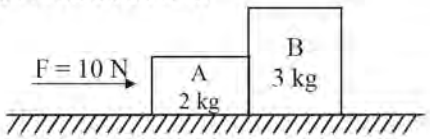
NEET (UG) Question Paper
5th May 2024

Time: 3 Hours 20 Minutes **Total Marks: 720**

Physics: Section – A (Q. No. 1 to 35)

1. 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) $\frac{T}{4}$ (B) $\sqrt{2}$ T
(C) T (D) 4T

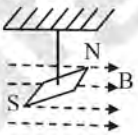
2. A horizontal force 10 N is applied to a block A as shown in figure. The mass of blocks A and B are 2 kg and 3 kg, respectively. The blocks slide over a frictionless surface. The force exerted by block A on block B is:



(A) 6 N (B) 10 N
(C) zero (D) 4 N

3. 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) 40 mm (B) 8 mm
(C) 4 mm (D) 0.4 mm

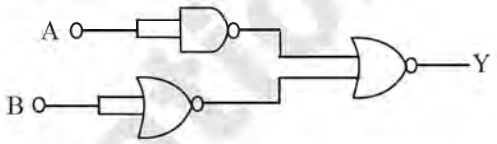
4. In a uniform magnetic field of 0.049 T, a magnetic needle performs 20 complete oscillations in 5 seconds as shown. The moment of inertia of the needle is 9.8×10^{-6} kg m^2. If the magnitude of magnetic moment of the needle is $x \times 10^{-5}$ Am^2; then the value of 'x' is:



(A) $50\pi^2$ (B) $1280\pi^2$
(C) $5\pi^2$ (D) $128\pi^2$

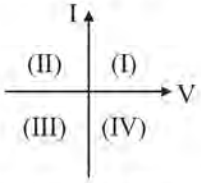
5. If c is the velocity of light in free space, the correct statements about photon among the following are:
I. The energy of a photon is E = hν.
II. The velocity of a photon is c.
III. The momentum of a photon, $p = \frac{h\nu}{c}$
IV. In a photon-electron collision, both total energy and total momentum are conserved.
V. Photon possesses positive charge.
Choose the correct answer from the options given, below:
(A) I, III and IV only
(B) I, II, IV and V only
(C) I and II only
(D) I, II, III and IV only

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



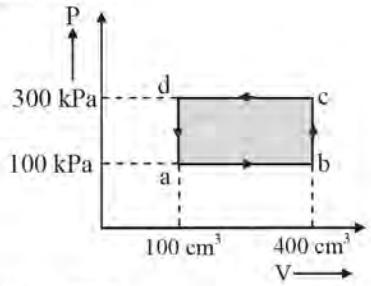
(A) OR gate (B) AND gate
(C) NAND gate (D) NOR gate

7. Consider the following statements P and Q and identify the correct answer:



P. For a solar-cell, the I-V characteristics lies in the IV quadrant of the given graph.
Q. In a reverse biased pn junction diode, the current measured in (μA), is due to majority charge carriers.
(A) Both P and Q are correct.
(B) Both P and Q are incorrect.
(C) P is correct but Q is incorrect.
(D) P is incorrect but Q is correct.

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



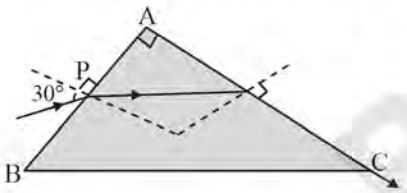
(A) –90 J (B) –60 J
(C) zero (D) 30 J

9. 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:
(A) 1.98 mN (B) 99 N
(C) 19.8 mN (D) 198 N

10. At any instant of time t, the displacement of any particle is given by 2t – 1 (SI unit) under the influence of force of 5 N. The value of instantaneous power is (in SI unit):
(A) 7 (B) 6
(C) 10 (D) 5

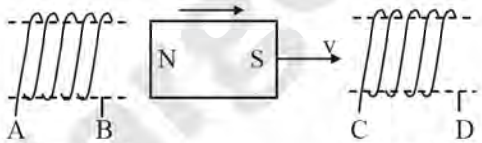
11. $^{290}_{82}X \xrightarrow{\alpha} Y \xrightarrow{e^+} Z \xrightarrow{\beta^-} P \xrightarrow{e^-} Q$
In the nuclear emission stated above, the mass number and atomic number of the product Q respectively, are:
(A) 288, 82 (B) 286, 81
(C) 280, 81 (D) 286, 80

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



(A) $\frac{\sqrt{3}}{4}$ (B) $\frac{\sqrt{3}}{2}$
(C) $\frac{\sqrt{5}}{4}$ (D) $\frac{\sqrt{5}}{2}$

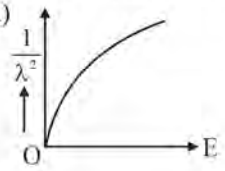
13.



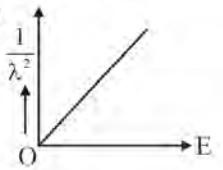
In the above diagram, a strong bar magnet is moving towards solenoid-2 from solenoid-1. The direction of induced current in solenoid-1 and that in solenoid-2, respectively, are through the directions:
(A) AB and CD (B) BA and DC
(C) AB and DC (D) BA and CD

14. 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) 1 : 1 (B) 1 : 4
(C) 1: 2 (D) 2 : 1

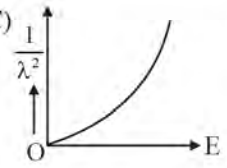
15. The graph which shows the variation of $\left(\frac{1}{\lambda^2}\right)$ and its kinetic energy, E is (where λ is de Broglie wavelength of a free particle):
(A)



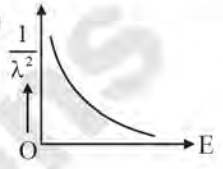
(B)



(C)



(D)

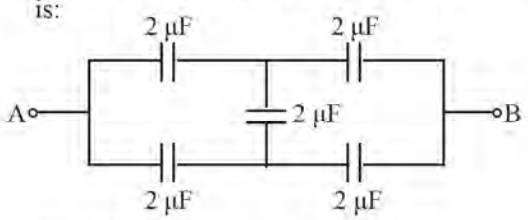


16. If the monochromatic source in Young's double slit experiment is replaced by white light, then
(A) there will be a central bright white fringe surrounded by a few coloured fringes.
(B) all bright fringes will be of equal width.
(C) interference pattern will disappear.
(D) there will be central dark fringe surrounded by a few coloured fringes.

17. 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.
(Take $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9$ SI units)
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:
(A) A is true but R is false.
(B) A is false but R is true.
(C) Both A and R are true and R is the correct explanation of A.
(D) Both A and R are true and R is NOT the correct explanation of A.

18. 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) 4 : 1 (B) 1 : 4
(C) 1 : 2 (D) 2 : 1

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



(A) 0.5 μF (B) 4 μF
(C) 2 μF (D) 1 μF

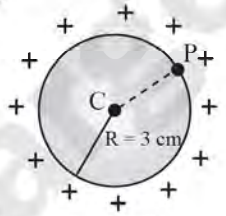
20. The quantities which have the same dimensions as those of solid angle are:
(A) strain and arc
(B) angular speed and stress
(C) strain and angle
(D) stress and angle

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

22. 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 $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9$ SI units)



q = 1 μC

(A) 0.5×10^5 (B) zero
(C) 3×10^5 (D) 1×10^5

23. Given below are two statements:
Statement I: Atoms are electrically neutral as they contain equal number of positive and negative charges.
Statement II: Atoms of each element are stable and emit their characteristic spectrum.
In the light of the above statements, choose the most appropriate answer from the options given below:
(A) Statement I is correct but Statement II is incorrect.
(B) Statement I is incorrect but Statement II is correct.
(C) Both Statement I and Statement II are correct.
(D) Both Statement I and Statement II are incorrect.

24. Match List I with List II.

List – I (Spectral Lines of Hydrogen for transitions from)		List – II (Wavelengths (nm))	
i.	$n_2 = 3$ to $n_1 = 2$	a.	410.2
ii.	$n_2 = 4$ to $n_1 = 2$	b.	434.1
iii.	$n_2 = 5$ to $n_1 = 2$	c.	656.3
iv.	$n_2 = 6$ to $n_1 = 2$	d.	486.1

Choose the correct answer from the options given below:
(A) i – d, ii – c, iii – a, iv – b
(B) i – a, ii – b, iii – c, iv – d
(C) i – b, ii – a, iii – d, iv – c
(D) i – c, ii – d, iii – b, iv – a

25. 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 cm, 1 s (B) 5 m, 1 s
(C) 5 cm, 2 s (D) 5 m, 2 s

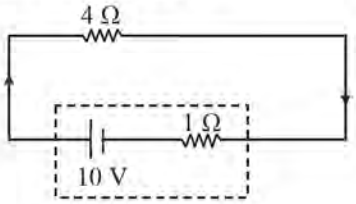
26. Match List-I with List-II.

