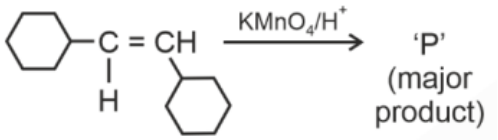
(1) 0.00889

(2) 0.0889

(3) 0.8889

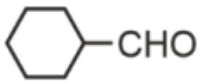
(4) 0.717

95. For the given reaction:

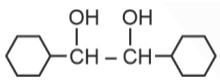


Identify the product 'P' formed in the reaction.

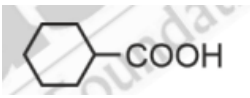
(1)



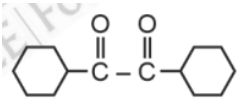
(2)



(3)



(4)



---

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

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

(1) 38.04 kJ/mol

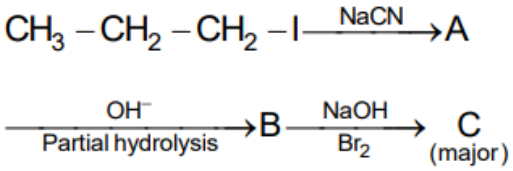
(2) 380.4 kJ/mol

(3) 3.80 kJ/mol

(4) 3804 kJ/mol

---

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



(1) Propylamine

(2) Butylamine

(3) Butanamide

(4) α-bromobutanoic acid

---

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

$$3ROH + \text{PCl}_3 \rightarrow 3RCl + A$$

$$ROH + \text{PCl}_5 \rightarrow RCl + \text{HCl} + B$$

(1) $POCl_3$ and H_3PO_3

(2) $POCl_3$ and H_3PO_4

(3) H_3PO_4 and $POCl_3$

(4) H_3PO_3 and $POCl_3$

---

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

(1) 37°C

(2) 310°C

(3) 25.73°C

(4) 12.05°C

---

100. 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 ligand, but $[Co(NH_3)_4Cl_2]^{+}$ has more than one kind of ligand.

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 true.

(2) Both Statement I and Statement II are false.

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

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

Botnay

Section A

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

(1) Cofactor inhibition

(2) Feedback inhibition

(3) Competitive inhibition

(4) Enzyme activation

---

102. 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 true

(2) Both Statement I and Statement II are false

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

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

---

103. Match List I with List II:

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

Choose the correct answer from the options given below:

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

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

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

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

---

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

1. Totipotency
2. Micropropagation
3. Differentiation
4. Somatic hybridization

---

105. The equation of Verhulst-Pearl logistic growth is:

$$\frac{dN}{dt} = rN\left[\frac{K-N}{K}\right]$$

From this equation, K indicates:

Choose the correct answer from the options given below:

1. Intrinsic rate of natural increase
2. Biotic potential
3. Carrying capacity
4. Population density

---

106. 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.

Choose the correct answer from the options given below:

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

---

107. 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-I, B-II, C-III, 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-II, D-I

---

108. 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) Only red flowered plants

(2) Red flowered as well as pink flowered plants

(3) Only pink flowered plants

(4) Red, Pink as well as white flowered plants

---

109. 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 true
2. Both Statement I and Statement II are false
3. Statement I is true but Statement II is false
4. Statement I is false but Statement II is true

---

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

1. Beta-galactosidase
2. Acetylase
3. Permease
4. Polymerase

---

111. 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, C and D only
2. A, B, C and D only

3. A, B and E only

4. A, B and D only

---

112. Bulliform cells are responsible for:

(1) Inward curling of leaves in monocots

(2) Protecting the plant from salt stress

(3) Increased photosynthesis in monocots

(4) Providing large spaces for storage of sugars

---

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

1. Datura

2. Cassia

3. Pisum

4. Sesbania

---

114. 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

4. BB/Bb

---

115. 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, B and C only
2. A, C, D and E only
3. B, C and D only
4. A, B, C, D and E

---

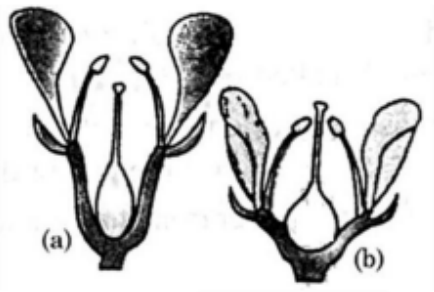
116. Formation of interfascicular cambium from fully developed parenchyma cells is an example for:

1. Differentiation
2. Redifferentiation
3. Dedifferentiation
4. Maturation

---

117. 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. in-situ conservation
2. Biodiversity conservation
3. Semi-conservative method
4. Sustainable development



