NEET UG 2024 S4 Question Paper

Time Allowed :3 Hours 20 mins	**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:
    - 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.
    - 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 only 10 (Ten) questions out of 15 (Fifteen).
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 attempted 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. Rough work is to be done in the space provided for this purpose in the Test Booklet only.

PHYSICS

SECTION-A

1. 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.

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2. 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) Zero

(2) 3×10^5

(3) 1×10^5

(4) 0.5×10^5

---

3. 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 has zero speed

(2) Point P moves slower than point Q

(3) Point P moves faster than point Q

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

---

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

(1) All bright fringes will be of equal width

(2) Interference pattern will disappear

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

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

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

(1) AND gate

(2) NAND gate

(3) NOR gate

(4) OR gate

---

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

(1) 10 V

(2) 4 V

(3) 6 V

(4) 8 V

---

7. 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) 10 N

(2) Zero

(3) 4 N

(4) 6 N

---

8. Two bodies A and B of the 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) 1 : 4

(2) 1 : 2

(3) 2 : 1

(4) 4 : 1

---

9. 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) $2T$

(2) T

(3) $4T$

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

---

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

(1) 286, 81

(2) 280, 81

(3) 286, 80

(4) 288, 82

---

11. Match List-I with List-II:

List-I

A. Diamagnetic I. $\chi = 0$

B. Ferromagnetic II. $0 < \chi \leq 1$

C. Paramagnetic III. $\chi \gg 1$

D. Non-magnetic IV. $0 < \chi < e$ (a small positive number)

List-II

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

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

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

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

---

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

(1) Varying velocity and varying acceleration

(2) Constant velocity

(3) Constant acceleration

(4) Constant velocity but varying acceleration

13. The moment of inertia of a thin rod about an axis passing through its mid-point and perpendicular to the rod is:

(1) 72.0 cm²

(2) 8.5 cm²

(3) 17.5 cm²

(4) 20.7 cm²

---

14. 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 DC

(2) AB and DC

(3) BA and CD

(4) AB and CD

---

15. 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.

(1) Both A and B are incorrect

(2) A is correct but B is incorrect

(3) A is incorrect but B is correct

(4) Both A and B are correct

---

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

(1) 6

(2) 10

(3) 5

(4) 7

---

17. Match List-I with List-II:

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

A. $n_2 = 3$ to $n_1 = 2$

B. $n_2 = 4$ to $n_1 = 2$

C. $n_2 = 5$ to $n_1 = 2$

D. $n_2 = 6$ to $n_1 = 2$

List-II

I. 410.2 nm

II. 434.1 nm

III. 656.3 nm

IV. 486.1 nm

---

18. 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 center of the dipole of dipole moment vector P of magnitude, 4×10^{-6} Cm, is 9×10^3 V.

Reason R: $V = \frac{2P}{4\pi\varepsilon_0 r^2}$, where r is the distance of any axial point, situated at 2 m from the center of the dipole.

(1) A is false but R is true

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

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

(4) A is true but R is false

---

19. 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) B

(2) $AB + A$

(3) $AB + A\overline{B}$

(4) $\overline{B}$

---

20. 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) $\frac{\sqrt{3}}{2}$

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

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

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

---

21. 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) $10(N+1)$

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

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

(4) $100N$

---

22. 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) 44 T

(2) 44 mT

(3) 4.4 T

(4) 4.4 mT

---

23. 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) 60 Ω

(2) 26 Ω

(3) 52 Ω

(4) 55 Ω

---

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

(1) Angular speed and stress

(2) Strain and angle

(3) Stress and angle

(4) Strain and arc

---

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

Capacitors in the circuit are: $2\,\mu\text{F}, 2\,\mu\text{F}, 2\,\mu\text{F}$

(1) 4 μF

(2) 2 μF

(3) 1 μF

(4) 0.5 μF

---

26. 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) 8 mm

(2) 4 mm

(3) 0.4 mm

(4) 40 mm

---

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

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

(2) The reflected light will be partially polarised.

(3) The refracted light will be completely polarised.

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

---

28. In an ideal transformer, the turns ratio is $\frac{N_p}{N_s} = \frac{V_p}{V_s}$. The ratio $V_s : V_p$ is equal to the (symbols carry their usual meaning):

(1) 1 : 4

(2) 1 : 2

(3) 2 : 1

(4) 1 : 1

---

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

(1) 3.92 m/s^2

(2) 19.6 m/s^2

(3) 9.8 m/s^2

(4) 4.9 m/s^2

---

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

(1) $\frac{1}{\lambda^2}$ vs E

(2) λ^2 vs E

(3) $\frac{1}{\lambda}$ vs E

(4) λ vs E

---

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

(1) -60 J

(2) 30 J

(3) Zero

(4) -90 J

---

32. 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) Statement I is incorrect but Statement II is correct.

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

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

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

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33. 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 magnetic moment of the needle is** $x \times 10^{-5}$ **Am^2, then the value of** x **is:**

(1) 1280 π^2

(2) 5 π^2

(3) 128 π^2

(4) 50 π^2

---

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

(1) 5 m, 1 s

(2) 5 cm, 2 s

(3) 5 m, 2 s

(4) 5 cm, 1 s

---

35. 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) 99 N

(2) 19.8 mN

(3) 198 N

(4) 1.98 mN

SECTION-B

36. 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) $\frac{M}{\sqrt{3}}$

(2) M

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

(4) $2M$

---

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

(1) Option 1

(2) Option 2

(3) Option 3

(4) Option 4

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38. 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) $\frac{GmM}{3R}$

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

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

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

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39. 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) $P_1 > P_2 > P_3$

