NEET UG 2024 R4 Question Paper

Time Allowed :200 minutes	**Maximum Marks :**720	**Total questions :**200

General Instructions

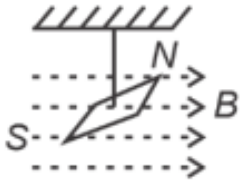
Read the following instructions very carefully and strictly follow them:

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. 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:



(A) $128\pi^2$

(B) $50\pi^2$

(C) $1280\pi^2$

(D) $5\pi^2$

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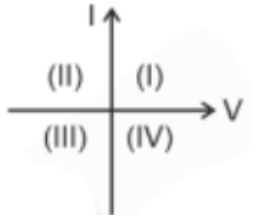
2. Consider the following statements A and B and identify the correct answer:



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.

(A) A is incorrect but B is correct

(B) Both A and B are correct

(C) Both A and B are incorrect

(D) A is correct but B is incorrect

3. 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:

(A) 5 m, 2 s

(B) 5 cm, 1 s

(C) 5 m, 1 s

(D) 5 cm, 2 s

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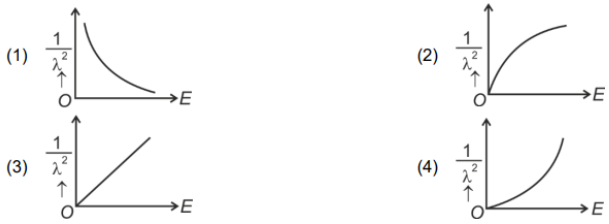
4. The graph which shows the variation of $\frac{1}{\lambda^2}$ and its kinetic energy, E, is (where λ is de Broglie wavelength of a free particle):



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5. The moment of inertia of a thin rod about an axis passing through its midpoint and perpendicular to the rod is 2400 g cm^2. The length of the 400 g rod is nearly:

(A) 17.5 cm

(B) 20.7 cm

(C) 72.0 cm

(D) 8.5 cm

---

6. 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:

(A) 0.4 mm

(B) 40 mm

(C) 8 mm

(D) 4 mm

7.

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

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

(A) $286, 80$

(B) $288, 82$

(C) $286, 81$

(D) $280, 81$

---

8. 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:

(A) 198 N

(B) 1.98 mN

(C) 99 N

(D) 19.8 mN

---

9. 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:

(A) 52Ω

(B) 55Ω

(C) 60Ω

(D) 26Ω

---

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

(A) 5

(B) 7

(C) 6

(D) 10

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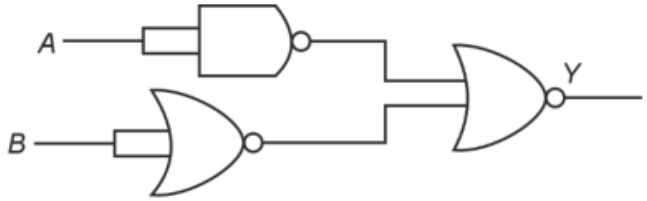
11. The output (Y) of the given logic gate is similar to the output of an/a:



(A) NOR gate

(B) OR gate

(C) AND gate

(D) NAND gate

---

12. 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):

(A) 4.4 T

(B) 4.4 mT

(C) 44 T

(D) 44 mT

---

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

(A) The refracted light will be completely polarised.

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

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

(D) The reflected light will be partially polarised.

---

14. Match List I with List II.

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

Choose the correct answer from the options given below:

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

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

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

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

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

(A) $2 : 1$

(B) $4 : 1$

(C) $1 : 4$

(D) $1 : 2$

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16. Match List-I with List-II.

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

Choose the correct answer from the options given below:

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

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

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

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

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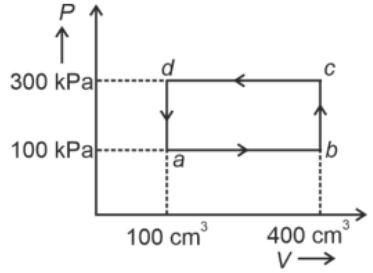
17. A thermodynamic system is taken through the cycle $abcd$. The work done by the gas along the path bc is:



(A) 30 J

(B) -90 J

(C) -60 J

(D) Zero

---

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

(A) stress and angle

(B) strain and arc

(C) angular speed and stress

(D) strain and angle

---

19. 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:

(A) 9.8 m s^{-2}

(B) 4.9 m s^{-2}

(C) 3.92 m s^{-2}

(D) 19.6 m s^{-2}

20. 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:

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

(B) $100N$

(C) $10(N+1)$

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

---

21. 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:

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

(B) $\overline{B}$

(C) B

(D) $A.B + \overline{A}$

---

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

Reason R:

$$V = \pm \frac{2P}{4\pi\varepsilon_0 r^2}$$

where r is the distance of any axial point, situated at 2 m from the centre of the dipole.

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

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

(B) A is true but R is false.

(C) A is false but R is true.

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

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23. In an ideal transformer, the turns ratio is $\frac{N_P}{N_S} = \frac{1}{2}$. The ratio $V_S : V_P$ is equal to (the symbols carry their usual meaning):

(A) $2 : 1$

(B) $1 : 1$

(C) $1 : 4$

(D) $1 : 2$

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

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

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

(C) All bright fringes will be of equal width

(D) Interference pattern will disappear

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25. A bob is whirled in a horizontal plane by means of a string with an initial speed of ω

rpm. The tension in the string is T. If speed becomes 2ω while keeping the same radius, the tension in the string becomes:

(A) $4T$

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

(C) $\sqrt{2}T$

(D) T

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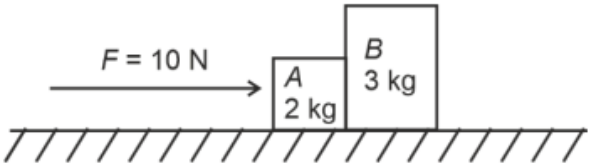
26. A horizontal force 10 N is applied to a block A as shown in the figure. The mass of blocks A and B are 2 kg and 3 kg respectively. The blocks slide over a frictionless surface. The force exerted by block A on block B is:



(A) 4 N

(B) 6 N

(C) 10 N

(D) Zero

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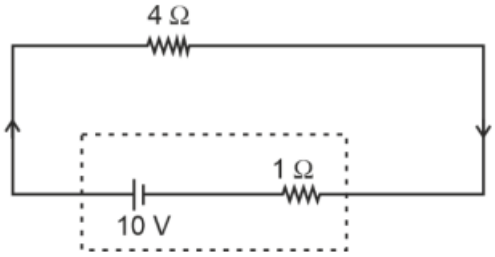
27. The terminal voltage of the battery, whose emf is 10 V and internal resistance 1 Ω, when connected through an external resistance of 4 Ω as shown in the figure is:



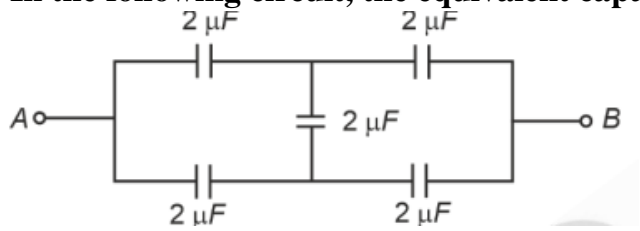
(A) 6 V

(B) 8 V

(C) 10 V

(D) 4 V

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



(1) $1\,\mu$F

(2) $0.5\,\mu$F

(3) $4\,\mu$F

(4) $2\,\mu$F

---

29. Given below are two statements: Statement I: Atoms are electrically neutral as they contain equal numbers of positive and negative charges.

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

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

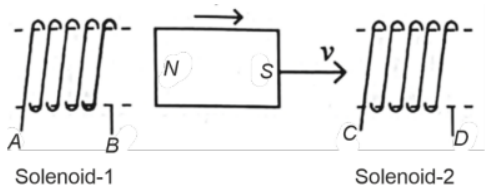
(1) Both Statement I and Statement II are incorrect

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

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

(4) Both Statement I and Statement II are correct

30.



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 solenoid-2, respectively, are through

the directions:

(1) BA and CD

(2) AB and CD

(3) BA and DC

(4) AB and DC

---

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

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

B. The velocity of a photon is c.

C. The momentum of a photon 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:

(1) A, B, C, and D only

(2) A, C, and D only

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

(4) A and B only

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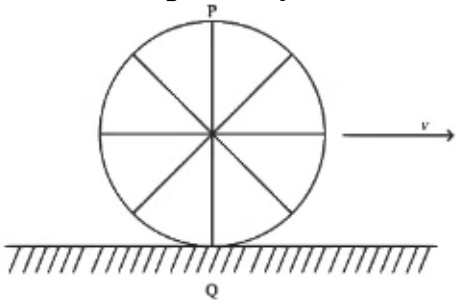
32. A wheel of a bullock cart is rolling on a level road as shown in the figure. If its linear speed is ν, which of the following is correct (P and Q are the highest and lowest points on the wheel, respectively)?



(1) Point P moves faster than point Q.

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

(3) Point P has zero speed.

(4) Point P moves slower than point Q.

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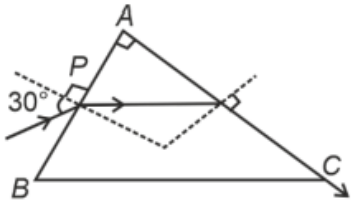
33. A light ray enters a right-angled prism at point P with an angle of incidence of 30°. It travels through the prism parallel to its base BC and emerges along the face AC. The refractive index of the prism is:



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

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

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

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

---

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

(1) Constant acceleration

(2) Constant velocity but varying acceleration

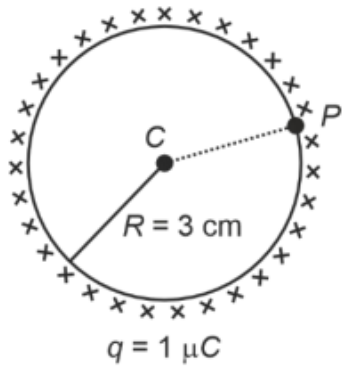
(3) Varying velocity and varying acceleration

(4) Constant velocity

---

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

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



(1) 1×10^5 V

(2) 0.5×10^5 V

(3) Zero

(4) 3×10^5 V

Section B

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

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

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

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

(4) There is no current.

---

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 0C to 100C without expansion or bending. The compressive force developed in it is:

(1) 50×10^3 N

(2) 100×10^3 N

(3) 2×10^3 N

(4) 5×10^3 N

---

38. The property which is not of an electromagnetic wave traveling in free space is:

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

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

(3) They originate from charges moving with uniform speed.

(4) They are transverse in nature.

---

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

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

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

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

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

---

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

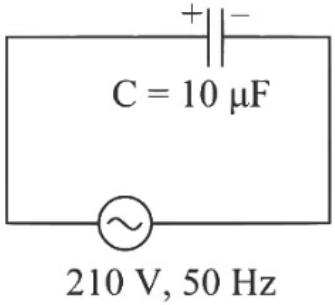
(1) $2 : 9$

(2) $1 : 2$

(3) $2 : 3$

(4) $1 : 1$

41. A $10\,\mu$F 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) $0.93\,\text{A}$

(2) $1.20\,\text{A}$

(3) $0.35\,\text{A}$

(4) $0.58\,\text{A}$

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

(1) 2

(2) $2\sqrt{3}$

(3) 4

(4) 3

---

43. 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):

(1) A and C only

(2) A, C, and D only

(3) C only

(4) B and D only

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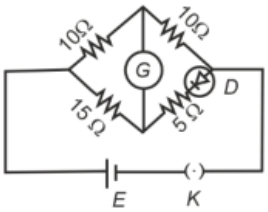
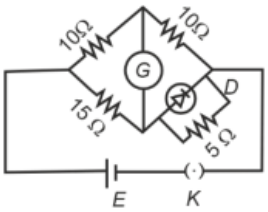
44. Choose the correct circuit which can achieve the bridge balance.

