

09/04/2024

CODE-A



Aakash

Medical | IIT-JEE | Foundations

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AIM - 720

(Advanced **INTENSIVE** Mastery for 720)

MM : 720

CST-5

Time : 3 Hrs. 20 Mins.

Instructions :

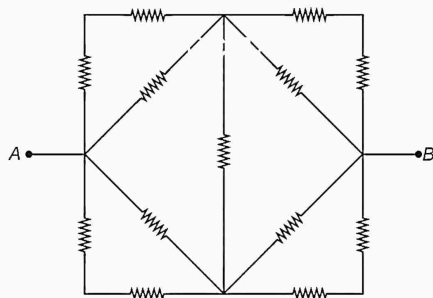
- There are two sections in each subject, i.e. Section-A & Section-B. You have to attempt all 35 questions from Section-A & only 10 questions from Section-B out of 15.
- Each question carries 4 marks. For every wrong response 1 mark shall be deducted from the total score. Unanswered / unattempted questions will be given no marks.
- Use blue/black ballpoint pen only to darken the appropriate circle.
- Mark should be dark and completely fill the circle.
- Dark only one circle for each entry.
- Dark the circle in the space provided only.
- Rough work must not be done on the Answer sheet and do not use white-fluid or any other rubbing material on the Answer sheet.

PHYSICS

Choose the correct answer:

SECTION-A

1. Thirteen identical resistors each of resistance $2\ \Omega$ are connected in the circuit as shown in the figure. The net resistance between points A and B is

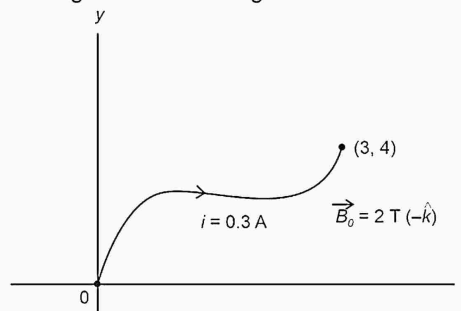


- (1) $\frac{4}{3}\ \Omega$ (2) $\frac{3}{4}\ \Omega$
(3) $\frac{5}{2}\ \Omega$ (4) $\frac{2}{3}\ \Omega$

2. A cell having emf 3 V and internal resistance $0.5\ \Omega$ is connected with a resistance of $1\ \Omega$. The potential difference across the terminals of the cells is

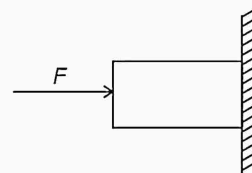
- (1) Zero (2) 1 V
(3) 2 V (4) 3 V

3. A current carrying wire of arbitrary shape placed in a uniform magnetic field ($\vec{B}_0$). The magnitude of magnetic force acting on the wire will be



(1)

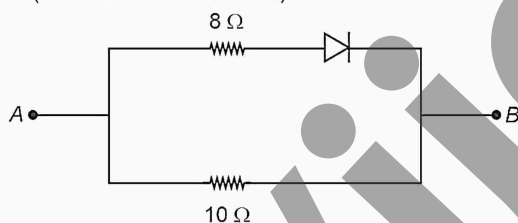
- (1) 10 N (2) 3 N
(3) 6 N (4) Zero
4. In a moving coil galvanometer, if the deflection of the coil is represented by θ and corresponding current is i , then
(1) $i \propto \theta^2$ (2) $i \propto \tan \theta$
(3) $i \propto \theta$ (4) $i \propto \cos \theta$
5. When a magnetic intensity field of 4 A/m is applied across a magnetic specimen, the intensity of magnetisation was observed to be 2000 A/m. The magnetic susceptibility of the specimen is
(1) 500 (2) 2000
(3) 1000 (4) -8000
6. The position of a particle moving along x-axis is given by the equation $S = (3t^3 + 7t^2)$ m where t is in second. The magnitude of velocity of particle at $t = 1$ s is
(1) 10 m s⁻¹ (2) 32 m s⁻¹
(3) 13 m s⁻¹ (4) 23 m s⁻¹
7. A car starts from rest and moves with constant acceleration on a straight road. The ratio of displacement travelled by car in first 2 seconds and next 2 seconds is
(1) 1 : 2 (2) 1 : 1
(3) 1 : 3 (4) 4 : 1
8. The vertical position 'y' and horizontal position 'x' of a projectile on a certain planet are given by, $x = 6t$ and $y = 8t - 5t^2$; where t is in second and x and y are in metre. The angle from horizontal with which the projectile is projected is
(1) 53°
(2) 37°
(3) 45°
(4) 60°
9. A horizontal force F is necessary to just hold a block stationary against a wall as shown. The coefficient of friction between block and wall is μ . The weight of block is



- (1) F (2) μF
(3) $\frac{F}{\mu}$ (4) $\frac{F}{2\mu}$
10. Gas at a pressure P_0 is contained in a vessel. If the masses of molecules are doubled and their speeds halved, then the resulting pressure P will be equal to
(1) $4P_0$ (2) $\frac{P_0}{2}$
(3) $2P_0$ (4) $\frac{P_0}{4}$
11. In a wave having wavelength λ , the path difference corresponding to the phase difference of ϕ is
(1) $\frac{2\lambda}{\pi} \phi$ (2) $\frac{2\pi}{\lambda} \phi$
(3) $\frac{\lambda}{\pi} \phi$ (4) $\frac{\lambda}{2\pi} \phi$
12. A ray of light passes through an equilateral prism such that the angle of incidence and the angle of emergence are both equal to $\frac{3}{4}$ th of the angle of prism. The angle of minimum deviation is
(1) 60° (2) 30°
(3) 15° (4) 45°
13. A capacitor having a capacity of 5 μ F. Electric potential across the capacitor is changing with a value of 10^7 V s⁻¹. The displacement current is
(1) 1 A
(2) 0.5 A
(3) 5 A
(4) 50 A

Space for Rough Work

14. Two plano-convex lens of focal length 20 cm and 40 cm are placed together to form a double convex lens. The final focal length will be
 (1) 40 cm (2) 20 cm
 (3) $\frac{40}{3}$ cm (4) $\frac{20}{3}$ cm
15. The linear momentum of a photon having energy 9 MeV is
 (1) 0.01 eV s m^{-1} (2) 0.02 eV s m^{-1}
 (3) 0.03 eV s m^{-1} (4) 0.04 eV s m^{-1}
16. An alpha particle is
 (1) Nucleus of deuterium
 (2) Nucleus of helium
 (3) Nucleus of tritium
 (4) Positron of nuclear origin
17. The equivalent resistance of the circuit shown in figure between the points A and B if $V_A < V_B$ is (Consider diode is ideal)



- (1) 8Ω (2) 10Ω
 (3) 18Ω (4) $\frac{40}{9} \Omega$
18. Consider the following statements and choose the correct option.
 (I) A Zener diode is used in reverse bias.
 (II) Zener diode can be used as voltage regulator.
 (III) Zener diode is usually a lightly doped p-n junction diode
 (1) Only (I) is correct
 (2) Only (II) is correct
 (3) Both (I) and (II) are correct
 (4) All (I), (II) and (III) are correct

19. A force $F = (20 + 20x)$ acts on a particle in x direction, where F is in newton and x is in metre. Work done by the force to move the particle from $x = 0$ to $x = 1$ m is
 (1) 10 J (2) 30 J
 (3) 50 J (4) 40 J
20. A moving block having a mass m , collides with another stationary block of mass $2m$. The lighter blocks comes to the rest after collision. If the initial velocity of lighter block is v , the value of coefficient of restitution is
 (1) 0.25 (2) 0.33
 (3) 0.5 (4) 0.75
21. A coil having area A is placed in a magnetic field which changes by B_0 to $3B_0$ in time t . The magnetic field makes an angle of 30° with plane of coil. The average emf induced in coil from $t = 0$ to $t = t$ is
 (1) $\frac{2AB_0}{t}$ (2) $\frac{\sqrt{3}AB_0}{t}$
 (3) $\frac{AB_0}{t}$ (4) $\frac{\sqrt{3}AB_0}{2}$
22. Choose the correct statement among the following.
 (1) The reactance of the inductor is directly proportional to its ability to store charge
 (2) The inductive reactance is inversely proportional to the frequency of AC current
 (3) The capacitive reactance is measured in farad
 (4) The impedance of AC circuit is measured in ohm
23. The difference $0.205 - 0.2014$ can be expressed as (with regards to significant figure)
 (1) 0.0036
 (2) 3.6×10^{-3}
 (3) 4.0×10^{-3}
 (4) 0.004

