Physics - Section A

1. The current in an inductor of self-inductance 4 H changes from 4 A to 2 A in 1 second. The e.m.f. induced in the coil is:
1. -2 V
2. 2 V
3. -4 V
4. 8 V

2. The correct statement about the variation of viscosity of fluids with an increase in temperature is:
1. viscosity of gases decreases
2. viscosity of both liquids and gases increases
3. viscosity of liquids increases
4. viscosity of liquids decreases

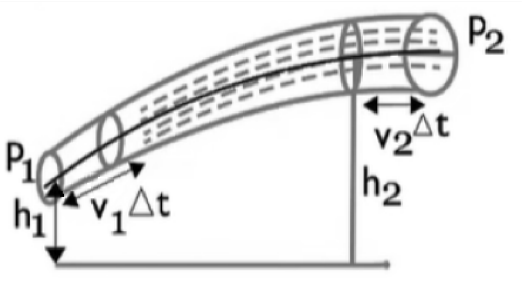
3. The de-Broglie wavelength of thermal electron at 27°C is λ. When the temperature is increased to 927°C, its de-Broglie wavelength will become:
1. 2λ
2. 4λ
3. $\frac{\lambda}{2}$
4. $\frac{\lambda}{4}$

4. Assuming the earth to be a sphere of uniform density, its acceleration due to gravity acting on a body:
1. increases with increasing altitude
2. increases with increasing depth
3. is independent of the mass of the earth
4. is independent of the mass of the body

5. A particle of mass 4M kg at rest splits into two particles of mass M and 3M. The ratio of the kinetic energies of mass M and 3M would be:
1. 3 : 1
2. 1 : 4
3. 1 : 1
4. 1 : 3

6. During simple harmonic motion of a body, the energy at the extreme position is:
1. both kinetic and potential
2. is always zero
3. purely kinetic
4. purely potential

7. A fluid of density ρ is flowing in a pipe of varying cross-sectional area as shown in the figure. Bernoulli's equation for the motion becomes:



1. $p + \frac{1}{2}\rho v^2 + \rho gh$=constant
2. $p + \frac{1}{2}\rho v^2$=constant
3. $\frac{1}{2}\rho v^2 + \rho gh$=constant
4. $p + \rho gh$=constant

8. The ratio of the moments of inertia of two spheres about their diameter and having same mass and their radii in the ratio of 1: 2 is:
1. 2 : 1
2. 4 : 1
3. 1 : 2
4. 1 : 4

9. Assertion (A): A standing bus suddenly accelerates. If there were no friction between the feet of a passenger and the floor of the bus, the passenger would move back.
Reason (R): In the absence of friction, the floor of the bus would slip forward under the feet of the passenger.
1. (A) is true but (R) is false.
2. (A) is false but (R) is true.
3. Both (A) and (R) are true and (R) is the correct explanation of (A).
4. Both (A) and (R) are true but (R) is not the correct explanation of (A).

10. A linearly polarized monochromatic light of intensity 10 lumen is incident on a polarizer. The angle between the direction of polarization of the light and that of the polarizer such that the intensity of output light is 2.5 lumen is:
1. 60°
2. 75°
3. 30°
4. 45°

11. The ratio of the radii of two circular coils is 1 : 2. The ratio of currents in the respective coils such that the same magnetic moment is produced at the centre of each coil is:

1. 4 : 1
2. 2 : 1
3. 1 : 2
4. 1 : 4

12. A gas undergoes an isothermal process. The specific heat capacity of the gas in the process is:

1. infinity
2. 0.5
3. zero
4. 1

13. Two amplifiers of voltage gain 20 each, are cascaded in series. If 0.01 volt a.c. input signal is applied across the first amplifier, the output a.c. signal of the second amplifier in volt is:

1. 2.0
2. 4.0
3. 0.01
4. 0.20

14. A hollow metal sphere of radius R is given '+Q' charges to its outer surface. The electric potential at a distance $\frac{R}{3}$ from the centre of the sphere will be:

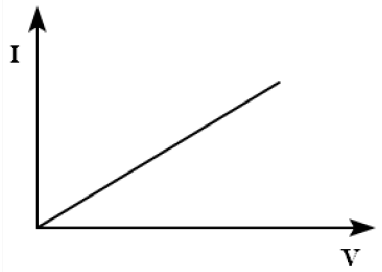
1. $\frac{1}{4\pi\varepsilon_0}\frac{Q}{9R}$
2. $\frac{3}{4\pi\varepsilon_0}\frac{Q}{R}$
3. $\frac{1}{4\pi\varepsilon_0}\frac{Q}{3R}$
4. $\frac{1}{4\pi\varepsilon_0}\frac{Q}{R}$

15. The dimensions of mutual inductance (M) are:

1. $[M^2LT^{-2}A^{-2}]$
2. $[MLT^{-2}A^2]$
3. $[M^2L^2T^{-2}A^2]$
4. $[ML^2T^{-2}A^{-2}]$

16. The plot of current I A flowing through a metallic conductor versus the applied voltage V across the ends of a conductor is:

1.



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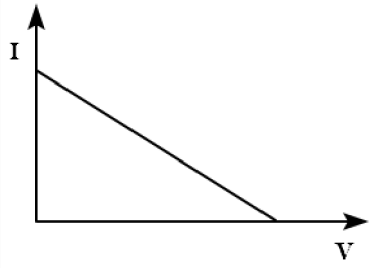

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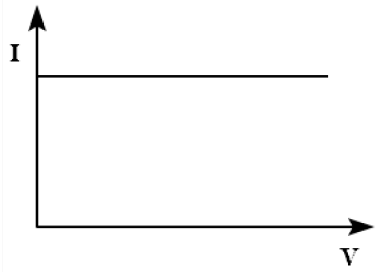

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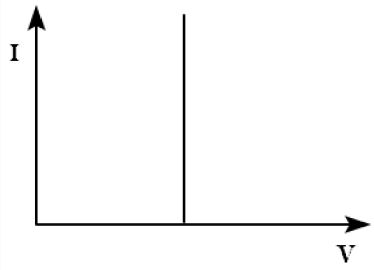
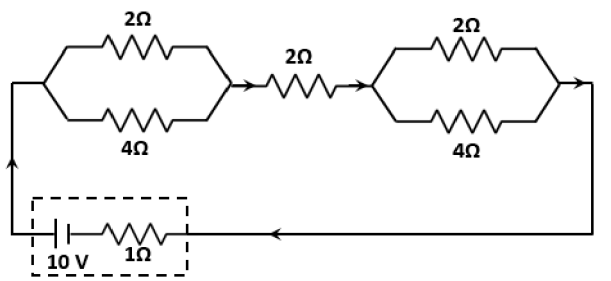


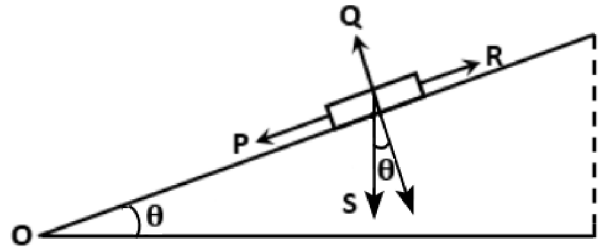
17. A network of resistors is connected across a 10 V battery with internal resistance of 1 Ω as shown in the circuit diagram. The equivalent resistance of the circuit is:



1. $\frac{17}{3}\Omega$
2. $\frac{14}{3}\Omega$
3. $\frac{12}{7}\Omega$
4. $\frac{14}{7}\Omega$

18. When a body of mass 'm' just begins to slide as shown, match list-I with list-II:

	List-I		List-II
(a)	Normal reaction	(i)	P
(b)	Frictional force (f_s)	(ii)	Q
(c)	weight (mg)	(iii)	R
(d)	mgsinθ	(iv)	S



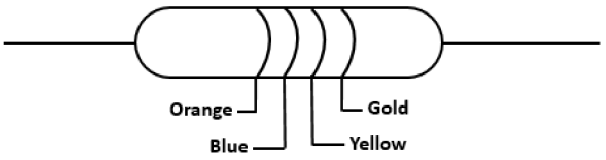
Choose the correct answer from the options given below:

	(a)	(b)	(c)	(d)
1.	(ii)	(i)	(iii)	(iv)
2.	(iv)	(ii)	(iii)	(i)
3.	(iv)	(iii)	(ii)	(i)
4.	(ii)	(iii)	(iv)	(i)

19. An inductor coil of self-inductance 10 H carries a current of 1 A. The magnetic field energy stored in the coil is:

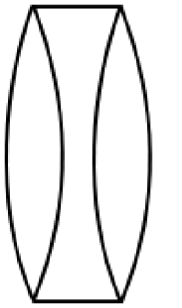
1. 10 J
2. 2.5 J
3. 20 J
4. 5 J

20. The value of resistance for the colour code of the given resistor is:



1. $(36 \pm 36)k\Omega$
2. $(470 \pm 47)k\Omega$
3. $(360 \pm 36)k\Omega$
4. $(360 \pm 18)k\Omega$

21. A concave lens of focal length 25 cm is sandwiched between two convex lenses, each of focal length, 40 cm. The power in dioptre of the combined lens would be:



1. 55
2. 9
3. 1
4. 0.01

22. A beam of light is incident vertically on a glass slab of thickness 1 cm, and refractive index 1.5. A fraction 'A' is reflected from the front surface while another fraction 'B' enters the slab and emerges after reflection from the back surface. Time delay between them is:

1. 10^{-10} s
2. 5×10^{-10} s
3. 10^{-11} s
4. 5×10^{-11} s

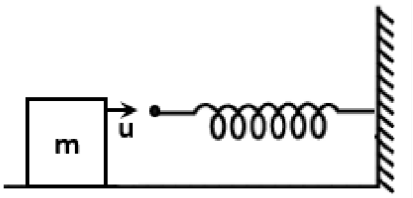
23. At some instant, the number of radioactive atoms in a sample is N_0 and after time 't', the number decreases to N. It is found that the graphical representation 'lnN' versus 't' along the y and x axis respectively is a straight line. Then the slope of this line is:

1. λ
2. $-\lambda$
3. λ^{-1}
4. $-\lambda^{-1}$

24. When the circular scale of a screw gauge completes 2 rotations, it covers 1 mm over the pitch scale. The total number of circular scale divisions is 50. The least count of the screw gauge in metres is:

1. 10^{-4}
2. 10^{-5}
3. 10^{-2}
4. 10^{-3}

25. A block of mass m is moving with initial velocity u towards a stationary spring of stiffness constant k attached to the wall as shown in the figure. Maximum compression of the spring is: (The friction between the block and the surface is negligible)



1. $u\sqrt{\frac{m}{k}}$
2. $4u\sqrt{\frac{m}{k}}$
3. $2u\sqrt{\frac{m}{k}}$
4. $\frac{1}{2}u\sqrt{\frac{k}{m}}$

26. If $\lambda_X, \lambda_I, \lambda_M$ and λ_γ are the wavelengths of X-rays, infrared rays, microwaves and γ-rays respectively, then:

1. $\lambda_\gamma < \lambda_X < \lambda_I < \lambda_M$
2. $\lambda_M < \lambda_I < \lambda_X < \lambda_\gamma$
3. $\lambda_X < \lambda_\gamma < \lambda_M < \lambda_I$
4. $\lambda_X < \lambda_I < \lambda_\gamma < \lambda_M$

27. Twelve point charges each of charge q coulomb are placed at the circumference of a circle of radius r with equal angular spacing. If one of the charges is removed, the net electric field (in N/C) at the centre of the circle is:

(ε_0-permittivity of free space)

(1) $\frac{13q}{4\pi\varepsilon_0 r^2}$

(2) zero

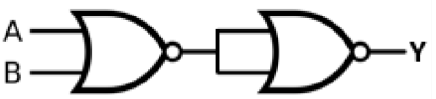
(3) $\frac{q}{4\pi\varepsilon_0 r^2}$

(4) $\frac{12q}{4\pi\varepsilon_0 r^2}$

28. Let L_1 and L_2 be the orbital angular momentum of an electron in the first and second excited states of the hydrogen atom, respectively. According to Bohr's model, the ratio L_1:L_2 is:

1. 1:2
2. 2:1
3. 3:2
4. 2:3

29. The output of the logic circuit shown is equivalent to a/an:



1. OR gate
2. NOR gate
3. AND gate
4. NAND gate

30. A strong magnetic field is applied along the direction of velocity of an electron. The electron would move along:

1. a parabolic path
2. the original path
3. a helical path
4. a circular path

31. A string is wrapped along the rim of a wheel of moment of inertia 0.10 kg-m^2 and radius 10 cm. If the string is now pulled by a force 10 N, then the wheel starts to rotate about its axis from rest. The angular velocity of the wheel after 2 seconds is:

1. 40 rad/s
2. 80 rad/s
3. 10 rad/s
4. 20 rad/s

32. A stone is thrown vertically downwards with an initial velocity of 40 m/s from the top of a building. If it reaches the ground with velocity 60 m/s, then the height of the building is: (Take g=10 m/s^2)

1. 120 m
2. 140 m
3. 80 m
4. 100 m

33. Rain is falling vertically downward with a speed of 35 m/s. Wind starts blowing after some time with a speed of 12 m/s in East to West direction. The direction in which a boy standing at the place should hold his umbrella is:

1. $tan^{-1}\left(\frac{12}{37}\right)$ w.r.t rain
2. $tan^{-1}\left(\frac{12}{37}\right)$ w.r.t. wind
3. $tan^{-1}\left(\frac{12}{35}\right)$ w.r.t. rain
4. $tan^{-1}\left(\frac{12}{35}\right)$ w.r.t. wind

34. An electromagnetic wave is moving along negative z (-z) direction and at any instant of time, at a point, its electric field vector is $3\hat{J}$ V/m. The corresponding magnetic field at that point and instant will be: (Take c = 3×10^8 ms^{-1})

1. 10 $\hat{i}nT$
2. -10 $\hat{i}nT$
3. $\hat{i}nT$
4. -$\hat{i}nT$

35. In a photoelectric experiment, blue light is capable of ejecting a photoelectron from a specific metal while green light is not able to eject a photoelectron. Ejection of photoelectrons is also possible using light of the colour:

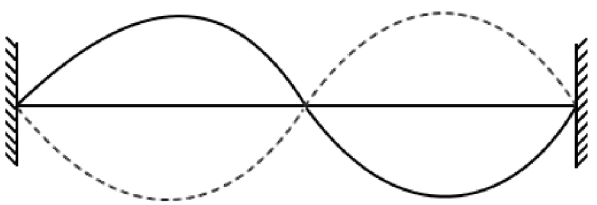
1. Yellow
2. Red
3. Violet
4. Orange

Physics - Section B

36. Three capacitors, each of capacitance 0.3 μF are connected in parallel. This combination is connected with another capacitor of capacitance 0.1 μF in series. Then the equivalent capacitance of the combination is :

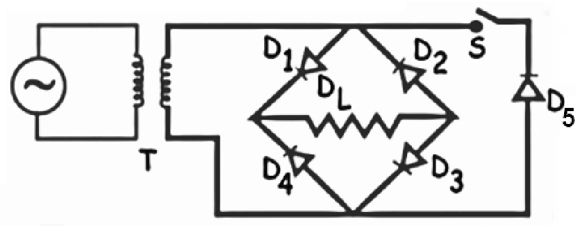
1. 0.9 μF
2. 0.09 μF
3. 0.1 μF
4. 0.01 μF

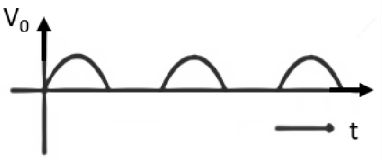
37. A string of length l is fixed at both ends and is vibrating in second harmonic. The amplitude at antinode is 2 mm. The amplitude of a particle at a distance l/8 from the fixed end is:

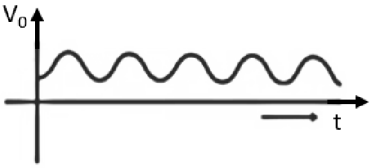


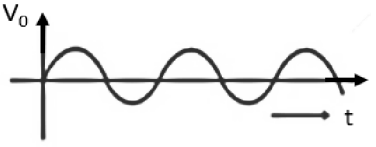
1. $2\sqrt{2}$ mm
2. 4 mm
3. $\sqrt{2}$ mm
4. $2\sqrt{3}$ mm

38. The circuit represents a full wave bridge rectifier when switch S is open. The output voltage (V_0) pattern across R_L when S is closed is:



1. 

2. 

3. 

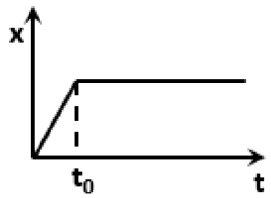
4. 

39. Assertion (A): Gauss's law for magnetism states that the net magnetic flux through any closed surface is zero.
Reason (R): The magnetic monopoles do not exist. North and South poles occur in pairs, allowing vanishing net magnetic flux through the surface.
1. (A) is true but (R) is false.
2. (A) is false but (R) is true.
3. Both (A) and (R) are true and (R) is the correct explanation of (A).
4. Both (A) and (R) are true but (R) is not the correct explanation of (A).

40. An a.c. source given by $V=V_m \sin\omega t$ is connected to a pure inductor L in a circuit and I_m is the peak value of the ac current. The instantaneous power supplied to the inductor is:
1. $\frac{V_m I_m}{2} sin(2\omega t)$
2. $-\frac{V_m I_m}{2} sin(2\omega t)$
3. $V_m I_m sin^2(\omega t)$
4. $-V_m I_m sin^2(\omega t)$

41. The fraction of the original number of radioactive atoms that disintegrates (decays) during the average lifetime of a radioactive substance will be:
1. $\frac{1}{e}$
2. $\frac{1}{1+e}$
3. $\frac{e-1}{e+1}$
4. $\frac{e-1}{e}$

42. The figure given below shows the displacement and time, (x-t) graph of a particle moving along a straight line:



The correct statement, about the motion of the particle, is:
1. The particle moves at a constant velocity up to a time t_0 and then stops.
2. The particle is accelerated throughout its motion.
3. The particle is accelerated continuously for time t_0 then moves with constant velocity.
4. The particle is at rest.

