PHYSICS

SECTION – A

1. If power (P), surface tension (S) and Planck's constant (h) are arranged so that the dimensions of time in their dimensional formula are in ascending order, then which of the following is correct?
(a) P, S, h (b) P, h, S
(c) S,P, h (d) S, h, P

2. In a circular L, C and R are connected in series with an alternating voltage source of frequency f. The current leads the voltage by 45°. The value of C is
(a) $\frac{1}{2\pi f\,(2\pi f\,L-R)}$ (b) $\frac{1}{2\pi f\,(2\pi f\,L+R)}$
(c) $\frac{1}{\pi f\,(2\pi f\,L-R)}$ (d) $\frac{1}{\pi f\,(2\pi f\,L+R)}$

3. When a string fixed at its both ends vibrate in 1 loop, 2 loops, 3 loops and 4 loops, the frequencies are in the ratio
(a) 1 : 1 : 1 : 1 (b) 1: 2 : 3 : 4
(c) 4 : 3 : 2 : 1 (d) 1 : 4 : 9 : 16

4. Two pendulum differ in lengths by 22 cm. They oscillate at the same place so that one of them makes 30 oscillations and the other makes 36 oscillations during the same time. The length (in Cm)
(a) 72 and 50 (b) 60 and 38
(c) 50 and 28 (d) 80 and 58

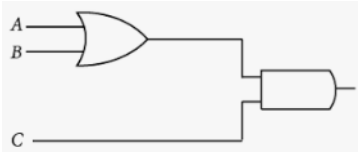
5. In which of the following system will the radius of the first orbit (n = 1) be minimum?
(a) Doubly ionized lithium
(b) Singly ionized helium
(c) Deuterium atom
(d) Hydrogen atom

6. Accelertion due to gravity on moon is $\left(\frac{1}{6}\right)^{th}$ of that on earth. When a balloon filled with hydrogen is released on moon, then it
(a) will rise with an acceleration less than $\frac{g}{6}$
(b) Will rise with acceleration $\frac{g}{6}$
(c) Will fall down with an acceleration less than $\frac{5g}{6}$
(d) Will fall down with acceleration $\frac{g}{6}$

7. A gramophone disc of brass of diameter 30 cm rotates horizontally at the rate of 100/3 revolutions per minute. If the vertical component of the earth's magnetic field be 0.01 weber/$meter^2$, then the emf induced between the centre and the rim of the disc will be
(a) $7.065 \times 10^{-4}V$ (b) $3.9 \times 10^{-4}V$
(c) $2.32 \times 10^{-4}V$ (d) None of the above

8. If the terminal speed of a sphere of gold (density = 19.5 kg/m^3) is 0.2 m/s in a viscous liquid, then find the terminal speed of sphere of silver (density = 10.5 kg/m^3) of the same size in the same liquid (density = 1.5 kg/m^3)
(a) 0.2 m/s (b) 0.4 m/s
(c) 0.133 m/s (d) 0.1 m/s

9. To get an output 1 from the circuit shown in the figure, the input can be



(a) A = 0, B = 1, C = 0 (b) A = 1, B = 0, C = 0
(c) A = 1, B = 0, C = 1 (d) A = 1, B = 1, C = 0

10. The position of a particle moving along the $x-axis$ at certain time is given below:

t(s)	0	1	2	3
$x(m)$	-2	0	6	16

Which of the following describes the motion correctly?
(a) Uniform, accelerated
(b) Uniform, decelerated
(c) Non – uniform, accelerated
(d) There is not enough data for generation

11. The electric field of a plane electromagnetic wave in vacuum is represented by
$E_x = 0, E_y = 0.5\cos[2\pi \times 10^8(t - x/c)$
and $E_z = 0$. Determine the wavelength of the wave.
(a) 4m (b) 5m
(c) 3m (d) 6m

12. A body initially at 80° C cools to 64°C in 5 minutes and to 52°C in 10 minutes. The temperature of the body after 15 minutes will be
(a) 42.7°C (b) 35°C
(c) 47°C (d) 40°C