Space for Rough Work

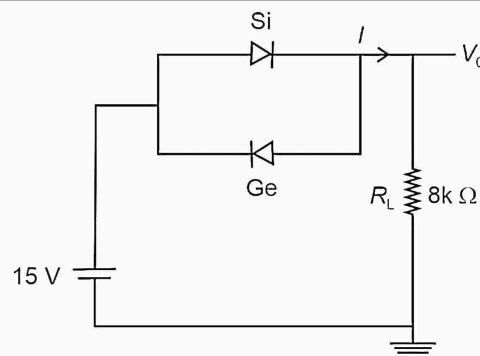
24. An ice-berg is floating partly immersed in seawater of density 2.03 g/cm^3 . The density of ice is 0.91 g/cm^3 . The fraction of the total volume of the ice-berg above the level of seawater is nearly
 (1) 20% (2) 30%
 (3) 55% (4) 60%
25. The amount of heat required to convert 8 g of ice at -15°C to steam at 100°C is (Given $C_{\text{ice}} = 0.50 \text{ cal/g}^\circ\text{C}$, $C_{\text{water}} = 1 \text{ cal/g}^\circ\text{C}$, $L_f = 80 \text{ cal/g}$, $L_v = 540 \text{ cal/g}$)
 (1) 2400 cal (2) 5820 cal
 (3) 1656 cal (4) 1500 cal
26. The value of specific heat capacity in case of isothermal process is
 (1) Zero (2) 1
 (3) $\frac{1}{2}$ (4) Infinity
27. A thermodynamic gaseous system is taken through the cycle $abcd$ shown in figure. The work done by the gas during the part cd is
-
- (1) 30 J (2) -40 J
 (3) -20 J (4) Zero
28. If the ratio of radii of two wires of same material is $2 : 1$ and ratio of their lengths is $4 : 1$, then the ratio of the normal forces that will produce the same extension in the length of two wires is
 (1) $2 : 1$
 (2) $4 : 1$
 (3) $1 : 3$
 (4) $1 : 1$
29. Newton's law of gravitation in vector form is given by
 (1) $\vec{F} = \frac{-Gm_1m_2\hat{r}}{r^2}$ (2) $\vec{F} = \frac{-Gm_1m_2\vec{r}}{r^2}$
 (3) $\vec{F} = \frac{-Gm_1m_2\hat{r}}{r^3}$ (4) $\vec{F} = \frac{-Gm_1m_2\vec{r}}{r^4}$
30. The centre of mass of two particle system
 (1) Lies on the line joining the particles between them
 (2) Lies on the line joining the particles on either side of them
 (3) Is always closer to lighter particle
 (4) Lies somewhere on the line perpendicular to the line joining them
31. Which of the following has the highest moment of inertia when each of them has the same mass and the same outer radius?
 (1) A ring about its axis perpendicular to the plane of the ring
 (2) A disc about its axis perpendicular to the plane of the ring
 (3) A solid sphere about one of its diameters
 (4) A spherical shell about one of its diameters
32. The force experienced by a charge particle of -4 C in an external electric field is 40 N towards south. The electric field intensity will be
 (1) 10 N/C towards north
 (2) 10 N/C towards south
 (3) 40 N/C towards north
 (4) 40 N/C towards south
33. The capacitance of an isolated conducting sphere of radius R is proportional to
 (1) R^2 (2) $\frac{1}{R^2}$
 (3) $\frac{1}{R}$ (4) R

Space for Rough Work

34. A man standing in between two parallel cliffs. He produces a sound and first echo is heard after 2 second and another echo is heard 1 second later. If speed of sound in air is 340 m/s, the distance between the two cliffs will be
 (1) 425 m (2) 170 m
 (3) 850 m (4) 340 m
35. If a body is executing SHM then for small amplitude of oscillations, nature of potential energy versus position travelled from equilibrium position curve is
 (1) Parabolic (2) Hyperbolic
 (3) Elliptical (4) Circular

SECTION-B

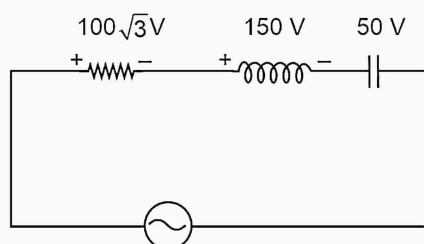
36. Bernoulli's equation does not apply to
 (1) Steady flow of fluids
 (2) Non-viscous fluid
 (3) Incompressible fluid
 (4) Viscous flow and compressible fluid
37. In a parallel combination of slabs of equal length but different materials having same area of cross-sections, the equivalent thermal conductivity will be (K_1, K_2, K_3 are respective conductivities of three slabs is)
 (1) $K_{eq} = 3(K_1 + K_2 + K_3)$
 (2) $K_{eq} = \frac{K_1 + K_2 + K_3}{3}$
 (3) $K_{eq} = \frac{K_1 K_2 + K_2 K_3 + K_3 K_1}{3}$
 (4) $K_{eq} = \frac{K_1 K_2 K_3}{3}$
38. Taking the Bohr radius as $r_0 = 53$ pm, the radius of Li^{++} ion in its first excited state on the basis of Bohr's model will be approximately
 (1) 53 pm (2) 212 pm
 (3) 70.7 pm (4) 18 pm
39. In the circuit shown in figure, the silicon and germanium diodes start conducting at 0.7 V and 0.3 V respectively. What are the values of V_0 and I ?



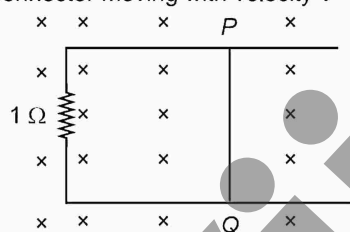
- (1) 14.3 V, 1.8 mA (2) 14.7 V, 1.8 mA
 (3) 15 V, 1.5 mA (4) 14 V, 1.4 mA
40. A plate is kept floating in a horizontal position by shooting particles of mass m vertically from below. Each particles hits the plate with a speed u and rebounds with same speed. If N number of particles need to be shot per unit time to keep plate in equilibrium, then mass of plate is
 (1) $\frac{2Nm}{4g}$ (2) $\frac{2mu}{g}$
 (3) $\frac{mu}{2Ng}$ (4) $\frac{2Nmu}{g}$
41. Two wires having resistances R_1 and R_2 and thermal coefficient of resistances α_1 and α_2 respectively are joined in series. The effective thermal coefficient of resistance of the combination is
 (1) $\sqrt{\frac{\alpha_1^2 + \alpha_2^2}{2}}$ (2) $\frac{\alpha_1 \alpha_2}{\alpha_1 + \alpha_2}$
 (3) $\frac{R_2 \alpha_1 + R_1 \alpha_2}{R_1 + R_2}$ (4) $\frac{R_1 \alpha_1 + R_2 \alpha_2}{R_1 + R_2}$
42. If the dimensions of a physical quantity are given by $M^a L^b T^c$, then the physical quantity will be
 (1) Pressure if $a = 1, b = -1, c = -2$
 (2) Velocity if $a = 1, b = 0, c = -1$
 (3) Acceleration if $a = 1, b = 1, c = -2$
 (4) Force if $a = 0, b = -1, c = -2$

Space for Rough Work

43. In the circuit shown below, the phase difference between the current and source voltage is



- (1) 30° (2) 45°
 (3) 60° (4) 75°
44. A rectangular loop with a sliding connector PQ of length $l = 1.0$ m and resistance $2\ \Omega$ is situated in the magnetic field $B = 2$ T, perpendicular to the plane of loop. A resistance of $1\ \Omega$ is connected as shown in the figure. The power required to keep the connector moving with velocity $v = 2$ m s^{-1} is



- (1) 16 W (2) 8 W
 (3) 12 W (4) $\frac{16}{3}$ W
45. A beam of light of wavelength 500 nm from a distant source falls on a single slit 1 mm wide and the resulting diffraction pattern is observed on a screen 2 m away. The distance between the first dark fringes on either side of central bright fringe is
- (1) 20 mm
 (2) $\frac{1}{2}$ mm
 (3) 2 mm
 (4) 1 mm

46. A simple microscope consists of a convex lens of power +5 D. If the image is formed at infinity, then the magnifying power

- (1) 1.25 (2) 2.5
 (3) 2.25 (4) 5

47. **Assertion (A)** : A rod AB of length L and linear mass density $\mu(x) = a + \frac{bx}{L}$ has its centre of mass at $x = \frac{L}{2}$ (where x is measured from A)

Reason (R) : COM of a straight rod always lies at mid-point of the rod.