43. Air is pushed carefully into a soap bubble of radius r to double its radius. If the surface tension of the soap solution is T, then work done in the process is:
1. $12\pi r^2 T$
2. $24\pi r^2 T$
3. $4\pi r^2 T$
4. $8\pi r^2 T$

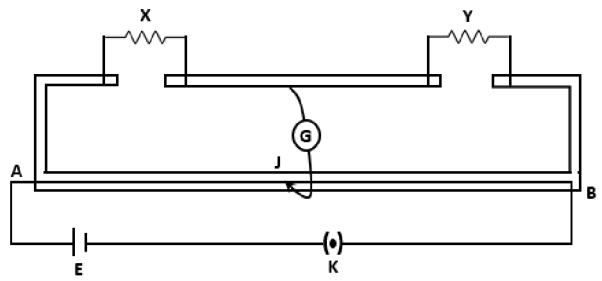
44. Statement - I: The magnetic field of a circular loop at very far away point on the axial line varies with distance as like that of a magnetic dipole.
Statement-II: The magnetic field due to magnetic dipole varies inversely with the square of the distance from the centre on the axial line.
1. Statement-I is correct and statement-II is incorrect
2. Statement-I is incorrect and statement-II is correct
3. Both statement-I and statement-II are correct
4. Both statement-I and statement-II are incorrect

45. When a particle with charge +q is thrown with an initial velocity v towards another stationary change +Q, it is repelled back after reaching the nearest distance r from +Q. The closest distance that it can reach if it is thrown with initial velocity 2v, is:
1. $\frac{r}{4}$
2. $\frac{r}{2}$
3. $\frac{r}{16}$
4. $\frac{r}{8}$

46. The determination of the value of acceleration due to gravity (g) by simple pendulum method employs the formula,
$g = 4\pi^2 \frac{L}{T^2}$
The expression for the relative error in the value of 'g' is:
1. $\frac{\Delta g}{g} = \frac{\Delta L}{L} + 2\left(\frac{\Delta T}{T}\right)$
2. $\frac{\Delta g}{g} = 4\pi^2\left[\frac{\Delta L}{L} - 2\frac{\Delta T}{T}\right]$
3. $\frac{\Delta g}{g} = 4\pi^2\left[\frac{\Delta L}{L} + 2\frac{\Delta T}{T}\right]$
4. $\frac{\Delta g}{g} = \frac{\Delta L}{L} - 2\left(\frac{\Delta T}{T}\right)$

47. A monochromatic light of frequency 500 THz is incident on the slits of a Young's double slit experiment. If the distance between the slits is 0.2 mm and the screen is placed at a distance 1 m from the slits, the width of 10 fringes will be:
1. 1.5 mm
2. 15 mm
3. 30 mm
4. 3 mm

48. In a meter bridge experiment, the null point is at a distance of 30 cm from A. If a resistance of 16 Ω is connected in parallel with resistance Y, the null point occurs at 50 cm from A. The value of the resistance Y is:

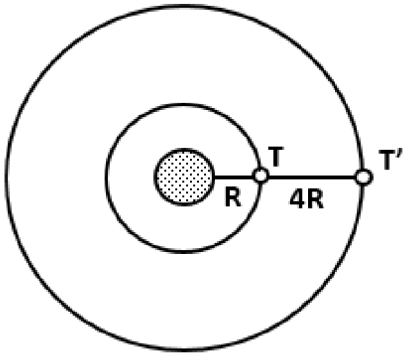


1. $\frac{112}{3}\Omega$
2. $\frac{40}{3}\Omega$
3. $\frac{64}{3}\Omega$
4. $\frac{48}{3}\Omega$

49. The temperature at which the RMS speed of atoms in neon gas is equal to the RMS speed of hydrogen molecules at 15°C is:
(Atomic mass of neon = 20.2 u, molecular mass of H_2 = 2 u)

1. 2.9×10^3 K
2. 2.9 K
3. 0.15×10^3 K
4. 0.29×10^3 K

50. Two planets are in a circular orbit of radius R and 4R about a star. At a specific time, the two planets and the star are in a straight line. If the period of the closest planet is T, then the star and planets will again be in a straight line after a minimum time:



1. $(4)^2\,T$
2. $(4)^{\frac{1}{3}}\,T$
3. $2\,T$
4. $8\,T$

Chemistry - Section A

51. What is the correct order for boiling points of the following compounds'?

1. $AsH_3 > PH_3 > NH_3 > SbH_3 > BiH_3$
2. $BiH_3 > SbH_3 > NH_3 > AsH_3 > PH_3$
3. $NH_3 > PH_3 > AsH_3 > SbH_3 > BiH_3$
4. $PH_3 > NH_3 > AsH_3 > SbH_3 > BiH_3$

52. Match list-I with list-II:

	List-I		List-II
(a)	4.48 litres of O_2 at STP	(i)	0.2 moles
(b)	12.022×10^{22} molecules of H_2O	(ii)	12.044×10^{23} molecules
(c)	96 g of O_2	(iii)	6.4 g
(d)	88 g of CO_2	(iv)	67.2 litres at STP

(Given - Molar volume of a gas at STP - 22.4 L)
Choose the correct answer from the options given below:

	(a)	(b)	(c)	(d)
1.	(i)	(iii)	(iv)	(ii)
2.	(iii)	(i)	(iv)	(ii)
3.	(iv)	(i)	(ii)	(iii)
4.	(iii)	(i)	(ii)	(iv)

53. Given below are two statements:
Statement-I: Aldehydes and ketones having at least one α-hdyrogen undergo aldol condensation in the presence of dilute alkali as catalyst.
Statement-II: When aldol condensation is carried out between two different aldehydes, it is called cross aldol condensation. Ketones do not give this reaction.
In light of the above statements, choose the most appropriate answer from the options given below:

1. Statement-I is correct and statement-II is incorrect.
2. Statement-I is incorrect and statement-II is correct.
3. Both statement-I and statement-II are correct.
4. Both statement-I and statement-II are incorrect.

54. Match list-I with list-II:

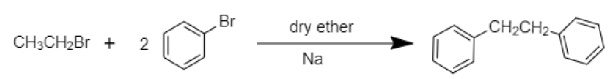
	List-I Elements		List-II Atomic radii (pm)
(a)	O	(i)	88
(b)	C	(ii)	74
(c)	B	(iii)	66
(d)	N	(iv)	77

Choose the correct answer from the options given below:

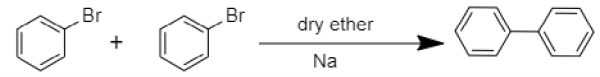
	(a)	(b)	(c)	(d)
1.	(ii)	(i)	(iv)	(iii)
2.	(iv)	(iii)	(ii)	(i)
3.	(i)	(iv)	(iii)	(ii)
4.	(iii)	(iv)	(i)	(ii)

55. The correct reaction among the following is

1.



2.



3. $2CH_3CH_2Br \xrightarrow[dry\ ether]{Mg} CH_3CH_2CH_2CH_3$

4. $2CH_3CH_2Br \xrightarrow[Ethanol]{Na} CH_3CH_2CH_2CH_3$

56. The number of bridging carbonyl groups in $[Co_2(CO)_8]$ and $[Mn_2(CO)_{10}]$, respectively are

1. 2 and 0
2. 2 and 2
3. 2 and 4
4. 0 and 2

57. LiF is sparingly soluble in water because it has

1. partial covalent character.
2. small electronegativity.
3. high lattice enthalpy.
4. low hydration enthalpy.

58. Match list-I with list-II:

	List-I (Commercial name)		List-II (Chemical name)
(a)	Calgon	(i)	Sodium aluminium silicate (hydrated)
(b)	Permutit	(ii)	Sodium carbonate
(c)	Soap	(iii)	Sodium hexameta-phosphate
(d)	Washing soda	(iv)	Sodium stearate

Choose the correct answer from the options given below:

	(a)	(b)	(c)	(d)
1.	(i)	(iv)	(ii)	(iii)
2.	(iii)	(i)	(iv)	(ii)
3.	(ii)	(iii)	(iv)	(i)
4.	(iv)	(iii)	(i)	(ii)

59. For the reaction, 2A → B, rates= $k[A]^2$. If the concentration of reactant is doubled, then the

(a) rate of reaction will be doubled.

(b) rate constant will remain unchanged, however rate of reaction is directly proportional to the rate constant.

(c) rate constant will change since the rate of reaction and rate constant are directly proportional to each other.

(d) rate of reaction will increase by four times.

Identify the set of correct statements & choose the correct answer from the options given below:

1. (a), (c) only
2. (a), (b) only
3. (b), (d) only
4. (c), (d) only

60. Match list-I with list-II:

	List-I (Monomers)		List-II (Polymers)
(a)	Caprolactam	(i)	Bakelite
(b)	Ethylene glycol and Benzene-1, 4-dicarboxylic acid	(ii)	Nylon 6, 6
(c)	Hexamethylenediamine and adipic acid	(iii)	Nylon-6
(d)	Phenol and Formaldehyde	(iv)	Terylene

Choose the correct answer from the options given below:

	(a)	(b)	(c)	(d)
1.	(ii)	(iii)	(iv)	(i)
2.	(i)	(ii)	(iii)	(iv)
3.	(iii)	(iv)	(ii)	(i)
4.	(iv)	(ii)	(i)	(iii)

61. Which of the following is the correct statement?

1. Ga^+ is more stable than ln^+.
2. Al^+ is more stable than ln^+.
3. Ga^+ is more stable than Al^+.
4. Al^+ is more stable than Ga^+.

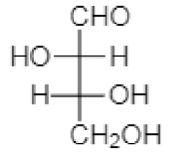
62. The incorrect statement among the following regarding food preservatives is

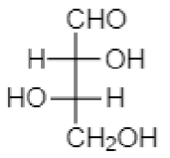
1. sorbic acid and propanoic acid are good food preservatives.
2. antioxidants used in a wine are SO_2 and sulphites.
3. antioxidants help in preserving the food longer.
4. antioxidants react with oxygen with a slower rate than food.

