STEP UP ACADEMY

NEET-2024

Set-S4

Date – 05.05.2024

Time: 3 hours **Maximum Marks: 720**

Physics: Section-A (Q. No. 1 to 35)

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 = hv.

B. The velocity of a photon is c.

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

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

E. Photon possesses positive charge.

Choose the correct answer from the options given below:

(1) A, B, D and E only

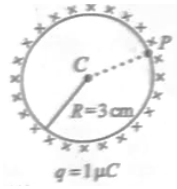
(2) A and B only

(3) A, B, C and D only

(4) A, C and D only

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 :

$\left(\text{Take } \frac{1}{4\pi \in_0} = 9\times10^9 \text{ SI units}\right)$



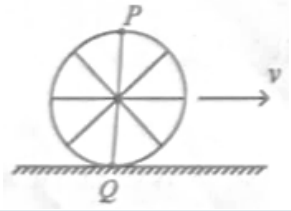
(1) zero

(2) 3×10^5

(3) 1×10^5

(4) 0.5×10^5

3. A when 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

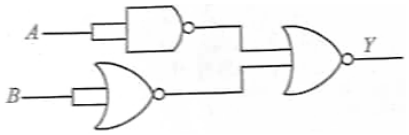
(1) all bright fringes will be of equal width.

(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:



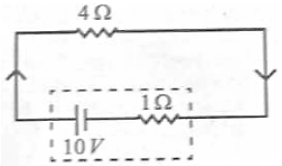
(1) AND gate

(2) NAND gate

(3) NOR gate

(4) OR gate

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



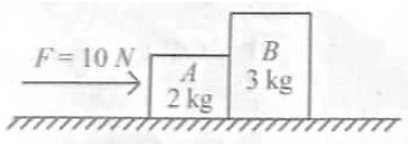
(1) 10 V

(2) 4 V

(3) 6 V

(4) 8 V

7. A horizontal force 10 N is applied to a block A as shown in figure. The mass 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 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 $v2$. 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 speed becomes 2 ω while keeping the same radius, the tension in the string becomes :

(1) $\sqrt{2}T$

(2) T

(3) $4T$

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

10. $^{290}_{82}X \xrightarrow{\alpha} Y \xrightarrow{e^+} Z \xrightarrow{\beta^-} P \xrightarrow{e^-} Q$

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

(1) 286, 81

(2) 280, 81

(3) 286, 80

(4) 288, 82

11. Match List-1 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. $\chi >> 1$
D. Non-magnetic	IV. $0 < \chi < \varepsilon$ (a small positive number)

Choose the correct answer from the options given below:

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

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

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

(4) A - III, B - II, 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 2400 g cm^2. The length of the 400 g rod is nearly :

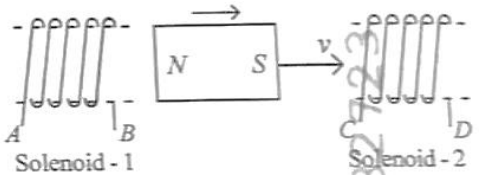
(1) 72.0 cm

(2) 8.5 cm

(3) 17.5 cm

(4) 20.7 cm

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:

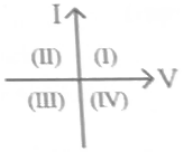
(1) *BA* and *DC*

(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 $2t - 1$ (SI unit) under the influence of force of 5N. The value of instantaneous power is (in SI unit).

(1) 6

(2) 10

(3) 5

(4) 7

17. Match List-I and List-II.

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

Choose the correct answer from the options given below:

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

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

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

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

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 centre of the dipole of dipole moment vector $\vec{P}$ of magnitude, 4×10^{-6} C m, is $\pm 9 \times 10^3$ V.

$\left(\text{Take } \frac{1}{4\pi \epsilon_0} = 9 \times 10^9 \text{ SI units}\right)$

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

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 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:

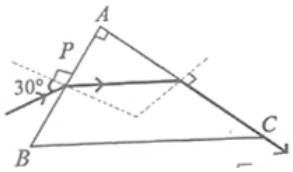
(1) B

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

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

(4) $\overline{B}$

20. A light ray centres 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) $\frac{1}{10N}$

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

(4) $100\,N$

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:

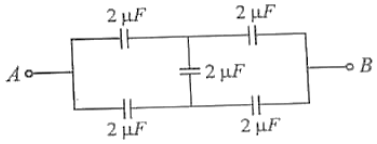
(1) angular speed and stress

(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:



(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) 3 mm

(3) 0.4 mm

(4) 40 mm

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

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

(2) the reflected light will be partially polarized.