- (1) Both (A) and (R) are correct and (R) is the correct explanation of (A)
 (2) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
 (3) (A) is correct but (R) is wrong
 (4) Both (A) and (R) are wrong
48. In case of circular orbital motion of a satellite which option is correct for its energies?
- (1) Kinetic energy is negative
 (2) Potential energy is negative
 (3) Total energy is positive
 (4) All of these

49. Consider two large parallel plates at potential -5 V and $+15$ V. If separation between plates is 2 cm, then electric field between the plates is

- (1) $500 \frac{V}{m}$ (2) $1000 \frac{V}{m}$
 (3) $100 \frac{V}{m}$ (4) Zero

50. Two charges A (48 pC) and B (36 pC) are located at (3 cm, 0 cm) and (0 cm, 4 cm) respectively. The magnitude of electric field at point (3 cm, 4 cm) due to these two charges is

- (1) 9×10^3 N/C (2) 9×10^2 N/C
 (3) 450 N/C (4) 4.5×10^3 N/C

Space for Rough Work

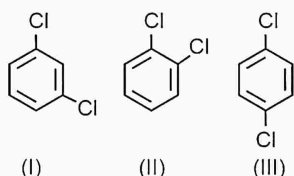
CHEMISTRY

SECTION-A

51. Buckminsterfullerene contains

- (1) Twenty six-membered rings and twelve five-membered rings.
- (2) Twenty six-membered rings and twenty five membered rings.
- (3) Twelve six-membered rings and twenty five-membered rings
- (4) Twelve six-membered rings and twelve five-membered rings

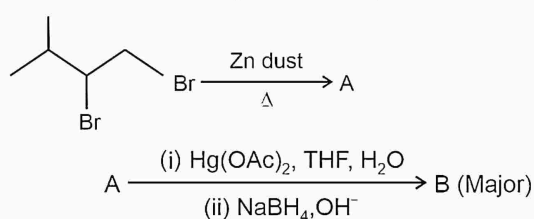
52. Consider the following compounds



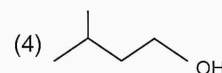
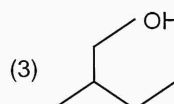
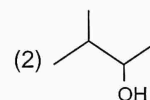
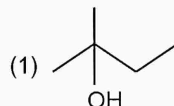
The correct order of boiling point is

- (1) (I) > (II) > (III)
 - (2) (III) > (I) > (II)
 - (3) (II) > (III) > (I)
 - (4) (I) > (III) > (II)
53. The number of optically active isomers possible with IUPAC name 2, 3-dichlorobutane is
- (1) 4
 - (2) 3
 - (3) 2
 - (4) Zero

54. Consider the following reaction sequence



Major product B is



55. Given below are two statements

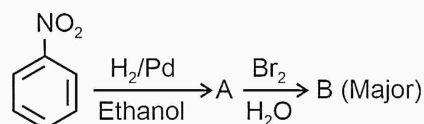
Statement (I): Glucose is oxidised to gluconic acid in presence of bromine water.

Statement (II): Glucose is an aldohexose and known as dextrose.

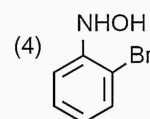
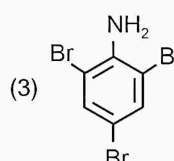
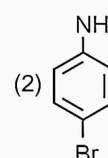
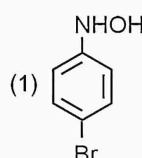
The correct option is

- (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

56. Consider the following reaction sequence



Major product B is



Space for Rough Work

57. Consider the following statements.

- (a) Propyne is more acidic in nature than ethyne
- (b) Ethyne on reaction with mercuric sulphate and dilute sulphuric acid at 333 K gives ethanal as major product
- (c) Propyne decolourises reddish orange colour of the solution of bromine in carbon tetrachloride.

The correct statements are

- (1) (a) and (b) only (2) (a) and (c) only
- (3) (b) and (c) only (4) (a), (b) and (c)

58. The gases evolved when zinc reacts with dilute nitric acid and with concentrated nitric acid respectively are

- (1) NO and NO₂ (2) N₂O and NO
- (3) NO and N₂O (4) N₂O and NO₂

59. Fluorine is a stronger oxidizing agent than chlorine because

- a. F-F bond has a low enthalpy of dissociation
- b. Fluoride ion (F⁻) has high hydration enthalpy
- c. Electron gain enthalpy of fluorine is less negative than chlorine

Choose the correct option from the following.

- (1) b and c only (2) a and b only
- (3) a and c only (4) a, b and c

60. Compound (A) of molecular formula C₆H₆O does not evolve CO₂ on reaction with sodium bicarbonate. Compound (A) dissolves in dilute aqueous sodium hydroxide and gives a characteristic colour with aqueous FeCl₃, on treatment with bromine water, it readily gives a precipitate of C₆H₃Br₃O. The structure of the compound (A) is

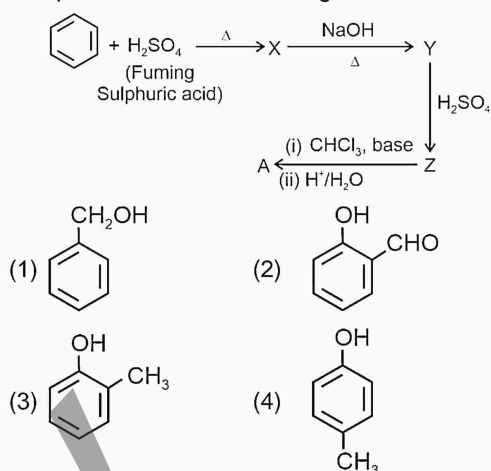
- (1)

(3)

(2)

(4)

61. The product 'A' in the following reaction is:



62. Strong field ligand with Co³⁺ ion is

- (1) Cl⁻ (2) H₂O
- (3) Br⁻ (4) I⁻

63. A swimmer coming out from a pool is covered with a film of water weighing about 36 g. Amount of heat that must be supplied to evaporate this water at 298 K is ($\Delta_{\text{vap}} H^\circ$ for water at 298 K is 44.01 kJ mol⁻¹.)

- (1) 85.2 kJ
- (2) 88.02 kJ
- (3) 44.01 kJ
- (4) 83.06 kJ

64. For which of the following reaction, the value of

$$\left(\frac{K_p}{K_c} \right) \text{ is lowest at } 298.15 \text{ K?}$$

- (1) N₂ (g) + 3H₂ (g) $\rightleftharpoons$ 2NH₃ (g)
- (2) 2HI (g) $\rightleftharpoons$ H₂(g) + I₂ (g)
- (3) N₂(g) + O₂ (g) $\rightleftharpoons$ 2NO (g)
- (4) PCl₅(g) $\rightleftharpoons$ PCl₃ (g) + Cl₂ (g)

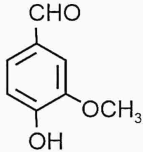
Space for Rough Work

65. Consider the following reaction,

$2A(g) + B(g) \rightleftharpoons C(g)$ for which $K_C = 50$. If 0.1 mole of each of the reactant and product are mixed in a 500 mL flask, then the reaction quotient and the spontaneous direction of the system will be

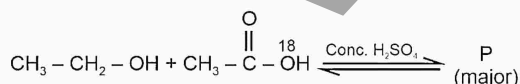
- (1) $Q_C = 10$; the equilibrium shifts to the left
- (2) $Q_C = 25$; the equilibrium shift to the left
- (3) $Q_C = 25$; the equilibrium shift to the right
- (4) $Q_C = 10$; the equilibrium shift to the right

66. Match the structures given in column (I) with their common name in column (II) and choose the correct answer

	Column (I)		Column (II)
a.	$CH_2=CH-CHO$	(i)	Cinnamaldehyde
b.	$CH_3-\overset{\overset{CH_3}{ }}{C}=CH-\overset{\overset{O}{ }}{C}-CH_3$	(ii)	Vanillin
c.		(iii)	Acrolein
d.		(iv)	Mesityl oxide