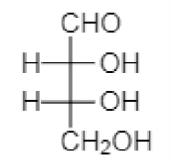
63. One mole of sugar is dissolved in three moles of water at 298 K. The relative lowering of vapour pressure is

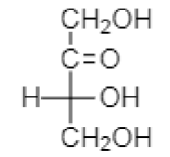
1. 0.25
2. 0.20
3. 0.50
4. 0.33

64. Which one is not a D-sugar?

1. 

2. 

3. 

4. 

65. Match list-I with list-II:

	List-I (Amines)		List-II (pK_b values)
(a)	N-methylmethanamine	(i)	9.30
(b)	Ammonia	(ii)	9.38
(c)	N-methylaniline	(iii)	4.75
(d)	Benzenamine	(iv)	3.27

Choose the correct answer from the options given below:

	(a)	(b)	(c)	(d)
1.	(iv)	(ii)	(i)	(iii)
2.	(iv)	(iii)	(i)	(ii)
3.	(iii)	(iv)	(i)	(ii)
4.	(i)	(iv)	(iii)	(ii)

66. Given below are two statements:

Statement-I: The product of reaction of phenol with bromine depends on the nature of solvent.

Statement-II: Reaction of phenol with bromine in $CHCl_3$ gives monosubstituted bromo derivative whereas reaction of phenol with bromine water yields trisubstituted bromo derivative of phenol.

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

1. Statement-I is correct and statement-II is incorrect.
2. Statement-I is incorrect and statement-II is correct.
3. Both statement-I and statement-II are correct.
4. Both statement-I and statement-II are incorrect.

67. The work done when 1 mole of gas expands reversibly and isothermally from pressure of 5 atm to 1 atm at 300 K is

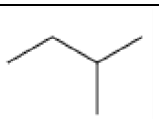
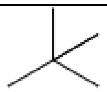
(Given log 5=0.6989 and R=8.314 J K^{-1} mol^{-1})

1. zero J
2. 150 J
3. +4014.6 J
4. -4014.6 J

68. Identify the set from the following sets in which all species can exhibit disproportionation reactions.

1. ClO^-_2, ClO^-_3, ClO^-_4, Cl_2
2. Cl_2, ClO^-_2, ClO^-_3, S_8
3. ClO^-_4, ClO^-, ClO^-_2, F_2
4. ClO^-_3, ClO^-_4, H_2O_2, ClO^-

69. Match list-I with list-II:

	List-I (Compound)		List-II (Boiling point in K)
(a)		(i)	300.9
(b)		(ii)	282.5
(c)		(iii)	309.1
(d)		(iv)	341.9

Choose the correct answer from the options given below:

	(a)	(b)	(c)	(d)
1.	(i)	(iv)	(iii)	(ii)
2.	(iii)	(i)	(iv)	(ii)
3.	(iii)	(iv)	(i)	(ii)
4.	(iv)	(i)	(ii)	(iii)

70. Match List-I with List-II:

	List-I (Example of Colloidal systems)		List-II (Nature of dispersion medium and dispersed phase)
(a)	Insecticide spray	(i)	Dispersion medium - liquid Dispersed phase - solid
(b)	Whipped cream	(ii)	Dispersion medium - gas Dispersed phase - liquid
(c)	Paint	(iii)	Dispersion medium - liquid Dispersed phase - liquid
(d)	Hair cream	(iv)	Dispersion medium - liquid Dispersed phase -gas

Choose the correct answer from the options given below:

1. (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)
2. (a)-(iv), (b)-(ii), (c)-(iii), (d)-(i)
3. (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)
4. (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)

71. Which of the following is not correct about postulates of kinetic molecular theory of gases?

1. Pressure of the gas is due to the collision of molecules against the walls of the container.
2. Volume of the gas is due to the large number of molecules of the gas.
3. Average kinetic energy of molecules is directly proportional to the absolute temperature of the gas.
4. The molecules move randomly with different speeds in different directions.

72. The chain length of silicones can be controlled by adding

1. CH_3SiCl_3
2. $SiCl_4$
3. $(CH_3)_2SiCl_2$
4. $(CH_3)_3SiCl$

73. Match List-I with List-II:

	List-I		List-II
(a)	Element which exhibits +3 oxidation state only	(i)	Mn
(b)	Element which exhibits more number of oxidation states	(ii)	Zn
(c)	Element which is a reducing agent in its +2 oxidation state	(iii)	Sc
(d)	Element which is not considered as a transition element	(iv)	Cr

Choose the correct answer from the options given below:

	(a)	(b)	(c)	(d)
1.	(iii)	(iv)	(i)	(ii)
2.	(iv)	(i)	(ii)	(iii)
3.	(ii)	(iv)	(iii)	(i)
4.	(iii)	(i)	(iv)	(ii)

74. Which one of the following statements is true about the structure of CO_3^{2-} ion?

1. It can be explained by considering sp^3 hydridization.
2. Out of the three C–O bonds, two are longer and one is shorter.
3. It has three sigma and three π-bonds.
4. All three C–O bonds are equal in length with a bond order in between 1 and 2.

75. Which one of the following is the correct order of decreasing bond enthalpies for the given species?
1. $O_2^{2-} > O_2^- > O_2 > N_2$
2. $N_2 > O_2 > O_2^{2-} > O_2^-$
3. $N_2 > O_2 > O_2^- > O_2^{2-}$
4. $O_2 > N_2 > O_2^- > O_2^{2-}$

76. A ferromagnetic substance becomes a permanent magnet when it is placed in a magnetic field because
1. all the domains get oriented in the direction opposite to the direction of magnetic field.
2. domains are not affected by magnetic field.
3. domains get randomly oriented.
4. all the domains get oriented in the direction of magnetic field.

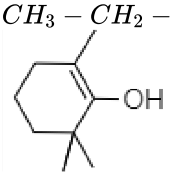
77. The three cells with their $E^\circ_{(cell)}$ values are given below:

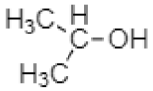
	Cells	$E^\circ_{(cell)}/V$
(a)	$Fe\|Fe^{2+}\|\|Fe^{3+}\|Fe$	0.404
(b)	$Fe\|Fe^{2+}\|\|Fe^{3+}, Fe^{2+}\|Pt$	1.211
(c)	$Fe\|Fe^{3+}\|\|Fe^{3+}, Fe^{2+}\|Pt$	0.807

The standard Gibbs free energy change values for three cells are, respectively
(F represents charge on 1 mole of electrons.)
1. -1.212 F, -1.211 F, -0.807 F
2. +2.424 F, +2.422 F, +2.421 F
3. -0.808 F, -2.422 F, -2.421 F
4. -2.424 F, -2.422 F, -2.421 F

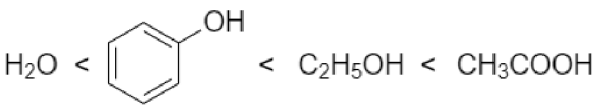
78. Which one of the following electrons in the ground state will have least amount of energy?
1. An electron in hydrogen atom.
2. An electron in 2p orbital of carbon atom.
3. The electron of copper atom present in 4s orbital.
4. The outermost electron in sodium atom.

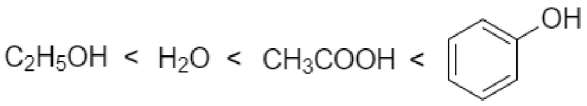
79. Alkali metals, though white, impart characteristic colour to the flame because of
1. excitation and coming back of valence electrons to the original level.
2. oxidation of metal in the presence of flame.
3. excitation of valence electrons.
4. gain of electrons.

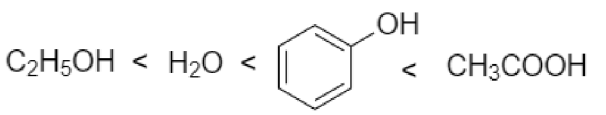
80. The increasing order of reactivity of the following compounds towards acid catalysed dehydration is
(a) $CH_3 - CH_2 - OH$
(b) 

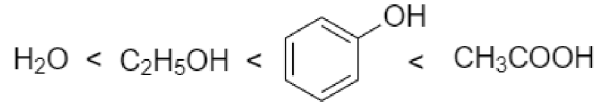
(c) 

(d) $CH_3 - C(CH_3)_2 - OH$
Choose the correct answer from the options given below:
1. (b) < (c) < (a) < (d)
2. (b) < (a) < (c) < (d)
3. (a) < (c) < (d) < (b)
4. (c) < (a) < (b) < (d)

81. The correct order of acid strength of the following molecules is
1. 

2. 

3. 

4. 

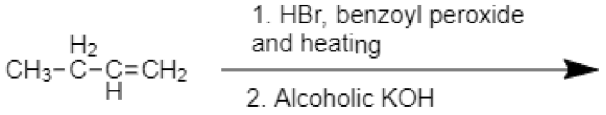
82. Match list-I with list-II:

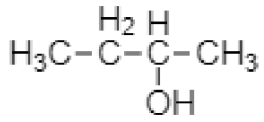
	List-I		List-II
(a)	Separation of aniline-water mixture	(i)	Fractional distillation
(b)	Separation of aniline-chloroform mixture	(ii)	Distillation under reduced pressure
(c)	Separation of glycerol from spent-lyze	(iii)	Distillation
(d)	Separation of different fractions of crude oil	(iv)	Steam distillation

Choose the correct answer from the options given below:

	(a)	(b)	(c)	(d)
1.	(i)	(iii)	(ii)	(iv)
2.	(iv)	(i)	(iii)	(ii)
3.	(iv)	(ii)	(iii)	(i)
4.	(iv)	(iii)	(ii)	(i)

83. The product formed in the following reaction sequence is



1. 