(3) the refracted light will be completely polarized.

(4) both the reflected and refracted light will be completely polarized.

28. In an ideal transformer, the turns ratio is $\frac{N_P}{N_S} = \frac{1}{2}$.

The ratio $V_S : V_P$ is equal to (the symbols carry their usual meaning) :

(1) 1 : 4

(2) 1 : 2

(3) 2 : 1

(4) 1 : 1

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

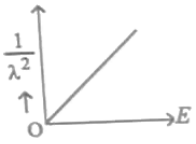
(1) 3.92 m s^{-2}

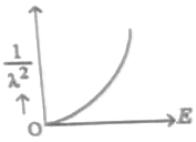
(2) 19.6 m s^{-2}

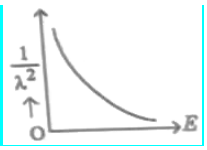
(3) 9.8 m s^{-2}

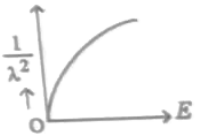
(4) 4.9 m s^{-2}

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

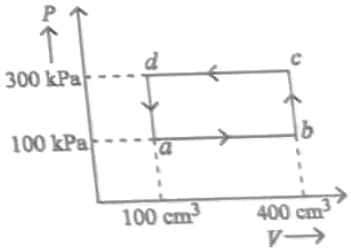
(1) 

(2) 

(3) 

(4) 

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) zero

(3) 30 J

(4) –90 J

32. Given below are two statements:

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

Statement II : Atoms each element are stable are 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.

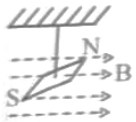
(2) Both Statement I and Statement II are correct.

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

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

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) $1280\ \pi^2$

(2) $5\ \pi^2$

(3) $128\ \pi^2$

(4) $50\ \pi^2$

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 surface tension of water is 0.07 Nm^{-1}, 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

Physics: Section-B (Q. No. 35 to 50)

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

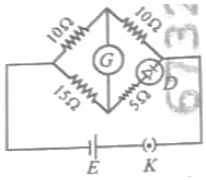
(2) M

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

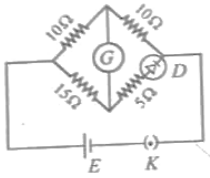
(4) 2 M

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

(1)



(2)



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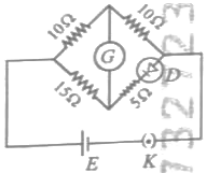
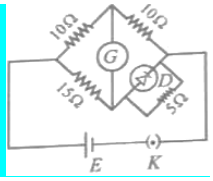


(4)



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

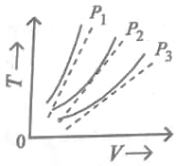
(1) $\frac{GmM}{3R}$

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

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

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

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) $P_2 > P_1 > P_3$

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 $\frac{1}{\sqrt{\mu_0 \in_0}}$.

41. A metallic bar of Young's modulus, 0.5×10^{11} Nm^{-2} and coefficient of linear thermal expansion 10^{-5} °C^{-1}, lengths 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 rating of 1 kW and 2 kW, respectively. Those two are first connected in series and then in parallel to a fixed power source. The ratio of power outputs for these two cases is:

(1) 2 : 3

(2) 1 : 1

(3) 2 : 9

(4) 1 : 2

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

(1) $\alpha\beta/t$

(2) $\beta t/\alpha$

(3) $\alpha t/\beta$

(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 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

A. the charge stored in it, increases.

B. the energy stored in it, decreases.

C. its capacitance increases.

D. the ratio of charge to its potential remains the same.

E. the product of charge and voltage increases.

Choose the most appropriate answer from the options given below:

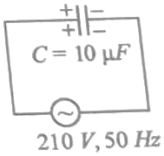
(1) A, B and C only

(2) A, B and E only

(3) A, C and E only

(4) B, D and E only

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 (π = 3.14):