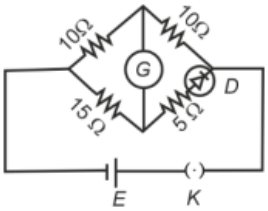
(1)



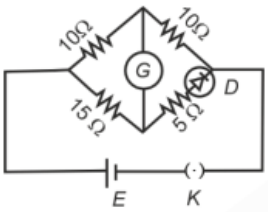
(2)



(3)



(4)



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45. 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:

(1) A, C, and E only

(2) B, D, and E only

(3) A, B, and C only

(4) A, B, and E only

---

46. An iron bar of length L has a 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) $\frac{M}{2}$

(2) $2M$

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

(4) M

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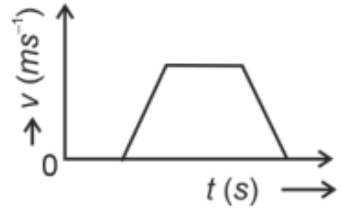
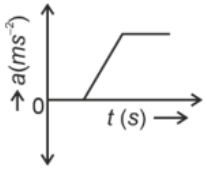
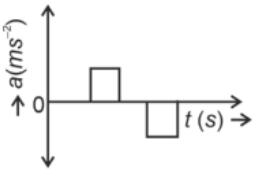
47. The velocity (v)–time (t) plot of a body's motion is shown below:



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

(1)


(2)


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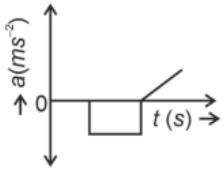

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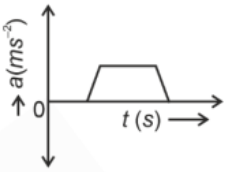

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48. A small telescope has an objective of focal length 140 cm and an eyepiece of focal

length 5.0 cm. The magnifying power of the telescope for viewing a distant object is:

(1) 28

(2) 17

(3) 32

(4) 34

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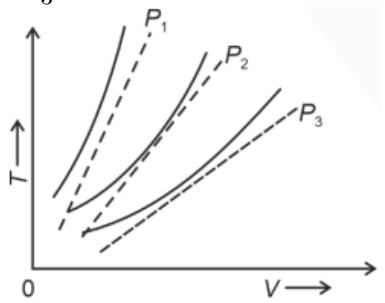
49. The following graph represents the T-V curves of an ideal gas at pressures P_1, P_2, and P_3. The correct relation is:



(1) $P_1 > P_3 > P_2$

(2) $P_2 > P_1 > P_3$

(3) $P_1 > P_2 > P_3$

(4) $P_3 > P_2 > P_1$

---

50. A force defined by $F = \alpha t^2 + \beta t$ acts on a particle at a given time t. Which factor is dimensionless if α and β are constants?

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

(2) $\alpha\beta t$

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

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

Chemistry

Section A

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

(A) Ti^{3+}

(B) Cr^{2+}

(C) Mn^{2+}

(D) Fe^{2+}

(E) Sc^{3+}

Choose the most appropriate answer from the options given below:

(1) A and E only

(2) B and C only

(3) A and D only

(4) B and D only

---

52. Match List I with List II.

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

Choose the correct answer from the options given below:

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

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

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

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

53. Fehling's solution 'A' is:

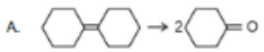
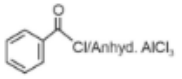
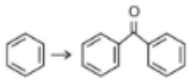
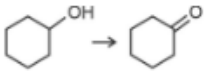
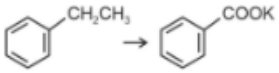
(1) Alkaline copper sulphate

(2) Alkaline solution of sodium potassium tartrate (Rochelle's salt)

(3) Aqueous sodium citrate

(4) Aqueous copper sulphate

54. Match List I with List II and choose the correct answer.

List I (Reaction)	List II (Reagents/Condition)
A. 	I. 
B. 	II. CrO_3
C. 	III. $KMnO_4/KOH, \Delta$
D. 	IV. (i) O_3 (ii) $Zn\text{-}H_2O$

Choose the correct answer from the options given below:

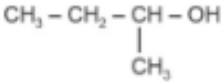
(1) A-III, B-I, C-II, D-IV

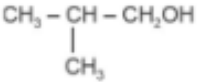
(2) A-IV, B-I, C-II, D-III

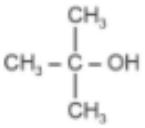
(3) A-I, B-IV, C-II, D-III

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

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

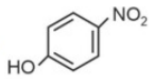
(1) 

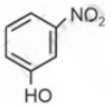
(2) 

(3) 

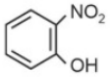
(4) $CH_3 - CH_2 - CH_2 - CH_2OH$

56. Intramolecular hydrogen bonding is present in:

(1) 

(2) 

(3) HF

(4) 

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57. Match List I with List II.

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

Choose the correct answer from the options given below:

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

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

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

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

---

58. Given below are two statements:

Statement 1: The boiling point of these isomeric pentanes follows the order n-pentane $>$ isopentane $>$ neopentane

Statement 2: When branching increases, the molecule attains a shape of a 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) Both Statement 1 and Statement 2 are incorrect

(2) Statement 1 is correct but Statement 2 is incorrect

(3) Statement 1 is incorrect but Statement 2 is correct

(4) Both Statement 1 and Statement 2 are correct

---

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

(A) A liquid evaporates to vapor.

(B) 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, B and D

(2) A, C and D

(3) C and D

(4) A and C

---

60. 1 gram of sodium hydroxide was treated with 25 mL of 0.75 M HCl solution. The mass of sodium hydroxide left unreacted is equal to:

(1) 250 mg

(2) 200 mg

(3) Zero mg

(4) 750 mg

---

61. Match List I with List II.

Choose the correct answer from the options given below:

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

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

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

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

List I (Molecule)		List II (Number and Types of Bonds 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

---

62. Given below are two statements:

Statement 1: The boiling point of hydrides of Group 16 elements follows the order

$$H_2O > H_2Te > H_2Se > H_2S$$

Statement 2: 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 H-bonding in H_2O, it has a higher boiling point.