2. $CH_3 - CH = CH - CH_3$
3. $CH_3 - CH_2 - CH = CH_2$
4. $CH_3 - CH_2 - CH_2 - CH_2 - OH$

84. The solubility product of $BaSO_4$ in water is 1.5×10^{-9}. The molar solubility of $BaSO_4$ in 0.1 M solution of $Ba(NO_3)_2$ in-

1. $2.0 \times 10^{-8} M$
2. $0.5 \times 10^{-8} M$
3. $1.5 \times 10^{-8} M$
4. $1.0 \times 10^{-8} M$

85. Chlorine shows the bleaching action in the presence of moisture due to the formation of

1. HOCl
2. HOClO
3. H_2O_2
4. O

Chemistry - Section B

86. The plot of ln k vs $\frac{1}{T}$ for the following reaction

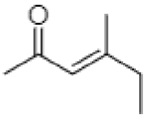
$2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$

gives a straight line with the slope of line equal to $-1.0 \times 10^4 K$. Activation energy for the reaction in J mol^{-1} is

(Given R = 8.3 J K^{-1} mol^{-1})

1. 4.0×10^2
2. 4.0×10^{-2}
3. 8.3×10^{-4}
4. 8.3×10^4

87. The correct IUPAC name of the following compound is



1. 2-ethylhex-3-en-4-one
2. 4-methylhex-3-en-2-one
3. 4-ethylpent-3-en-2-one
4. 3-methylhex -3-en-4-one

88.

$\wedge_m^o$ for NaCl, HCl and CH_3COONa are 126.4, 425.9 and 91.05 S cm^2 mol^{-1} respectively. If the conductivity of 0.001028 mol L^{-1} acetic acid solution is $4.95 \times 10^{-5} S\ cm^{-1}$, find the degree of dissociation of the acetic acid solution

1. 0.01233
2. 1.00
3. 0.1233
4. 1.233

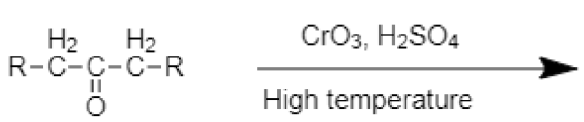
89. Consider the following reaction taking place in 1L capacity container at 300 K

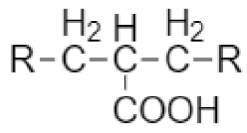
$A + B \rightleftharpoons C + D$

If one mole each of A and B are present initially and at equilibrium 0.7 mol of C is formed, then equilibrium constant (K_c) for the reaction is

1. 9.7
2. 1.2
3. 6.2
4. 5.4

90. The product(s) formed from the following reaction is/are

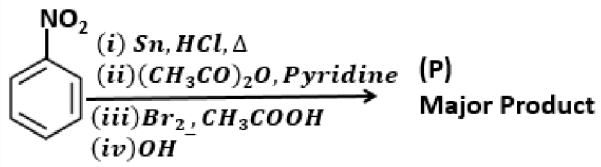


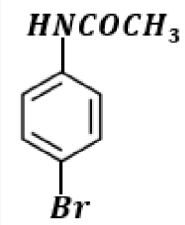
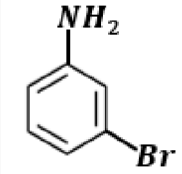
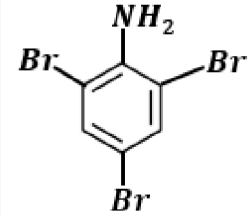
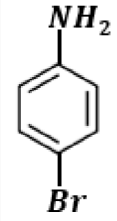
1. RCOOH only
2. RCH_2COOH only
3.  only
4. $RCOOH\ and\ RCH_2COOH$

91. A monochromatic infrared range finder of power 1m W emits photons with wavelength 1000 nm in 0.1 second. The number of photons emitted in 0.1 second is- (Given -h = $6.626 \times 10^{-34} J\ s$, $c = 3 \times 10^{8} m\ s^{-1}$, Avogadro number = 6.022×10^{23})

1. 30×10^{37}
2. 5×10^{14}
3. 30×10^{34}
4. 5×10^{11}

92. The major product (P) formed in the following reaction sequence is



1. 
2. 
3. 
4. 

93. Which one of the following is the correct order of spin-only magnetic moment for the given complexes?

1. $[Co(H_2O)_6]^{2+} > [MnCl_6]^{3-} > [Fe(CN)_6]^{3-}$
2. $[Fe(CN)_6]^{3-} > [Co(H_2O)_6]^{2+} > [MnCl_6]^{3-}$
3. $[MnCl_6]^{3-} > [Fe(CN)_6]^{3-} > [Co(H_2O)_6]^{2+}$
4. $[MnCl_6]^{3-} > [Co(H_2O_6]^{2+} > [Fe(CN)_6]^{3-}$

94. A student collected samples from two water bodies A and B in a metro city. The biochemical oxygen demand for 'A' is 3 ppm while for B is found to be 18 ppm. Which one of the following is true?

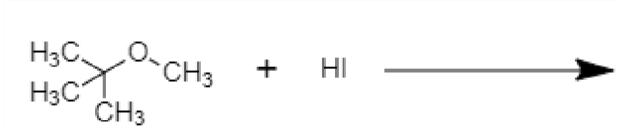
1. Both A and B are clean
2. Both A and B are polluted
3. A is clean but B is polluted
4. A is polluted but B is clean

95. Identify the pair of Lanthanoides with one strong oxidant and one strong reductant
1. Ce(IV) , Tb(IV)
2. Yb(II) , Eu(II)
3. Eu(IV) , Lu(III)
4. Ce(IV) , Eu(II)

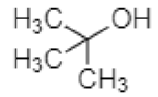
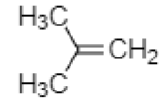
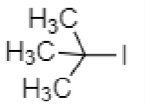
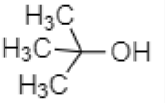
96. The compound obtained by addition of water to an alkyne having more than two carbons, in presence of $HgSO_4$ and dilute H_2SO_4 at 333K is
1. a vicinal diol
2. an aldehyde
3. an alcohol
4. a ketone

97. Given below are two statements :
Statement-I: The Ellingham diagram provides an idea about the feasibility of a reaction
Statement-II: The Ellingham diagram explains the rate of the reduction reactions,
In the light of the above statements, choose the most appropriate answer from the options given below:
1. Statement-I is correct and Statement-II is incorrect
2. Statement-I is incorrect and Statement-II is correct
3. Both statement-I and statement-II are correct
4. Both statement-I and statement-II are incorrect

98. The major products formed in the following reaction are



?

1.  , CH_3-I
2.  , CH_3I
3.  , CH_3OH
4.  , CH_3OH

99. At 300 K, 250 mL of gas A at 1 bar pressure is mixed with 500 mL of a gas B at 2 Bar pressure in a 1.0 L flask. Gas A does not react with gas B. The final pressure of the mixture is-
1. 1.00 bar
2. 2.15 bar
3. 2.50 bar
4. 1.25 bar

100. Which statements among the following is not correct?
1. When conduction band and valence band overlap, a semiconductor is obtained
2. Ferrimagnetism arises due to the alignment of magnetic moments of the domains in the substance in parallel and anti-parallel directions in unequal numbers
3. Replacing some silicon atoms by boron atoms in crystal of silicon produces p-type semiconductor
4. Replacing some germanium atoms by phosphorus atoms in a crystal of germanium produces n-type semiconductor

Biology - 1 - Section A

101. Match List -I with List-II

List - I	List - II
a. *Cedrus*	(i) Pteridophyte
b. *Adiantum*	(ii) Gymnosperm
c. *Sphagnum*	(iii) Liverwort
d. *Marchantia*	(iv) Moss

Choose the correct answer from the options given below:

	a.	b.	c.	d.
1.	(ii)	(iii)	(i)	(iv)
2.	(iii)	(i)	(iv)	(ii)
3.	(ii)	(i)	(iv)	(iii)
4.	(iii)	(iv)	(ii)	(i)

102. The products of light reaction in photosynthesis are:
1. ATP, NADPH and O_2
2. ATP, NADPH, O_2 and H_2O
3. ATP, NADPH , and H_2O
4. ATP, NADPH , and CO_2

103. In prophase I of Meiosis, chromosomes start pairing together and synapis takes place. This process occurs dusring which of the following stage?
1. Pachytene
2. Diplotene
3. Leptotene
4. Zygotene

104. Identify the correct statements related to the androecium in the flower
a. The sterile stamens are called staminodes
b. When stamens are attached to petals they are called epipetalous
c. Monadelphy is seen in China-rose
d. Polyadelphy is seen in Pea
e. Variation in the length of anther filaments is seen in Mustard
Choose the correct answer from the options given below:
1. (a), (c), (d) and (e) only
2. (a) , (b), (c) and (e) only
3. (a) , (b) and (c) only
4. (b) , (c) and (d) only

105. Which of the following statements above facilitated diffusion is incorrect?
1. Special proteins of the membrane help in this process
2. Porins are involved in this process
3. Movement of molecule the occurs against the concentration gradient
4. ATP is not required for this process

106. Phloem sap in the plants mainly consists of :
1. fructose and water
2. fructose and sucrose
3. glucose and water
4. sucrose and water

107. Identify the correct set of statements with regard to properties of humus
(a) Highly resistant to microbial action
(b) Dark-colored amorphous substance
(c) End product of detritus food chain
(d) Reservoir of nutrients
(e) Undergoes decomposition very fast
Choose the correct answer fro the options given below:
1. (a), (b) and (d) only
2. (a),(b) and (e) only
3. (a) and (b) only
4. (b) , (c) and (a)