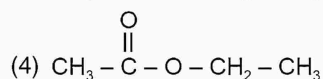
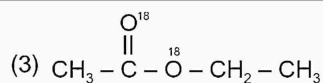
- (1) a(ii), b(i), c(iv), d(iii) (2) a(iii), b(iv), c(i), d(ii)
- (3) a(i), b(ii), c(iii), d(iv) (4) a(iv), b(iii), c(ii), d(i)

67. Consider the following reaction given below



Product (P) formed in this reaction is

- (1) $CH_3-\overset{\overset{O}{||}}{C}-\overset{^{18}O}{O}-CH_2-CH_3$
- (2) $CH_3-\overset{\overset{O^{18}}{||}}{C}-O-CH_2-CH_3$



68. The correct IUPAC official name of an element with atomic number 104 is

- (1) Rutherfordium (2) Lawrencium
- (3) Hassium (4) Bohrium

69. Which among the following elements has maximum electron affinity?

- (1) O (2) S
- (3) Te (4) Po

70. During the electrolysis of aqueous Na_2SO_4 using Pt electrode the products obtained are

- (1) H_2 at cathode (2) O_2 at anode
- (3) Na at cathode (4) Both (1) and (2)

71. The compound with maximum covalent character is

- (1) LiI (2) LiBr
- (3) LiCl (4) LiF

72. Given below are two statements one is labelled as assertion (A) other is labelled as reason (R)

Assertion (A) : Bond angle of NH_3 is greater than NH_4^+

Reason (R): In NH_3 , there is lone pair-bond pair repulsion which is greater than bond pair-bond pair repulsion of NH_4^+ .

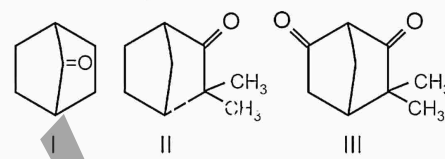
In the light of above statements choose the correct answer

- (1) Both (A) and (R) are correct and (R) is the correct explanation of (A)
- (2) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
- (3) (A) is correct but (R) is incorrect
- (4) (A) is incorrect but (R) is correct

73. 3 g of urea is dissolved in 45 g of water. The relative lowering of vapour pressure is

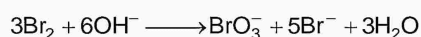
- (1) 0.02 (2) 0.03
- (3) 0.05 (4) 0.04

Space for Rough Work

74. 15 g of ethanoic acid is dissolved in 500 g of water. The depression in the freezing point of water observed is 1.00°C . Then Van't Hoff factor of ethanoic acid will be ($K_f = 1.86 \text{ K kg mol}^{-1}$)
- (1) 1.75 (2) 1.08
(3) 1.2 (4) 1.8
75. The radius ratio of second orbit of Li^{2+} to third orbit of He^{+} is
- (1) $\frac{1}{8}$ (2) $\frac{4}{3}$
(3) $\frac{9}{4}$ (4) $\frac{8}{27}$
76. Consider the following statements regarding interstitial compounds.
- (a) They are usually non-stoichiometric
(b) They have melting points lower than pure metals
(c) They lose metallic conductivity.
(d) They are chemically inert
- The correct statements are
- (1) (a) and (c) only (2) (a) and (d) only
(3) (b), (c) and (d) only (4) (b) and (d) only
77. Oxidation state of central bromine atom in Br_3O_8 is
- (1) 0 (2) +2
(3) +4 (4) +6
78. Given below are two statements one is labelled as assertion (A) other is labelled as Reason (R).
- Assertion (A):** For the oxidation of 2 moles of sulphite ion into sulphate ion in acidic medium, 1.5 mol of potassium dichromate is needed.
- Reason (R):** Oxidation state of sulphur in sulphite ion is +6.
- In the light of the above statements, choose the **correct** answer from the options given below:
- (1) Both (A) and (R) are true but (R) is **NOT** the correct explanation of (A)
(2) (A) is true but (R) is false
(3) Both (A) and (R) are false
(4) Both (A) and (R) are true and (R) is the correct explanation of (A)
79. Sodium extract of a sulphur containing organic compound reacts with sodium nitroprusside to give
- (1) Green colour
(2) Yellow colour
(3) Prussian blue colour
(4) Violet colour
80. Consider the given molecules:
- 
- Which among the following of these will not exhibit tautomerism?
- (1) I & II only
(2) II & III only
(3) III only
(4) I, II & III
81. Amount of CO_2 produced from 20 g of 50% pure CaCO_3 is
- (1) 2.2 g (2) 8.8 g
(3) 4.4 g (4) 17.6 g
82. Given below are two statements:
- Statement I :** An empirical formula represents the simplest whole number ratio of various atoms present in a compound
- Statement II :** Molecular formula represents the exact number of different type of atoms present in a molecule of compound.
- Choose the correct option
- (1) Both statement I and statement II are incorrect
(2) Statement I is correct but statement II is incorrect
(3) Statement I is incorrect but statement II is correct
(4) Both statement I and statement II are correct

Space for Rough Work

83. The standard enthalpy of solution of 1 mol NaCl is ($\Delta_{\text{hyd}}H^\circ = -784 \text{ kJ mol}^{-1}$, $\Delta_{\text{lattice}}H^\circ = +788 \text{ kJ mol}^{-1}$)
- (1) -4 kJ mol^{-1} (2) 8 kJ mol^{-1}
 (3) -8 kJ mol^{-1} (4) 4 kJ mol^{-1}
84. Layer test is done for detection of
- (1) N (2) S
 (3) C (4) Br
85. For given reaction, the correct expression for rate of reaction is

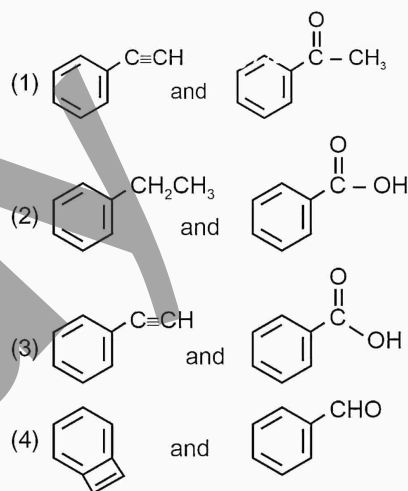
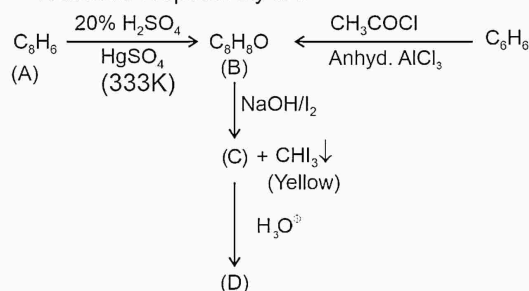


- (1) $\frac{-1}{2} \frac{d[\text{Br}_2]}{dt}$ (2) $\frac{d[\text{BrO}_3^-]}{dt}$
 (3) $\frac{-1}{5} \frac{d[\text{Br}^-]}{dt}$ (4) $\frac{1}{6} \frac{d[\text{OH}^-]}{dt}$

SECTION-B

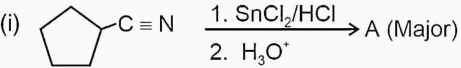
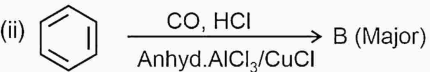
86. Number of chiral carbons present in β -D-(+)-glucopyranose is
- (1) 5 (2) 4
 (3) 6 (4) 3
87. Correct order of basic strength of the given compounds in aqueous medium is
- (1) $\text{NH}_3 > (\text{C}_2\text{H}_5)_2\text{NH} > (\text{C}_2\text{H}_5)_3\text{N} > \text{C}_2\text{H}_5\text{NH}_2$
 (2) $(\text{C}_2\text{H}_5)_2\text{NH} > (\text{C}_2\text{H}_5)_3\text{N} > \text{C}_2\text{H}_5\text{NH}_2 > \text{NH}_3$
 (3) $(\text{C}_2\text{H}_5)_3\text{N} > (\text{C}_2\text{H}_5)_2\text{NH} > \text{C}_2\text{H}_5\text{NH}_2 > \text{NH}_3$
 (4) $\text{C}_2\text{H}_5\text{NH}_2 > (\text{C}_2\text{H}_5)_2\text{NH} > (\text{C}_2\text{H}_5)_3\text{N} > \text{NH}_3$
88. Number of structural isomers of C_7H_{16} are
- (1) 7 (2) 5
 (3) 8 (4) 9
89. In the following reaction
- $$\text{XeF}_6 + \text{H}_2\text{O} \rightarrow \text{A} \text{ [Complete hydrolysis]}$$
- Hybridisation and shape of xenon product A is
- (1) sp^3d^2 , Square pyramidal
 (2) sp^3 , Pyramidal
 (3) sp^3d , T-Shaped
 (4) sp^3d^2 , See-Saw