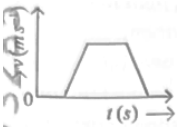
(1) 0.35 A

(2) 0.58 A

(3) 0.93 A

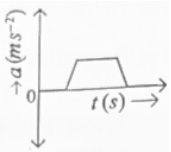
(4) 1.20 A

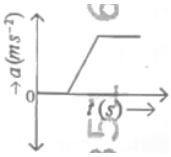
48. The velocity (v) –time (t) plot of the motion of a body is shown below:

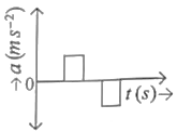


The acceleration (a) –time (t) graph that best suits this motion is:

(1) 

(2) 

(3) 

(4) 

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

A. hold the sheet there if it is magnetic.

B. hold the sheet there if it is non-magnetic.

C. move the sheet away from the pole with uniform velocity if it is conducting.

D. move the sheet away from the pole with uniform velocity if it is both, non-conducting and non-polar.

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

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

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 (Q. No. 51 to 85)

51. Match List I with List II.

List I Quantum Number	**List II Information provided**
A. m_l	I. shape of orbital
B. m_s	II. size of orbital
C. l	III. orientation of orbital
D. n	IV. orientation of spin of electron

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

52. Given below are two statements:

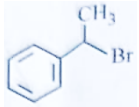
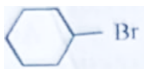
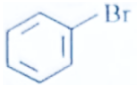
Statement I: Both $\left[Co(NH_3)_6\right]^{3+}$ and $\left[CoF_6\right]^{3-}$ complexes are octahedral but differ in their magnetic behaviour.

Statement II: $\left[Co(NH_3)_6\right]^{3+}$ is diamagnetic whereas $\left[CoF_6\right]^{3-}$ 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° 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 S_N1 reaction with the fastest rate is

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

55. Given below are two statements:
Statement I: The bolting 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.

56. 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. orientation of spin of electron

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

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

(3) Li < B < Be < C < 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
A. Tollen's reagent
B. Schiff's reagent
C. HCN
D. NH_2OH
E. $NaHSO_3$
Choose the correct options from the given below:
(1) E and D
(2) B and C
(3) A and D
(4) B and E

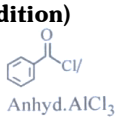
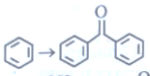
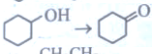
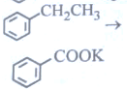
61. 'Spin only' magnetic moment is same for which of the following ions?
A. Ti^{3+} B. Cr^{2+}
C. Mn^{2+} D. Fe^{2+}
E. Sc^{3+}
Choose the most appropriate answer from the options given below:
(1) A and D only
(2) B and D only
(3) A and E only
(4) B and C only

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) $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-OH$
(2) $CH_3-CH_2-CH_2-CH_2OH$
(3) $CH_3-\underset{\displaystyle CH_3}{\overset{|}{CH}}-CH_2OH$
(4) $CH_3-\underset{\displaystyle CH_3}{\overset{|}{CH}}-CH_2OH$

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

65. Match List I with List II.

List I (Conversion)		List II (Reagents/ Condition)	
A.		I.	
B.		II.	CrO_3
C.		III.	
D.		IV.	(i) O_3 (ii) $Zn-H_2O$

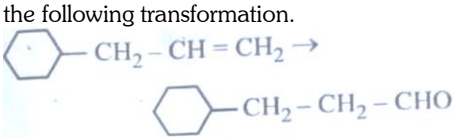
Choose the correct answer from the options given below:
(1) A-I, B-IV, C-II, D-III
(2) A-IV, B-I, C-III, D-II
(3) A-III, B-1, C-II, D-IV
(4) A-IV, B-I, C-II, D-III

66. Match List I with List II.

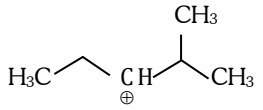
List I (Reaction)		List II (Number of Faraday required)	
A.	1 mol of H_2O to O_2	I.	3F
B.	1 mol of MnO_4^- to Mn^{2+}	II.	2F
C.	1.5 mol of Ca from molten $CaCl_2$	III.	1F
D.	1 mol of FeO to Fe_2O_3	IV.	5F