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

(1) Both Statement 1 and Statement 2 are false

(2) Statement 1 is false but Statement 2 is true

(3) Statement 1 is true but Statement 2 is false

(4) Both Statement 1 and Statement 2 are true

---

63. Match List I with List II.

Choose the correct answer from the options given below:

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

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

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

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

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

---

64. The highest number of helium atoms is in:

(1) 1 g of helium

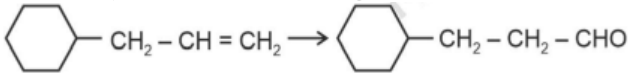
(2) 4 g of helium

(3) 2.27108 g of helium at STP

(4) 4 mol of helium

---

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



(1) (i) BH_3

(ii) H_2O_2/OH^-

(iii) PCC

(2) (i) BH_3

(ii) H_2O_2/OH^-

(iii) alk.$KMnO_4$

(iv) H_3O^+

(3) (i) H_2O/H^+

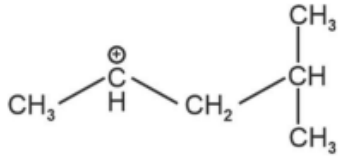
(ii) PCC

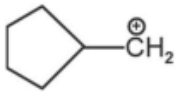
(4) (i) H_2O/H^+

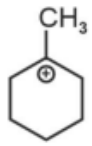
(ii) CrO_3

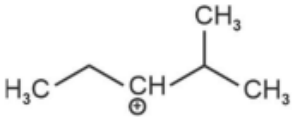
---

66. The most stable carbocation among the following is:

(1) 

(2) 

(3) 

(4) 

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

N, O, F, C, Si.

(1) Si ¡ C ¡ O ¡ N ¡ F

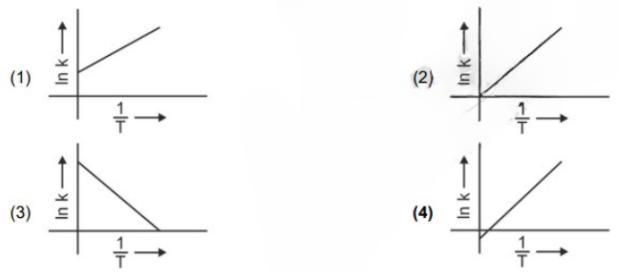
(2) O ¡ F ¡ N ¡ C ¡ Si

(3) F ¡ O ¡ N ¡ C ¡ Si

(4) Si ¡ C ¡ N ¡ O ¡ F

---

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



---

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

(1) Se

(2) Te

(3) Po

(4) O

---

70. 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 < B < Be < C < N

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

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

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

---

71. Given below are two statements:

Statement 1: Aniline does not undergo Friedel-Crafts alkylation reaction.

Statement 2: 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 1 and Statement 2 are false

(2) Statement 1 is correct but Statement 2 is false

(3) Statement 1 is incorrect but Statement 2 is true

(4) Both Statement 1 and Statement 2 are true

---

72. Given below are two statements:

Statement 1: Both $[Co(NH_3)_6]^{3+}$ and $[CoF_6]^{3-}$ complexes are octahedral but differ in their magnetic behavior.

Statement 2: $[Co(NH_3)_6]^{3+}$ 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 1 and Statement 2 are false

(2) Statement 1 is true but Statement 2 is false

(3) Statement 1 is false but Statement 2 is true

(4) Both Statement 1 and Statement 2 are true

---

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

(1) d^5 to d^4 configuration

(2) d^4 to d^5 configuration

(3) d^3 to d^2 configuration

(4) d^6 to d^5 configuration

---

74. Match List I with List II.

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

Choose the correct answer from the options given below:

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

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

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

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

---

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

Then, which of the following is correct?

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

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

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

(4) Reaction is at equilibrium.

---

76. Match List I with List II.

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

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

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

---

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

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

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

(3) $2BrCl(g) \rightleftharpoons Br_2(g) + Cl_2(g)$

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

---

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

A. Tollen's reagent

B. Schiff's reagent

C. HCN

D. NH2OH

E. NaHSO3

Choose the correct options from the given below:

(1) A and D

(2) B and E

(3) E and D

(4) B and C

---

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

(1) Sublimation

(2) Distillation

(3) Chromatography

(4) Crystallization

---

80. Which reaction is NOT a redox reaction?

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

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

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

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

---

81. 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 $>$ C $>$ A

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

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

(4) B > A > C

---

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

(1) Probability of collision

(2) Orientation of reactant molecules during collision

(3) Rate constant at two different temperatures

(4) Rate constant at standard temperature

---

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

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

(2) $-4x$

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

(4) $-x$

---

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

---

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

(1) 2-methylpentane

(2) 2,3-dimethylbutane

(3) 2,2-dimethylbutane

(4) n-hexane

Section B

86.

Given below are certain cations. Using inorganic qualitative analysis, arrange them in increasing group number from 0 to VI.

A. Al^{3+}

B. Cu^{2+}

C. Ba^{2+}

D. Co^{2+}

E. Mg^{2+}

Choose the correct answer from the options given below.

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

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

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

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

---

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

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

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

(A) $POCl_3$ and H_3PO_4

(B) H_3PO_4 and $POCl_3$

(C) H_3PO_3 and $POCl_3$

(D) $POCl_3$ and H_3PO_3

---

88. 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) Concentrated sulphuric acid

(2) Dilute nitric acid

(3) Dilute sulphuric acid

(4) Dilute hydrochloric acid

---

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}. The temperature at which the osmotic pressure measurement is done is

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

(1) 310°C

(2) 25.73°C

(3) 12.05°C

(4) 37°C

---

90. 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) -413.14 calories

(2) 413.14 calories

(3) 100 calories

(4) 0 calorie

---

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

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

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

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

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

---

92. Identify the correct answer:

(A) BF_3 has non-zero dipole moment.