(2) $P_3 > P_2 > P_1$

(3) $P_1 > P_3 > P_2$

(4) $P_2 > P_3 > P_1$

---

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

(1) They originate from charges moving with uniform speed

(2) They are transverse in nature

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

(4) They travel with a speed equal to $\frac{1}{\sqrt{\mu_0 \varepsilon_0}}$

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41. A metallic bar of Young's modulus, 0.5×10^{11} N/m^2 and coefficient of linear thermal expansion $10^{-5}\,°\text{C}^{-1}$, 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) 2×10^3 N

(2) 5×10^3 N

(3) 50×10^3 N

(4) 100×10^3 N

---

42. Two heaters A and B have power ratings 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) $2 : 3$

(2) $1 : 1$

(3) $2 : 9$

(4) $4 : 2$

---

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

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

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

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

(4) $\alpha\beta t$

---

44. 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 greater than i flows but can be in any direction

(2) There is no current

(3) Displacement current of magnitude equal to i flows in the same direction as i

(4) Displacement current of magnitude equal to i flows in a direction opposite to that of i

---

45. 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 the telescope for viewing a distant object is:

(1) 32

(2) 34

(3) 28

(4) 17

---

46. If the plates of a parallel plate capacitor connected to a battery are moved close to each other, then:

(1) The charge stored in it increases.

(2) The energy stored in it decreases.

(3) Its capacitance increases.

(4) The ratio of charge to its potential remains the same.

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

(1) 0.35 A

(2) 0.58 A

(3) 0.93 A

(4) 1.20 A

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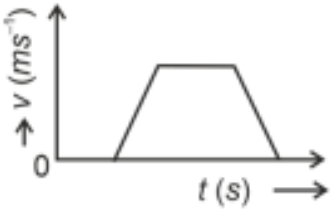
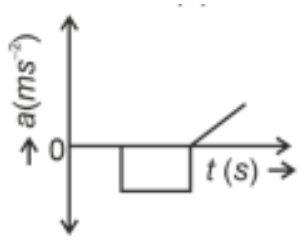
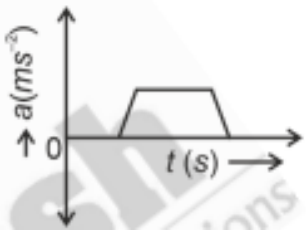
48. The velocity (v) time (t) plot of the motion of a body is shown below:



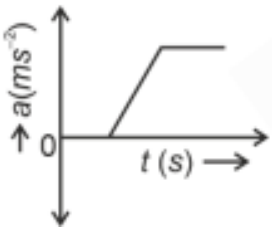
(1)



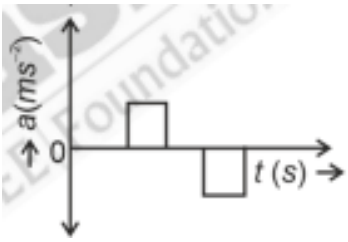
(2)



(3)



(4)



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49. A sheet is placed on a horizontal surface in front of a strong magnetic pole. A force is needed to:

(1) Hold the sheet there if it is magnetic.

(2) Hold the sheet there if it is non-magnetic.

(3) Move the sheet away from the pole with uniform velocity if it is conducting.

(4) Move the sheet away from the pole with uniform velocity if it is both non-conducting and non-polar.

50. 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) 4

(2) $\sqrt{3}$

(3) $\sqrt{2}$

(4) $2\sqrt{3}$

CHEMISTRY

SECTION-A

51. Match List I with List II:

List I (Quantum Number)

- A. m
- B. m_s
- C. l
- D. n

List II (Information provided)

- I. Shape of orbital
- II. Size of orbital
- III. Orientation of orbital
- IV. Orientation of spin of electron

Choose the correct answer from the options given below:

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

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

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

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

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52. 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) Statement I is false but Statement II is true

(2) Both Statement I and Statement II are true

(3) Both Statement I and Statement II are false

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

---

53. The E^0 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^3 to d^5 configuration
- (2) d^5 to d^4 configuration
- (3) d^5 to d^2 configuration
- (4) d^4 to d^5 configuration

---

54. The compound that will undergo Sn1 reaction with the fastest rate is:

- (1) CH_3CH_2Br
- (2) $CH_3CH_2CH_2Br$
- (3) $C_6H_{12}Br_2$
- (4) $C_6H_{10}Br_2$

---

55. Given below are two statements:

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

n-pentane $>$ isopentane $>$ neopentane.

Statement II: When branching increases, the molecule attains a shape of sphere. This results in smaller surface area for contact, due to which the intermolecular forces between the spherical molecules are weak, thereby lowering the boiling point.

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

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

(2) Both Statement I and Statement II are correct

(3) Both Statement I and Statement II are incorrect

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

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56. Match List I with List II:

List I (Process)

- A. Isothermal process
- B. Isochoric process
- C. Isobaric process
- D. Adiabatic process

List II (Conditions)

- I. No heat exchange
- II. Carried out at constant temperature
- III. Carried out at constant volume
- IV. Carried out at constant pressure

Choose the correct answer from the options given below:

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

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

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

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

---

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

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

---

58. 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 < N < C < B

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

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

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

---

59. 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) Chromatography

(2) Crystallization

(3) Sublimation

(4) Distillation

---

60. The reagents with which glucose does not react to give the corresponding tests/products are:

(1) E and D

(2) B and C

(3) A and D

(4) B and E

---

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

(1) A and D only

(2) B and D only

(3) A and E only

(4) B and C only

---

62. 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) A > B > C

(2) B > A > C

(3) B > C > A

(4) A > C > B

---

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

(1) $CH_3–CH_2–OH$

(2) $CH_3–CH_2–CH_2OH$

(3) $CH_3–CH_2–CH_2–OH$

(4) $CH_3–CH_2–CH_2–OH$

---

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

N, O, F, C, Si

Choose the correct answer from the options given below:

(1) F ¡ O ¡ N ¡ C ¡ Si

(2) Si ¡ C ¡ N ¡ O ¡ F

(3) Si ¡ O ¡ C ¡ N ¡ F

(4) O ¡ F ¡ N ¡ C ¡ Si

---

65. Match List I with List II:

List I (Reaction)