13. A polarizer and an analyser are oriented so that maximum light is transmitted. What will be the intensity of out coming light when analyser is rotated through 60°?
(a) $\frac{I_0}{2}$ (b) $\frac{I_0}{4}$
(c) $\frac{I_0}{8}$ (d) I_0

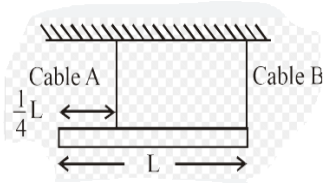
14. A comet orbits the sun in a highly elliptical orbit. Which of the following quantities remains constant throughout its orbit?
(i) Linear speed (ii) Angular speed
(iii) Angular momentum (iv) Kinetic energy
(v) Potential energy (vi) Total energy
(a) (i), (ii), (iii) (b) (iii), (iv), (v)
(c) (iii) and (iv) (d) (ii), (iii) and (vi)

15. The radii of the two columns in U – tube are r_1 and r_2. When a liquid of density ρ (angle of contact is 0°) is filled in it the level difference of liquid in two arms is h. The surface tension of liquid is (g= acceleration due to gravity)
(a) $\frac{\rho g h r_1 r_2}{2(r_2 - r_1)}$ (b) $\frac{\rho g h (r_1 - r_2)}{2 r_1 r_2}$
(c) $\frac{2(r_2 - r_1)}{\rho g h r_1 r_2}$ (d) $\frac{\rho g h}{2(r_2 - r_1)}$

16. The temperature of a radiating body increases by 30%. Then the increase in the amount of radiation is
(a) 185% (b) 285%
(c) 325% (d) 130%

17. In a potentiometer of 10 wires, the balance point is obtained on the 7th wire. To shift the balance point to 9th wire, we should
(a) decrease resistance in the main circuit
(b) increase resistance in the main circuit
(c) decrease resistance in series with the cell whose emf is to be measured
(d) increase resistance in series with the cell whose emf is to be determined

18. A uniform bar of mass M and length L is horizontally suspended from the celling by two vertical light cables as shown. Cable A is connected 1/4th distance from the left end of the bar, cable B is attached at the far right end of the bar. What is the tension in cable A?



(a) Mg/4 (b) Mg/3
(c) 2Mg/3 (d) 3Mg/4

19. **Assertion:** The wave nature of electrons was first experimentally verified by Davission and Germer Experiment
Reason: From the electron diffraction measurements, the wavelength of matter waves was found to be 0.165 nm.
(a) Both **assertion** and **reason** are true and **reason** is the correct explanation of assertion
(b) Both **assertion** and **reason** are true but reason is not the correct explanation of assertion
(c) **Assertion** is true but **reason** is false
(d) Both **assertion** and **reason** are false

20. Consider the three waves $z_1, z_2 and\ z_3$ as $z_1 = A\sin(kx - \omega t), z_2 = A\sin(kx + \omega t) z_3 = A\sin(ky - \omega t)$
Which of the following represents a standing wave?
(a) $z_1 + z_2$ (b) $z_2 + z_3$
(c) $z_3 + z_1$ (d) $z_1 + z_2 + z_3$

21. The sum of the magnitudes of two forces acting at a point is 18 N and the magnitude of their resultant is 12N. If the resultant makes an angle of 90° with the force of smaller magnitude, what are the magnitude of the two forces?
(a) 5N, 13N (b) 2N, 5N
(c) 6N, 12N (d) 2N, 12N

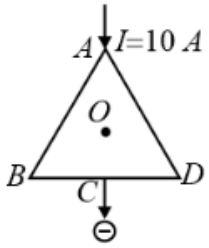
22. Two particles A and B are moving with uniform velocity 10 m s^{-1} and 20 m s^{-1} as shown, find the shortest distance between two particles.
(a) 5m (b) 4m
(c) $4\sqrt{5}m$ (d) $2\sqrt{5}$m

23. In the reaction, ${}_1^2H + {}_1^3H \rightarrow {}_2^4He + {}_0^1n$, if the binding energie of ${}_1^2H, {}_1^3H\ and\ {}_2^4He$ are respectively, $a, b\ and\ c$ (in MeV), then the energy (in Mev) released in this reaction is
(a) $a + b + c$ (b) $a + b - c$
(c) $c - a - b$ (d) $c + a - b$