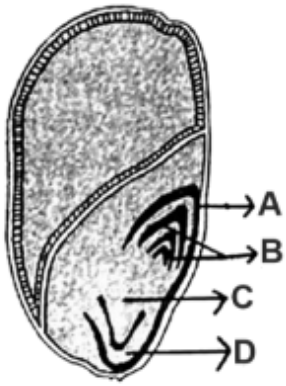
---

118. 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):
Choose the correct answer from the options given below:

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

---

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



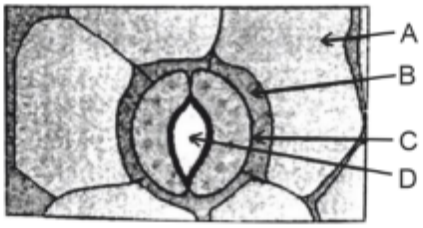
1. A
2. B
3. C
4. D

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

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

---

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



Choose the correct answer from the options given below:

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

---

122. 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 3 molecules of NADPH
(2) 2 molecules of ATP and 2 molecules of NADPH
(3) 3 molecules of ATP and 3 molecules of NADPH
(4) 3 molecules of ATP and 2 molecules of NADPH

123. 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, C, D and E only
2. A and B only
3. A, B and E only
4. A, B and D only

---

124. The cofactor of the enzyme carboxypeptidase is:

1. Zinc
2. Niacin
3. Flavin
4. Haem

---

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

A. Light

B. Chlorophyll

C. Co2

D. ATP

E. NADPH

1. A, B and C only

2. B, C and D only

3. C, D and E only

4. D and E only

---

126. A transcription unit in DNA is defined primarily by the three regions in DNA and these are with respect to upstream and downstream end:
Choose the correct answer from the options given below:

1. Repressor, Operator gene, Structural gene

2. Structural gene, Transposons, Operator gene

3. Inducer, Repressor, Structural gene

4. Promoter, Structural gene, Terminator

---

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

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

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

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

---

128. 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

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

---

129. 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 chromosome.

E. It shows ability to replicate.

Choose the correct answer from the options given below:

1. A and B only
2. D and E only
3. B and C only
4. A and E only

---

130. Spindle fibers attach to kinetochores of chromosomes during:

1. Prophase

2. Metaphase
3. Anaphase
4. Telophase

---

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

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

---

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

1. 8 bp
2. 6 bp
3. 4 bp
4. 10 bp

---

133. 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 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 true
2. Both Statement I and Statement II are false
3. Statement I is true but Statement II is false

4. Statement I is false but Statement II is true

---

134. List of endangered species was released by:

1. GEAC
2. WWF
3. FOAM
4. IUCN

---

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

1. Morphology of mycelium
2. Mode of nutrition
3. Mode of spore formation
4. Fruiting body

Section B

136. The DNA present in chloroplast is:

(1) Linear, double stranded

(2) Circular, double stranded

(3) Linear, single stranded

(4) Circular, single stranded

---

137. Match List I with List II:

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

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

(1) Malic acid $\rightarrow$ Oxaloacetic acid

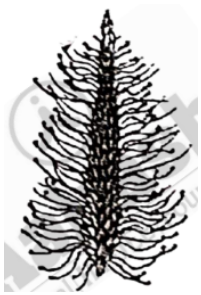
(2) Succinic acid $\rightarrow$ Malic acid

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

(4) Isocitrate $\rightarrow$ α-ketoglutaric acid

---

139. Identify the correct description about the given figure:



(1) Wind pollinated plant inflorescence showing flowers with well exposed stamens.

(2) Water pollinated flowers showing stamens with mucilaginous covering.

(3) Cleistogamous flowers showing autogamy.

(4) Compact inflorescence showing complete autogamy.

---

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

(1) Auxin

(2) Gibberellin

(3) Cytokinin

(4) Abscisic acid

---

141. 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) $\frac{x}{10}$ kcal m^{-2} yr^{-1}

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

(3) $10x$ kcal m^{-2} yr^{-1}

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

---

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

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

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

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

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

---

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

(1) Callus

(2) Somatic embryos

(3) Protoplasts

(4) Pollens

---

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

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

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

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

---

145. 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

Choose the correct answer from the options given below:

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

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

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

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

---

146. Match List-I with List-II

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

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

---

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

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

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

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

---

148. Given below are two statements:

Statement I: In C3 plants, some O_2 binds to RuBisCO, hence CO_2 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 true

(2) Both Statement I and Statement II are false

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

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

149. Match List-I with List-II

List-I	List-II
$A. Monoadelphous$	$I. Citrus$
$B. Diadelphous$	$II. Pea$
$C. Polyadelphous$	$III. Lily$
$D. Epiphyllous$	$IV. China - rose$

Choose the correct answer from the options given below:

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

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

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

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

---

150. 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) A, B, C and D only

(2) B, C, D and E only

(3) A, C, D and E only

(4) A, B, C and E only

ZOOLOGY

Section A

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

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

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

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

---

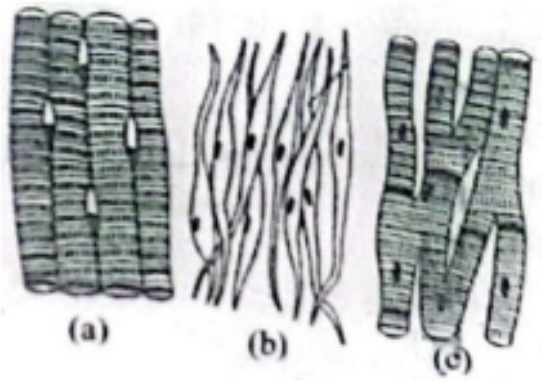
152. Match List I with List II:

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

Choose the correct answer from the options given below :

---

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



Muscle Name/Location:

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

(2) (a) Skeletal - Triceps, (b) Smooth – Stomach, (c) Cardiac – Heart

(3) (a) Skeletal - Biceps, (b) Involuntary – Intestine, (c) Smooth – Heart

(4) (a) Involuntary – Nose tip, (b) Skeletal – Bone, (c) Cardiac – Heart

---

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

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

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

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

---

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

(1) Uterine fundus

(2) Isthmus

(3) Infundibulum

(4) Ampulla

---

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

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

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

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

---

157. 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 D only

(2) A,B E only

(3) B,C E only

(4) C,D E only

158. 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 and increases the surface area for reabsorption.

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

(1) Both Statement I and Statement II are true

(2) Both Statement I and Statement II are false

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

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

---

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

(1) Cortisol

(2) Testosterone

(3) Progesterone

(4) Glucagon

---

160. 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.

Choose the correct answer from the options given below:

(1) Both Statement I and Statement II are true

(2) Both Statement I and Statement II are false

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

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

---

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

(1) High pO2 and High pCO2

(2) High pO2 and Lesser H+ concentration

(3) Low pCO2 and High H+ concentration

(4) Low pCO2 and High temperature

---

162. 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-III, C-II, D-I

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

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

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

---

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

(1) Adaptive radiation

(2) Natural selection

(3) Convergent evolution

(4) Divergent evolution

---

164. 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) D-A-C-B

(2) B-A-D-C

(3) C-B-D-A

(4) A-D-C-B

---

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

(1) 5th segment

(2) 10th segment

(3) 8th and 9th segment

(4) 11th segment

---

166. Which of the following statements is incorrect?

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

(2) Most commonly used bio-reactors are of stirring type

(3) Bio-reactors are used to produce small scale bacterial cultures

(4) Bio-reactors have an agitator system, an oxygen delivery system and foam control system

---

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

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

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

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

---

168. Consider the following statements:

A. Annelids are true coelomates

B. Poriferans are pseudocoelomates

C. Aschelminthes are acoelomates

D. Platyhelminthes are pseudocoelomates

---

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

(1) Coitus interruptus

(2) Periodic abstinence

(3) Lactational amenorrhea

(4) Vaults

---

170. 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.Neurosecretory cells

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-III, C-II, D-IV

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

---

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

(1) Genetic recombination

(2) Genetic drift

(3) Gene migration

(4) Constant gene pool

---

172. Match List I with List II:

List I	List II
$A.\alpha - Iantitrypsin$	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-II, B-I, C-IV, D-III

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

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

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

---

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

A. AV bundle

B. Purkinje fibers

C. AV node

D. Bundle branches

E. SA node

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

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

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

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

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

---

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

(1) Tumour inhibiting plasmid

(2) Tumor independent plasmid

(3) Tumor inducing plasmid

(4) Temperature independent plasmid

---

175. Match List I with List II:

List I	List II
A.Expiratory capacity	I.Expiratory reserve volume + Tidal volume + Inspiratory 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-II, B-IV, C-I, D-III

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

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

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

---

176. 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) C-E-D-A-B

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

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

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

---

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

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

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

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

178. Given below are two statements:

Statement I: FSH acts upon ovarian follicles in female and Leydig cells in male.

Statement II: Growing ovarian follicles secrete estrogen in female while interstitial cells secrete androgen in male human beings.