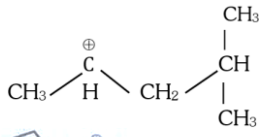
Choose the correct answer from the options given below:
(1) A-III, B-IV, C-II, D-I
(2) A-II, B-IV, C-I, D-III
(3) A-III, B-IV, C-I, D-II
(4) A-II, B-III, C-I, D-IV

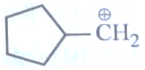
67. Which reaction is **NOT** a redox reaction?
(1) $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2\,NaCl$
(2) $Zn+CuSO_4 \rightarrow ZnSO_4 + Cu$
(3) $2\,KClO_3 + I_2 \rightarrow 2\,KIO_3 + Cl_2$
(4) $H_2 + Cl_2 \rightarrow 2\,HCl$

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

(1) (i) H_2O/H^+
(ii) PCC
(2) (i) H_2O/H^+
(ii) CrO_3
(3) (i) BH_3
(ii) $H_2O_2/\overset{\ominus}{O}H$
(iii) PCC
(4) (i) BH_3
(ii) $H_2O_2/\overset{\ominus}{O}H$
(iii) Alk. $KMnO_4$
(iv) $H_3O^{\oplus}$

69. The most stable carbocation among the following is:
(1) 

(2) 

(3) 

(4) 

70. Among Group 16 elements, which one does NOT shows –2 oxidation state?
(1) Po (2) O
(2) Se (4) Te

71. The energy of an electron in the ground state (n = 1) for He^+ ion –xJ, then that for an electron in n = 2 state for Be^{3+} ion in J is :
(1) $-\frac{4}{9}x$ (2) – x
(3) $-\frac{x}{9}$ (4) – 4x

72. Match List I with List II.

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

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

73. For the reaction $2A \rightleftharpoons B+C$, $K_C = 4\times10^{-3}$. At a given time, the composition of reaction mixture is: $[A] = [B] = [C] = 2\times10^{-3}$ 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 3 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
(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?
(1) $2\,BrCl_{(g)} \rightleftharpoons Br_{2(g)} + Cl_{2(g)}$
(2) $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$
(3) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2\,HI_{(g)}$
(4) $CO_{(g)} + H_2O_{(g)} \rightleftharpoons CO_{2(g)} + H_{2(g)}$

77. A compound with a molecular formula of C_6H_{14} has two tertiary carbons. Its IUPAC name is:
(1) 2,2-dimethylbutane
(2) n-hexane
(3) 2-methylpentane
(4) 2,3-dimethylbutane

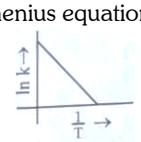
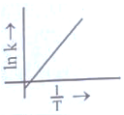
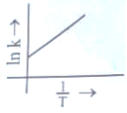
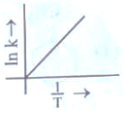
78. Fehling's solution 'A' is
(1) aqueous sodium citrate
(2) aqueous copper sulphate
(3) alkaline copper sulphate
(4) alkaline solution of sodium potassium tartrate (Rochelle's salt)

79. Match List I with List II.

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

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

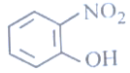
80. The highest number of helium atoms is in
(1) 2.271098 L of helium at STP
(2) 4 mol of helium
(3) 4 u of helium
(4) 4 g of helium

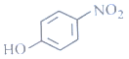
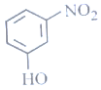
81. Which plot of In k vs $\frac{1}{T}$ is consistent with Arrhenius equation?
(1)  (2) 
(3)  (4) 

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

(1) HF (2) 

(3)  (4) 

84. In which of the following processes entropy increases?

A. A liquid evaporates to vapour.

B. Temperature of a crystalline solid lowered from 130 K to 0 K.

C. $2\,NaHCO_{3(s)} \rightarrow Na_2CO_{3(s)} + CO_{2(g)} + H2O_{(g)}$

D. $Cl_{2(g)} \rightarrow 2Cl_{(g)}$

Choose the correct answer from the options given below:

(1) C and D (2) A and C

(3) A, B and D (4) A, C and D

85. Match List I with List II.

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

Choose the correct answer from the options given below:

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

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

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

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

Chemistry: Section-B (Q. No. 86 to 100)

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 (3) ABC_3

(2) A_2BC_2 (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 J K^{-1} 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 (II) 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) 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}, IF = 96487 C)

(1) 0.0315 g (2) 3.15 g

(3) 0.315 g (4) 31.5 g

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

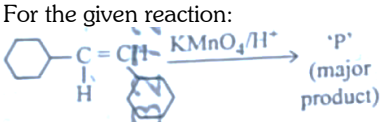
$2NO_{(g)} \rightleftharpoons N_2 + O_{2(g)}$

If 0.1 mol L^{-1} of $NO_{(g)}$ is taken in a closed vessel, what will be degree of dissociation (α) of $NO_{(g)}$ at equilibrium?