(B) Dipole moment of NF_3 is greater than that of NH_3.

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

(D) Three resonance structures can be drawn for ozone.

---

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):

(A) 0.315 g

(B) 31.5 g

(C) 0.0315 g

(D) 3.15 g

---

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

$CH_3 - CH_2 - CH_2 - I \xrightarrow{NaCN} A$

$A \xrightarrow{OH^- \text{(Partial hydrolysis)}} B \xrightarrow{NaOH, Br_2} C$ (major)

(1) butylamine

(2) butanamide

(3) α-bromobutanoic acid

(4) propylamine

---

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

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

$2NO_{(g)} \rightleftharpoons N_2(g) + O_2(g)$

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) 0.0889

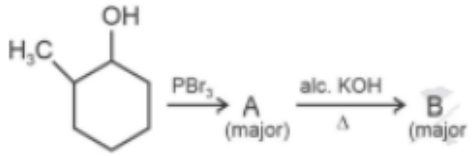
(2) 0.8889

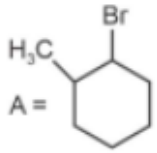
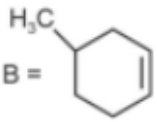
(3) 0.717

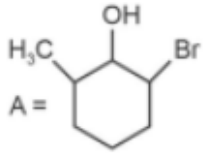
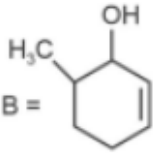
(4) 0.00889

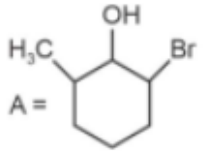
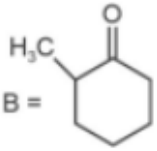
---

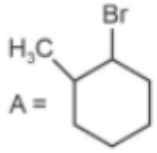
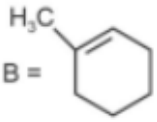
96. Major products A and B formed in the following reaction sequence are:



(1) A =  ; B = 

(2) A =  ; B = 

(3) A =  ; B = 

(4) A =  ; B = 

---

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

Given:

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

(1) $380.4\, kJ/mol$

(2) $3.80\, kJ/mol$

(3) $3804\, kJ/mol$

(4) $38.04\, kJ/mol$

---

98. Given below are two statements:

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

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

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

(1) Both Statement I and Statement II are false

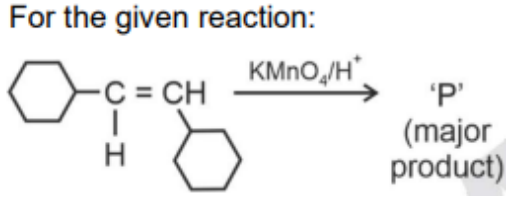
(2) Statement I is true but Statement II is false

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

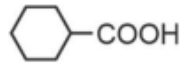
(4) Both Statement I and Statement II are true

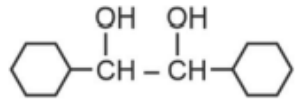
---

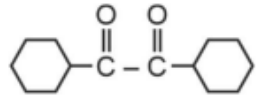
99. For the given reaction:

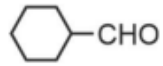


'P' is

(1) 

(2) 

(3) 

(4) 

---

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

(Given atomic masses: A = 64, B = 40, C = 32 u)

(1) ABC_3

(2) AB_2C_2

(3) ABC_4

(4) A_2BC_2

Botany

Section A

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

(1) 6 bp

(2) 4 bp

(3) 10 bp

(4) 8 bp

---

102. Given below are two statements:

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

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

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

(1) Both Statement I and Statement II are false

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

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

(4) Both Statement I and Statement II are true

---

103. 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 an inactive protoxin in *B. thuringiensis*. However, after ingestion by the insect, the inactive protoxin gets converted into an active form due to the acidic pH of the insect gut.

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

(1) Both Statement I and Statement II are false

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

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

(4) Both Statement I and Statement II are true

---

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

A. Out of one pair of factors, one is dominant and the other is recessive.

B. Alleles do not show any expression, and both the characters appear as such in F_2 gener-

ation.

C. Factors occur in pairs in normal diploid plants.

D. The discrete unit controlling a particular character is called a factor.

E. The expression of only one of the parental characters is found in a monohybrid cross.

Choose the correct answer from the options given below:

(1) A, C, D, and E only

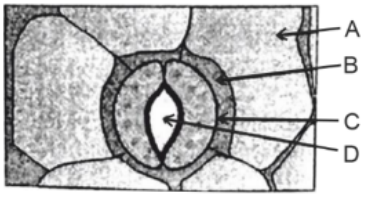
(2) B, C, and D only

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

(4) A, B, and C only

---

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



(1) D

(2) A

(3) B

(4) C

---

106. List of endangered species was released by

(1) WWF

(2) FOAM

(3) IUCN

(4) GEAC

---

107. The lactose present in the growth medium of bacteria is transported to the cell by

the action of

(1) Acetylase

(2) Permease

(3) Polymerase

(4) Beta-galactosidase

---

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

(1) Mode of nutrition

(2) Mode of spore formation

(3) Fruiting body

(4) Morphology of mycelium

---

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

(1) Feedback inhibition

(2) Competitive inhibition

(3) Enzyme activation

(4) Cofactor inhibition

---

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

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

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

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

---

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, B, C and D only

(2) A, B and E only

(3) A, B and D only

(4) A, C and D only

---

112. Given below are two statements:

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

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

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

(1) Both Statement I and Statement II are false

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

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

(4) Both Statement I and Statement II are true

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

(1) Redifferentiation

(2) Dedifferentiation

(3) Maturation

(4) Differentiation

---

114. Tropical regions show greatest level of species richness because

(A) Tropical latitudes have remained relatively undisturbed for millions of years, hence more time was available for species diversification.

(B) Tropical environments are more seasonal.

(C) More solar energy is available in tropics.