24. In a hypothetical Bohr hydrogen atom the mass of the electron is doubled. The energy E_0' and radius r_0' of the first orbit will be (r_0 is the Bohr radius)
(a) – 11.2 eV (b) – 6.8 eV
(c) – 13.6 eV (d) – 27.2 eV

25. Two capacitors, $3\mu F$ and 4 μF, are individually charded across a 6V battery. After being disconnected from the battery, they are connected together witht the negative plate of one attached to the positive plate of the other. What is the final total energy stored?
(a) $1.26 \times 10^{-4} J$ (b) $2.57 \times 10^{-4} J$
(c) $1.26 \times 10^{-6} J$ (d) $2.57 \times 10^{-6} J$

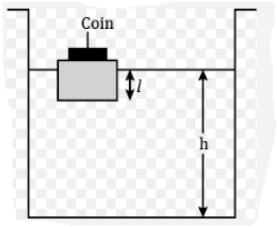
26. Magnetic field at centre O of an equlateral triangle of side 2 cm is (Resistance of part ABC is $2\Omega, and\ resistance\ of\ part\ ADCis\ 4\ \Omega$)



(a) $1.4 \times 10^{-4} T$ (b) $3 \times 10^{-4} T$
(c) $0.5 \times 10^{-4} T$ (d) None of thes e

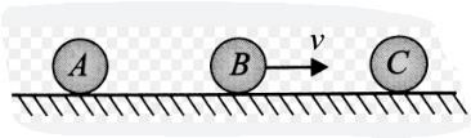
27. When a volage V_s = 200 $\sqrt{2}\sin(\omega t + 15°)$ is applied to an AC circuit the current in the circuit is found to be $i = 2\sin(\omega t + \pi\backslash 4)$. Then the average power consumed in the circuit is
(a) 200 W (b) 400 $\sqrt{2}$ W
(c) 100 $\sqrt{6}$ W (d) 200 $\sqrt{2}$ W

28. A wooden block with a coin placed on its top, floats in water as shown in the figure. The distance l and h are shown here. After some time the coin falls into the water. Then



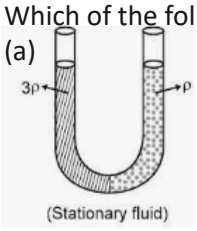
(a) l decreases and h increase
(b) l increases and h decrease
(c) Both l and h will increase
(d) Both l and h will decrease

29. Three balls A, B and C ($m_A = m_C = 4m_B$) are placed on a smooth horizonatal surface. Ball B collides with ball C with an initial velocity v as shown in the figure. Total number of collisions between the balls will be (All collisions are elastic)

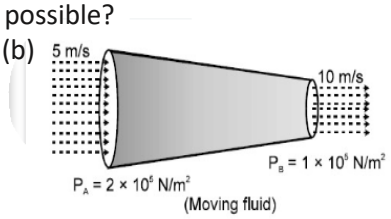


(a) one (b) two
(c) three (d) four

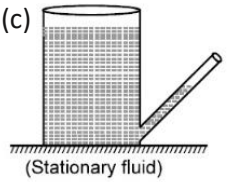
30. Which of the following is possible?
(a)



(b)



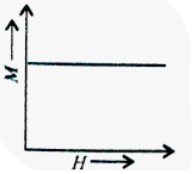
(c)



(d) None of these

31. The correct $M - H$ curve for a paramagnetic material at a constant temperature (T) is represented by
(a)

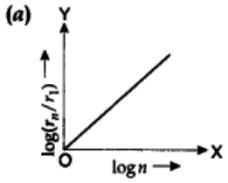
(b)



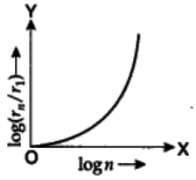
(c)

(d)

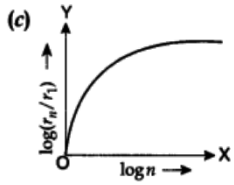
32. In a hydrogen atom, the radius of n^{th} Bohr orbit is r_n. The graph between log (r_n/r_1) and log n will be
(a)