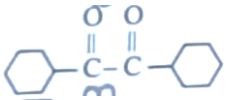
(1) 0.717 (2) 0.00889

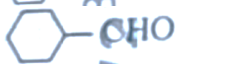
(3) 0.0889 (4) 0.8889

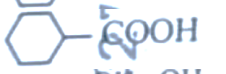
92. For the given reaction:

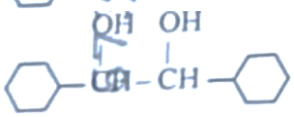


'P' is

(1) 

(2) 

(3) 

(4) 

93. The pair of lanthanoid ions which are diamagnetic is

(1) Pm^{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

$3ROH + POI_3 \rightarrow 3RCI + A$

$ROH + PCI_5 \rightarrow RCI + HCI + B$

(1) H_3PO_3 and $POCl_3$

(2) $POCl_3$ and H_3PO_3

(3) $POCl_3$ and H_3PO_4

(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 $[Co(NH_3)_4Cl_2]^{+}$ is a heteroleptic complex.

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

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 and Statement II are true.

(3) Both Statement 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:

$$CH_3-CH_2-CH_2-I \xrightarrow{NaCN} A \xrightarrow[\text{Partial hydrolysis}]{OH^-} B \xrightarrow[Br_2]{NaOH} C\ (\text{major})$$

(1) α-bromobutanojc acid

(2) propylamine

(3) butylamine

(4) butanamide

97. Identify the **correct** answer.

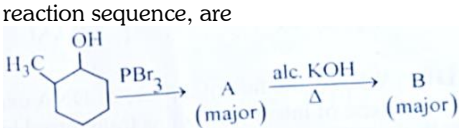
(1) Three canonical forms can be drawn for CO_3^{2-} ion.

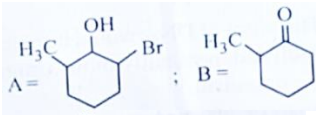
(2) Three resonance structures can be drawn for ozone.

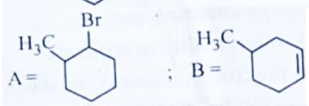
(3) BF_3 has non-zero dipole moment.

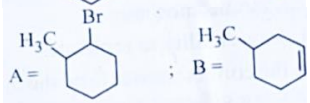
(4) Dipole moment of NF_3 is greater than that of NH_3.

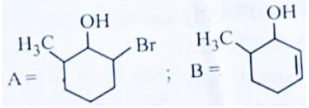
98. Major products A and B formed in the following reaction sequence, are



(1) 

(2) 

(3) 

(4) 

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

BIOLOGY

Botany: Section-A (Q. No. 101 to 135)

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.

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

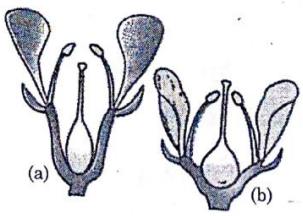
(1) Statement I is false but Statement II is true

(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

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) (a) Perigynous; (b) Perigynous

(2) (a) Epigynous; (b) Hypogynous

(3) (a) Hypogynous; (b) Epigynous

(4) (a) Perigynous; (b) Epigynous

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

Choose the correct answer from the options given below:

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

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

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

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

107. Match List I with List II

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

Choose the correct answer from the options given below:

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

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

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

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

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.

Choose the correct answer from the options given below:

(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

Choose the correct answer from the options given below:

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

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

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 F_2 generation.

C. Factors occur in pairs in normal diploid plants.

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

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

Choose the correct answer from the options given below:

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

(2) A, B and C only

(3) A, C, D 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) Daturd

(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 Succinic 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 begining 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.