A. $C_6H_5–CH=O$

B. $C_6H_5–OH$

C. $CH_3–COOCH_3$

D. $C_6H_5–CH_2–COOH$

List II (Reagents/Condition)

I. Cl/Anhyd. $AlCl_3$

II. CrO_3

III. $KMnO_4/KOH, \Delta$

IV. O_3

(i) $Zn-H_2O$

Choose the correct answer from the options given below:

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

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

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

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

---

66. Match List I with List II:

List I (Conversion)

A. 1 mol of H_2O to O_2

B. 1 mol of MnO_4 to Mn^{2+}

C. 1.5 mol of Ca from molten $CaCl_2$

D. 1 mol of FeO to Fe_2O_3

List II (Number of Faraday required)

I. 3F

II. 2F

III. 1F

IV. 5F

Choose the correct answer from the options given below:

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

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

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

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

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67. Which reaction is NOT a redox reaction?

Choose the correct answer from the options given below:

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

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

(3) $2KClO_3 + I_2 \rightarrow 2KI_3 + Cl_2$

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

---

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

$CH_3–CH = CH_2 \rightarrow CH_2–CH_2–CHO$

Choose the correct answer from the options given below:

(1) (i) H_2O_2/H_+, (ii) PCC

(2) (i) H_2O_2/H_+, (ii) H_2O_2/OH, (iii) PCC

(3) (i) BH_3, (ii) H_2O_2/OH, (iii) alk.$KMnO_4$

(4) (i) BH_3, (ii) H_2O_2/OH, (iii) H_3O^+

---

69. The most stable carbocation among the following is:

Choose the correct answer from the options given below:

(1) $CH_3C^+H_2CH_3$

(2) $CH_3C^+H_2CH_3$

(3) $CH_3C^+H_2CH_2CH_3$

(4) $CH_3C^+CH_3$

---

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

Choose the correct answer from the options given below:

(1) Po

(2) O

(3) Se

(4) Te

---

71. The energy of an electron in the ground state (n = 1) for He^+ ion is -xJ, then that for an electron in n = 2 state for Be^{3+} ion is -yJ.

Choose the correct answer from the options given below:

(1) $\frac{4}{9}x$ **(2)** $-x$ **(3)** $\frac{x}{9}$ **(4)** $-4x$

---

72. Match List I with List II. List I (Molecule)

A. ethane

B. ethene

C. carbon molecule, C_2

D. ethyne

List II (Number and types of bonds between two carbon atoms)

I. one σ-bond and two π-bonds

II. two π-bonds

III. one σ-bond

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

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

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

---

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

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

Then, which of the following is correct?

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

(2) Reaction is at equilibrium.

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

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

---

74. 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 lower boiling

point than the other members of the group but due to the presence of extensive H-bonding in H_2O, it has higher boiling point.

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

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

(2) Both Statement I and Statement II are true

(3) Both Statement I and Statement II are false

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

---

75. 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

Choose the correct answer from the options given below:

(1) 200 mg

(2) 750 mg

(3) 250 mg

(4) Zero mg

---

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

Choose the correct answer from the options given below:

(1) $2\text{BrCl}(g) \rightleftharpoons \text{Br}_2(g) + \text{Cl}_2(g)$

(2) $\text{PCl}_5(g) \rightleftharpoons \text{PCl}_3(g) + \text{Cl}_2(g)$

(3) $\text{H}_2(g) + \text{I}_2(g) \rightleftharpoons 2\text{HI}(g)$

(4) $\text{CO}_2(g) + \text{H}_2O(g) \rightleftharpoons \text{CO}_2(g) + \text{H}_2(g)$

---

77. A compound with a molecular formula of C_8H_{14} has two tertiary carbons. Its IUPAC name is:

Choose the correct answer from the options given below:

(1) 2,2-dimethylbutane

(2) n-hexane

(3) 2-methylpentane

(4) 2,3-dimethylbutane

---

78. Fehling's solution 'A' is:

Choose the correct answer from the options given below:

(1) aqueous sodium citrate

(2) aqueous copper sulphate

(3) alkaline copper sulphate (Rochelle's salt)

(4) alkaline solution of sodium potassium tartrate

---

79. Match List I with List II: List I (Compound)

A. NH_3

B. BrF_5

C. XeF_4

D. SF_6

List II (Shape/geometry)

I. Trigonal Pyramidal

II. Square Planar

III. Octahedral

IV. Square Pyramidal

Choose the correct answer from the options given below:

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

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

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

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

---

80. The highest number of helium atoms is in:

Choose the correct answer from the options given below:

(1) 2.2271098 L of helium at STP

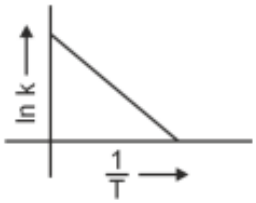
(2) 4 mol of helium

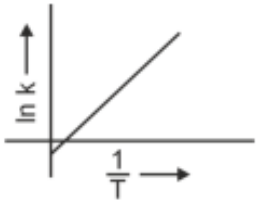
(3) 3 u of helium

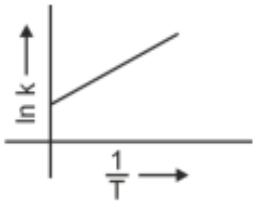
(4) 4 g of helium

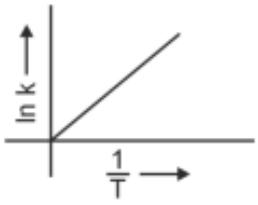
---

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

(1) 

(2) 

(3) 

(4) 

---

82. 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) Statement I is incorrect but Statement II is true

(2) Both Statement I and Statement II are true

(3) Both Statement I and Statement II are false

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

---

83. Intramolecular hydrogen bonding is present in:

Choose the correct answer from the options given below:

(1) HF

(2) $C_6H_4(OH)NO_2$

(3) $C_6H_4(NO_2)^2$

(4) HO-C_6H_4

84. In which of the following processes entropy increases?

Choose the correct answer from the options given below:

(1) A liquid evaporates to vapour.