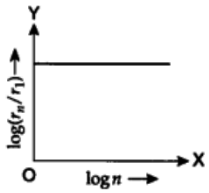
(b)



(c)



(d)



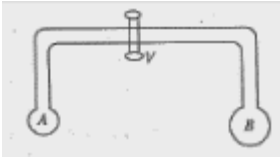
33. Two slites are 1 mm apart from each other andilluminated with a light of wavelength $5 \times 10^{-7} m$. If the distance of the screen is 1 m from the slits, then the distance between third dark fringe and fifthe bright fringe is
(a) 1.2 mm (b) 0.75 mm
(c) 1.25 mm (d) 0.625 mm

34. A particle of mass $m = 5$units is moving with a uniform speed $v = 3\sqrt{2}$m in te XOY plane along the line $y = x + 4$. The magnitude of the angular momentum about origin is
(a) zero (b) 60 unit
(c) 7.5 unit (d) $40\sqrt{2}$unit

35. An electron is moving round the nucleus of a hydrogen atom in a circular orbit of radius r. The coulomb force $\vec{F}$ between the two is (where $k = \frac{1}{4\pi\varepsilon_0}$ and $\hat{r}$ is radially outward)
(a) $-k\frac{e^2}{r^3}\hat{r}$ (b) $k\frac{e^2}{r^3}\hat{r}$
(c) $-k\frac{e^2}{r^3}\vec{r}$ (d) $k\frac{e^2}{r^3}\hat{r}$

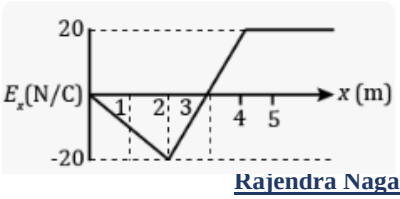
SECTION B

36. The valve V in the bend tube is initially kept closed. Two soap bubbles A (smaller) and B (larger) are formed at the two open ends of the tube. V is now opened and air can flow freely between the bubbles.



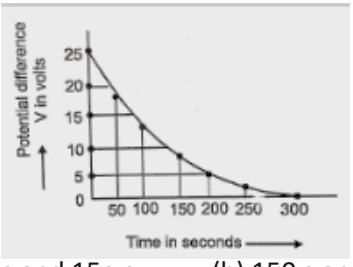
(a) There will be change in the size of the bubbles
(b) The bubbles will become of equal size
(c) A will become smaller and B will become larger.
(d) The size of A and B will be interchanged

37. A graph of the x component of the electric field as a function of x in a region of space as shown. The y and z components of the electric field are zero in this region. If the electric potential is 10 V at the origin, then potential at $x = 2.0$ m is



(a) 10 V (b) 40 V
(c) – 10 V (d) 30 V

38. The figure shows an experimental plot for discharging of a capacitor in an RC circuit. The time constant τ of this circuit lies between



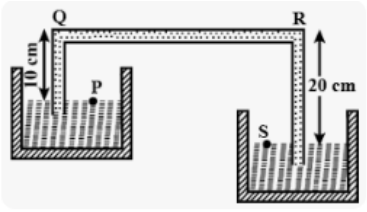
(a) 100 s and 15o s (b) 150 s and 200s
(c) 0 and 50 s (d) 50 s and 100 s

39. A heavy string is tied at one end to a movable support and to a light thread at the other end as shown in figure. The thread goes over a fixed pulley and supports a weight to produce a tension. The lowest frequency with which the heavy string resonates is 120Hz. If the movable support is pushed to the right by 10 cm so that the joint is placed on the pulley. The minimum frequency at which the heavy string can resonate is
(a) 150 Hz (b) 60 Hz
(c) 120 Hz (d) 240 Hz

40. A constant torque of 1000N m turns a wheel of moment of inertia 200 kg m^2 about an axis through its centre. Its angular velocity after 3s is (in rad /s)
(a) 1 (b) 5
(c) 15 (d) 10

41. If a galvanometer current is 10 mA, resistance of the galvanometer is 40 Ω and shunt of 2 Ω is connected to the galvanometer, the maximum current which can be measured by this ammeter is
(a) 0.21 A (b) 2.1 A
(c) 210 A (d) 21 A