(D) Constant environments promote niche specialization.

(E) Tropical environments are constant and predictable.

Choose the correct answer from the options given below.

(1) A and B only

(2) A, B and E only

(3) A, B and D only

(4) A, C, D and E only

---

115. Spindle fibers attach to kinetochores of chromosomes during

(1) Metaphase

(2) Anaphase

(3) Telophase

(4) Prophase

---

116. 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 F1 progeny with homozygous recessive parent	II. Ploidy
C. Cross of F1 progeny with any of the parents	III. Allele
D. Number of chromosome sets in plant	IV. Test cross

Choose the correct answer from the options given below:

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

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

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

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

---

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

(1) Phospholipids

(2) Glycerides

(3) Carbohydrates

(4) Amino acids

---

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

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

From this equation, K indicates:

(1) Biotic potential

(2) Carrying capacity

(3) Population density

(4) Intrinsic rate of natural increase

---

119. Match List I with List II

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

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

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

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

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

---

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

(1) Micropropagation

(2) Differentiation

(3) Somatic hybridization

(4) Totipotency

---

121. 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) A, B, C and D only

(2) A, C, D and E only

(3) B, C, D and E only

(4) C, D and E only

---

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 2 molecules of NADPH

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

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

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

---

123. The cofactor of the enzyme carboxypeptidase is:

(1) Niacin

(2) Flavin

(3) Haem

(4) Zinc

---

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

(1) Biodiversity conservation

(2) Semi-conservative method

(3) Sustainable development

(4) *in-situ* conservation

---

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

(1) Structural gene, Transposons, Operator gene

(2) Inducer, Repressor, Structural gene

(3) Promoter, Structural gene, Terminator

(4) Repressor, Operator gene, Structural gene

---

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

A.The piece of DNA would be able to multiply itself independently in the progeny cells of the organism.

B. It may get integrated into the genome of the recipient.

C. It may multiply and be inherited along with the host DNA.

D. The alien piece of DNA is not an integral part of chromosome.

E. It shows ability to replicate.

Choose the correct answer from the options given below:

(1) D and E only

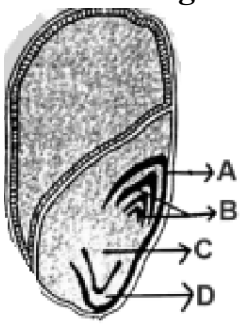
(2) B and C only

(3) A and E only

(4) A and B only

---

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



(1) B

(2) C

(3) D

(4) A

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

(1) *Cassia*

(2) *Pisum*

(3) *Sesbania*

(4) *Datura*

---

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

(1) promotes abscission of mature leaves only.

(2) does not affect mature monocotyledonous plants.

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

(4) promotes apical dominance.

---

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

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

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

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

---

131. A pink flowered Snapdragon plant was crossed with a red flowered Snapdragon

plant. What type of phenotype/s is/are expected in the progeny?

(1) Red flowered as well as pink flowered plants

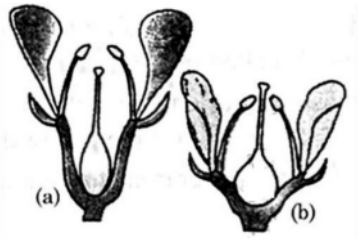
(2) Only pink flowered plants

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

(4) Only red flowered plants

---

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



(1) (a) Hypogynous; (b) Epigynous

(2) (a) Perigynous; (b) Epigynous

(3) (a) Perigynous; (b) Perigynous

(4) (a) Epigynous; (b) Hypogynous

---

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

A. Light

B. Chlorophyll

C. CO_2

D. ATP

E. NADPH

Choose the **correct** answer from the options given below:

(1) B, C and D only

(2) C, D and E only

(3) D and E only

(4) A, B and C only

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

(1) **bb**

(2) Bb

(3) BB/Bb

(4) BB

---

135. Bulliform cells are responsible for

(1) Protecting the plant from salt stress.

(2) Increased photosynthesis in monocots.

(3) Providing large spaces for storage of sugars.

(4) Inward curling of leaves in monocots.

Section B

136. Given below are two statements:

Statement I: In C_3 plants, some O_2 binds to RuBisCO, hence CO_2 fixation is decreased.

Statement II: In C_4 plants, mesophyll cells show very little photorespiration while bundle sheath cells do not show photorespiration.

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

(1) Both Statement I and Statement II are false

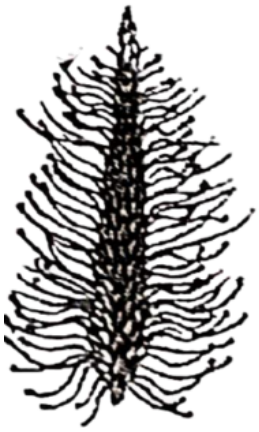
(2) Statement I is true but Statement II is false

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

(4) Both Statement I and Statement II are true

---

137. Identify the correct description about the given figure:



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

(2) Cleistogamous flowers showing autogamy.

(3) Compact inflorescence showing complete autogamy.

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

---

138. Match List I with List II

List I	Plant	List II	Feature
A	Rose	I	Twisted aestivation
B	Pea	II	Perigynous flower
C	Cotton	IV	Marginal placentation
D	Mango	III	Drupe

Choose the correct answer from the options given below:

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

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

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

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

---

139. The DNA present in chloroplast is:

(1) Circular, double stranded

(2) Linear, single stranded

(3) Circular, single stranded

(4) Linear, double stranded

---

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

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

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

(3) The DNA dependent DNA polymerase catalyses polymerization in 5' → 3' direction

(4) The DNA dependent DNA polymerase catalyses polymerization in one direction, that is 3' → 5'

---

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

(1) Somatic embryos

(2) Protoplasts

(3) Pollens

(4) Callus

---

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

(1) Succinic acid → Malic acid

(2) Succinyl-CoA → Succinic acid

(3) Isocitrate → -ketoglutaric acid

(4) Malic acid → Oxaloacetic acid

---

143. Match List-I with List-II

List-I	Biological Component	List-II	Function
A	GLUT-4	I	Hormone
B	Insulin	II	Enzyme
C	Trypsin	III	Intercellular ground substance
D	Collagen	IV	Enables glucose transport into cells

Choose the correct answer from the options given below:

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

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

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

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

---

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

(1) Gibberellin

(2) Cytokinin

(3) Abscisic acid

(4) Auxin

---

145. Match List-I with List-II

List-I	Scientist(s)	List-II	Discovery/Contribution
A	Frederick Griffith	I	Genetic code
B	Francois Jacob & Jacque Monod	II	Semi-conservative mode of DNA repl
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-IV, C-I, D-II

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

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

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

---

146. Match List-I with List-II

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

Choose the correct answer from the options given below:

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

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

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

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

---

147. 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*, carotenoids, and xanthophyll.