List – I (Material)		List – II (Susceptibility (χ))	
i.	Diamagnetic	a.	$\chi = 0$
ii.	Ferromagnetic	b.	$0 > \chi > -1$
iii.	Paramagnetic	c.	$\chi >> 1$
iv.	Non-magnetic	d.	$0 < \chi < \varepsilon$ (a small positive number)

Choose the correct answer from the options given below:
(A) i – c, ii – b, iii – a, iv – d
(B) i – d, ii – c, iii – b, iv – a
(C) i – b, ii – c, iii – d, iv – a
(D) i – b, ii – a, iii – c, iv – d

27. 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) 55 Ω (B) 60 Ω
(C) 26 Ω (D) 52 Ω

28. 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) 8 V (B) 10 V
(C) 4 V (D) 6 V

29. A particle moving with uniform speed in a circular path maintains:
(A) constant velocity but varying acceleration.
(B) varying velocity and varying acceleration.
(C) constant velocity.
(D) constant acceleration.

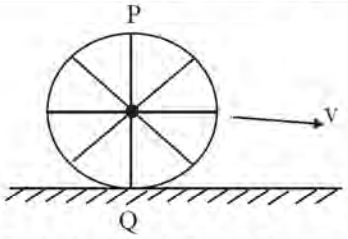
30. A tightly wound 100 turns coil of radius 10 cm carries a current of 7 A. The magnitude of the magnetic field at the centre of the coil is (Take permeability of free space as $4\pi \times 10^{-7}$ SI units):
(A) 4.4 mT (B) 44 T
(C) 44 mT (D) 4.4 T

31. 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) 100N (B) 10(N + 1)
(C) $\frac{1}{10N}$ (D) $\frac{1}{100(N+1)}$

32. An unpolarised light beam strikes a glass surface at Brewster's angle. Then
(A) both the reflected and refracted light will be completely polarised.
(B) the reflected light will be completely polarised but the refracted light will be partially polarised.
(C) the reflected light will be partially polarised.
(D) the refracted light will be completely polarised.

33. 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) 4.9 m s^{-2} (B) 3.92 m s^{-2}
(C) 19.6 m s^{-2} (D) 9.8 m s^{-2}

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

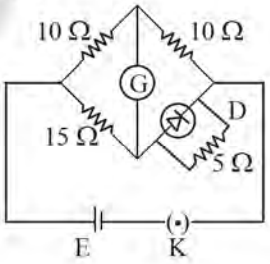


(A) Both the points P and Q move with equal speed
(B) Point P has zero speed.
(C) Point P moves slower than point Q.
(D) Point P moves faster than point Q.

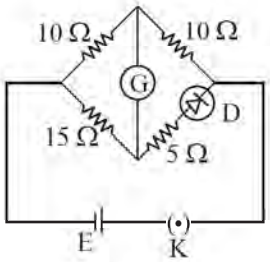
35. The moment of inertia of a thin rod about an axis passing through its mid point and perpendicular to the rod is 2400 g cm^2. The length of the 400 g rod is nearly:
(A) 20.7 cm (B) 72.0 cm
(C) 8.5 cm (D) 17.5 cm

Physics: Section – B (Q. No. 36 to 50)

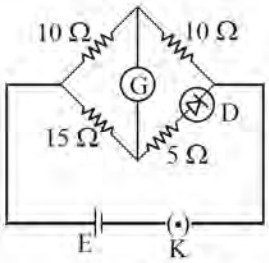
36. Choose the correct circuit which can achieve the bridge balance.
(A)



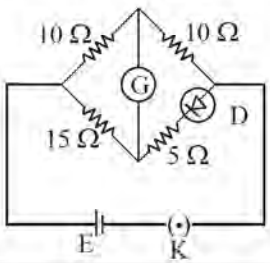
(B)



(C)

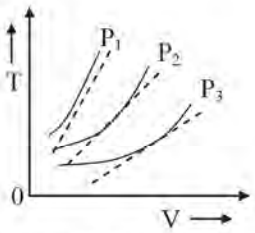


(D)



37. 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:
(A) displacement current of magnitude equal to I flows in a direction opposite to that of I.
(B) displacement current of magnitude greater than I flows but can be in any direction.
(C) there is no current.
(D) displacement current of magnitude equal to I flows in the same direction as I.

38. 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' law represented as dotted lines.



Then the correct relation is:
(A) $P_2 > P_1 > P_3$ (B) $P_1 > P_2 > P_3$
(C) $P_3 > P_2 > P_1$ (D) $P_1 > P_3 > P_2$

39. 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:
(A) $2\sqrt{3}$ (B) 4
(C) $\sqrt{3}$ (D) $\sqrt{2}$

40. 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:
(A) 1 : 2 (B) 2 : 3
(C) 1 : 1 (D) 2 : 9

41. If the plates of a parallel plate capacitor connected to a battery are moved close to each other, then
I. the charge stored in it, increases.
II. the energy stored in it, decreases.
III. its capacitance increases.
IV. the ratio of charge to its potential remains the same.
V. the product of charge and voltage increases.
Choose the most appropriate answer from the options given below:
(A) II, IV and V only
(B) I, II and III only
(C) I, II and V only
(D) I, III and V only

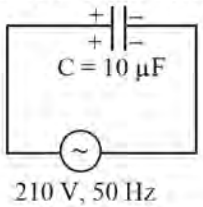
42. A small telescope has an objective of focal length 140 cm and an eye piece of focal length 5.0 cm. The magnifying power of telescope for viewing a distant object is:
(A) 17 (B) 32
(C) 34 (D) 28

43. A sheet is placed on a horizontal surface in front of a strong magnetic pole. A force is needed to :
I. hold the sheet there if it is magnetic.
II. hold the sheet there if it is non-magnetic.
III. move the sheet away from the pole with uniform velocity if it is conducting.
IV. 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:
(A) I, III and IV only
(B) III only
(C) II and IV only
(D) I and III only

44. A metallic bar of Young's modulus, $0.5 \times 10^{11}\ Nm^{-2}$ and coefficient of linear thermal expansion $10^{-5}\ °C^{-1}$, length 1 m and area of cross-section $10^{-3}\ m^2$ is heated from 0°C to 100°C without expansion or bending. The compressive force developed in it is:
(A) 100×10^3 N (B) 2×10^3 N
(C) 5×10^3 N (D) 50×10^3 N

45. 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:
(A) $\frac{GmM}{2R}$ (B) $\frac{GmM}{3R}$
(C) $\frac{5\ GmM}{6R}$ (D) $\frac{2\ GmM}{3R}$

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



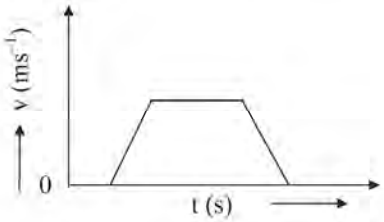
(A) 1.20 A (B) 0.35 A
(C) 0.58 A (D) 0.93 A

47. 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:

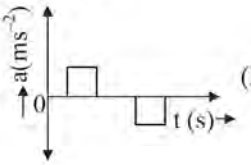
(A) 2 M (B) $\frac{M}{\sqrt{3}}$

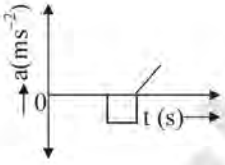
(C) M (D) $\frac{M}{2}$

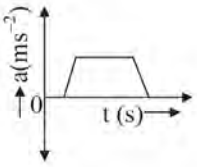
48. The velocity (v) - time (t) plot of the motion of a body is shown below:

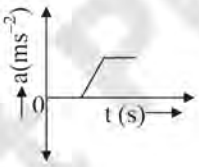


The acceleration (a) – time (t) graph that best suits this motion is:

(A) 

(B) 

(C) 

(D) 

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

(A) they travel with a speed equal to $\frac{1}{\sqrt{\mu_0 \in_0}}$

(B) they originate from charges moving with uniform speed.

(C) they are transverse in nature.

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

50. 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:

(A) $\alpha\beta t$ (B) $\frac{\alpha\beta}{t}$

(C) $\frac{\beta t}{\alpha}$ (D) $\frac{\alpha t}{\beta}$

Chemistry: Section – A (Q. No. 51 to 85)

51. In which of the following processes entropy increases?

I. A liquid evaporates to vapour.

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

III. $2NaHCO_{3(s)} \longrightarrow Na_2CO_{3(s)} + CO_{2(g)} + H_2O_{(g)}$

IV. $Cl_{2(g)} \longrightarrow 2Cl_{(g)}$

Choose the correct answer from the options given below:

(A) I, III and IV (B) III and IV

(C) I and III (D) I, II and IV

52. 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

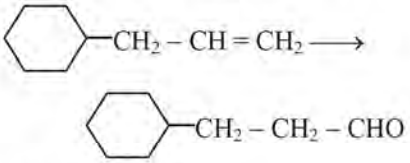
(A) Distillation

(B) Chromatography

(C) Crystallization

(D) Sublimation

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



(A) i. BH_3
ii. H_2O_2/OH^-
iii. alk. $KMnO_4$
iv. H_3O^+

(B) i. H_2O/H^+
ii. PCC

(C) i. H_2O/H^+
ii. CrO_3

(D) i. BH_3
ii. H_2O_2/OH^-
iii. PCC

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

(A) –4x (B) $-\frac{4}{9}$ x

(C) –x (D) $-\frac{x}{9}$

55. Match List I with List II.

List I (Molecule)		List II (Number and types of bond/s between two carbon atoms)	
i.	Ethane	a.	One σ-bond and two π-bonds
ii.	Ethene	b.	Two π-bonds
iii.	Carbon molecule, C_2	c.	One σ-bonds
iv.	Ethyne	d.	One σ-bond and one π-bond

Choose the correct answer from the options given below:
(A) i – c, ii – d, iii – b, iv – a
(B) i – c, ii – d, iii – a, iv – b
(C) i – a, ii – d, iii – b, iv – c
(D) i – d, ii – c, iii – b, iv – a

56. For the reaction $2A \rightleftharpoons B + C$, $K_c = 4 \times 10^{-3}$. At a given time, the composition of reaction mixture is: $[A] = [B] = [C] = 2 \times 10^{-3}$ M. Then, which of the following is correct?
(A) Reaction has a tendency to go in backward direction.
(B) Reaction has gone to completion in forward direction.
(C) Reaction is at equilibrium.
(D) Reaction has a tendency to go in forward direction.