108. Select the correct statements with respect to pleiotropism
(a) A gene is said to be pleiotropy if it affects more than one trait
(b) Phenylketonuria is an example of pleiotropy
(c) A condition where one gene has several alleles is referred to as pleiotropism
(d) A trait is said to be pleiotropic if several genes control it
Choose the correct answer from the options given below:
1. (a) and (b) only
2. (a) and (d) only
3. (a), (b) and (c) only
4. (b) ,(c) and (d) only

109. The living differentiated cells, that lost the capacity to divide anymore, can regain the capacity of division under certain conditions. This Phenomenon is termed as
1. Redifferentiation
2. Maturation
3. Differentiation
4. Dedifferentiation

110. Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R)
Assertion(A): A father will never pass the gene for haemophilia to his sons
Reason (R) : Haemophilia is sex-linked (X-linked recessive traits.
In the light of the above statements, choose the correct answer from the options given below
1. (A) is correct but R is not correct
2. (A) is not correct but (R) is correct
3. Both (A) and (R) are correct (R) is the correct explanation of (A)
4. Both (A) and (R) are correct but (R) is not the correct explanation of (A)

111. Which one of the following is not a criterion of genetic material?
1. Should not provide the scope for changes for evolution
2. Should be able to express itself in the form of Mendelian character
3. Should be able to generate its replica
4. Should be stable chemically and structurally

112. DNA replication is semi-conservative in nature was experimentally proved in eukaryotes by:
1. Hershey and Chase
2. Macleod and McCarty
3. Meselson and Stahl
4. Talyor and his colleagues

113. Which one of the following experiments of Frederick Griffith resulted in the descovery of bacterial transformation?
1. S-stain(heat-killed) → injected in to Mice → Mice lived
2. S-strain (heat killed) + R-strain(live) → injected in to Mice → Mice died
3. S-stain → injected in to Mice → Mice died
4. R-strain → injected in to Mice → Mice lived

114. Which of the following come under the "Evil Quarter"?
(a) Habitat loss and fragmentation
(b) Over-exploitation
(c) Alien species invasion
(d) Mortality
(e) Competition
Choose the correct answer from the options given below:
1. (a), (c) and (d)
2. (b) , (c) and (d)
3. (a), (b) and (c)

115. High dose of UV-B causes inflammation of cornea and is called as:
1. UV -blindness
2. Colour-blindness
3. Evening- blindness
4. Snow- blindness

116. Given below are two statements:
Statements-I: Cellulose is a polymeric polysaccharide
Statement-II The builiding blocks of cellulose are glucose molecules
In the light of the above statements , choose the correct answer from the options given beloow:
1. Statements-I is correct but statements-II is incorrect
2. Statements-I is incorrect but statements-II is correct
3. Both statements-I and statements-II are correct
4. Both statements-I and Statements -II

117. Which hormone is used to induce immediate stomatal closure in leveas ?
1. Cytokinin
2. Gibberellin
3. Abscisic Acid
4. Auxin

118. Given below are two statements : One is labelled as Assertion (A) and the other is labelled as Reason (R)
Assertion (A): The growth of multicellular organism is due to mitosis
Reason (R) Mitosis is also called as equational division and it offers genetic stability
In the light of the above statements choose the correct answer from the options given below:
1. (A) is correct but (R is not correct
2. (A) is not correct but R is correct
3. Both (A) and (R) are correct and (R) is the correct explanation of (A)
4. Both (A) and (R) are correct and (R) is not the correct explanation of (A)

119. Axillary buds are derived from the activity of :
1. Lateral meristem
2. Secondary meristem
3. Apical meristem
4. Intercalary meristem

120. The process of individuals of the same species that have come into the habitat from elsewhere during the time period under consideration is referred as:
1. Association
2. Emigration
3. Competition
4. Immigration

121. Match List-I with List-II

List-I	List-II
(a) Haemophilia	(i) Inborn error of metabolism which lacks an enzyme that converts phenylalanine into tyrosine
(b) Down's Syndrome	(ii) Sex-linked recessive disorder defect in blood coagulation
(c)Phenylketonuria	(iii) Presence of additional copy of X-chromosome (44+XXY)
(d) Klinefelter's Syndrome	(iv) Additional copy of chromosome number 21

Choose the correct answer from the options given below:

	(a)	(b)	(c)	(d)
1.	(ii)	(iv)	(i)	(iii)
2.	(iv)	(ii)	(i)	(iii)
3.	(ii)	(iii)	(i)	(iv)
4	(i)	(ii)	(iii)	(iv)

122. Genetically engineered insulin for human is produced from:
1. *Escherichia coli*
2. *Psuedomonas putida*
3. *Bacillus thuringiensis*
4. *Rhizobium meliloti*

123. Removal of apical dominance by decapitation is utilised for:
1. Suppressing the activity of intercalary meristem
2. Early senescence
3. Hedge making
4. Preparing weed-free lawns

124. Which one of the following process is responsible for the release of N_2 is the atmosphere?
1. Industrial Nitrogen fixation
2. Ammonification
3. Denitrification
4. Biological nitrogen fixation

125. What will be the ploidy of endosperm of a seed produced after crossing tetraploid female plant with tetraploid male plant?
1. Pentaploid
2. Hexaploid
3. Diploid
4. Triploid

126. Which one of the following structures is haploid in its ploidy level?
1. Primary Endospore Nucleus
2. Microspore Mother cell
3. Protonemal cell of a moss
4. Primary endosperm nucleus in dicot

127. Select the correct statements related to the activity of cork cambium
1. The outer cells differentiate into phelloderm
2. The cork differentiated from cork combium, is impervious to water due to deposition of tannins and resins
3. Cuts the cells only on the outer side
4. Cuts the cells on inner as well as outer side

128. Match List-I with List II

List-I	List-II
(a) ETS complex-I	(i) Cyt be1
(b) ETS complex-II	(ii) Cyt a,a3 and 2 copper centres
(c) ETS complex III	(iii) NADH dehydrogenase
(d) ETS complex-IV	(iv) Ubiquinone and FADH dehydrogenase

Choose the correct answer from the options given below:

	(a)	(b)	(c)	(d)
1.	(ii)	(i)	(iv)	(iii)
2.	(iv)	(iii)	(ii)	(i)
3.	(iii)	(ii)	(i)	(iv)
4.	(iii)	(iv)	(i)	(ii)

129. Species Area relationship is described by the following equation.
log S = log C + Z log A
where Z is:
1. Area
2. Species richness
3. Slope of the line
4. Y-intercept

130. Which of the following physical properties of water is/are responsible for providing water, the high tensible strength and high capillarity during ascent of sap in the plants?
1. Surface tension and cohesion
2. Cohesion, adhesion and surface tension
3. Cohension only
4. Adhesion and cohesion

131. Choose the mismatched pair of leaf character with its example:
1. Palmately compound - *Alstonia*
2. Alternate Phyllotaxy - China-rose
3. Leaf tentdril - Pea
4. Opposite phyllotaxy - *Calotropis*

132. Which of the following is the correct equation of exponential growth?
1. $N_t = N_0\, e^{rnt}$
2. $N_t = N_0\, e^{rpt}$
3. $N_t = N_0\, e^{rst}$
4. $N_t = N_0\, e^{rt}$

133. Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R)
Assertion (A): Restriction enzyme is a type of endonuclease
Reason (R) : Restriction enzyme cuts the two stands of DNA at specific positions within the DNA
In the light of the above statements, choose the correct answer from the options given below:
1. (A) is correct but (R) is not correct
2. (A) is not correct but (R) is correct
3. Both (A) and (R) (R) are correct and (R) is the correct explanation of (A)
4. Both (A) and (R) are correct but (R) is not the correct explanation of (A)

134. Identify the cytochrome which acts as a mobile carrier for the transfer of electrons between complex III and IV?
1. Cytochrome a
2. Cytochrome a_3
3. Cytochrome b c_1
4. Cytochrome c

135. Which of the following plants possessses the placentation of ovules borne on central axis with no septa?
1. Lemaon
2. Pea
3. China-rose
4. *Primrose*

Biology - 1 - Section B

136. Which of the following are not correct regarding decomposition of wastes ?
(a) Low temperature inhibits decomposition
(b) Warm and moist enviornment favours the process
(c) The process is anaerobic
(d) It is slower if detritus is rich in proteins and carbohydrates
(e) Detritus is fegraded into simpler inorganic substance by fungal and bacterial enzymes
Choose the correct answer from the options given below:
1. (b) and (c) only
2. (c) (a) and (d) only
3. (c) and (d) only
4. (c) (d) and (e) only

137. The ratio of carbon dioxide fixation between C_4 plants and C_3 plants is :
1. 2:1
2. 2: 3
3. 1:1
4. 1:2

138. Which of the following bond is formed as a result of reaction of carboxyl group of one amino acid with amino group of other amino acid with elimination of water?
1. Phosphodiester Bond
2. Hydrogen Bond
3. Glycosidic Bond
4. Peptide Bond

139. Following crops have been extensively cultivated in CO_2 rich atmosphere for higher yield:
1. Sugar beet and Cabbage
2. Carrots and Tomatoes
3. Wheat and Sugar beet
4. Tomatoes and Bell pepper