(2) Temperature of a crystalline solid lowered from 130 K to 0 K.

(3) $2NaHCO_3(s) \rightarrow Na_2CO_3(s) + CO_2(g) + H_2O(g)$

(4) $Cl_2(g) \rightarrow Cl_2(l)$

---

85. Match List I with List II:

List I (Complex)

A. $[Co(NH_3)_5(NO_2)]Cl_2$

B. $[Co(NH_3)_5(SO_4)]Br$

C. $[Co(NH_3)_6[Cr(CN)_6]$

D. $[Co(NH_3)_6Cl_3$

List II (Type of isomerism)

I. Solvate isomerism

II. Linkage isomerism

III. Ionization isomerism

IV. Coordination isomerism

Choose the correct answer from the options given below:

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

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

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

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

SECTION-B

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

(Given atomic masses of A = 64; B = 40; C = 32 u)

(1) ABC_4

(2) A_2BC_2

(3) ABC_3

(4) AB_2C_2

---

87. 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) 3804 kJ/mol

(2) 38.04 kJ/mol

(3) 380.4 kJ/mol

(4) 3.80 kJ/mol

---

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

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

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

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

---

89. 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} K^{-1}. The temperature at which the osmotic pressure measurement is done is:

(1) 12.05°C

(2) 37°C

(3) 310°C

(4) 25.73°C

---

90. 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) 0.0315 g

(2) 3.15 g

(3) 0.315 g

(4) 3.15 mg

---

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

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

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

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) 0.717

(2) 0.00889

(3) 0.0889

(4) 0.8889

---

92. For the given reaction:

$$C_6H_5CH = CH_2 \xrightarrow{KMnO_4/H^+} P \text{ (major product)}$$

What is the structure of the major product P?

(1) C_6H_5COOH

(2) C_6H_5CHO

(3) $C_6H_5CH_2OH$

(4) $C_6H_5CH_2CHO$

---

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

(1) $Pr^{3}+$ and $Sm^{3}+$

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

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

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

---

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

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

$$ROH + PCl_3 \rightarrow RCl + HCl + B$$

(1) H_3PO_3 and $POCl_3$

(2) $POCl_3$ and H_3PO_4

(3) $POCl_3$ and H_3PO_3

(4) H_3PO_4 and $POCl_3$

---

95. Given below are two statements: **Statement I:** $[Co(NH_3)_6]^{3+}$ is a homoleptic complex whereas $[Co(NH_3)_5Cl]^{2+}$ is a heteroleptic complex.

Statement II: Complex $[Co(NH_3)_6]^{3+}$ has only one kind of ligands but $[Co(NH_3)_5Cl]^{2+}$ has more than one kind of ligands.

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

(2) Both Statement I and Statement II are true

(3) Both Statement I and Statement II are false

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

---

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

$$CH_3 - CH_2 - CH_2 - CH = CH_2 \xrightarrow{NaCN} A \xrightarrow{OH^-,\ \text{Partial hydrolysis}} B \xrightarrow{NaOH,B_2} C\ (\text{major})$$

(1) α-bromobutanoic acid

(2) propylamine

(3) butylamine

(4) butanamide

---

97. Identify the correct answer.

- (1) Three canonical forms can be drawn for CO_3^{2-} ion
- (2) Three resonance structures can be drawn for ozone

- (3) BF_3 has non-zero dipole moment
- (4) Dipole moment of NF_3 is greater than that of NH_3

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

(2) Three resonance structures can be drawn for ozone

(3) BF_3 has non-zero dipole moment

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

---

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

$$CH_3CH_2OH \xrightarrow{PbBr_3} \text{A (major)} \xrightarrow{\text{alc. KOH}} \text{B (major)}$$

(1) A: C_4H_9Br, B: C_4H_9OH

(2) A: C_4H_9Cl, B: C_4H_9OH

(3) A: C_4H_9OH, B: C_4H_9Cl

(4) A: C_4H_9Cl, B: C_4H_9Br

---

99. 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 sulphuric acid

(2) dilute hydrochloric acid

(3) concentrated sulphuric acid

(4) dilute nitric acid

---

100. 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) 100 calories

(2) 0 calorie

(3) -413.14 calories

(4) 413.14 calories

BOTANY

SECTION-A

101. Spindle fibers attach to kinetochores of chromosomes during

(1) Telophase

(2) Prophase

(3) Metaphase

(4) Anaphase

---

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

(1) Somatic hybridization

(2) Totipotency

(3) Micropropagation

(4) Differentiation

---

103. Bulliform cells are responsible for **(1)** Providing large spaces for storage of sugars.

(2) Inward curling of leaves in monocots.

(3) Protecting the plant from salt stress.

(4) Increased photosynthesis in monocots

---

104. Given below are two statements:

- **Statement I:** Parenchyma is living but collenchyma is dead tissue.
- **Statement II:** Gymnosperms lack xylem vessels but presence of xylem vessels is the characteristic of angiosperms.