E. Vegetative cells have a cellulosic wall, usually covered on the outside by a gelatinous coating of algin.

Choose the correct answer from the options given below:

(1) B, C, D and E only

(2) A, C, D and E only

(3) A, B, C and E only

(4) A, B, C and D only

---

148. Match List-I with List-II

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

Choose the correct answer from the options given below:

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

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

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

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

---

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

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

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

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

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

---

150. Match List-I with List-II

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

Choose the correct answer from the options given below:

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

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

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

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

Zoology

Section A

151. Match List-I with List-II

List-I	Type of Joint	List-II	Example/Function
A	Fibrous joints	I	Adjacent vertebrae, limited movement
B	Cartilaginous joints	II	Humerus and Pectoral girdle, rotational moveme
C	Hinge joints	III	Skull, don't allow any movement
D	Ball and socket joints	IV	Knee, help in locomotion

Choose the correct answer from the options given below:

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

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

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

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

---

152. Match List-I with List-II

List-I	Disease/Concept	List-II	Associated Pathogen/Factor
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-I, B-III, C-II, D-IV

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

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

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

---

153. Match List-I with List-II

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

Choose the correct answer from the options given below:

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

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

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

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

---

154. Given below are two statements: one is labeled as Assertion (A) and the other is labeled as Reason (R):

Assertion A: FSH acts upon ovarian follicles in female and Leydig cells in male.

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

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

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

(2) A is true but R is false

(3) A is false but R is true

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

155. The "Ti plasmid" of *Agrobacterium tumefaciens* stands for

(1) Tumor independent plasmid

(2) Tumor inducing plasmid

(3) Temperature independent plasmid

(4) Tumour inhibiting plasmid

---

156. 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 options given below:

(1) Both Statement I and Statement II are false

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

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

(4) Both Statement I and Statement II are true

---

157. Match List-I with List-II

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

Choose the correct answer from the options given below:

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

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

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

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

---

158. Match List-I with List-II

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

Choose the correct answer from the options given below:

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

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

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

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

---

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

(1) Testosterone

(2) Progesterone

(3) Glucagon

(4) Cortisol

---

160. Given below are some stages of human evolution.

Arrange them in correct sequence (Past to Recent).

A.Homo habilis

B.Homo sapiens

C.Homo neanderthalensis

D.Homo erectus

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

(1) B-A-D-C

(2) C-B-D-A

(3) A-D-C-B

(4) D-A-C-B

---

161. Match List-I with List-II

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

Choose the correct answer from the options given below:

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

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

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

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

---

162. Given below are two statements:

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

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

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

(1) Both Statement I and Statement II are false

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

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

(4) Both Statement I and Statement II are true

---

163. Match List-I with List-II

List-I	Biological Component	List-II	Application/Effect
A	α-1 antitrypsin	I	Cotton bollworm
B	Cry IAb	II	ADA deficiency
C	Cry IAc	III	Emphysema
D	Enzyme replacement therapy	IV	Corn borer

Choose the correct answer from the options given below:

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

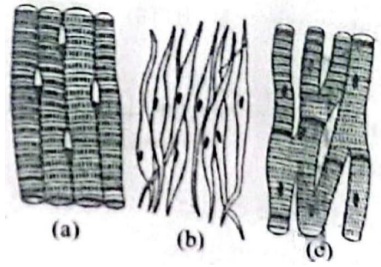
(2) A-III, B-IV, C-I, D-II

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

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

---

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



Name of muscle/location:

(1) (a) Skeletal - Triceps

(b) Smooth - Stomach

(c) Cardiac - Heart

(2) (a) Skeletal - Biceps

(b) Involuntary - Intestine

(c) Smooth - Heart

(3) (a) Involuntary - Nose tip

(b) Skeletal - Bone

(c) Cardiac - Heart

(4) (a) Smooth - Toes

(b) Skeletal - Legs

(c) Cardiac - Heart

---

165. Match List-I with List-II

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

Choose the correct answer from the options given below:

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

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

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

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

---

166. Match List-I with List-II

List-I	**Cell Structure**	**List-II**	**Associated Organelle/Function**
A	Axoneme	I	Centriole
B	Cartwheel pattern	II	Cilia and flagella
C	Crista	III	Chromosome
D	Satellite	IV	Mitochondria

Choose the correct answer from the options given below:

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

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

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

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

---

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

(1) 10^{th} segment

(2) 8^{th} and 9^{th} segment

(3) 11^{th} segment

(4) 5^{th} segment

---

168. Match List-I with List-II

List-I	Organism/Structure	List-II	Phylum/Class
A	*Pleurobrachia*	I	Mollusca
B	Radula	II	Ctenophora
C	Stomochord	III	Osteichthyes
D	Air bladder	IV	Hemichordata

Choose the correct answer from the options given below:

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

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

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

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

---

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

A. AV bundle

B. Purkinje fibres

C. AV node

D. Bundle branches

E. SA node

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

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

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

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

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

---

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

(1) Natural selection

(2) Convergent evolution

(3) Divergent evolution

(4) Adaptive radiation

---

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

3' TACATGGCAAATATCCATTCA 5'