90. The compounds 'A' and 'D' in the following reactions respectively are



91. Consider the following statements given below
- Statement-I:** Metal to ligand bonding creates a synergic effect between CO and the metal.
- Statement-II:** $\text{M}-\text{C} \pi$ bond in metal carbonyls is formed by the donation of a pair of electrons from filled d orbital of metal into π orbital of CO.
- Choose the correct statement
- (1) Both statements I and II are correct
 (2) Both statements I and II are incorrect
 (3) Statement I is correct but statement II is incorrect
 (4) Statement I is incorrect but statement II is correct

Space for Rough Work

92. Heat of atomization of CH_4 and C_2H_4 are 'x' kcal mol^{-1} and 'y' kcal mol^{-1} respectively. The bond energy of (C = C) bond in kJ mol^{-1} is
- (1) $\frac{x-y}{4.18}$ kJ mol^{-1} (2) $x - y$ kJ mol^{-1}
 (3) $(3x - 4y)$ kJ mol^{-1} (4) $(y - x)$ 4.18 kJ mol^{-1}
93. If we add 500 mL of 0.04 M CH_3COOH & 500 mL of 0.04 M NaOH solution in a beaker and shake it well, then add 20 mL of 1 M HCl solution to it what is the pH of the solution?
 (Neglect the added volume of HCl solution)
 (K_a for CH_3COOH is 1.8×10^{-5})
- (1) 1.78 (2) 2.60
 (3) 4.78 (4) 3.22
94. Consider the following reactions given below:-
- (i)  (Major)
- (ii)  (Major)
- Choose the correct option
- (1) Only product A can give positive Fehling test
 (2) Only product B can give positive Fehling test
 (3) Both product A and B gives positive Fehling test
 (4) Neither product A nor B gives positive Fehling test
95. Mass of Cu deposited at cathode by passing 9.65 A current through an aqueous CuSO_4 solution for 50 minutes is (atomic mass of Cu = 63.5 u)
- (1) 38.10 g (2) 4.76 g
 (3) 9.525 g (4) 10 g
96. Consider the following species,
 $\text{N}_2, \text{N}_2^+, \text{O}_2, \text{O}_2^+, \text{O}_2^-, \text{O}_2^{2-}, \text{F}_2^-, \text{F}_2$
- The total number of paramagnetic species according to MOT are
- (1) 3 (2) 4
 (3) 5 (4) 2
97. A 50-watt bulb emits monochromatic red light of wavelength of 795 nm. The number of protons emitted per second by the bulb is
- (1) 5×10^{19} (2) 6×10^{18}
 (3) 2×10^{20} (4) 8×10^{20}
98. Given below are two statements one is labelled as assertion (A) other is labelled as Reason (R).
Assertion (A): $\text{Cu}^{2+}(\text{aq})$ is more stable than $\text{Cu}^+(\text{aq})$
Reason (R): $\text{Cu}^{2+}(\text{aq})$ has much more negative $\Delta_{\text{hyd}}H^\circ$ than $\text{Cu}^+(\text{aq})$ which compensates the second ionisation enthalpy of Cu.
 In the light of the above statements, choose the **correct** answer from the options given below:
- (1) Both (A) and (R) are true but (R) is **NOT** the correct explanation of (A)
 (2) (A) is true but (R) is false
 (3) (A) is false but (R) is true
 (4) Both (A) and (R) are true and (R) is the correct explanation of (A)
99. During estimation of an organic compound by Kjeldahl's method, the evolved ammonia from 0.4 g of the organic compound is neutralised using 10 mL of 0.1 M H_2SO_4 . The percentage of nitrogen in the compound is
- (1) 7% (2) 14%
 (3) 28% (4) 56%
100. Given below are two statements one is labelled as assertion (A) other is labelled as Reason (R).
Assertion (A):- Successive half lives of a first order reaction is constant.
Reason (R):- Half life of a first order reaction does not depend on concentration of reactant.
 In the light of the above statements, choose the **correct** answer from the options given below:
- (1) Both (A) and (R) are true and (R) is **NOT** the correct explanation of (A)
 (2) (A) is true but (R) is false
 (3) (A) is false but (R) is true
 (4) Both (A) and (R) are true and (R) is the correct explanation of (A)

Space for Rough Work

BOTANY**SECTION-A**

101. Which of the following DNA stretches if act as template strand would result in a translational unit that can code for polypeptide with maximum number of amino acids?
- (1) 3'-TACGGCTACGCAACTCAT-5'
 (2) 5'-ATGTTATTACCGACGCAT-3'
 (3) 3'-CCCGCAACGGATATTTAA-5'
 (4) 5'-GGGACGGCACAGCTACAT-3'
102. If the distance between two consecutive base pairs is 0.34 nm and the length of the DNA is approximately 2.2 meters, then the total number of base pairs is approximately
- (1) 6.5×10^9 (2) 6.9×10^9
 (3) 6.5×10^3 (4) 6.9×10^{12}
103. DNA helicase facilitates
- (1) ATP dependent unwinding of DNA helix during replication
 (2) Opening of DNA helix during transcription
 (3) Release of supercoiling in DNA during transcription
 (4) Joining of discontinuously synthesized strands during replication
104. Which of the following options represent the conclusion of Chargaff's rule?
- (1) $A + T = G + C$ (2) $\frac{A+G}{T+C} = 1$
 (3) $A = G$ (4) $\frac{A}{T} = \frac{(C+A)}{(G+T)}$
105. Select the **incorrect** statement regarding chemiosmotic hypothesis.
- (1) Hydrogen ions produced by water splitting accumulate in the stroma of chloroplast.
 (2) As electrons move through the photosystems, protons are transported across the membrane.
 (3) NADP reductase enzyme is located on the stroma side of the thylakoid membrane.
 (4) Breakdown of proton gradient leads to synthesis of ATP.
106. Which of the following is the first stable product of CO_2 fixation in maize?
- (1) PEP (2) RuBP
 (3) 3 PGA (4) OAA
107. The cell membrane of human erythrocyte has approximately ____ proteins and ____ lipids respectively.
- (1) 50%, 30% (2) 52%, 40%
 (3) 40%, 52% (4) 72%, 22%
108. Select the **incorrect** statement.
- (1) All cells arise de novo
 (2) Schleiden and Schwann formulated the cell theory
 (3) Presence of cell wall is a unique character of the plant cells concluded by a British zoologist
 (4) All living organisms are composed of cells and products of cells
109. Match the **Column I** and **Column II** and choose the **correct** option.
- | | Column I | | Column II |
|-----|-----------------------|-------|--|
| (a) | Anton Von Leeuwenhoek | (i) | Studied cork cells |
| (b) | Robert Brown | (ii) | First to observe live cells |
| (c) | Robert Hooke | (iii) | Explained <i>Omnis cellula - e cellula</i> |
| (d) | Rudolf Virchow | (iv) | Discovered Nucleus |
- (1) a(i), b(ii), c(iii), d(iv) (2) a(ii), b(iv), c(i), d(iii)
 (3) a(ii), b(i), c(iv), d(iii) (4) a(iv), b(iii), c(i), d(ii)