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

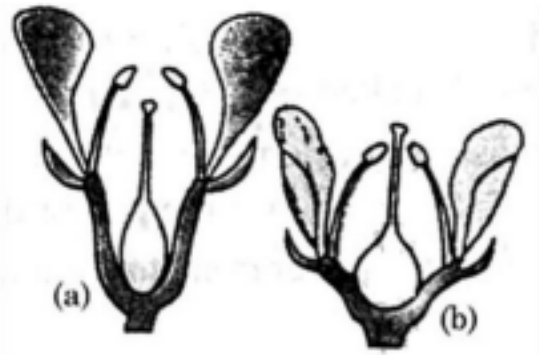
(2) Both Statement I and Statement II are true

(3) Both Statement I and Statement II are false

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

---

105. 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) Perigynous; Epigynous

(2) Epigynous; Hypogynous

(3) Hypogynous; Epigynous

(4) Perigynous; Perigynous

---

106. Match List I with List II:

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

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

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

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

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

---

107. Match List I with List II:

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

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

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

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

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

---

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

(1) Promotor, Structural gene, Terminator

(2) Repressor, Operator gene, Structural gene

(3) Structural gene, Transposons, Operator gene

(4) Inducer, Repressor, Structural gene

---

109. List of endangered species was released by

(1) IUCN

(2) GEAC

(3) WWF

(4) FOAM

---

110. 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.

(1) A and E only

(2) A and B only

(3) D and E only

(4) B and C only

---

111. 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, Pink as well as white flowered plants

(2) Only red flowered plants

(3) Red flowered as well as pink flowered plants

(4) Only pink flowered plants

---

112. 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

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

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

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

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

---

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

(1) 10 bp

(2) 8 bp

(3) 6 bp

(4) 4 bp

---

114. 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.

(1) A, B, C and E

(2) A, B and C only

(3) A, C and E only

(4) B, C and D only

---

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

(1) Sustainable development

(2) In-situ conservation

(3) Biodiversity conservation

(4) Semi-conservative method

---

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

(1) can help in cell division in grasses, to produce growth.

(2) promotes apical dominance.

(3) promotes abscission of mature leaves only.

(4) does not affect mature monocotyledonous plants

---

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

(1) Sesbania

(2) Datura

(3) Cassia

(4) Pisum

---

118. The cofactor of the enzyme carboxypeptidase is:

(1) Haem

(2) Zinc

(3) Niacin

(4) Flavin

---

119. The equation of Verhulst-Pearl logistic growth is

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

From this equation, K indicates:

(1) Population density

(2) Intrinsic rate of natural increase

(3) Biotic potential

(4) Carrying capacity

---

120. Inhibition of Succinate dehydrogenase enzyme by malonate is a classical example of:

(1) Enzyme activation

(2) Cofactor inhibition

(3) Feedback inhibition

(4) Competitive inhibition

---

121. 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) Statement I is false but Statement II is true

(2) Both Statement I and Statement II are true

(3) Both Statement I and Statement II are false

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

---

122. 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, B and D only

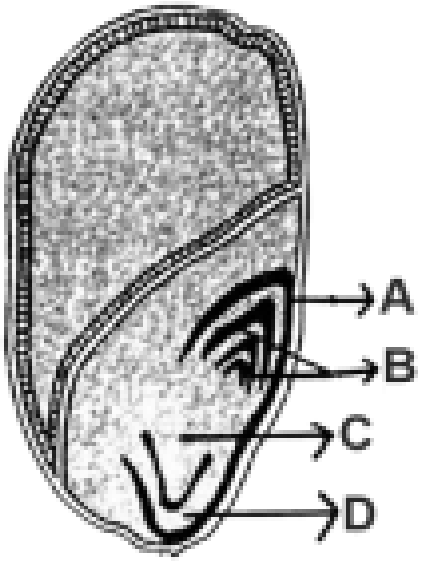
(2) A, C, D and E only

(3) A and B only

(4) A, B and E only

---

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



(1) D

(2) A

(3) B

(4) C

---

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

Choose the correct answer from the options given below:

(1) A, B and D only

(2) A, C and D only

(3) A, B, C and D only

(4) A, B and E only

---

125. Identify the set of correct statements:

Choose the correct answer from the options given below:

(1) B, C, D and E only

(2) C, D and E only

(3) A, B, C and D only

(4) A, C, D and E only

---

126. 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.

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

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

(2) Both Statement I and Statement II are true

(3) Both Statement I and Statement II are false

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

---

127. Match List I with List II:

List I

A. Two or more alternative forms of a gene

B. Cross of F1 progeny with homozygous recessive parent

C. Cross of F1 progeny with any of the parents

D. Number of chromosome sets in plant

List II

I. Back cross

II. Ploidy

III. Allele

IV. Test cross

Choose the correct answer from the options given below:

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

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

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

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

---

128. 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?

Choose the correct answer from the options given below:

(1) BB/Bb

(2) BB

(3) bb

(4) Bb

---

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

Choose the correct answer from the options given below:

(1) Carbohydrates

(2) Amino acids

(3) Phospholipids

(4) Glycerides

---

130. How many molecules of ATP and NADPH are required for every molecule of CO_2 fixed in the Calvin cycle?

Choose the correct answer from the options given below:

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

(2) 2 molecules of ATP and 3 molecules of NADPH

(3) 2 molecules of ATP and 2 molecules of NADPH

(4) 3 molecules of ATP and 3 molecules of NADPH

---

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

Choose the correct answer from the options given below:

(1) Maturation

(2) Differentiation

(3) Redifferentiation

(4) Dedifferentiation

---

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

Choose the correct answer from the options given below:

(1) Fruiting body

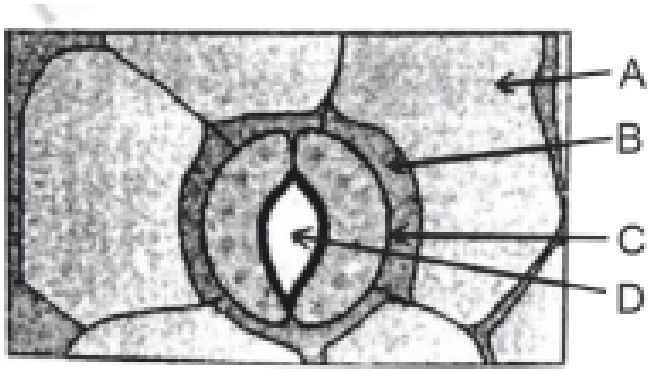
(2) Morphology of mycelium

(3) Mode of nutrition

(4) Mode of spore formation

---

133. 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) B

(2) C

(3) D

(4) A

---

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

Choose the correct answer from the options given below:

(1) Polymerase

(2) Beta-galactosidase

(3) Acetylase

(4) Permease

---

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

Choose the correct answer from the options given below:

(1) D and E only

(2) A, B and C only

(3) B, C and D only

(4) C, D and E only

SECTION-B

136. Match List I with List II:

List I

A. Citric acid cycle

B. Glycolysis

C. Electron transport system

D. Proton gradient

List II

I. Cytoplasm

II. Mitochondrial matrix

III. Intermembrane space of mitochondria

IV. Inner mitochondrial membrane

Choose the correct answer from the options given below:

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

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

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

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

---

137. Identify the correct description about the given figure:

Choose the correct answer from the options given below:

(1) Compact inflorescence showing complete autogamy

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

(3) Water pollinated flowers showing stamens with mucilaginous covering

(4) Cleistogamous flowers showing autogamy

---

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

Choose the correct answer from the options given below:

(1) Abscisic acid

(2) Auxin

(3) Gibberellin

(4) Cytokinin

---

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

Choose the correct answer from the options given below:

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

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

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

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

---

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

Choose the correct answer from the options given below:

(1) Pollens

(2) Callus

(3) Somatic embryos

(4) Protoplasts

---

141. Match List I with List II:

List I

A. Monoadelphous

B. Diadelphous

C. Polyadelphous

D. Epiphyllous

List II

I. Citrus

II. Pea

III. Lily

IV. China-rose

Choose the correct answer from the options given below:

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

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

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

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

---

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

Choose the correct answer from the options given below:

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

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

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

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

---

143. 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 E only

(2) A, B, C and D only

(3) B, C, D and E only

(4) A, C, D and E only

---

144. Match List I with List II:

List I

A. Robert May

B. Alexander von Humboldt

C. Paul Ehrlich

D. David Tilman

List II

I. Species-Area relationship

II. Long term ecosystem experiment using out door plots

III. Global species diversity at about 7 million

IV. Rivet popper hypothesis

Choose the correct answer from the options given below:

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

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

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

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

---

145. Match List I with List II:

List I

A. Frederick Griffith

B. François Jacob Jacque Monod

C. Har Gobind Khorana

D. Meselson Stahl

List II

I. Genetic code

II. Semi-conservative mode of DNA replication

III. Transformation

IV. Lac operon

Choose the correct answer from the options given below:

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

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

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

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

---

146. Match List I with List II:

List I

A. Rose

B. Pea

C. Cotton

D. Mango

List II

I. Twisted aestivation

II. Perigynous flower

III. Drupe

IV. Marginal placentation

Choose the correct answer from the options given below:

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

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

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

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

---

147. The DNA present in chloroplast is:

Choose the correct answer from the options given below:

(1) Circular, single stranded

(2) Linear, double stranded

(3) Circular, double stranded

(4) Linear, single stranded

---

148. Match List-I with List-II:

List I

A. GLUT-4

B. Insulin

C. Trypsin

D. Collagen

List II

I. Hormone

II. Enzyme

III. Intercellular ground substance

IV. Enables glucose transport into cells

Choose the correct answer from the options given below:

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

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

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

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

---

149. 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) Statement I is false but Statement II is true

(2) Both Statement I and Statement II are true

(3) Both Statement I and Statement II are false

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

---

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

Choose the correct answer from the options given below:

(1) Isocitrate $\rightarrow$ -ketoglutaric acid

(2) Malic acid $\rightarrow$ Oxaloacetic acid

(3) Succinic acid $\rightarrow$ Malic acid

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

ZOOLOGY

SECTION-A

151. Match List I with List II:

List I

A. Down's syndrome

B. $\alpha - Thalassemia$

C. $\beta - Thalassemia$

D. Klinefelter's syndrome

List II

I. 11th chromosome

II. 'X' chromosome

III. 21st chromosome

IV. 16th chromosome

Choose the correct answer from the options given below:

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

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

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

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

---

152. Match List I with List II:

List I

A. Axoneme

B. Cartwheel pattern

C. Crista

D. Satellite

List II

I. Centriole

II. Cilia and flagella

III. Chromosome

IV. Mitochondria

Choose the correct answer from the options given below:

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

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

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

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

---

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

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.

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

(1) A is false but R is true

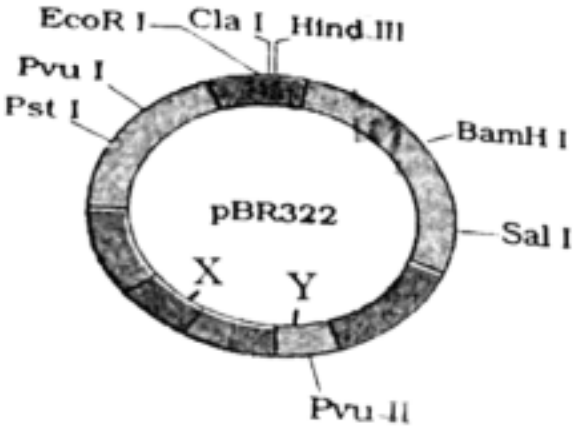
(2) Both A and R are true and R is the correct explanation of A

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

(4) A is true but R is false

---

154. The following diagram showing restriction sites in *E. coli* cloning vector pBR322. Find the role of 'X' and 'Y' genes:



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

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

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

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

---

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

Reason:

Assertion A: The presence or absence of hymen is not a reliable indicator of virginity.

Reason R: The hymen is torn during the first coitus only.