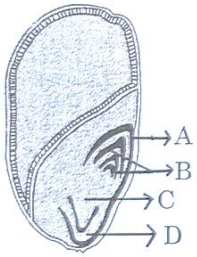
E. Tropical environments are constant and predictable.

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:

A. Over exploitation

B. Co-extinction

C. Mutation

D. Habitat loss and fragmentation

E. Migration

Choose the correct option:

(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:

A. The flowers of Vallisneria are colourful and produce nectar.

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

Choose the correct answer from the options given below:

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

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

(3) A-II, B-I, C-III, 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?

(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:

(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?

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

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

(3) 2 molecules NADPH ATP and 2 molecules of

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

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

(1) Maturation

(2) Differentiation

(3) Redifferentiation

(4) Dedifferentiation

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

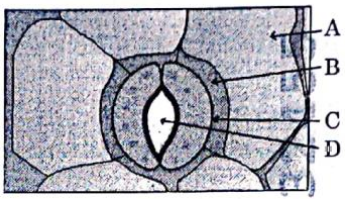
(1) Fruiting body

(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?



(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:

(1) Polymerase

(2) Beta-galactosidase

(3) Acetylase

(4) Permease

135. 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) D and E only

(2) A, B and C only

(3) B, C and D only

(4) C, D and E only

Botany: Section-B (Q. No. 136 to 150)

136. Match List I with List II

List I		List I	
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:

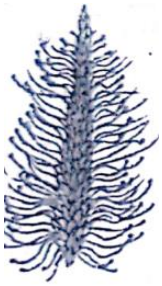
(1) A-IV, B-III, C-II, D-I

(2) A-I, B-II, 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:



(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?

(1) Abscisic acid (2) Auxin

(3) Gibberellin (4) Cytokinin

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

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

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

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

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

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

(1) Pollens

(2) Callus

(3) Somatic embryos

(4) Protoplasts

141. Match List I with List II

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

Choose the correct answer from the options given below:

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

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

(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 E.coli?

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

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

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

(4) The DNA dependent DNA polymerase catalyses polymerization in 5'→3' as well as 3'→ 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		**List II**
A.	Robert May	I.	Species-Area relationship
B.	Alexander von Humboldt	II.	Long term ecosystem experiment using out door plots
C.	Paul Ehrlich	III.	Global species diversity at about 7 million
D.	David Tilman	IV.	Rivet popper hypothesis

Choose the correct answer from the options given below:

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

Choose the correct answer from the options given below:

(1) A-IV, B-I, C-II, D-III (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		List II
A.	Rose	I.	Twisted aestivation
B.	Pea	II.	Perigynous flower
C.	Cotton	III.	Drupe
D.	Mango	IV.	Marginal placentation

Choose the correct answer from the options given below:

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

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

147. The DNA present in chloroplast is:

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

Choose the correct answer from the options given below:

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

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

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

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

149. Given below are two statements:

Statement I: In C_3 plants, some O_2 binds to $RuBisCO_2$ 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) 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.

(1) Isocitrate → α-ketoglutaric acid

(2) Malic acid → Oxaloacetic acid.

(3) Succinic acid Malic acid

(4) Succinyl-CoA →Succinic acid

Zoology: Section-A (Q. No. 151 to 185)

151. Match List I with List II:

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

Choose the correct answer from the options given below:

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

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

152. Match List I with List II

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

Choose the correct answer from the options given below:

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

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

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

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

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

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

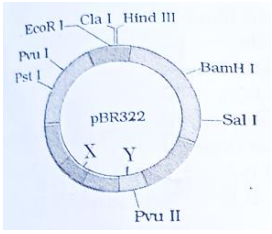
(1) A is false but R is true

(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 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:

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

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

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

(1) 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?

3'TACATGGCAAATATCCATTCA5'

(1) 5'ATGTACCGTTTATAGGTAAGT3'

(2) 5'AUGUACCGUUUAUAGGUAAGU3'

(3) 5'AUGUAAAGUUUAUAGGUAAGU3'

(4) 5'AUGUACCGUUUAUAGGGAAGU3'

157. Match List I with List II:

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

Choose the correct answer from the options given below:

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

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

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

(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:

(1) 11^{th} segment

(2) 5^{th} segment

(3) 10^{th} segment

(4) 8^{th} and 9^{th} segment

160. Match List I with List II:

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

Choose the correct answer from the options given below:

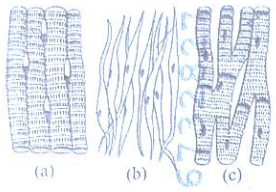
(1) A-IV, B-III, C-II, D-I

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

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

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

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
(b) Skeletal Bone
(c) Cardiac - Heart.