57. The E^o 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
(A) d^4 to d^5 configuration
(B) d^3 to d^5 configuration
(C) d^5 to d^4 configuration
(D) d^5 to d^2 configuration

58. Given below are two statements:

Statement I: The boiling point of hydrides of Group 16 elements follow the order
$H_2O > H_2Te > H_2Se > H_2S$

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

In the light of the above statements, choose the *correct* answer from the options given below:
(A) Statement I is true but Statement II is false.
(B) Statement I is false but Statement II is true.
(C) Both Statement I and Statement II are true.
(D) Both Statement and Statement II are false.

59. Match List I with List II.

List I (Process)		List II (Conditions)	
i.	Isothermal process	a.	No heat exchange
ii.	Isochoric process	b.	Carried out at constant temperature
iii.	Isobaric process	c.	Carried out at constant volume
iv.	Adiabatic process	d.	Carried out at constant pressure

Choose the correct answer from the options given below:
(A) i – a, ii – b, iii – c, iv – d
(B) i – b, ii – c, iii – d, iv – a
(C) i – d, ii – c, iii – b, iv – a
(D) i – d, ii – b, iii – c, iv – a

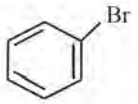
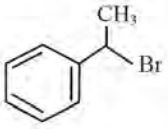
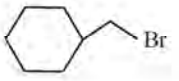
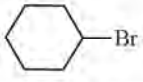
60. 1 gram of sodium hydroxide was treated with 25 mL of 0.75 M HCl solution, the mass of sodium hydroxide left unreacted is equal to
(A) Zero mg (B) 200 mg
(C) 750 mg (D) 250 mg

61. Match List I with List II.

List I (Complex)		List II (Type of isomerism)	
i.	$[Co(NH_3)_5(NO_2)]Cl_2$	a.	Solvate isomerism
ii.	$[Co(NH_3)_5(SO_4)]Br$	b.	Linkage isomerism
iii.	$[Co(NH_3)_6][Cr(CN)_6]$	c.	Ionization isomerism
iv.	$[Co(H_2O)_6]Cl_3$	d.	Coordination isomerism

Choose the correct answer from the options given below:
(A) i–a, ii–d, iii–c, iv–b
(B) i–b, ii–d, iii–c, iv–a
(C) i–b, ii–c, iii–d, iv–a
(D) i–a, ii–c, iii–d, iv–b

62. Among Group 16 elements, which one does **NOT** show –2 oxidation state?
(A) Te (B) Po
(C) O (D) Se

63. The compound that will undergo S_N1 reaction with the fastest rate is
(A) 
(B) 
(C) 
(D) 

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

(A) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2OH$

(B) $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-OH$

(C) $CH_3-CH_2-CH_2-CH_2OH$

(D) $CH_3-CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-OH$

65. Match List I with List II.

List I (Conversion)		List II (Number of Faraday required)	
i.	1 mol of H_2O to O_2	a.	3F
ii.	1mol of MnO_4^- to Mn^{2+}	b.	2F
iii.	1.5 mol of Ca from molten $CaCl_2$	c.	1F
iv.	1 mol of FeO to Fe_2O_3	d.	5F

Choose the correct answer from the options given below:

(A) i–b, ii–c, iii–a, iv–d
(B) i–c, ii–d, iii–b, iv–a
(C) i–b, ii–d, iii–a, iv–c
(D) i–c, ii–d, iii–a, iv–b

66. The highest number of helium atoms is in

(A) 4 g of helium
(B) 2.271098 L of helium at STP
(C) 4 mol of helium
(D) 4 u of helium

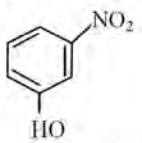
67. 'Spin only' magnetic moment is same for which of the following ions?

i. Ti^{3+} ii. Cr^{2+}
iii. Mn^{2+} iv. Fe^{2+}
v. Sc^{3+}

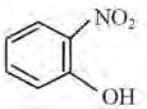
Choose the most appropriate answer from the options given below:

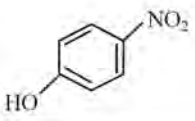
(A) ii and iii only (B) i and iv only
(C) ii and iv only (D) i and v only

68. Intramolecular hydrogen bonding is present in

(A) 

(B) HF

(C) 

(D) 

69. Fehling's solution 'A' is

(A) alkaline solution of sodium potassium tartrate (Rochelle's salt)
(B) aqueous sodium citrate
(C) aqueous copper sulphate
(D) alkaline copper sulphate

70. Match List I with List II.

List I Quantum Number		List II Information provided	
i.	m_l	a.	Shape of orbital
ii.	m_s	b.	Size of orbital
iii.	l	c.	Orientation of orbital
iv.	n	d.	Orientation of spin of electron

Choose the correct answer from the options given below:

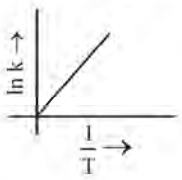
(A) i–c, ii–d, iii–b, iv–a
(B) i–b, ii–a, iii–d, iv–c
(C) i–a, ii–c, iii–b, iv–d
(D) i–c, ii–d, iii–a, iv–b

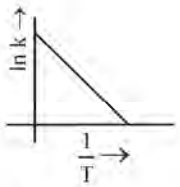
71. Arrange the following elements in increasing order of first ionization enthalpy:
Li, Be, B, C, N

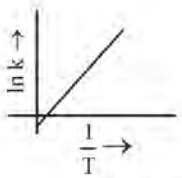
Choose the correct answer from the options given below:

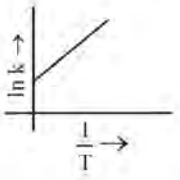
(A) Li < Be < C < B < N
(B) Li < Be < N < B < C
(C) Li < Be < B < C < N
(D) Li < B < Be < C < N

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

(A) 

(B) 

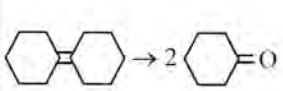
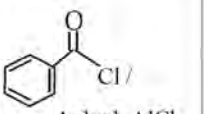
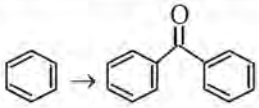
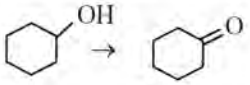
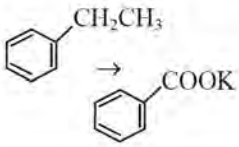
(C) 

(D) 

73. Arrange the following elements in increasing order of electronegativity:
N, O, F, C, Si
Choose the correct answer from the options given below:

(A) O < F < N < C < Si
(B) F < O < N < C < Si
(C) Si < C < N < O < F
(D) Si < C < O < N < F

74. Match List I with List II.

List I (Reaction)		List II (Reagents/ Condition)	
i.		a.	 Anhyd. $AlCl_3$
ii.		b.	CrO_3
iii.		c.	$KMnO_4/KOH, \Delta$
iv.		d.	(i) O_3 (ii) ZnH_2O

Choose the correct answer from the options given below:

(A) i–d, ii–a, iii–b, iv–c

(B) i–a, ii–d, iii–b, iv–c

(C) i–d, ii–a, iii–c, iv–b

(D) i–c, ii–a, iii–b, iv–d

75. 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:

(A) Statement I is correct but Statement II is false.

(B) Statement I is incorrect but Statement II is true.

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

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

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

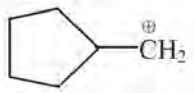
(A) $CO_{(g)} + H_2O_{(g)} \rightleftharpoons CO_{2(g)} + H_{2(g)}$

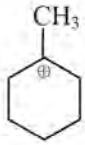
(B) $2BrCl_{(g)} \rightleftharpoons Br_{2(g)} + Cl_{2(g)}$

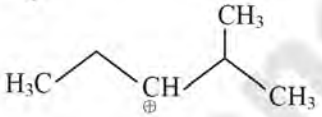
(C) $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$

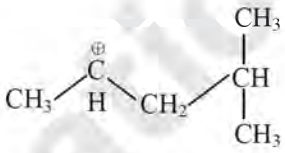
(D) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$

77. The most stable carbocation among the following is:

(A) 

(B) 

(C) 

(D) 

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

i. Tollen's reagent ii. Schiff's reagent

iii. HCN iv. NH_2OH

v. $NaHSO_3$

Choose the correct options from the given below:

(A) ii and v (B) v and iv

(C) ii and iii (D) i and iv

79. Given below are two statements

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

Statement II: $[Co(NH_3)_6]^{3+}$ is diamagnetic whereas $[COF_6]^{3-}$ is paramagnetic.