42. A siphon is use in demostraed in the following figure. The density of the liquid flowing in siphon is 1.5 g/cc. The pressure difference between P and S will be



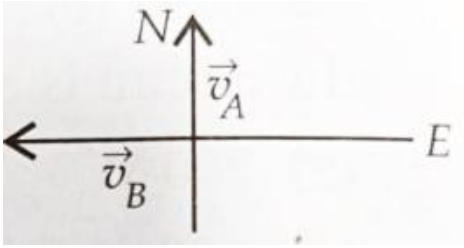
(a) $10^5 N/m$ (b) $2 \times 10^5 Nm$
(c) zero (d) infinity

43. Two similar plano – convex lenses are combined together in three different ways as shown in the below figure. The ratio of the focal lengths in three cases will be

(a) 2:2:1 (b) 1:1:1
(c) 1:2:2 (d) 2:1:1

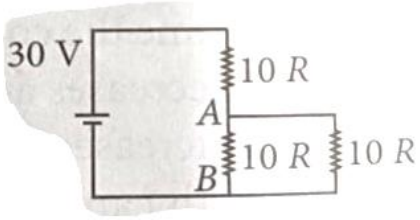
44. If the average kinetic energy of matter waves is kT, then the wavelength of de – Broglie waves associated with neutrons at rom temperature T is
(a) $\frac{1.82}{T}$ (b) $\frac{1.82}{\sqrt{T}}$ Å
(c) $\frac{30.7}{\sqrt{T}}$ Å (d) $\frac{30.7}{T}$ Å

45. A ship A streams due north at 16 km h^{-1} and a ship B due west at 12 km h^{-1}. At a certain moment position of B is $10\,\hat{\imath}$ and of A is $0\,\hat{\imath}$. The distance are measured in kilometer. Find the velocity of A relative to B



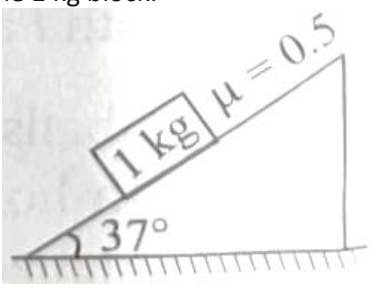
(a) 20 km/h (b) 10 km/h
(c) 15 km/h (d) 50 km/h

46. Find V_{AB} for the circular given here.



(a) 10 V (b) 20 V
(c) 30 V (d) None ofthese

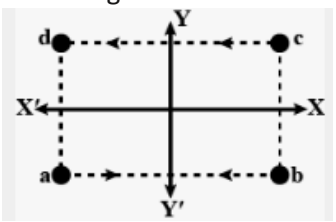
47. A block of mass 1 kg is kept at rest on a rough inclined surface as shown. Find the net contact force on the 1 kg block.



(a) $\sqrt{80}N$ (b) $\sqrt{20}N$
(c) $\sqrt{10}N$ (d) $\sqrt{5}N$

48. A transformer has 100 turns in the primary coil and carries 8 A current. If input power is one kilowatt, the number of turns in secondary coil to have 500 V output will be
(a) 100 (b) 200
(c) 400 (d) 300

49. Four bodies of equal mass start moving with same speed as shown in the figure. In which of the following combination the centre of mass will remains at origin?



(a) c and d (d) a and b
(c) a and c (d) b and

50. A ball is thrown horizontally from a height of 20m. It hits the ground with a velocity three times its initial velocity. The initial velocity of ball is
(a) 2 m/s (b) 3 m/s
(c) 5 m/s (d) 7 m/s

CHEMISTRY
SECTION A

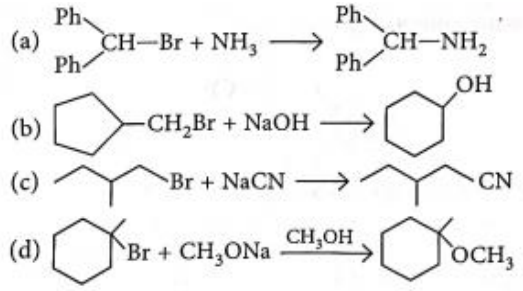
51. The cubic unit of a metal (molar mass = 63.55 g mol^{-1}) has an edge length of 362 pm. Its density is 8.92 g cm^{-3}. The type of unit cell is
(a) Pimitive (b) face centered
(c) body centered (d) end centered