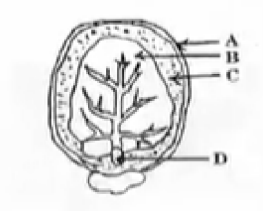
140. Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R) .
Assertion(A) : In rDNA technology non-recombinants transformed bacteria grow on the medium containing ampicillin as well as medium containing tetracycline
Reason (R): Recombinant plasmids contain the foreign gene of interest. In the light of the above statements, choose the correct answer from the options given below:
1. (A) is correct but (R) is not correct
2. (A) is not correct but (R) is correct
3. Both (A) and (R) are correct and (R) is the correct explanation of (A)
4. Both (A) and (R) are correct but (R) is not the correct explanation of (A)

141. Identify the fungi which do not belong to the group of other fungi among the following
1. Sac-fungi
2. Puffballs
3. Mushrooms
4. Bracket Fungi

142. Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): The beginning of diplotene is recognised by the dissolution of the synaptonemal complex and formation of X shaped structures called chiasmata
Reason(R): In oocytes of some vertebrates, diplotene can last for months or years. In the light of the above statements, choose the correct answer from the options given below:
1. (A) is correct but (R) is not correct
2. (A) is not correct but (R) is correct
3. Both (A) and (R) are correct and (R) is the correct explanation of (A)
4. Both (A) and (R) are correct but (R) is not the the correct explanation of (A)

143. Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R)
Assertion (A): Semiconservative replication was experimentally proved by Mathew Meselson and Frasnkin Stahl (1958)
Reason(R): Meselson and Stahl used radioactive isotope ^{15}N and equilibrium density gradient centrigugation technique. In the light of the above statements, choose the correct answer from the options given below:
1. (A) is correct but (R) is not correct
2. (A) is not correct but (R) is correct
3. Both (A) and (R) are correct and (R) is the correct explanation of (A)
4. Both (A) and (R) are correct but (R) is not the correct explanation od (A)

144. Which of the following set represents the correct labelling of A,B, C and D with respect to the given diagram ?



1. A- Seed Coat, B- Cotyledon, C- Endosperm, D - Hypecotyle
2. A -Seed Coat, B- Scutellum, C- Endocarp, D - Mesocarp
3. A- Seed Coat, B- Scutellum, C- Microphyle, D - Endocarp
4. A-Pericarp, B - Coleoptile

145. The thickness of the ozone in a column of air from the ground to the top of the atmosphere is measured in terms of :
1. Balton units
2. Swedberg units
3. Monomeric units
4. Dobson units

146. Which of the following was proved by girdling experiment?
1. Apoplastic movement of water occurs through intercellular spaces
2. Symplastic movement of water occurs through interconnected protoplast
3. Xylem is responsible for uptake of water
4. Phloem is responsible for translocation of food

147. Which of the following is not a character of collenchyma tissue?
1. They provide mechanical support to the growing part of the plant
2. They occur in layers below epidermis in dicotyledonous plants
3. They consist of cells with thick corners due to cellulose deposition
4. They are usually dead and without protoplasts

148. Which of the following pair of micronutrients would help in the light phase of photosynthesis to help in the reaction leading to oxygen evolution?
1. Zinc and Chlorine
2. Manganese and Molybdenum
3. Molybdenum and Iron
4. Manganese and Chlorine

149. The construction of the first recombinant DNA emerged from the possibility of linking a gene encoding antibiotic resistance with a native plasmid of which of the following organism?
1. *Escherichia coli*
2. *Bacillus thuringiensis*
3. *Salmonella typhi*murium
4. Agrobacterium tumefaciens

150. Assuming that fur colour of an animal is dark, range of colour shade and white. A cross is made between a male (AABBCC) with dark fur colour and a female (aabbcc) with white fur colour. What would be the fur colour of F_1 generation?
1. All intermediate colour
2. Range of colour shade
3. All dark colour
4. All white colour

Biology - 2 - Section A

151. Which of the following disorders represents decrease in respiratory surface due to damaged alveolar walls ?
1. Hypocapnia
2. Bronchitis
3. Asthma
4. Emphysema

152. The hormone releasing IUDs among the following are :
(a) Multiload 375 (b) LNG - 20
(c) Progestasert (d) Lippe's loop
(e) Vaults
Choose the most appropriate answer from the options given below :
1. (a) and (d) only
2. (c) and (e) only
3. (a) and (b) only
4. (b) and (c) only

153. The term 'Blue Revolution' is related with :
1. Various crop plants and their by products
2. Development of water reservoirs
3. Honey and its by products
4. Fishery industry

154. Which of the following is/are vegetative propagule(s) ?
(a) Eyes of Potato
(b) Zoospore of *Chlamydomonas*
(c) Rhizome of Ginger
(d) Buds in *Hydra*
(e) Bulbil of *Agave*
Choose the most appropriate answer form the options given below :
1. (e) only
2. (a), (c), (e) only
3. (a), (b), (c), (d) only
4. (b), (d) only

155. In Drosophila, the genes for color of body and color of eyes are situated on _____.
1. both the sex chromosomes
2. autosomes
3. Y-chromosome
4. X-chromosome

156. Which of the following is correct statement ?
1. Actin and regulatory proteins are located in thin filament.
2. Z-lines anchor myosin (thick) filament to the ends of the sarcomere.
3. Sarcoplasmic reticulum stores acetylcholine.
4. Myosin cross bridges contain calcium binding sites.

157. Given below are two statements :
Statement - I : Membrane-bound organelles of the endomembrane system coordinate cellular functions.
Statement - II : Mitochondria and chloroplasts are not considered a part of the endomembrane system.
In the light of the above statements, choose the most appropriate answer from the options given below
1. Statement - I is correct but Statement - II is incorrect
2. Statement - I is incorrect but Statement - II is correct
3. Both Statement - I and Statement - II are correct
4. Both Statement - I and Statement - II are incorrect

158. With respect to nucleosome, Which of the following statements is incorrect ?
1. Nucleosome contains 120 bp of DNA helix
2. Nucleosomes are seen as 'beads' on string' under Electron Microscope
3. DNA is wrapped around positively charged histone octamer to form nucleosome.
4. Nucleosome it the repeating unit of chromatin

159. In a reaction catalyzed by an enzyme, which of the following statements is correct ?
1. Enzymes decrease the activation energy for formation of transition state.
2. Enzymes make transition form substrate to product more difficult.
3. Enzymes increase the activation energy for formation of transition state.
4. Enzyme-substrate complex formed during a reaction lasts for a very long time.

160. Which one of the following hormones reduces the blood pressure?
1. Antidiuretic hormone
2. Atrial Natriuretic factor
3. Aldosterone
4. Angiotensin-II

161. Endemism refers to:
1. Species richness
2. Species evenness
3. Species confined to that region
4. Species diversity

162. In a cell, the separation of DNA strands is brought about by the enzyme DNA helicase, whereas in PCR, the separation of DNA strands is due to :
1. High temperature
2. Two sets of Primers
3. Taq DNA polymerase
4. Deoxynucleotides

163. A low frequency recombination indicates that the genes are:
1. Located far apart from each other
2. Located close to each other
3. Not linked
4. Present on different c

164. How many Y-chromosomes are present in the 2nd polar body in human beings?
1. 01
2. 00
3. 23
4. 02

165. A population with finite resources shows a logistic growth curve where the correct sequence of events will be:
1. Stationary phase → Acceleration phase → Lag phase → Asymptote
2. Acceleration phase → Deceleration → Asymptote
3. Acceleration phase → Leg phase → Stationary phase
4. Lag phase → Acceleration phase → Deceleration → Asymptote

166. Air bladder is found in :
1. Osteichthyes
2. Aves
3. Cyclostomata
4. Chondrichthyes

167. Which of the following hormones are secreted in women only during pregnancy?
(a) Relaxin
(b) Oxytocin
(c) hCG
(d) hPL
(e) Progesterone
Choose the most appropriate answer from the options given below:
1. (c) , (d) and (e) only
2. (b) and (e) only
3. (b) , (c) and (d) only
4. (a) , (c) and (d) only

168. In the regulation of respiration, a chemosensitive area adjacent to the rhythm centre in the medulla region of the brain, is highly sensitive to:
1. HCO_3^-
2. CO_2
3. O_2
4. N_2

169. Herbarium, Botanical gardens, Museum, Zoological parks and Key are considered as:
1. Trophic aids
2. Environmental aids
3. Pollution aids
4. Taxonomical aids

170. The oocytes of some vertebrates get arrested for years or months in:
1. Telophase - I
2. Diplotene
3. Diakinesis
4. Metaphase - I

171. Which of the following types of epithelium lines the walls of blood vessels ?
1. Ciliated epithelium
2. Squamous epithelium
3. Cuboidal epithelium
4. Columnar epithelium

172. Select the correct sequence of events occurring during Prophase-I of Meiosis-I
(a) Nuclear envelope breakdown
(b) Synaptonemal complex formation
(c) Compaction of chromosomes
(d) Terminalisation of chiasmata
(e) Crossing over
Choose the most appropriate answer from the options given below:
1. (c) → (b) → (e) → (d) → (a)
2. (c) → (a) → (b) → (d) → (e)
3. (b) → (c) → (a) → (d) → (e)
4. (c) → (a) → (b) → (e) → (d)

173. One of the strands of double stranded DNA has base composition as follows: 15% A, 15% T, 40%G and 30%C. What will be the percentage of these bases in the complementary strand ?
1. 15% A, 15% T, 30% G , 40% C
2. 15% A, 30% T, 40% G , 15% C
3. 15% A, 15% T, 40% G , 30% C
4. 15% A, 40% T, 15% G , 30% C