Choose the correct answer from the options given below:

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

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

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

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

---

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

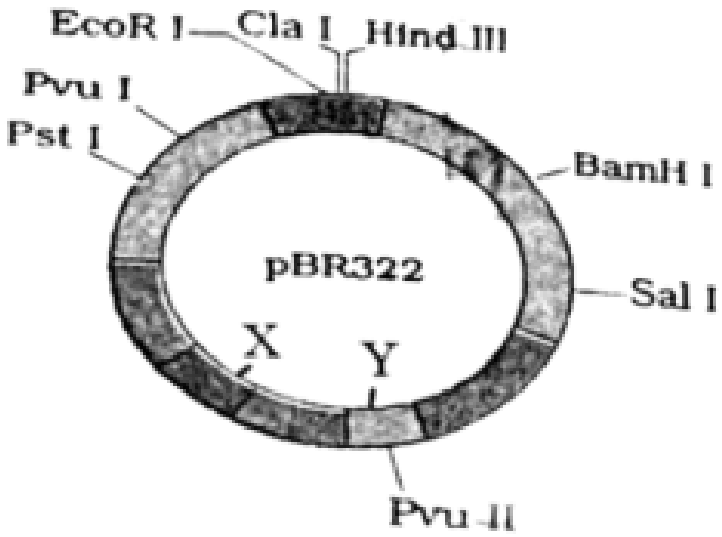
(2) A-I, B-II, C-IV, D-III

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

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

---

180. 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 resistance to antibiotics and 'Y' for protein involved in the replication of Plasmid.

(2) The gene 'X' is responsible for controlling the copy number of the linked DNA and 'Y' for protein involved in the replication of Plasmid.

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

(4) Gene 'X' is responsible for recognition sites and 'Y' is responsible for antibiotic resistance.

---

181. 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

Choose the correct answer from the options given below :

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

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

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

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

---

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

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

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

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

---

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

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

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

(3) A is correct but R is not correct

(4) A is not correct but R is correct

---

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

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

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

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

---

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

$3'$TACATGGCAAATATCCATTCA$5'$

(1) 5' AUGUACCGUUUAUAGGUAAGU 3'

(2) 5' AUGUAAAGUUUAUAGGUAAGU 3'

(3) 5' AUGUACCGUUUAUAGGGAAGU 3'

(4) 5' ATGTACCGTTTATAGGTAAGT 3'

---

186. Match List I with List II related to 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

Choose the correct answer from the options given below:

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

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

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

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

---

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

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

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

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

---

188. 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.

Quick Tip

Non-chordates lack a notochord and the dorsal position of the heart, unlike chordates.

190.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, as compared to the chloroplast membrane.

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 correct.

(2) Both Statement I and Statement II are incorrect.

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

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

---

191. 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.

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 correct.

(2) Both Statement I and Statement II are incorrect.

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

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

---

192. 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) E, A, D, C, B

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

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

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

---

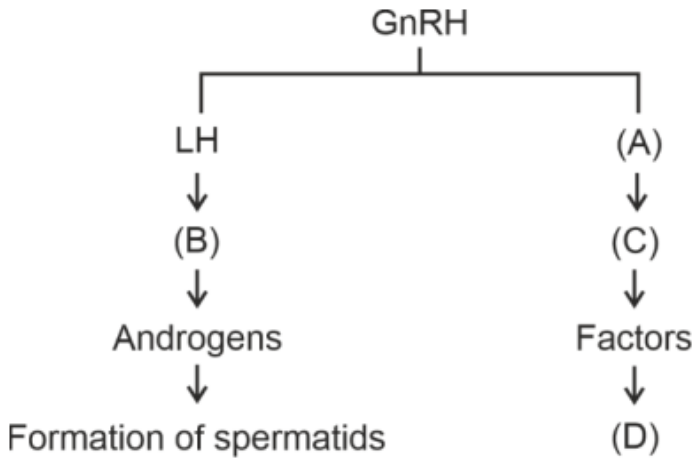
193. Given below are two statements:

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.

---

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



(1) FSH, Leydig cells, Sertoli cells, spermiogenesis.

(2) ICSH, Interstitial cells, Leydig cells, spermiogenesis.

(3) FSH, Sertoli cells, Leydig cells, spermatogenesis.

(4) ICSH, Leydig cells, Sertoli cells, spermatogenesis.

---

195. Match List I with List II:

Choose the correct answer from the options given below:

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

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

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

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

---

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

A. Juxta medullary nephrons are located in the columns of Bertini.

B. Renal corpuscle of juxta medullary nephron lies in the outer portion of the renal medulla.

C. Loop of Henle of juxta medullary nephron runs deep into medulla.

D. Juxta medullary nephrons outnumber the cortical nephrons.

---

197. 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.

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 correct.

(2) Both Statement I and Statement II are incorrect.

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

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

---

198. Match List I with List II:

Choose the correct answer from the options given below:

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

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

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

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

---

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

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

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

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

200.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

A. $I^Bi/I^Ai/ii$

B. $I^BI^B/I^AI^A/ii$

C. $I^AI^B/iI^A/I^Bi$

D. $I^Ai/I^Bi/I^Ai$

Choose the most appropriate answer from the options given below : (1) A only

(2) B only

(3) C and B only

(4) D and E only