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

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

(2) Both Statement I and Statement II are true

(3) Both Statement I and Statement II are false

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

---

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

Given template: 3'TACATGGAAAATTACCTTCA5'

Choose the correct answer from the options given below:

(1) 5'ATGTACCTTTTAATGGAGT3'

(2) 5'AUGUACCUUUUAAUGGAAGU3'

(3) 5'AUGAAAGUUUAUGGUAGAGU3'

(4) 5'AUGUACCGUUUAUAGGGAGU3'

---

157. Match List I with List II:

List I

A. *Pterophyllum*

B. *Myxine*

C. *Pristis*

D. *Exocoetus*

List II

I. Hag fish

II. Saw fish

III. Angel fish

IV. Flying fish

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-II, D-III

---

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

Choose the correct answer from the options given below:

(1) Vaults

(2) Coitus interruptus

(3) Periodic abstinence

(4) Lactational amenorrhea

---

159. In both sexes of cockroach, a pair of jointed filamentous structures called anal cerci are present on which segment?

Choose the correct answer from the options given below:

(1) 11th segment

(2) 5th segment

(3) 10th segment

(4) 8th and 9th segment

---

160. Match List I with List II:

List I

A. Pleurobrachia

B. Radula

C. Stomochord

D. Air bladder

List II

I. Mollusca

II. Ctenophora

III. Osteichthyes

IV. Hemichordata

Choose the correct answer from the options given below:

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

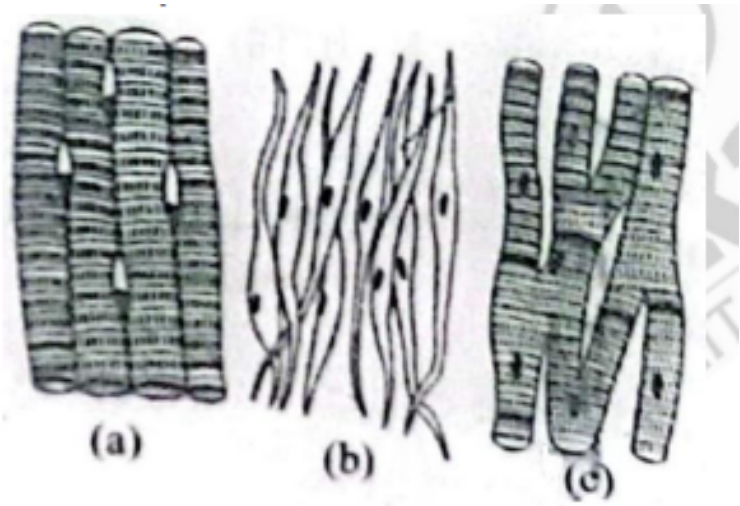
(2) A-IV, B-I, C-II, D-III

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

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

---

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



Name of muscle/location

(1) (a) Involuntary – Nose tip

(2) (a) Smooth – Toes

(3) (a) Skeletal – Triceps

(4) (a) Smooth – Heart

---

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

Choose the correct answer from the options given below:

(1) Ampulla

(2) Uterine fundus

(3) Isthmus

(4) Infundibulum

---

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

Choose the correct answer from the options given below:

(1) Low pCO2 and High temperature

(2) High pO2 and High pCO2

(3) High pO2 and Lesser H+ concentration

(4) Low pCO2 and High H+ concentration

---

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

A. AV bundle

B. Purkinje fibres

C. AV node

D. Bundle branches

E. SA node

Choose the correct sequence of pathway from the options given below: **(1)** E-A-D-B-C

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

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

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

---

165. Match List I with List II:

List I

A. Expiratory capacity

B. Functional residual capacity

C. Vital capacity

D. Inspiratory capacity

List II

I. Expiratory reserve volume + Tidal volume + Inspiratory reserve volume

II. Tidal volume + Expiratory reserve volume

III. Tidal volume + Inspiratory reserve volume

IV. Expiratory reserve volume + Residual volume

Choose the correct answer from the options given below:

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

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

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

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

---

166. 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)** A-D-C-B

(2) D-A-C-B

(3) B-A-D-C

(4) C-B-D-A

---

167. Match List I with List II:

List I

A. Common cold

B. Haemozoin

C. Widal test

D. Allergy

List II

I. Plasmodium

II. Typhoid

III. Rhinoviruses

IV. Dust mites

Choose the correct answer from the options given below:

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

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

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

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

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

Choose the correct answer from the options given below:

(1) Divergent evolution

(2) Adaptive radiation

(3) Natural selection

(4) Convergent evolution

---

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 sequence of stages from the options given below: **(1)** E-C-A-D-B

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

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

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

---

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

Choose the correct answer from the options given below:

(1) Constant gene pool

(2) Genetic recombination

(3) Genetic drift

(4) Gene migration

---

171. Match List I with List II:

List I

A. Pons

B. Hypothalamus

C. Medulla

D. Cerebellum

List II

I. Provides additional space for Neurons, regulates posture and balance.

II. Controls respiration and gastric secretions.

III. Connects different regions of the brain.

IV. Neuro secretory 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-I, D-IV

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

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

---

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

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) A is not correct but R is correct

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

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

(4) A is correct but R is not correct

---

173. Match List I with List II:

List I

A. Typhoid

B. Leishmaniasis

C. Ringworm

D. Filariasis

List II

I. Fungus

II. Nematode

III. Protozoa

IV. Bacteria

Choose the correct answer from the options given below:

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

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

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

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

---

174. Match List I with List II:

List I

A. Cocaine

B. Heroin

C. Morphine

D. Marijuana

List II

I. Effective sedative in surgery

II. Cannabis sativa

III. Erythroxylum

IV. Papaver somniferum

Choose the correct answer from the options given below:

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

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

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

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

---

175. Which of the following statements is incorrect?

Choose the correct answer from the options given below:

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

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

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

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

---

176. Match List I with List II:

List I

A. – antitrypsin

B. Cry IAb

C. Cry IAc

D. Enzyme replacement therapy

List II

I. Cotton bollworm

II. ADA deficiency

III. Emphysema

IV. Corn borer

Choose the correct answer from the options given below:

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

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

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

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

---

177. Match List I with List II:

List I

A. Non-medicated IUD

B. Copper releasing IUD

C. Hormone releasing IUD

D. Implants

List II

I. Multiload 375

II. Progestogens

III. Lippes loop

IV. LNG-20

Choose the correct answer from the options given below:

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

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

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

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

---

178. Match List I with List II:

List I

A. Lipase

B. Nuclease

C. Protease

D. Amylase

List II

I. Peptide bond

II. Ester bond

III. Glycosidic bond

IV. Phosphodiester bond

Choose the correct answer from the options given below:

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

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

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

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

---

179. 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.