(2) (a) Smooth -Foes
(b) Skeletal-Legs
(c) Cardiac Heart.

(3) (a) Skeletal -Triceps
(b) Smooth -Stomach
(c) Cardiac - Heart.

(4) (a) Skeletal Biceps
(b) Involuntary - Intestine
(c) Smooth Heart.

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

(1) Ampulla (2) Uterine fundus

(3) Isthmus (4) Infundibulum

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

(1) Low pCO_2 and High temperature

(2) High pO_2 and High pCO_2

(3) High pO_2 and Lesser H^+ concentration

(4) Low pCO_2 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		List II
A.	Expiratory capacity	I.	Expiratory resene 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 give 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-I, C-IV 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		List II
A.	Common cold	I.	Plasmodium
B.	Haemozoin	II.	Typhoid
C.	Widal test	III.	Rhinoviruses
D.	Allergy	IV.	Dust mites

Choose the correct answer from the options given below:

(1) A-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 the

(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?

(1) Constant gene pool

(2) Genetic recombination

(3) Genetic drift (4) Gene migration

171. 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-II, B-I, 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 A and the other is labelled as Reason R:

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

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

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

(1) 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		List II
A.	Typhoid	I.	Fungus
B.	Leishmaniasis	II.	Nematode
C.	Ringworm	III.	Protozoa
D.	Filariasis	IV.	Bacterial

Choose the correct answer from the options given below:

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

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

174. Match List I with List II:

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

Choose the correct answer from the options given below:

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

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

175. Which of the following statements is incorrect?

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

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

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

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

177. Match List I with List II:

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

Choose the correct answer from the options given below:

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

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

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

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

178. Match List I with List II:

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

Choose the correct answer from the options given below:

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

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

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

(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 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 is true but Statement II is false

180. 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 terminalization of chiasmata
C.	Zygotene	III. Chromosomes look like thin threads
D.	Leptotene	IV. Appearance of recombination hodules

Choose the correct answer from the options given below:

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

(2) A-IV, BT, C-III, D-I

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

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

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

(1) Temperature independent plasmid

(2) Tumor inhibiting plasmid

(3) Tumor independent plasmid

(4) Tumor inducing plasmid

182. Match List I with List II:

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

Choose the correct answer from the options given below:

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

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

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?

(1) Glucagon

(2) Cortisol

(3) Testosterone

(4) Progesterone

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186. Match List I with

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

Choose the correct answer from the options given below:

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

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

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

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

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

(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) B, C & 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

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

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

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

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

E. iI^B/ iI^A/ I^AI^B

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

Choose the correct answer from the options given below:

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

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

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

(4) A-II, B-III, 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:

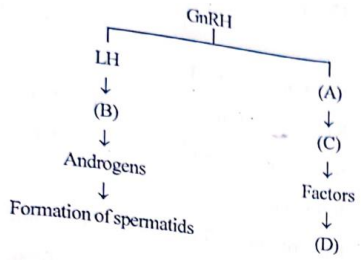
(1) Statement I is incorrect but Statement II is correct.

(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.



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

(2) FSH Leydig cells, Sertoli cells, spermiogenesis

(3) ICSH, Interstitial cells, Ledig cells, spermiogenesis.

(4) FSH Sertoli ells, Leydig cells, spermatogenesis.

193. Match List I with List II:

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

Choose the correct answer from the options given below:

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

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

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

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

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.

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 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.

196. Match List I with List II:

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

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

197. Match List I with List II:

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

Choose the correct answer from the options given below:

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

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

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

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

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

A. Substrate enzyme complex formation.

B. Free enzyme ready to bind with another substrate.

C. Release of products.

D. Chemical bonds of the substrate broken.

E. Substrate binding to active site.

Choose the correct answer from the options given below:

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

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

199. Match of cockroach.

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

Choose the correct answer from the options give below:

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

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

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

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

200. Given below are two statements:

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

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

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

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