Space for Rough Work

110. Congression of chromosomes occurs during
 (1) Prophase (2) Metaphase
 (3) Anaphase (4) Telophase
111. All of the following are not visible in cell at the end of prophase, when viewed under the microscope **except**
 (1) Golgi complex
 (2) Endoplasmic reticulum
 (3) Nucleolus
 (4) Centromere
112. Select the **correct** number of statement(s) w.r.t cell cycle.
 (a) In interphase, cell is metabolically inactive
 (b) Most of the organelles duplicate in G₁ phase
 (c) All membrane bound organelles duplicate in G₂ phase
 (d) Centrioles duplicate in the cytoplasm
 (1) One (2) Two
 (3) Three (4) Four
113. State **True (T)** or **False (F)** for the given statements and choose the correct option.
 (a) Algin and carrageen are hydrocolloids obtained from brown and red algae respectively.
 (b) *Fucus* and *Laminaria* are rich source of iodine.
 (c) Floridean starch is structurally very similar to amylopectin and glycogen.
 (a) (b) (c)
 (1) T F T
 (2) F T T
 (3) T T T
 (4) F F T
114. Which set of characters are specific to green algae w.r.t. pigments and stored food?
 (1) Chlorophyll a and b, Starch
 (2) Chlorophyll a and d, Floridean starch
 (3) Chlorophyll c and d, Mannitol
 (4) Chlorophyll a and c, Laminarin
115. Which of the following statement is **correct**?
 (1) Primary treatment is also called biological treatment
 (2) Flocs are masses of bacteria associated with filamentous algae
 (3) The greater the B.O.D of waste water, lesser is its polluting potential
 (4) Treatment of waste water is done by heterotrophic microbes naturally present in the sewage
116. Read the following statements and select the **correct** option.
Statement A: Suspend is the stage in life cycle where an organism changes its developmental, physiological, structural and biochemical behaviour to pass through unfavourable conditions.
Statement B: A stage of suspended development called diapause, found in many zooplankton species.
 (1) Only statement A is correct
 (2) Only statement B is correct
 (3) Both statements A and B are correct
 (4) Both statements A and B are incorrect
117. Amount of living material present in different trophic levels at a given time is called
 (1) Primary productivity
 (2) Secondary productivity
 (3) Standing state
 (4) Standing crop
118. Glycerol would enter the respiratory pathway after being converted to
 (1) Acetyl CoA
 (2) Pyruvic acid
 (3) Phosphoglyceraldehyde
 (4) Glucose-6-phosphate

Space for Rough Work

119. Pleiotropy can be best exemplified by
 (1) Colour blindness (2) Phenylketonuria
 (3) Skin colour of human (4) ABO blood group
120. Choose the **incorrect** statement w.r.t. experiments performed by Mendel in pea plant.
 (1) He applied statistical methods and mathematical logics for analyzing his results.
 (2) Large sampling size of his experiment gave greater credibility to the data he collected.
 (3) He conducted his experiment from 1856 to 1863.
 (4) He studied seven different contrasting traits of the pea plant.
121. Tropical regions have more biological diversity than the temperate region because
 (i) Tropical regions are less seasonal and relatively more constant and predictable.
 (ii) These regions are subjected to frequent glaciation in past.
 (iii) These regions receive low light and indirectly contributes in high biodiversity.
 Choose the option with **correct** one(s).
 (1) (ii) and (iii) only (2) (i) only
 (3) (ii) only (4) All (i), (ii), (iii)
122. Which animal got recently extinct from Australia?
 (1) Thylacine (2) Quagga
 (3) Steller's Sea Cow (4) Dodo
123. A woman who is carrier of sickle cell anaemia trait marries a man whose mother is carrier for the same and his father do not carry gene for the trait. Choose the **correct** statement for the above case.
 (1) No chance for a female progeny to be affected with this trait
 (2) 50% of their children will be carrier of the trait
 (3) None of their progeny can inherit the sickle cell anaemia gene
 (4) The probability of males getting affected with this trait is more than female progenies
124. Female heterogamety is observed in
 (1) *Drosophila* (2) Grasshopper
 (3) Birds (4) Human
125. Water containing cavities present within vascular bundles are characteristic of
 (1) Monocot root (2) Dicot stem
 (3) Monocot stem (4) Dicot root
126. Phloem fibres are
 (a) Tube like, branched fibres
 (b) Much elongated, unbranched fibres
 (c) Generally present in primary phloem
 (d) At maturity, lose their protoplasm
 Choose the **correct** option
 (1) (a), (d) only (2) (a), (c), (d) only
 (3) (b), (d) only (4) (b), (c), (d) only
127. Heterophylly is not found in
 (1) Cotton (2) Maize
 (3) Coriander (4) Larkspur
128. Sporopollenin is present in
 (1) Intine of pollen grain (2) Exine of pollen grain
 (3) Endothecium (4) Pericarp
129. State **True (T)** or **False (F)** to the given statements.
 (a) *Oxalis* and *Commelina* produce only chasmogamous flowers.
 (b) Geitonogamy is functionally cross pollination but genetically similar to autogamy.
 (c) Xenogamy brings genetically different types of pollen grains to stigma.
 (d) Autogamy is prevented in Castor and Maize but not geitonogamy.
 Choose the **correct** option.
- | | (a) | (b) | (c) | (d) |
|-----|-----|-----|-----|-----|
| (1) | T | T | T | F |
| (2) | F | F | T | T |
| (3) | F | T | T | T |
| (4) | F | F | F | T |

Space for Rough Work

130. What do **A**, **B** and **C** represent in the given scientific name respectively?

Solanum melongena Linn

B **C** **A**

- (1) Specific epithet, Generic name and Author's name
- (2) Author's name, Specific epithet and Generic name
- (3) Generic name, Author's name and Specific epithet
- (4) Author's name, Generic name and Specific epithet

131. Who among the following scientist was the earliest to attempt a more scientific basis for classification?

- (1) Carl Woese (2) Carolus Linnaeus
- (3) Aristotle (4) R.H. Whittaker

132. Which of the following statements are **correct** w.r.t. heterocyst?

- (a) Capable of converting atmospheric nitrogen into ammonium compounds.
 - (b) Heterocysts lack PSII activities.
 - (c) Thin cell wall of heterocyst is permeable to oxygen.
 - (d) They are not covered by mucilaginous sheath.
- Choose the option with **correct** ones.

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

133. Mark the **wrongly** matched pair.

- (1) Pseudocarpic fruit – Pear
- (2) Pneumatophores – *Rhizophora*
- (3) Placenta at the base of ovary – *Primrose*
- (4) Perigynous flower – Plum

134. What is **incorrect** w.r.t. Roots?

- (1) Provide anchorage to the plant parts
- (2) Synthesis of plant growth regulators
- (3) Positively phototropic
- (4) Lack buds, nodes, leaves and are non-green part of plant

135. Most advanced family of dicots is

- (1) Brassicaceae (2) Malvaceae
- (3) Asteraceae (4) Poaceae

SECTION-B

136. Which one is the **wrong** pairing for the diseases and its causal agents?

- (1) Smut disease – *Ustilago*
- (2) Citrus canker – *Xanthomonas citri*
- (3) Rust disease in wheat – *Puccinia*
- (4) Ergot disease – *Alternaria*

137. Floral formula of china rose is

- (1) $\oplus \frac{\text{♂}}{\text{♀}} K_{(5)} \overline{C}_{(5)} A_5 \underline{G}_{(2)}$
- (2) $\text{Epi}_{5-7} \oplus \frac{\text{♂}}{\text{♀}} K_{(5)} \overline{C}_5 A_{(2)} \underline{G}_{(5)}$
- (3) $\text{Br} \oplus \frac{\text{♂}}{\text{♀}} P_{(3+3)} A_{3+3} \underline{G}_{(3)}$
- (4) $\% \frac{\text{♂}}{\text{♀}} K_{(5)} \overline{C}_{1+2+(2)} A_{(9)+1} \underline{G}_1$

138. Find the **incorrect** statements w.r.t. wood formation in different seasons.

- (i) Cambium is least active in spring season.
- (ii) In winter, the wood formed have large number of xylary elements with wider lumens.
- (iii) Early wood is lighter in colour as compared to Late wood.
- (iv) Density of wood formed in spring season is lower.

Select the **correct** option from below.