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

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

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

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

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

80. Activation energy of any chemical reaction be calculated if one knows the value of

(A) orientation of reactant molecules during collision

(B) rate constant at two different temperatures

(C) rate constant at standard temperature

(D) probability of collision

81. A compound with a molecular formula of C_6H_{14} has two tertiary carbons. Its IUPAC name
(A) 2,3-dimethylbutane
(B) 2,2-dimethylbutane
(C) n-hexane
(D) 2-methylpentane

82.

List I (Compound)		List II (Shape/Geometry)	
i.	NH_3	a.	Trigonal pyramidal
ii.	BrF_5	b.	Square planar
iii.	XeF_4	c.	Octahedral
iv.	SF_6	d.	Square pyramidal

Choose the correct answer from the options given below:
(A) i – c, ii – d, iii – a, iv – b
(B) i – b, ii – c, iii – d, iv – a
(C) i – a, ii – d, iii – b, iv – c
(D) i – b, ii – d, iii – c, iv – a

83. The Henry's law constant (K_H) values of three gases (A, B, C) in water are 145, 2×10^{-5} and 35 kbar, respectively. The solubility of these gases in water follows the order:
(A) A > C > B
(B) A > B > C
(C) B > A > C
(D) B > C > A

84. Which reaction is **NOT** a redox reaction?
(A) $H_2 + Cl_2 \longrightarrow 2HCl$
(B) $BaCl_2 + Na_2SO_4 \longrightarrow BaSO_4 + 2NaCl$
(C) $Zn + CuSO_4 \longrightarrow ZnSO_4 + Cu$
(D) $2\,KClO_3 + I_2 \longrightarrow 2KIO_3 + Cl_2$

85. **Statement I:** The boiling point of three isomeric pentanes follows the order
n-pentane > isopentane > neopentane
Statement II: When branching increases, the molecule attains a shape of sphere. This results in smaller surface area for contact, due to which the intermolecular forces between the spherical molecules are weak, thereby lowering the boiling point

In the light of the above statements, choose the *most appropriate* answer from the options given
(A) Statement I is correct but Statement II is incorrect.
(B) Statement I is incorrect but Statement II is correct.
(C) Both Statement I and Statement II are correct.
(D) Both Statement I and Statement II are incorrect.

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

86. The rate of a reaction quadruples when temperature changes from 27 °C to 57 °C. Calculate the energy of activation.
Given: $R = 8.314\ J\ K^{-1}\ mol^{-1}$, $\log 4 = 0.6021$
(A) 3.80 kJ/mol (B) 3804 kJ/mol
(C) 38.04 kJ/mol (D) 380.4 kJ/mol

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

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

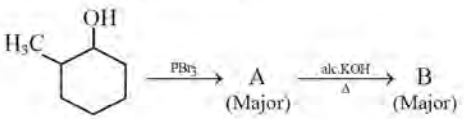
If 0.1 mol L^{-1} of $NO_{(g)}$ is taken in a closed vessel, what will be degree of dissociation (α) of $NO_{(g)}$ at equilibrium?
(A) 0.8889 (B) 0.717
(C) 0.00889 (D) 0.0889

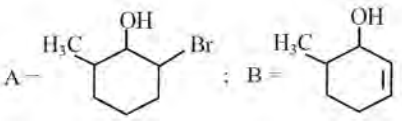
88. During the preparation of Mohr's salt solution (ferrous ammonium sulphate), which of the following acid is added to prevent hydrolysis Fe^{2+} ion?
(A) dilute nitric acid
(B) dilute sulphuric acid
(C) dilute hydrochloric acid
(D) concentrated sulphuric acid

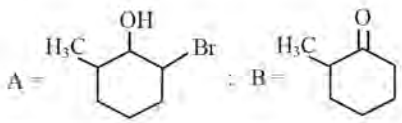
89. A compound X contains 32% of A, 20% of B and remaining percentage of C. Then, the empirical formula of X is:
(Given atomic masses of A = 64: B = 40, C = 32 u)
(A) AB_2C_2 (B) ABC_4
(C) A_2BC_2 (D) ABC_3

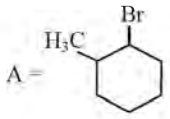
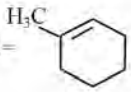
90. The pair of lanthanoid ions which are diamagnetic is
(A) Gd^{3+} and Eu^{3+}
(B) Pm^{3+} and Sm^{3+}
(C) Ce^{4+} and Yb^{2+}
(D) Ce^{3+} and Eu^{2+}

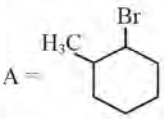
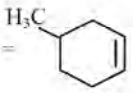
91. Major products A and B formed in the following reaction sequence are



(A) 

(B) 

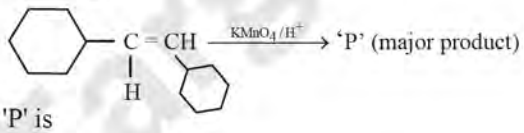
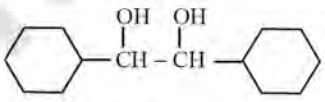
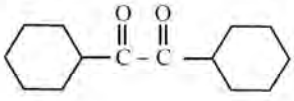
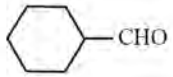
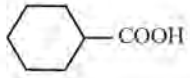
(C) A =  ; B = 

(D) A =  ; B = 

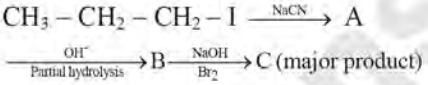
92. The plot of osmotic pressure (π) vs concentration (mol L^{-1}) for a solution gives a straight line with slope 25.73 L bar mol^{-1}. The temperature at which the osmotic pressure measurement is done is:
(Use R = 0.083 L bar mol^{-1} K^{-1})
(A) 25.73 °C (B) 12.05 °C
(C) 37 °C (D) 310 °C

93. Given below are certain cations. Using inorganic qualitative analysis arrange them in increasing group number from 0 to VI.
i. Al^{3+} ii. Cu^{2+}
iii. Ba^{2+} iv. Co^{2+}
v. Mg^{2+}
Choose the correct answer from the options given below:
(A) v, iii, iv, ii, i
(B) v, i, ii, iii, iv
(C) ii, i, iv, iii, v
(D) ii, iii, i, iv, v

94. 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) H_3PO_4 and $POCl_3$
(B) H_3PO_3 and $POCl_3$
(C) $POCl_3$ and H_3PO_3
(D) $POCl_3$ and H_3PO_4

95. For the given reaction:

'P' is
(A) 
(B) 
(C) 
(D) 

96. The work done during reversible isothermal expansion of one mole of hydrogen gas at 25 °C from pressure of 20 atmospheres to 10 atm is:
(Given R= 2.0 cal K^{-1} mol^{-1})
(A) 413.14 calories
(B) 100 calories
(C) 0 calorie
(D) –413.25 calories

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

(A) butanamide
(B) α–bromobutanoic acid
(C) propylamine
(D) butylamine

98. Identify the correct answer.
(A) Dipole moment of NF_3 is greater than that of NH_3.
(B) Three canonical forms can be drawn for CO_3^{2-} ion.
(C) Three resonance structures can be drawn for ozone.
(D) BF_3 has nonzero dipole moment.

99. 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) 31.5 g
(B) 0.0315 g
(C) 3.15 g
(D) 0.315 g

100. Given below are two statements:
Statement I: $[Co(NH_3)_6]^{3+}$ is a homoleptic complex whereas $[Co(NH_3)_4Cl_2]^{+}$ is a heteroleptic complex.
Statement II: Complex $[Co(NH_3)_6]^{3+}$ has only one kind of 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:
(A) Statement I is true but Statement II is false.
(B) Statement I is false but Statement II is true.
(C) Both Statement I and Statement II are true.
(D) Both Statement I and Statement II are false.