(1) $5'$AUGUAAAGUUUAUAGGUAAGU$3'$

(2) $5'$AUGUACCGUUUAUAGGGAAGU$3'$

(3) $5'$ATGTACCGTTTATAGGTAAGT$3'$

(4) $5'$AUGUACCGUUUAUAGGUAAGU$3'$

---

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

Assertion A: Breastfeeding during the 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 newborn 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 but R is NOT the correct explanation of A

(2) A is correct but R is not correct

(3) A is not correct but R is correct

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

---

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

(1) High pO_2 and Lesser H^+ concentration

(2) Low pCO_2 and High H^+ concentration

(3) Low pCO_2 and High temperature

(4) High pO_2 and High pCO_2

---

174. Consider the following statements:

A. Annelids are true coelomates

B. Poriferans are pseudocoelomates

C. Aschelminthes are acoelomates

D. Platyhelminthes are pseudocoelomates

Choose the correct answer from the options given below:

(1) A only

(2) C only

(3) D only

(4) B only

---

175. Following are the stages of cell division:

A. Gap 2 phase

B. Cytokinesis

C. Synthesis phase

D. Karyokinesis

E. Gap 1 phase

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

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

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

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

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

---

176. Which of the following statements is incorrect?

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

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

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

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

---

177. Match List I with List II:

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

Choose the correct answer from the options given below:

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

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

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

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

---

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

(1) Periodic abstinence

(2) Lactational amenorrhea

(3) Vaults

(4) Coitus interruptus

---

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

(1) Genetic drift

(2) Gene migration

(3) Constant gene pool

(4) Genetic recombination

---

180. Match List I with List II:

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

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

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

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

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

---

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

(1) Isthmus

(2) Infundibulum

(3) Ampulla

(4) Uterine fundus

---

182. 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*

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

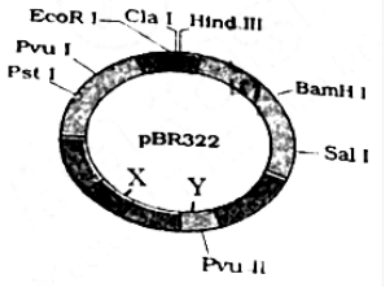
(2) A-II, B-I, C-III, D-IV

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

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

---

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



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

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

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

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

---

184. Which of the following are Autoimmune disorders?

A. Myasthenia gravis

B. Rheumatoid arthritis

C. Gout

D. Muscular dystrophy

E. Systemic Lupus Erythematosus (SLE)

(1) A, B & E only

(2) B, C & E only

(3) C, D & E only

(4) A, B & D only

---

185. Match List I with List II:

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

Choose the correct answer from the options given below :

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

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

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

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

---

186. Match List I with List II:

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

Choose the correct answer from the options given below :

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

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

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

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

---

187. Given below are two statements:

Statement I: 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 incorrect.

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

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

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

188. Given below are two statements:

Statement I: Mitochondria and chloroplasts both are double membrane-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 **misappropriate** answer from the options given below:

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

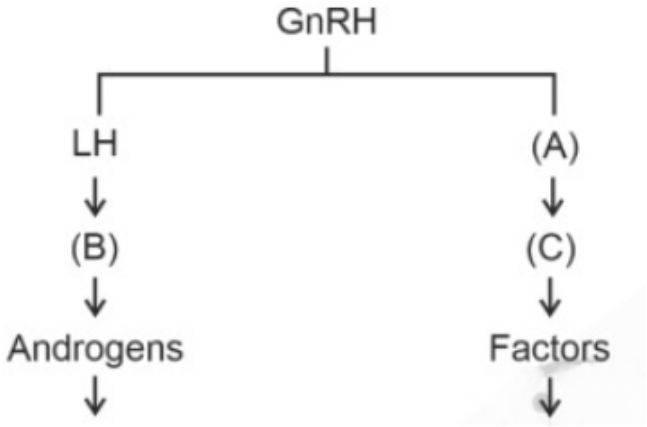
(2) **Statement I is correct but Statement II is incorrect.**

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

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

---

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



Choose the correct answer from the options given below:

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

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

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

(4) **FSH, Leydig cells, Sertoli cells, spermiogenesis.**

---

190. Given below are two statements:

Statement I: Bone marrow is the main lymphoid organ where all blood cells including

lymphocytes are produced.

Statement II: Both bone marrow and thymus provide 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 incorrect.

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

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

(4) **Both Statement I and Statement II are correct.**

---

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

(A) I^Bi/I^Ai

(B) I^BI^B/I^Ai

(C) I^AB/I^AI^B

(D) I^Ai/I^BI^A

(E) ii/I^AI^B

Choose the most appropriate answer from the options given below :

(1) B only

(2) C & B only

(3) D & E only

(4) A only

---

192. Given below are two statements:

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

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

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

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

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

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

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

---

193. Match List I with List II:

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

Choose the correct answer from the options given below:

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

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

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

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

---

194. Match List I with List II:

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

Choose the correct answer from the options given below:

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

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

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

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

---

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

A. Substrate enzyme complex formation.

B. Free enzyme ready to bind with another substrate.

C. Release of products.

D. Chemical bonds of the substrate broken.

E. Substrate binding to active site.

Choose the correct answer from the options given below:

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

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

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

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

---

196. Match List I with List II:

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

Choose the correct answer from the options given below:

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

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

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

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

---

197. Match List I with List II:

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

Choose the correct answer from the options given below:

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

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

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

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

---

198. Choose the correct statement given below regarding juxta medullary nephron:

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

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

(3) Juxta medullary nephrons outnumber the cortical nephrons.

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

---

199. Match List I with List II related to the digestive system of a 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-I, B-II, C-III, D-IV

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

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

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

---

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

A. Pharynx is perforated by gill slits.

B. Notochord is absent.

C. Central nervous system is dorsal.

D. Heart is dorsal if present.

E. Post-anal tail is absent.

Choose the most appropriate answer from the options given below:

(1) A, B & D only

(2) B, D & E only

(3) B, C & D only

(4) A & C only