174. Inadequate supply of oxygen to heart muscles leads to a symptom of acute chest pain. This disorder of the circulatory system is identified as:
1. Angina pectoris
2. Cardiac arrest
3. Heart failure
4. Coronary Heart Disease

175. Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R) .
Assertion (A): With the help of several ommatidia, a cockroach can perceive several images of an object, ie, mosaic vision
Reason (R): Mosaic vision gives more sensitivity but less resolution
In the light of the above statements, choose the most appropriate answer from the options given below:
1. (A) is correct but (R) is not correct
2. (A) is not correct but (R) is correct
3. Both (A) and (R) are correct and (R) is the correct explanation of (A)
4. Both (A) and (R) are correct but (R) is not the correct explanation of (A)

176. Given below are two statements:
Statements-I: Amphibians and reptiles have a 3-chambered heart with two atria and a single ventricle, and oviparous in nature
Statements-II: Crocodiles possess a 4 chambered heart with two ventricles and two atria: and viviparous in nature
In the light of the above statements, choose the most appropriate answer from the options given below:
1. Statements-I is correct but statements-II is incorrect
2. Statement-I is incorrect but statements-II is correct
3. Both statement-I and statement-II are correct
4. Both statement-I and statements-II are incorrect

177. Which one of the following is not an Assisted Reproductive Technology (ART) used by childless couples to have hildren?
1. ZIFT
2. IUD
3. IVF
4. IUT

178. Immuno-suppressants are administered to burn-patients or during organ transplantation to suppress:
1. Innate immunity
2. Cytokine storm
3. Humoral immunity
4. Cell-mediated immunity

179. Ear wax secreting cells have which type of epithelium?
1. Columnar epithelium
2. Exocrine glandular epithelium
3. Compound epithelium
4. Endocrine glandular epithelium

180. Arrange the following male sex accessory ducts in the correct sequence for the transport of sperms from the tests
(a) Epididymis
(b) Ejaculatory duct
(c) Vasa efferentia
(d) Rete testis
(e) Vas deferens
Choose the most appropriate answer from the options given below:
1. (d) , (a) , (c) , (e) , (b)
2. (d) , (c) , (e) , (a) , (b)
3. (d) , (c) , (a) , (e) , (b)
4. (d) , (e) , (a) , (c) , (b)

181. Chylomicrons are:
1. fat coated protein globules
2. micro-sized lipid molecules
3. protein coated fat globules
4. spherical aggregates of fatty acids

182. Genetic Drift occurs due to :
1. Natural selection
2. Sudden population migration
3. Continuous gene migration
4. Mutation

183. Bee-keeping helps to improve the yield of following crops Except _____.
1. Jowar
2. Sunflower
3. Apple
4. Mustard

184. Normal sleep-wake cycle in a human body is maintained by the secretion of:
1. Thyroid gland
2. Thymus gland
3. Pineal gland
4. Pituitary gland

185. An intestinal hormone that stimulates the pancreas to release a watery secretion that is rich in bicarbonate ions:
1. Cholecystokinin
2. Gastric Inhibitory Peptide
3. Enterokinin
4. Secretion

Biology - 2 - Section B

186. Which biological process leads to a decrease in the fish-eating bird population near a water body containing toxicants from industrial drainage?
1. Algal bloom
2. Biochemical oxygen demand
3. Accelerated Eutrophication
4. Biomagnification

187. Terrestrial adaptations necessitated the production of :
1. Highly toxic nitrogenous wastes like urea and uric acid
2. Lesser toxic nitrogenous wastes like urea and uric acid
3. Lesser toxic nitrogenous wastes like ammonia and urea
4. Highly toxic nitrogenous wastes like ammonia and urea

188. Given below are two statements:
Statement - I: Pyramid of energy is always upright and is the most efficient
Statement-II: Pyramid of biomass in sea is generally inverted
In the light of the above statements, choose the most appropriate answer from the options given below:
1. Statements-I is correct but statement-II is incorrect
2. Statements-I is incorrect but statement-II is correct
3. Both statement-I and statements-II are correct
4. Both statement-I and statement-II are incorrect

189. Identify the properties of a good vector used in rDNA technology
(a) It should have origin of replication supporting a high copy number
(b) It should have preferably more than '2' recognition sites
(c) The restriction sites in vector should be in the antibiotic- resistant genes
(d) It should have suitable marker genes
(e) It should be easy to isolate and purify
Choose the most appropriate answer from the options given below:
1. (a), (c) and (e) only
2. (c), (d) and (e) only
3. (a), (b) and (c) only
4. (a), (c) , (d) and (e) only

190. Select the correct match regarding adaptive radiation of Australian marsupials corresponding to placental mammals
1. Numbat-Flying Squirrel
2. Tasmanian Wolf - Bobcat
3. Marsupial mouse- Mole
4. Spotted Cuscus - Lemur

191. Match List - I with List - II

List - I	List - II
(a) Chromoplasts	(i) Proteins
(b) Amyloplasts	(ii) Oil and fats
(c) Elaioplasts	(iii) Starch
(d) Aleuroplasts	(iv) Carotene

Choose the correct answer from the option given below

	(a)	(b)	(c)	(d)
1.	(iv)	(i)	(iii)	(ii)
2.	(iv)	(iii)	(ii)	(i)
3.	(iv)	(ii)	(iii)	(i)
4.	(iv)	(iii)	(i)	(ii)

192. Match List - I with List - II regarding sensory organs in human.

List - I	List - II
(a) Organ of corti	(i) Photo receptors
(b) Nasal mucosa	(ii) Gustatory receptors
(c) Taste buds	(iii) Auditory receptors
(d) Retina	(iv) Olfactory receptors

Choose the correct answer from the option given below

	(a)	(b)	(c)	(d)
1.	(ii)	(iv)	(iii)	(i)
2.	(iii)	(iv)	(ii)	(i)
3.	(iv)	(iii)	(i)	(ii)
4.	(iii)	(i)	(ii)	(iv)

193. Which one of the following features are not true for chordates?
(a) Heart is dorsal.
(b) Pharynx is perforated by gill slits.
(c) Central nervous system is ventral solid and single.
(d) post-anal tail is present.
(e) Notochord is present.
Choose the most appropriate answer from the option give below :
1. (e) only
2. (a), (d) and (c) only
3. (b) and (c) only
4. (a) and (c) only

194. Give below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A) : In human beings, insulin is synthesized as a pro-hormone which needs to be processed before it becomes fully mature and functional.
Reason (R) : The extra stretch of C-peptide is to be removed from A-peptide and B-peptide chain of insulin.
In the light of the above statements, Choose the most appropriate answer from the option given below :
1. (A) is correct but (R) is not correct
2. (A) is not correct but (R) is correct
3. Both (A) and (R) are correct and (R) is the correct explanation or (A)
4. Both (A) and (R) are correct but (R) is not the correct explanation (A)

195. Give below are two statements :
Statement - I : When an infected female *Anopheles* mosquito bits, it release gametocytes of plasmodium into the healthy person.
Statement - II : The female *Anopheles* mosquito takes up sporozoites of *Plasmodium* with blood meal form an infected person, suffering form malaria.
In the light of the above statements, Choose the most appropriate answer from the options give below :
(1) Statement - I is correct but
Statement - II is incorrect
(2) Statement - I is incorrect but
Statement - II is correct
(3) Both Statement - I and Statement - II are correct
(4) Both Statement - I and Statement - II are incorrect

196. Match List - I with List - II

List - I	List - II
(a) *Puccinia*	(i) Parasitic fungus on mustard
(b) *Neurospora*	(ii) Dead substrates
(c) Saprophytes	(iii) Wheat rust
(d) *Albugo*	(iv) Biochemical and Genetic Work

Choose the correct answer from the option given below :

	(a)	(b)	(c)	(d)
1.	(iii)	(ii)	(iv)	(i)
2.	(iii)	(iv)	(ii)	(i)
3.	(i)	(ii)	(iii)	(iv)
4.	(iv)	(ii)	(i)	(iii)

197. What would be the proportions of light and hybrid density DNA molecule, respectively if Meselson and Stahl's experiment was continued for 60 minutes ?
1. 50%, 50%
2. 25%, 75%
3. 75%, 25%
4. 100%, 0%

198. Match List-I with List-II

List-I	List-II
(a) Adhering junctions	(i) Establish a barrier that prevents leakage of extracellular third across a layer of cells
(b) Tight junctions	(ii) Functions like rivets and fasten cells together into strong sheets
(c) Gap junctions	(iii) Pass information through neurotransmitters from one cell to another
(d) Synaptic junctions	(iv) Provide cytoplasmic channels from one cell to an adjacent cell for communication

Choose the correct answer from the options given below

	(a)	(b)	(c)	(d)
1.	(iv)	(iii)	(ii)	(i)
2.	(i)	(iii)	(ii)	(iv)
3.	(ii)	(i)	(iv)	(iii)
4.	(i)	(ii)	(iii)	(iv)

199. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A) : The nematode can not survive in a transgenic host which expresses specific interfering RNA.
Reason (R) : Nematode specific gene introduced in the host produces both sense and antisense complementary RNA which initiate RNA interference in the host cell.
In the light of the above statement, choose the most appropriate answer form the option given below :
1. (A) is correct but (R) is not correct
2. (A) is not correct but (R) is correct
3. Both (A) and (R) are correct and (R) is the correct explanation of (A)
4. Both (A) and (R) are correct but (R) is not the correct explanation of (A)

200. If a DNA molecule is shortened by 25 base pairs, how many helical turns will be reduced from its structure?
1. 1
2. 3
3. 2.5
4. 2