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

101. Inhibition of Succinic dehydrogenase enzyme by malonate is a classical example of:
(A) Competitive inhibition
(B) Enzyme activation
(C) Cofactor inhibition
(D) Feedback inhibition

102. Which one of the following can be explained on the basis of Mendel's Law of Dominance?
I. Out of one pair of factors one is dominant and the other is recessive.
II. Alleles do not show any expression and both the characters appear as such in F_2 generation.
III. Factors occur in pairs in normal diploid plants.
IV. The discrete unit controlling a particular character is called factor.
V. The expression of only one of the parental characters is found in a monohybrid cross.
Choose the correct answer from the options given below:
(A) II, III and IV only
(B) I, II, III, IV and V
(C) I, II and III only
(D) I, III, IV and V only

103. Lecithin, a small molecular weight organic compound found in living tissues, is an example of:
(A) Glycerides (B) Carbohydrates
(C) Amino acids (D) Phospholipids

104. Match List I with List II

	List I		List II
i.	Nucleolus	a.	Site of formation of glycolipid
ii.	Centriole	b.	Organization like the cartwheel
iii.	Leucoplasts	c.	Site for active ribosomal RNA synthesis
iv.	Golgi apparatus	d.	For storing nutrients

Choose the correct answer from the options given below:
(A) i-c, ii-d, iii-b, iv-a
(B) i-a, ii-b, iii-c, iv-d
(C) i-c, ii-b, iii-d, iv-a
(D) i-b, ii-c, iii-a, iv-d

105. Which of the following is an example of actinomorphic flower?
(A) *Pisum* (B) *Sesbania*
(C) *Datura* (D) *Cassia*

106. How many molecules of ATP and NADPH are required for every molecule of CO_2 fixed in the Calvin cycle?
(A) 3 molecules of ATP and 3 molecules of NADPH
(B) 3 molecules of ATP and 2 molecules of NADPH
(C) 2 molecules of ATP and 3 molecules of NADPH
(D) 2 molecules of ATP and 2 molecules of NADPH

107. Formation of interfascicular cambium from fully developed parenchyma cells is an example for
(A) Dedifferentiation
(B) Maturation
(C) Differentiation
(D) Redifferentiation

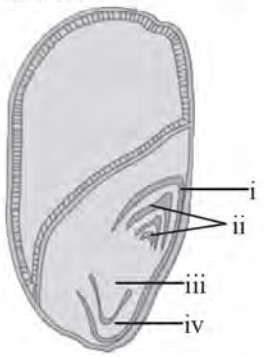
108. Auxin is used by gardeners to prepare weed-free lawns. But no damage is caused to grass as auxin
(A) does not affect mature monocotyledonous plants.
(B) can help in cell division in grasses, to produce growth.
(C) promotes apical dominance.
(D) promotes abscission of mature leaves only.

109. Which of the following are required for the dark reaction of photosynthesis?
I. Light II. Chlorophyll
III. CO_2 IV. ATP
V. NADPH
Choose the correct answer from the options below:
(A) III, IV and V only (B) IV and V only
(C) I, II and III only (D) II, III and IV only

110. The lactose present in the growth medium of bacteria is transported to the cell by the action of.
(A) Permease
(B) Polymerase
(C) Beta-galactosidase
(D) Acetylase

111. The cofactor of the enzyme carboxypeptidase
(A) Flavin (B) Haem
(C) Zinc (D) Niacin

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



(A) iii (B) iv (C) i (D) ii

113. 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:
(A) Statement I is true but Statement II is false
(B) Statement I is false but Statement II is true
(C) Both Statement I and Statement II are true
(D) Both Statement I and Statement II are false

114. 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:
(A) Semi-conservative method
(B) Sustainable development
(C) *in-situ* conservation
(D) Biodiversity conservation

115. 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:
(A) Statement I is true but Statement II is false
(B) Statement I is false but Statement II is true
(C) Both Statement I and Statement II are true
(D) Both Statement I and Statement II are false

116. The equation of Verhulst-Pearl logistic growth is $\frac{dN}{dt} = rN\left[\frac{K-N}{K}\right]$
From this equation, K indicates:
(A) Carrying capacity
(B) Population density
(C) Intrinsic rate of natural increase
(D) Biotic potential

117. Match List I with List II

	List I		List II
i.	*Clostridium butylicum*	a.	Ethanol
ii.	*Saccharomyces cerevisiae*	b.	Streptokinase
iii.	*Trichoderma polysporum*	c.	Butyric acid
iv.	*Streptococcus* sp.	d.	Cyclosporin-A

Choose the correct answer from the options given below:
(A) i-c, ii-a, iii-d, iv-b
(B) i-d, ii-a, iii-c, iv-b
(C) i-c, ii-a, iii-b, iv-d
(D) i-b, i-d, iii-c, iv-a

118. Which one of the following is <u>not</u> a criterion for classification of fungi?
(A) Mode of spore formation
(B) Fruiting body
(C) Morphology of mycelium
(D) Mode of nutrition

119. The capacity to generate a whole plant from any cell of the plant is called:
(A) Differentiations
(B) Somatic hybridization
(C) Totipotency
(D) Micropropagation

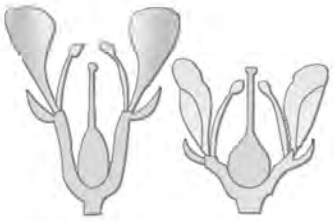
120. Given below are two statements:
Statement I: Bt toxins are insect group specific and coded by a gene *cry* IAc.
Statement II: Bt toxin exists as inactive protoxin in *B. thuringiensis*. However, after ingestion by the insect the inactive protoxin gets converted into active form due to acidic pH of the insect gut.
In the light of the above statements, choose the correct answer from the options given below:
(A) Statement I is true but Statement II is false
(B) Statement I is false but Statement II is true
(C) Both Statement I and Statement II are true
(D) Both Statement I and Statement II are false

121. Identify the set of correct statements:
I. The flowers of *Vallisneria* are colourful and produce nectar.
II. The flowers of waterlily are not pollinated by water.
III. In most of water-pollinated species, the pollen grains are protected from wetting.
IV. Pollen grains of some hydrophytes are long and ribbon like.
V. In some hydrophytes, the pollen grains are carried passively inside water.
Choose the correct answer from the options given below:
(A) I, III, IV and V only
(B) II, III, IV and V only
(C) III, IV and V only
(D) I, II, III and IV only

122. 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;
(A) Inducer, Repressor, Structural gene
(B) Promotor, Structural gene, Terminator
(C) Repressor, Operator gene, Structural gene
(D) Structural gene, Transposons, Operator gene

123. Bulliform cells are responsible for
(A) Increased photosynthesis in monocots.
(B) Providing large spaces for storage of sugars.
(C) Inward curling of leaves in monocots.
(D) Protecting the plant from salt stress.

124. 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)



(a) (b)

(A) (a) Perigynous; (b) Epigynous
(B) (a) Perigynous; (b) Perigynous
(C) (a) Epigynous; (b) Hypogynous
(D) (a) Hypogynous; (b) Epigynous

125. What is the fate of a piece of DNA carrying only gene of interest which is transferred into an alien organism?
I. The piece of DNA would be able to multiply itself independently in the progeny cells of the organism.
II. It may get integrated into the genome of the recipient.
III. It may multiply and be inherited along with the host DNA.
IV. The alien piece of DNA is not an integral part of chromosome.
V. It shows ability to replicate.
Choose the correct answer from the options given below:
(A) II and III only (B) I and V only
(C) I and II only (D) IV and V only

126. Tropical regions show greatest level of species richness because
I. Tropical latitudes have remained relatively undisturbed for millions of years, hence more time was available for species diversification.
II. Tropical environments are more seasonal
III. More solar energy is available in tropics
IV. Constant environments promote niche specialization.
V. Tropical environments are constant and predictable.
Choose the correct answer from the options given below:
(A) I, II and V only
(B) I, II and IV only
(C) I, III, IV and V only
(D) I and II only

127. A pink flowered Snapdragon plant was crossed with a red flowered Snapdragon plant. What type of phenotype/s is/are expected in the progeny.
(A) Only pink flowered plants
(B) Red, Pink as well as white flowered plants
(C) Only red flowered plants
(D) Red flowered as well as pink flowered plants

128. These are regarded as major causes of biodiversity loss:
I. Over exploitation
II. Co-extinction
III. Mutation
IV. Habitat loss and fragmentation
V. Migration
Choose the correct option:
(A) I, II and V only
(B) I, II and IV only
(C) I, III and IV only
(D) I, II, III and IV only

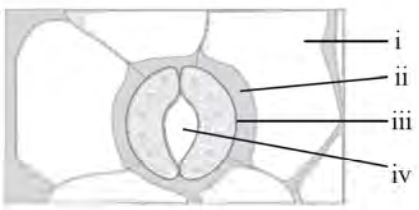
129. Match List I with List II

	List I		List II
i.	*Rhizopus*	a.	Mushroom
ii.	*Ustilaga*	b.	Smut fungus
iii.	*Puccinia*	c.	Bread mould
iv.	*Agaricus*	d.	Rust fungus

Choose the correct answer from the options given below:
(A) i-c, ii-b, iii-a, iv-d
(B) i-d, ii-c, iii-b, iv-a
(C) i-c, ii-b, iii-d, iv-a
(D) i-a, ii-c, iii-b iv-d

130. 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?
(A) Bb (B) BB/Bb
(C) BB (D) bb

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



(A) i (B) ii (C) iii (D) iv

132. List of endangered species was released by-
(A) FOAM (B) IUCN
(C) GEAC (D) WWF

133. Match List I with List II

	List I		List II
i.	Two or more alternative forms of a gene	a.	Back cross
ii.	Cross of F_1 progeny with homozygous recessive parent	b.	Ploidy
iii.	Cross of F_1 progeny with any of the parents	c.	Allele
iv.	Number of chromosome sets in plant	d.	Test cross