- (1) (i), (ii) only (2) (i), (ii), (iv) only
- (3) (iii), (iv) only (4) (i), (iii), (iv) only

139. In the given equation of arithmetic growth, 'r' represents

$$L_t = L_0 + rt$$

- (1) Rate of metabolism
- (2) Growth rate
- (3) Elongation per unit area
- (4) Range of temperature

Space for Rough Work

140. In the light of given statements, choose **correct** answer from options given below.
- Statement I:** Radical and root cap enclosed in differentiated sheath called coleorhiza.
- Statement II:** Coleoptile is a hollow foliar structure enclosing shoot apex and few leaf primordia.
- (1) Both statements are correct
 - (2) Only statement I is correct
 - (3) Only statement II is correct
 - (4) Both statements are incorrect
141. Aminoacylation of tRNA represents
- (1) First phase of translation
 - (2) Initiation of transcription
 - (3) Elongation phase of translation
 - (4) Termination of translation
142. DNA as an acidic substance present in nucleus was first identified by
- (1) Rosalind Franklin
 - (2) James Watson
 - (3) Friedrich Miescher
 - (4) Francis Crick
143. Select the substrate level phosphorylation reaction of Krebs cycle.
- (1) Phosphoenolpyruvate → Pyruvic acid
 - (2) Isocitrate → Oxalosuccinic acid
 - (3) Succinyl CoA → Succinic acid
 - (4) Fructose 6 phosphate → Fructose-1, 6-bisphosphate
144. In a typical Mendelian dihybrid cross, out of sixteen progenies in F₂ generation, how many among them are not phenotypically similar to the parents of F₁ generation?
- (1) One
 - (2) Six
 - (3) Nine
 - (4) Seven
145. Plasmids are mainly made of
- (1) Fat
 - (2) Lipids
 - (3) Polysaccharides
 - (4) Nucleic acids
146. All of the following are **correct** about the meiosis-I **except**
- (1) Crossing over occurs
 - (2) Splitting of centromere of each chromosome
 - (3) Bivalent formation
 - (4) Reduction of chromosome number
147. Which of the following plant group is considered as the first embryophytes?
- (1) Algae
 - (2) Bryophytes
 - (3) Pteridophytes
 - (4) Angiosperm
148. _____ used as an immunosuppressive agent in organ-transplant patients, is produced by *Trichoderma polysporum*.
- (1) Statins
 - (2) Streptokinase
 - (3) Cyclosporin A
 - (4) Lipases
149. Presence of lice on human hair is the example of
- (1) Mutualism
 - (2) Parasitism
 - (3) Ammensalism
 - (4) Commensalism
150. Which of the following statement is **correct** for primary succession?
- (1) Pioneer community establishes with comparatively more ease.
 - (2) Succession is faster and climax is also reached more quickly.
 - (3) It starts in areas that somehow lost all the living organisms that existed here.
 - (4) It starts at barren area, never having vegetation or where no living organism ever existed.

Space for Rough Work

ZOOLOGY

SECTION-A

151. Which of the following is **correct** for insemination in humans?
- (1) Release of sperms from the Sertoli cells
 - (2) Release of sperms from testis to get stored within the epididymis
 - (3) Transfer of sperms into the female genital tract
 - (4) Transfer of sperms within the fallopian tube
152. Choose the **incorrect** match w.r.t. human brain.
- (1) Dura mater – Outermost meninx
 - (2) Arachnoid – Middle layer of meninges
 - (3) Pia mater – Meninx in contact with the brain tissue
 - (4) Cerebellum – Contains association areas
153. All of the following features are associated with the tall and slender cells of columnar epithelium, **except**
- (1) They have basal nuclei
 - (2) They help in secretion and absorption
 - (3) They may have cilia on their free surface
 - (4) They are found in the walls of blood vessels
154. Select the **incorrect** option w.r.t. smooth muscle fibres.
- (1) They are fusiform in shape
 - (2) Cell junctions hold them together
 - (3) Present in the walls of blood vessels and stomach
 - (4) Their myofibrils show light and dark bands
155. The plants whose genes have been altered by manipulation are called genetically modified plants. These genetic modifications have been useful in all, **except**
- (1) Increasing crop yields and reducing post-harvest losses
 - (2) Making crops more tolerant to cold and heat but not other abiotic stresses such as salt and drought
 - (3) Enhancing nutritional value of food
 - (4) Reducing the reliance of crops on chemical pesticides
156. The permanent cure for ADA deficiency can be achieved by
- (1) Performing bone marrow transplantation
 - (2) Performing genetic modification of the lymphocytes isolated from patients
 - (3) Giving functional ADA to the patients by injection
 - (4) Manipulating the early embryonic cells by introducing the gene isolated from marrow cells producing ADA
157. Match column I with column II and select the **correct** option w.r.t. excretory structures.
- | Column I | Column II |
|------------------------|-----------------------|
| (a) Green glands | (i) Earthworm |
| (b) Malpighian tubules | (ii) Cockroach |
| (c) Nephridia | (iii) <i>Planaria</i> |
| (d) Flame cells | (iv) Prawn |
- (1) a-(i), b-(ii), c-(iii), d-(iv)
 - (2) a-(ii), b-(iii), c-(iv), d-(i)
 - (3) a-(iv), b-(ii), c-(i), d-(iii)
 - (4) a-(iv), b-(iii), c-(i), d-(ii)
158. Read the following statements and select the **correct** option.
- Statement A:** *Branchiostoma* belongs to the class Cephalochordata.
- Statement B:** Tunicates are exclusively marine.
- (1) Only statement A is correct
 - (2) Both statements A and B are correct
 - (3) Only statement B is correct
 - (4) Both statements A and B are incorrect
159. In an adult human, under normal physiological conditions, the most favourable factors for the formation of oxyhaemoglobin are
- (1) Low temperature, high $p\text{CO}_2$
 - (2) Less H^+ concentration, high $p\text{O}_2$
 - (3) Low $p\text{CO}_2$, high temperature
 - (4) Low $p\text{O}_2$, high $p\text{CO}_2$

Space for Rough Work

160. In humans, lower side of the thoracic chamber is formed by
 (1) Sternum (2) Diaphragm
 (3) Ribs (4) Vertebral column
161. Which of the following statements are true for blood group 'B' individuals?
 (a) The antibodies present in the plasma of blood group 'B' individuals, can react with the antigens present on the RBCs of blood group 'A' individuals.
 (b) Individuals with blood group 'O' can act as donor for them.
 (c) A and B antigens are present on their RBCs surface.
 Select the **correct** option.
 (1) Statements (a), (b) and (c) are correct
 (2) Statements (b) and (c) are correct
 (3) Statements (a) and (b) are correct
 (4) Statements (a) and (c) are correct
162. Platelets are produced from
 (1) Erythrocytes (2) Lymphocytes
 (3) Megakaryocytes (4) Thrombocytes
163. A popular brand of condom for males in India is
 (1) Vaults
 (2) Diaphragm
 (3) Cervical caps
 (4) Nirodh
164. Use of which of the following contraceptives has increased in recent years that also protects the users from contracting STIs and AIDS?
 (1) Condom (2) Diaphragm
 (3) Lippes loop (4) Cu7
165. Progestogens in combination with estrogen is used by females for contraception in the form of
 (1) Multiload 375 (2) Vaults
 (3) Implants (4) Barriers
166. During the initial days of lactation, colostrum is secreted by the mother which contains abundant amount of 'X' antibodies and it provides 'Y' immunity to the infant.
 Select the **correct** option w.r.t. 'X' and 'Y' respectively.
- (1) IgA, naturally acquired passive
 (2) IgM, artificially acquired active
 (3) IgE, naturally acquired active
 (4) IgG, artificially acquired passive
167. Proto-oncogenes can lead to the oncogenic transformation of the normal cells when it gets
 (1) Repressed (2) Inactivated
 (3) Suppressed (4) Activated
168. The excretory system of a frog consists of all, **except**
 (1) Kidney (2) Urinary bladder
 (3) Ureter (4) Anus
169. Select the correct sequence of the parts of the alimentary canal in a cockroach only upto the foregut starting from mouth.
 (1) Mouth → Gizzard → Crop → Pharynx → Oesophagus
 (2) Mouth → Crop → Pharynx → Oesophagus → Gizzard
 (3) Mouth → Pharynx → Oesophagus → Crop → Gizzard
 (4) Mouth → Oesophagus → Pharynx → Crop → Gizzard
170. Choose the **incorrect** statement.
 (1) Compounds found in the acid-soluble pool have molecular weights ranging from 18 to around 800 daltons approximately.
 (2) The acid-insoluble fraction has only 4 types of organic compounds *i.e.*, proteins, nucleic acids, polysaccharides and lipids.
 (3) The molecules in the acid-insoluble fraction with the exception of proteins are polymeric substances.
 (4) With the exception of lipids, compounds present in the acid-insoluble fraction have molecular weights in the range of ten thousand daltons and above.
171. Select the number of fatty acid(s) present in the structure of lecithin.
 (1) One (2) Four
 (3) Two (4) Three