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

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

(2) Both Statement I and Statement II are true

(3) Both Statement I and Statement II are false

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

(3) Both Statement I and Statement II are false

Solution: Statement I is incorrect as the descending limb of the loop of Henle is permeable to water but not to electrolytes. Statement II is also incorrect; the proximal convoluted tubule is lined by simple cuboidal epithelium, not columnar.

Quick Tip

Understanding the structure and function of different parts of the nephron is vital for comprehending how the kidneys regulate body fluids and electrolytes.

---

180. Match List I with List II:

List I

A. Diakinesis

B. Pachytene

C. Zygotene

D. Leptotene

List II

I. Synaptonemal complex formation

II. Completion of terminalisation of chiasmata

III. Chromosomes look like thin threads

IV. Appearance of recombination nodules

Choose the correct answer from the options given below:

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

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

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

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

181. The "Ti plasmid" of *Agrobacterium tumefaciens* stands for:

Choose the correct answer from the options given below:

(1) Temperature independent plasmid

(2) Tumour inhibiting plasmid

(3) Tumor independent plasmid

(4) Tumor inducing plasmid

---

182. Match List I with List II:

List I

A. Fibrous joints

B. Cartilaginous joints

C. Hinge joints

D. Ball and socket joints

List II

I. Adjacent vertebrae, limited movement

II. Humerus and Pectoral girdle, rotational movement

III. Skull, don't allow any movement

IV. Knee, help in locomotion

Choose the correct answer from the options given below:

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

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

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

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

Quick Tip

Understanding the types of joints and their locations helps in studying human anatomy and movements.

---

183. 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) C, D E only

(2) A, B D only

(3) A, B E only

(4) B, C E only

---

184. 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) D only

(2) B only

(3) A only

(4) C only

---

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

Choose the correct answer from the options given below:

(1) Glucagon

(2) Cortisol

(3) Testosterone

(4) Progesterone

SECTION-B

186. Match List I with List II:

List I

A. RNA polymerase III

B. Termination of transcription

C. Splicing of Exons

D. TATA box

List II

I. snRNPs

II. Promoter

III. Rho factor

IV. SnRNAs, tRNA

Choose the correct answer from the options given below:

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

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

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

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

---

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

Choose the correct answer from the options given below:

(1) Juxta medullary nephrons outnumber the cortical nephrons. **(2)** Juxta medullary nephrons are located in the columns of Bertini. **(3)** Renal corpuscle of juxta medullary nephron lies in the outer portion of the renal medulla. **(4)** Loop of Henle of juxta medullary nephron runs deep into medulla.

---

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.

choose the most appropriate answer from the options given below:

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

189. 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:

choose the most appropriate answer from the options given below:

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

---

190. Match List I with List II:

List I

A. P wave

B. QRS complex

C. T wave

D. T-P gap

List II

I. Heart muscles are electrically silent.

II. Depolarisation of ventricles.

III. Depolarisation of atria.

IV. Repolarisation of ventricles.

Choose the correct answer from the options given below:

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

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

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

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

---

191. 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) Statement I is incorrect but Statement II is correct. **(2)** Both Statement I and Statement II

are correct. **(3)** Both Statement I and Statement II are incorrect. **(4)** Statement I is correct but Statement II is incorrect.

---

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

GnRH $\rightarrow$ LH $\downarrow$

(A) $\rightarrow$ (B) $\rightarrow$ Androgens $\rightarrow$ (C) $\rightarrow$ Formation of spermatids $\rightarrow$ (D)

choose the most appropriate answer from the options given below:

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

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193. Match List I with List II:

List I

A. Exophthalmic goiter

B. Acromegaly

C. Cushing's syndrome

D. Cretinism

List II

I. Excess secretion of cortisol, moon face & hyperglycemia.

II. Hypo-secretion of thyroid hormone and stunted growth.

III. Hyper secretion of thyroid hormone & protruding eye balls.

IV. Excessive secretion of growth hormone.

Choose the correct answer from the options given below:

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

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

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

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

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

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195. Given below are two statements:

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

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

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

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

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

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

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

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196. Match List I with List II:

List I

A. Mesozoic Era

B. Proterozoic Era

C. Cenozoic Era

D. Paleozoic Era

List II

I. Lower invertebrates

II. Fish & Amphibia

III. Birds & Reptiles

IV. Mammals

Choose the correct answer from the options given below:

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

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

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

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

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197. Match List I with List II:

List I

A. Unicellular glandular epithelium

B. Compound epithelium

C. Multicellular glandular epithelium

D. Endocrine glandular epithelium

List II

I. Salivary glands

II. Pancreas

III. Goblet cells of alimentary canal

IV. Moist surface of buccal cavity

Choose the correct answer from the options given below:

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

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

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

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

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

A. Substrate enzyme complex formation.

B. Freeze 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, D, C, B, A

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

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

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

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

List I

A. The structures used for storing of food

B. Ring of 6-8 blind tubules at junction of foregut and midgut.

C. Ring of 100-150 yellow coloured thin filaments at junction of midgut and hindgut.

D. The structures used for grinding the food.

List II

I. Gizzard

II. Gastric Caeca

III. Malpighian tubules

IV. Crop

Choose the correct answer from the options given below:

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

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

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

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

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200. Given below are two statements:

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

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

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

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