Choose the correct answer from the options given below:
(A) i-c, ii-d, iii-a, iv-b
(B) i-d, ii-c, iii-b, iv-a
(C) i-a, ii-b, iii-c, iv-d
(D) i-b, ii-a, iii-c, iv-d

134. Hind II always cuts DNA molecules at a particular point called recognition sequence and it consists of:
(A) 4 bp (B) 10 bp
(C) 8 bp (D) 6 bp

135. Spindle fibers attach to kinetochores of chromosomes during
(A) Anaphase (B) Telophase
(C) Prophase (D) Metaphase

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

136. Match List I with List II

	List I		List II
i.	Robert May	a.	Species-Area relationship
ii.	Alexander von Humboldt	b.	Long term ecosystem experiment using out door plots
iii.	Paul Ehrlich	c.	Global species diversity at about 7 million
iv.	David Tilman	d.	Rivet popper hypothesis

Choose the correct answer from the options given below:
(A) i-a, ii-c, iii-b, iv-d
(B) i-c, ii-d, iii-b, iv-a
(C) i-b, ii-c, iii-a, iv-d
(D) i-c, ii-a, iii-d, iv-b

137. Match List I with List II

	List I		List II
i.	Frederick Griffith	a.	Genetic code
ii.	Francois Jacob & Jacque Monod	b.	Semi-conservative mode of DNA replication
iii.	Har Gobind Khorana	c.	Transformation
iv.	Meselson & Stahl	d.	*Lac* operon

Choose the correct answer from the options given below:
(A) i-b, ii-c, iii-d, iv-a
(B) i-d, ii-a, iii-b, iv-c
(C) i-c, ii-b, iii-a, iv-d
(D) i-c, ii-d, iii-a, iv-b

138. Match List I with List II

	List I (Types of Stamens)		List II (Example)
i.	Monoadelphous	a.	Citrus
ii.	Diadelphous	b.	Pea
iii.	Polyadelphous	c.	Lily
iv.	Epiphyllous	d.	China-rose

Choose the correct answer from the options given below:
(A) i-a, ii-b, iii-d, iv-c
(B) i-c, ii-a, iii-d, iv-b
(C) i-d, ii-b, iii-a, iv-c
(D) i-d, ii-a, iii-b, iv-c

139. Match List I with List II

	List I		List II
i.	GLUT-4	a.	Hormone
ii.	Insulin	b.	Enzyme
iii.	Trypsin	c.	Intercellular ground substance
iv.	Collagen	d.	Enables glucose transport into cells

Choose the correct answer from the options given below:
(A) i-b, ii-c, iii-d, iv-a
(B) i-c, ii-d, iii-a, iv-b
(C) i-d, ii-a, iii-b, iv-c
(D) i-a, ii-b, iii-c, iv-d

140. Which of the following statement is correct regarding the process of replication in *E.coli*?
(A) The DNA dependent DNA polymerase catalyses polymerization in 5'→3' as well as 3'→5' direction.
(B) The DNA dependent DNA polymerase catalyses polymerization in 5'→3' direction
(C) The DNA dependent DNA polymerase catalyses polymerization in one direction that is 3'→5'.
(D) The DNA dependent RNA polymerase catalyses polymerization in one direction that is 5'→3'.

141. Match List I with List II

	List I		List II
i.	Citric acid cycle	a.	Cytoplasm
ii.	Glycolysis	b.	Mitochondrial matrix
iii.	Electron transport system	c.	Intermembrane space of mitochondria
iv.	Proton gradient	d.	Inner mitochondrial membrane

Choose the correct answer from the options given below:
(A) i-c, ii-d, iii-a, iv-b
(B) i-d, ii-c, iii-b, iv-a
(C) i-a, ii-b, iii-c, iv-d
(D) i-b, ii-a, iii-d, iv-c

142. Identify the step in tricarboxylic acid cycle, which does not involve oxidation of substrate.
(A) Succinyl-CoA → Succinic acid
(B) Isocitrate → α-ketoglutaric acid
(C) Malic acid → Oxaloacetic acid
(D) Succinic acid → Malic acid

143. Spraying sugarcane crop with which of the following plant growth regulators, increases the length of stem, thus, increasing the yield?
(A) Cytokinin (B) Abscisic acid
(C) Auxin (D) Gibberellin

144. The DNA present in chloroplast is:
(A) Linear, single stranded
(B) Circular, single stranded
(C) Linear, double stranded
(D) Circular, double stranded

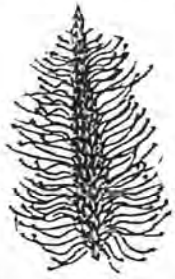
145. Given below are two statements:
Statement I: In C_3 plants, some O_2 binds to RuBisCO, hence CO_2 fixation is decreased.
Statement II: In C_4 plants, mesophyll cells show very little photorespiration while bundle sheath cells do not show photorespiration.
In the light of the above statements, choose the *correct* answer from the options given below:
(A) Statement I is true but Statement II is false
(B) Statement I is false but Statement II is true
(C) Both Statement I and Statement II are true
(D) Both Statement I and Statement II are false

146. Which of the following are fused in somatic hybridization involving two varieties of plants?
(A) Protoplasts
(B) Pollens
(C) Callus
(D) Somatic embryos

147. Read the following statements and choose the set of correct statements:
In the members of Phaeophyceae,
I. Asexual reproduction occurs usually by biflagellate zoospores.
II. Sexual reproduction is by oogamous method only.
III. Stored food is in the form of carbohydrates which is either mannitol or laminarin.
IV. The major pigments found are chlorophyll a, c and carotenoids and xanthophyll.
V. 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:
(A) I, III, IV and V only
(B) I, II, III and V only
(C) I, II, III and IV only
(D) II, III, IV and V only

148. 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?
(A) $10x\ (kcal\ m^{-2})\ yr^{-1}$
(B) $\frac{100x}{3x}\ (kcal\ m^{-2})\ yr^{-1}$
(C) $\frac{x}{10}\ (kcal\ m^{-2})\ yr^{-1}$
(D) $x\ (kcal\ m^{-2})\ yr^{-1}$

149. Identify the correct description about the given figure:



(A) Cleistogamous flowers showing autogamy.
(B) Compact inflorescence showing complete autogamy.
(C) Wind pollinated plant inflorescence showing flowers with well exposed stamens.
(D) Water pollinated flowers showing stamens with mucilaginous covering.

150. Match List I with List II

	List I		List II
i.	Rose	a.	Twisted aestivation
ii.	Pea	b.	Perigynous flower
iii.	Cotton	c.	Drupe
iv.	Mango	d.	Marginal placentation

Choose the correct answer from the options given below:
(A) i-d, ii-c, iii-b, iv-a
(B) i-b, ii-c, iii-d, iv-a
(C) i-b, ii-d, iii-a, iv-c
(D) i-a, ii-b, iii-c, iv-d

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

151. Match List I with List II:

	List I		List II
i.	Pleurobrachia	a.	Mollusca
ii.	Radula	b.	Ctenophora
iii.	Stomochord	c.	Osteichthyes
iv.	Air bladder	d.	Hemichordata

Choose the correct answer from the options given below:
(A) i-b, ii-d, iii-a, iv-c
(B) i-d, ii-c, iii-b, iv-a
(C) i-d, ii-b, iii-c, iv-a
(D) i-b, ii-a, iii-d, iv-c

152. Match List I with List II:

	List I		List II
i.	Non-medicated IUD.	a.	Multiload 375
ii.	Copper releasing IUD	b.	Progestogens
iii.	Hormone releasing IUD	c.	Lippes loop
iv.	Implants	d.	LNG-20

Choose the correct answer from the options give below:
(A) i-d, ii-a, iii-b, iv-c
(B) i-c, ii-a, iii-d, iv-b
(C) i-c, ii-a, iii-b, iv-d
(D) i-a, ii-c, iii-d, iv-b

153. Match List I with List II:

	List I		List II
i.	α-1 antitrypsin	a.	Cotton bollworm
ii.	Cry IAb	b.	ADA deficiency
iii.	Cry IAc	c.	Emphysema
iv.	Enzyme replacement therapy	d.	Corn borer

Choose the correct answer from the options given below:
(A) i-c, ii-d, iii-a, iv-b
(B) i-b, ii-d, iii-a, iv-c
(C) i-b, ii-a, iii-d, iv-c
(D) i-c, ii-a, iii-b, iv-d

154. Match List I with List II:

	List I		List II
i.	Common cold	a.	*Plasmodium*
ii.	Haemozoin	b.	Typhoid
iii.	Widal test	c.	Rhinoviruses
iv.	Allergy	d.	Dust mites

Choose the correct answer from the options given below:
(A) i-c, ii-a, iii-b, iv-d
(B) i-d, ii-b, iii-c, iv-a
(C) i-b, ii-d, iii-c, iv-a
(D) i-a, ii-c, iii-b, iv-d

155. Match List I with List II:

	List I		List II
i.	Cocaine	a.	Effective sedative in surgery
ii.	Heroin	b.	*Cannabis sativa*
iii.	Morphine	c.	*Erythroxylum*
iv.	Marijuana	d.	*Papaver somniferum*