Space for Rough Work

172. 'X' is the organic compound that contributes 10–15% of the total cellular mass of the living organisms. At which structural level, 'X' will represent the positional information of its monomers?
- Quaternary structure
 - Primary structure
 - Secondary structure
 - Tertiary structure
173. Select the **incorrect** match w.r.t. hormone and its function.
- Erythropoietin – Stimulates formation of RBCs
 - Secretin – Stimulates secretion of water and bicarbonate ions from the exocrine part of the pancreas
 - Progesterone – Stimulates growth of mammary glands and inhibits formation of milk in them
 - Glucagon – Reduces the cellular glucose uptake
174. A neural signal reaching the neuromuscular junction of a skeletal muscle releases 'X' which leads to
- Generation of an action potential in the sarcolemma
 - Inhibition of shortening of sarcomere
 - Decrease in the length of 'A' bands
 - Increase in the length of 'I' bands
175. The structure that assists in the movement of food through cytopharynx in *Paramecium* also help in
- Capturing of prey by *Hydra*
 - Passage of ova through the female reproductive tract in humans
 - Movement of tongue in vertebrates
 - Streaming of protoplasm in *Amoeba*
176. All of the following are descendants of sauropsids, **except**
- Tuataras
 - Crocodyles
 - Mammals
 - Lizards
177. The time period in which the fish with stout and strong fins could move on land and go back to water was 'P'. Select the event that also occurred around 'P'.
- Formation of invertebrates
 - Evolution of jawless fishes
 - Dominance of reptiles of different shapes and sizes on Earth
 - Disappearance of dinosaurs from the Earth
178. In the year _____ experimental evidence for the chemical evolution of life was given by _____. Select the option that correctly fills the blanks in the above statement respectively.
- 1963, Oparin and Haldane
 - 1983, Louis Pasteur
 - 1973, Charles Darwin
 - 1953, S.L. Miller
179. How many of the feature(s) given in the box below are present in ctenophores?
- Bioluminescence, Flagellated collar cells, Ciliated comb plates, Bilateral symmetry, Diploblasty
- Select the **correct** option.
- One
 - Three
 - Four
 - Two
180. The removal of nitrogenous wastes takes place through the Malpighian tubules in ____ and _____. Select the **correct** option to fill in the blanks respectively.
- Hirudinaria*, *Pila*
 - Aedes*, *Aplysia*
 - Apis*, *Bombyx*
 - Anopheles*, *Pinctada*
181. In gel electrophoresis, the DNA fragments separate according to their size through sieving effect provided by the matrix used. This matrix is a natural polymer which is extracted from
- Sea weeds
 - Sea urchin
 - Sea-pen
 - Sea-hare

Space for Rough Work

182. If a gene of interest is ligated at the *Cla* I site of the cloning vector pBR322, then the recombinants will
- (1) Be sensitive to ampicillin
 - (2) Be sensitive to tetracycline
 - (3) Not replicate in the host
 - (4) Remain resistant to ampicillin and tetracycline
183. Testicular hormones called androgens are secreted by
- (1) Sertoli cells
 - (2) Interstitial cells
 - (3) Male germ cells
 - (4) Immunologically competent cells
184. Which of the following is not a part of the hindbrain in humans?
- (1) Pons
 - (2) Cerebellum
 - (3) Thalamus
 - (4) Medulla oblongata
185. Choose the option which represents the correct sequence of different parts of the oviduct in human females starting from its last part.
- (1) Infundibulum → Ampulla → Isthmus
 - (2) Infundibulum → Isthmus → Ampulla
 - (3) Isthmus → Ampulla → Infundibulum
 - (4) Ampulla → Infundibulum → Isthmus

SECTION-B

186. What happens when a foreign DNA is ligated at a site other than 'ori'?
- (1) Successful replication of the foreign DNA in the host cell occurs
 - (2) Foreign DNA will act as a selectable marker
 - (3) The foreign DNA does not multiply in the host cell
 - (4) The foreign DNA always gets inherited along with the host DNA

187. Read the following statements (A-D).

- (A) Rhino viruses do not infect the nose and the respiratory passage but infect the lungs in the humans.
- (B) The female *Anopheles* is the vector as well as the host for the malarial parasite.
- (C) Filarial worm is the causative agent of ascariasis.
- (D) Chikungunya is caused by the gram positive bacterium.

How many of the above given statement(s) is/are **correct** w.r.t. diseases in humans?

- (1) One
- (2) Two
- (3) Three
- (4) Four

188. Consider the given options and choose the **incorrect** one.

- (1) Hindlimbs of horse are homologous to the wings of bird
- (2) Flippers of whale are homologous to the wings of bat
- (3) Gills of prawn and lungs of man are analogous structures
- (4) Flippers of dolphin and flippers of penguin are analogous structures

189. The sum of total number of phalanges in one hindlimb and ear ossicles of both the ears in an adult human equals to 'X'. The value of 'X' will be

- (1) Equal to the total number of bones in each limb of man
- (2) Less than the total number of ribs in man
- (3) More than the total number of vertebrae in man
- (4) Twice the total number of skull bones in man

Space for Rough Work

190. Select the **incorrect** option w.r.t. the functions of the hormones released by the adrenal cortex in humans.
- (1) Involved in maintaining the cardio-vascular system as well as the kidney functions.
 - (2) Play a role in the growth of the axial hair, pubic hair and facial hair during puberty.
 - (3) Increase alertness, pupillary dilation, piloerection, sweating, etc., in case of emergency.
 - (4) Act at the renal tubules and stimulate the reabsorption of Na^+ and H_2O .
191. **Assertion (A):** With the increase in substrate concentration, the velocity of the enzymatic reaction rises at first. The reaction ultimately reaches a maximum velocity which is not exceeded by any further rise in concentration of the substrate.
- Reason (R):** The enzyme molecules are fewer than substrate molecules and after saturation of these molecules, there are no free enzyme molecules to bind with the additional substrate.
- In the light of above given statements, select the **correct** option.
- (1) Both (A) and (R) are true and (R) is the correct explanation of (A)
 - (2) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (3) (A) is true but (R) is false
 - (4) Both (A) and (R) are false
192. How does bacteria restrict the growth of bacteriophage in them?
- (1) By using DNA ligase to seal its own DNA
 - (2) By adding methyl groups to its own DNA
 - (3) By using the DNA helicase enzyme
 - (4) By digesting the hydrogen bonds in the bacterial DNA
193. Supply of sterile air in the form of bubbles in sparged stirred-tank bioreactor
- (1) Increases the pH of the broth
 - (2) Acts as a foam breaker
 - (3) Increases the temperature of the broth
 - (4) Increases the oxygen transfer area
194. Insects ingest the Bt protoxin and it gets converted into an active form due to the
- (1) Highly acidic pH of their gut
 - (2) Alkaline pH of their gut
 - (3) Slightly acidic pH of their gut
 - (4) Neutral pH of their gut
195. Decrease in the cardiac output by decreasing the rate of heart beat and speed of conduction of action potential is facilitated by
- (1) Stimulation of sympathetic nervous system
 - (2) Release of adrenaline
 - (3) Stimulation of parasympathetic nervous system
 - (4) Release of epinephrine
196. Select the correct match w.r.t. contraceptives and their mode of action in humans.
- | | |
|------------------|---|
| (1) IUDs | – Decrease phagocytosis of sperms within the uterus |
| (2) Progestasert | – Makes the uterus suitable for implantation |
| (3) LNG –20 | – Makes the cervix hostile to sperms |
| (4) Cu7 | – Increases sperm motility and the fertilising capacity of sperms |
197. Total lung capacity for humans can be represented by all, **except**
- (1) IC + FRC
 - (2) TV + IRV + ERV + RV
 - (3) TV + IRV + FRC
 - (4) IC + IRV + VC

Space for Rough Work

198. If the cardiac output in a healthy individual is 5500 mL per minute, what will be the average volume of blood filtered by his kidneys per minute?

- (1) 1400 mL (2) 1100 mL
(3) 7000 mL (4) 5600 mL

199. Select the **correct** match w.r.t. humans.

- (1) After one month of pregnancy – The first movements of the foetus is observed
(2) By the end of the 3rd month of pregnancy – The body of the foetus is covered with fine hair

(3) By the end of the second month of pregnancy – Foetus develops limbs and digits

(4) During the fifth month of pregnancy – Eyelids separate and eyelashes are formed

200. Ionic gradients across the resting membrane are maintained by the active transport of ions by the sodium-potassium pump which transports

- (1) Two Na⁺ outwards for two K⁺ into the cell
(2) Three Na⁺ outwards for two K⁺ into the cell
(3) Three K⁺ outwards for two Na⁺ into the cell
(4) Two K⁺ outwards for three Na⁺ into the cell

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