Choose the correct answer from the options given below:
(A) i-b, ii-a, iii-c, iv-d
(B) i-c, ii-d, iii-a, iv-b
(C) i-d, ii-c, iii-a, iv-b
(D) i-a, ii-c, iii-b, iv-d

156. Match List I with List II:

	List I (Sub Phases of Prophase I)		List II (Specific characters)
i.	Diakinesis	a.	Synaptonemal complex formation
ii.	Pachytene	b.	Completion of terminalisation of chiasmata
iii.	Zygotene	c.	Chromosomes look like thin threads
iv.	Leptotene	d.	Appearance of recombination nodules

Choose the correct answer from the options given below:
(A) i-b, ii-d, iii-a, iv-c
(B) i-d, ii-c, iii-b, iv-a
(C) i-d, ii-b, iii-c, iv-a
(D) i-a, ii-b, iii-d, iv-c

157. 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:

(A) Statement I is true but Statement II is false
(B) Statement I is false but Statement II is true
(C) Both Statement I and Statement II are true
(D) Both Statement I and Statement II are false

158. Which one is the correct product of DNA dependent RNA polymerase to the given template?
3'TACATGGCAAATATCCATTCA5'
(A) 5'AUGUACCGUUUAUAGGGAAGU3'
(B) 5'ATGTACCGTTTATAGGTAAGT3'
(C) 5'AUGUACCGUUUAUAGGUAAGU3'
(D) 5'AUGUAAAGUUUAUAGGUAAGU3'

159. Match List I with List II:

	List I		List II
i.	Expiratory capacity	a.	Expiratory reserve volume + Tidal volume + Inspiratory reserve volume
ii.	Functional residual capacity	b.	Tidal volume + Expiratory reserve volume
iii.	Vital capacity	c.	Tidal volume + Inspiratory reserve volume
iv.	Inspiratory capacity	d.	Expiratory reserve volume + Residual volume

Choose the correct answer from the options given below:
(A) i-b, ii-a, iii-d, iv-c
(B) i-a, ii-c, iii-b, iv-d
(C) i-b, ii-d, iii-a, iv-c
(D) i-c, ii-b, iii-d, iv-a

160. Which of the following are Autoimmune disorders?
I. Myasthenia gravis
II. Rheumatoid arthritis
III. Gout
IV. Muscular dystrophy
V. Systemic Lupus Erythematosus (SLE)
Choose the most appropriate answer from the options given below:
(A) II, III & V only (B) III, IV & V only
(C) I, II & IV only (D) I, II & V only

161. Consider the following statements:
I. Annelids are true coelomates
II. Poriferans are pseudocoelomates
III. Aschelminthes are acoelomates
IV. Platyhelminthes are pseudocoelomates
Choose the correct answer from the options given below:
(A) III only (B) IV only
(C) II only (D) I only

162. 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:
(A) Statement I is true but Statement II is false
(B) Statement I is false but Statement II is true
(C) Both Statement I and Statement II are true
(D) Both Statement I and Statement II are false

163. Match List I with List II

	List I		List II
i.	*Pterophyllum*	a.	Hag fish
ii.	*Myxine*	b.	Saw fish
iii.	*Pristis*	c.	Angel fish
iv.	*Exocoetus*	d.	Flying fish

Choose the correct answer from the options given below:
(A) i-d, ii-a, iii-b, iv-c
(B) i-c, ii-b, iii-a, iv-d
(C) i-b, ii-a, iii-c, iv-d
(D) i-c, ii-a, iii-b, iv-d

164. Which of the following is not a steroid hormone?
(A) Progesterone (B) Glucagon
(C) Cortisol (D) Testosterone

165. Match List I with List II:

	List I		List II
i.	Lipase	a.	Peptide bond
ii.	Nuclease	b.	Ester bond
iii.	Protease	c.	Glycosidic bond
iv.	Amylase	d.	Phosphodiester bond

Choose the correct answer from the options given below:
(A) i-b, ii-d, iii-a, iv-c
(B) i-d, ii-a, iii-c, iv-b
(C) i-d, ii-b, iii-c, iv-a
(D) i-c, ii-b, iii-a, iv-d

166. Match List I with List II:

	List I		List II
i.	Down's syndrome	a.	11^{th} chromosome
ii.	α-Thalassemia	b.	'X' chromosome
iii.	β-Thalassemia	c.	21^{st} chromosome
iv.	Klinefelter's syndrome	d.	16^{th} chromosome

Choose the correct answer from the options given below:
(A) i-c, ii-d, iii-a, iv-b
(B) i-d, ii-a, iii-b, iv-c
(C) i-a, ii-b, iii-c, iv-d
(D) i-b, ii-c, iii-d, iv-a

167. The "Ti plasmid" of *Agrobacterium tumefaciens* stands for
(A) Tumor inducing plasmid
(B) Temperature independent plasmid
(C) Tumour inhibiting plasmid
(D) Tumor independent plasmid

168. 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:
(A) A is correct but R is not correct.
(B) A is not correct but R is correct.
(C) Both A and R are correct and R is the correct explanation of A.
(D) Both A and R are correct but R is NOT the correct explanation of A.

169. Which of the following is not a component of Fallopian tube?
(A) Infundibulum (B) Ampulla
(C) Uterine fundus (D) Isthmus

170. In both sexes of cockroach, a pair of jointed filamentous structures called anal cerci are present on:
(A) 8th and 9th segment
(B) 11th segment
(C) 5th segment
(D) 10th segment

171. Which one of the following factors will not affect the Hardy-Weinberg equilibrium?
(A) Gene migration
(B) Constant gene pool
(C) Genetic recombination
(D) Genetic drift

172. Match List I with List II:

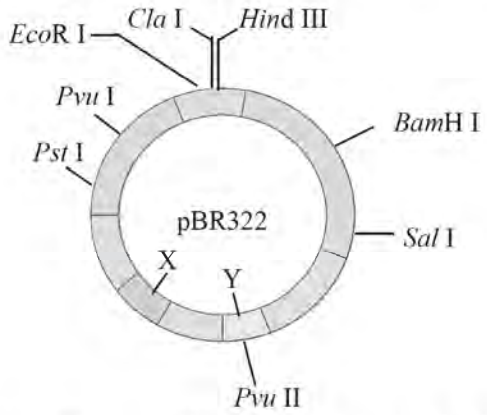
	List I		List II
i.	Pons	a.	Provides additional space for neurons, Regulates posture and balance.
ii.	Hypothalamus	b.	Controls respiration and gastric secretions.
iii.	Medulla	c.	Connects different regions of the brain.
iv.	Cerebellum	d.	Neuro secretory cells

Choose the correct answer from the options given below:
(A) i-a, ii-c, iii-b, iv-d
(B) i-b, ii-a, iii-c, iv-d
(C) i-b, ii-c, iii-a, iv-d
(D) i-c, ii-d, iii-b, iv-a

173. The flippers of the Penguins and Dolphins are the examples of the
(A) Convergent evolution
(B) Divergent evolution
(C) Adaptive radiation
(D) Natural selection

174. Following are the stages of pathway for conduction of an action potential through the heart:
I. AV bundle
II. Purkinje fibres
III. AV node
IV. Bundle branches
V. SA node
Choose the correct sequence of pathway from the options given below:
(A) II-IV-V-III-I (B) V-I-IV-II-III
(C) V-III-I-IV-II (D) I-V-III-II-IV

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



(A) The gene 'X' is for protein involved in replication of Plasmid and 'Y' for resistance to antibiotics.
(B) Gene 'X' is responsible for recognition sites and 'Y' is responsible for antibiotic resistance.
(C) The gene 'X' is responsible for resistance to antibiotics and 'Y' for protein involved in the replication of Plasmid.
(D) The gene 'X' is responsible for controlling the copy number of the linked DNA and 'Y' for protein involved in the replication of Plasmid.

176. 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:
(A) A is true but R is false
(B) A is false but R is true
(C) Both A and R are true and R is the correct explanation of A.
(D) Both A and R are true but R is NOT the correct explanation of A.

177. Which of the following statement is incorrect.
(A) Bio-reactors are used to produce small scale bacterial cultures.
(B) Bio-reactors have an agitator system, an oxygen delivery system and foam control system.
(C) A bio-reactor provides optimal growth conditions for achieving the desired product.
(D) Most commonly used bio-reactors are stirring type.

178. Match List I with List II:

	List I		List II
i.	Axoneme	a.	Centriole
ii.	Cartwheel pattern	b.	Cilia and flagella
iii.	Crista	c.	Chromosome
iv.	Satellite	d.	Mitochondria

Choose the correct answer from the options giver below:
(A) i-b, ii-d, iii-a, iv-c
(B) i-b, ii-a, iii-d, iv-c
(C) i-d, ii-c, iii-b, iv-a
(D) i-d, ii-b, iii-c, iv-a

179. Match List I with List II:

	List I		List II
i.	Fibrous joints	a.	Adjacent vertebrae, limited movement
ii.	Cartilaginous joints	b.	Humerus and Pectoral girdle, rotational movement
iii.	Hinge joints	c.	Skull, don't allow any movement
iv.	Ball and socket joints	d.	Knee, help in locomotion

Choose the correct answer from the options given below:
(A) i-b, ii-c, iii-a, iv-d
(B) i-c, ii-a, iii-d, iv-b
(C) i-d, ii-b, iii-c, iv-a
(D) i-a, ii-c, iii-b, iv-d

180. Given below are some stages of human evolution. Arrange them in correct sequence. (Past to Recent)
I. *Homo habilis*
II. *Homo sapiens*
III. *Homo neanderthalensis*
IV. *Homo erectus*
Choose the correct sequence of human evolution from the options given below:
(A) III-II-IV-I (B) I-IV-III-II
(C) IV-I-III-II (D) II-I-IV-III

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

(a) (b) (c)

Name of muscle/location
(A) (a) Skeletal - Biceps
(b) Involuntary - Intestine
(c) Smooth - Heart
(B) (a) Involuntary - Nose tip
(b) Skeletal - Bone
(c) Cardiac - Heart
(C) (a) Smooth - Toes
(b) Skeletal - Legs
(c) Cardiac - Heart
(D) (a) Skeletal - Triceps
(b) Smooth - Stomach
(c) Cardiac - Heart

182. Following are the stages of cell division:
I. Gap 2 phase
II. Cytokinesis
III. Synthesis phase
IV. Karyokinesis
V. Gap 1 phase
Choose the correct sequence of stages from the options given below:
(A) II-IV-V-I-III (B) V-III-I-IV-II
(C) III-V-IV-I-II (D) V-II-IV-I-III

183. Which of the following is not a natural/traditional contraceptive method?
(A) Lactational amenorrhea
(B) Vaults
(C) Coitus interruptus
(D) Periodic abstinence

184. Match List I with List II

	List I		List II
i.	Typhoid	a.	Fungus
ii.	Leishmaniasis	b.	Nematode
iii.	Ringworm	c.	Protozoa
iv.	Filariasis	d.	Bacteria

Choose the correct answer from the options given below:
(A) i-c, ii-a, iii-d, iv-b
(B) i-b, ii-d, iii-c, iv-a
(C) i-a, ii-c, iii-b, iv-d
(D) i-d, ii-c, iii-a, iv-b

185. Which of the following factors are favourable for the formation of oxyhaemoglobin in alveoli?
(A) Low pCO_2 and High H^+ concentration
(B) Low pCO_2 and High temperature
(C) High pO_2 and High pCO_2
(D) High pO_2 and Lesser H^+ concentration

Zoology: Section – B (Q. No. 186 to 200)

186. 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:
(A) Statement I is correct but Statement II is incorrect.
(B) Statement I is incorrect but Statement II is correct.
(C) Both Statement I and Statement II are correct.
(D) Both Statement I and Statement II are incorrect.

187. Match List I with List II:

	List I		List II
i.	P wave	a.	Heart muscles are electrically silent
ii.	QRS complex	b.	Depolarisation of ventricles.
iii.	T wave	c.	Depolarisation of atria
iv.	T-P gap	d.	Repolarisation of ventricles

Choose the correct answer from the options given below:
(A) i-b, ii-c, iii-a, iv-d
(B) i-d, ii-b, iii-a, iv-c
(C) i-a, ii-c, iii-d, iv-b
(D) i-c, ii-b, iii-d, iv-a

188. 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:
(A) Statement I is correct but Statement II is incorrect.
(B) Statement I is incorrect but Statement II is correct.
(C) Both Statement I and Statement II are correct.
(D) Both Statement I and Statement II are incorrect.

189. Match List I with List II:

	List I		List II
i.	Unicellular glandular epithelium	a.	Salivary glands
ii.	Compound epithelium	b.	Pancreas
iii.	Multicellular glandular epithelium	c.	Goblet cells of alimentary canal
iv.	Endocrine glandular epithelium	d.	Moist surface of buccal cavity

Choose the correct answer from the options given below:
(A) i-c, ii-d, iii-a, iv-b
(B) i-b, ii-a, iii-d, iv-c
(C) i-b, ii-a, iii-c, iv-d
(D) i-d, ii-c, iii-a, iv-b

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

	List I		List II
i.	The structures used for storing of food	a.	Gizzard
ii.	Ring of 6-8 blind tubules at junction of foregut and midgut.	b.	Gastric Caeca
iii.	Ring of 100-150 yellow coloured thin filaments at junction of midgut and hindgut.	c.	Malpighian tubules
iv.	The structures used for grinding the food.	d.	Crop

Choose the correct answer from the options given below:
(A) i-d, ii-c, iii-b, iv-a
(B) i-c, ii-b, iii-d, iv-a
(C) i-d, ii-b, iii-c, iv-a
(D) i-a, ii-b, iii-c, iv-d

191. Match List I with List II:

	List I		List II
i.	Mesozoic Era	a.	Lower invertebrates
ii.	Proterozoic Era	b.	Fish & Amphibia
iii.	Cenozoic Era	c.	Birds & Reptiles
iv.	Paleozoic Era	d.	Mammals

Choose the correct answer from the options given below:
(A) i-a, ii-b, iii-d, iv-c
(B) i-c, ii-a, iii-d, iv-b
(C) i-b, ii-a, iii-c, iv-d
(D) i-c, ii-a, iii-b, iv-d

192. Given below are two statements:
Statement I: Mitochondria and chloroplasts are both 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 most appropriate answer from the options given below:
(A) Statement I is correct but Statement II is incorrect.
(B) Statement I is incorrect but Statement II is correct.
(C) Both Statement I and Statement II are correct.
(D) Both Statement I and Statement II are incorrect.

193. 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
I. $I^Bi / I^Ai / ii$
II. $I^BI^B / I^AI^A / ii$
III. $I^AI^B / iI^A / I^Bi$
IV. $I^Ai / I^Bi / I^Ai$
V. $iI^B / iI^A / I^AI^B$
Choose the most appropriate answer from the options given below:
(A) III & II only
(B) IV & V only
(C) I only
(D) II only

194. Match List I with List II:

	List I		List II
i.	Exophthalmic goiter	a.	Excess secretion of cortisol, moon face & hyperglycemia
ii.	Acromegaly	b.	Hypo-secretion of thyroid hormone and stunted growth.
iii.	Cushing's syndrome	c.	Hyper secretion of thyroid hormone & protruding eye balls.
iv.	Cretinism	d.	Excessive secretion of growth hormone.

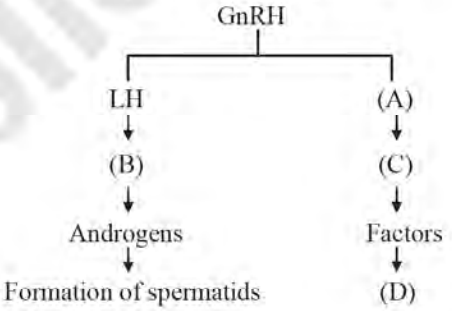
Choose the correct answer from the options given below:
(A) i-c, ii-d, iii-b, iv-a
(B) i-c, ii-d, iii-a, iv-b
(C) i-a, ii-c, iii-b, iv-d
(D) i-d, ii-b, iii-a, iv-c

195. Match List I with List II:

	List I		List II
i.	RNA polymerase III	a.	snRNPs
ii.	Termination of transcription	b.	Promotor
iii.	Splicing of Exons	c.	Rho factor
iv.	TATA box	d.	SnRNAs, tRNA

Choose the correct answer from the options given below:
(A) i-c, ii-d, iii-a, iv-b
(B) i-d, ii-c, iii-a, iv-b
(C) i-b, ii-d, iii-a, iv-c
(D) i-c, ii-b, iii-d, iv-a

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



(A) FSH, Sertoli cells, Leydig cells. spermatogenesis.
(B) ICSH, Leydig cells. Sertoli cells, Spermatogenesis.
(C) FSH, Leydig cells, Sertoli cells, spermiogenesis.
(D) ICSH, Interstitial cells, Leydig cells, spermiogenesis.

197. The following are the statements about non-chordates:
I. Pharynx is perforated by gill slits.
II. Notochord is absent.
III. Central nervous system is dorsal.
IV. Heart is dorsal if present.
V. Post anal tail is absent.
Choose the most appropriate answer from the options given below:
(A) II, IV & V only
(B) II, III & IV only
(C) I & III only
(D) I, II & IV only

198. Choose the correct statement given below regarding juxta medullary nephron.
(A) Loop of Henle of juxta medullary nephron runs deep into medulla.
(B) Juxta medullary nephrons outnumber the cortical nephrons.
(C) Juxta medullary nephrons are located in the columns of Bertini.
(D) Renal corpuscle of juxta medullary nephron lies in the outer portion of the renal medulla

199. 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:
(A) Statement I is true but Statement II is false
(B) Statement I is false but Statement II is true
(C) Both Statement I and Statement II are true.
(D) Both Statement I and Statement II are false.

200. Regarding catalytic cycle of an enzyme action, select the correct sequential steps:
I. Substrate enzyme complex formation.
II. Free enzyme ready to bind with another substrate.
III. Release of products.
IV. Chemical bonds of the substrate broken.
V. Substrate binding to active site.
Choose the correct answer from the options given below:
(A) II, I, III, IV, V
(B) V, IV, III, II, I
(C) V, I, IV, III, II
(D) I, V, II, IV, III