52. n −Butane $\xrightarrow[HCl]{AlCl_3}[X]\xrightarrow{KMnO_4}[Y]$, $[Y]$ is
(a) primary alcohol
(b) secondary alcohol
(c) tertiary alcohol
(d) dialcohol

53. Which of the following condition favors the reduction of a metal oxide to metal?
(a) $\Delta H = +ve, T\Delta S = +ve$ at low temperature
(b) $\Delta H = +ve, T\Delta S = -ve$ at any temperature
(c) $\Delta H = -ve, T\Delta S = -ve$ at high temperature
(d) $\Delta H = -ve, T\Delta S = +ve$ at any temperature

54. How many moles of magnesium phosphate, $Mg_3(PO_4)$ will contain 0.25 mole of oxygen atoms?
(a) 1.25×10^{-2} (b) 2.5×10^{-2}
(b) 0.2 (d) 3.125×10^{-2}

55. Which of the following reaction will go faster when concentration of attacking nucleophile is increased?



56. Amino acid $\xrightarrow[\Delta]{NaOH/CaO}$ gs evolved $\xrightarrow[lime\ water]{Pass\ in}$ 0.1999 kg salt (1 mole)
Amino acid has
(a) two $-NH_2$ groups
(b) one $-$ $COOH$ group
(c) two – COOH groups
(d) three $-$ COOH groups

57. Which of the following complex inons is expected to absorb visible light?
(a) $[Ti(en)_2(NH_3)_2]^{4+}$
(b) $[Cr\ (NH_3)_6]^{3+}$
(c) $[Zn(NH_3)_6]^{2+}$
(d) $[Sc(H_2O)_3(NH_3)_3]^{3+}$

58. If an electron undergoes transition from n=2 to $n = 1$ in Li^{2+}ion, the energy of photon radiated will be best given by
(a) hv (b) $hv_1 + hv_2$
(c) $hv_1 + hv_2 + hv_3$ (d) all of these

59. What is the secondary valance of following compounds $ptCl_2 \cdot 2NH_3, CoCl_3 \cdot 4NH_3$ and $NiCl_2 \cdot 6H_2O$ of moles of AgCl precipitated per mole of the given compounds with excess $AgNO_3$ respectively are 0, 1 and 2
(a) 6, 4, 4 (b) 4, 6, 6
(c) 4, 4, 6 (d) 2, 4, 6

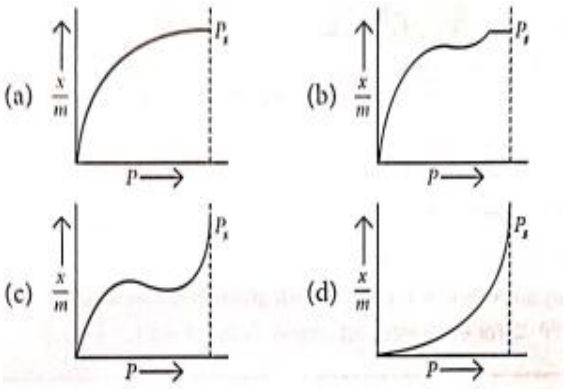
60. The metals A and B from oxide but B also forms nitride when both burn in air. The A and B are
(a) Cs, K (b) Mg, Ca
(c) Li, Na (d) K, Mg

61. The carbonyl compound producing an optically active product by reaction with $LiAlH_4$ is
(a) propanone (b) butanone
(c) 3 – pentanone (d) benzophenone

62. $[X]\xrightarrow[(ii)\ NH_3 + C_2H_5OH]{(i)\ SOCl_2}[Y]\xrightarrow{OBr^-}[Z]\xrightarrow[(ii)\ H_2O]{(i)\ NaNO_2 + HCl}$ Ortho cresol [X] willbe
(a) o- toluic acid
(b) o – chloro toluene
(c) o- bromo benzoic acid
(d) o −nitro benzoic acid

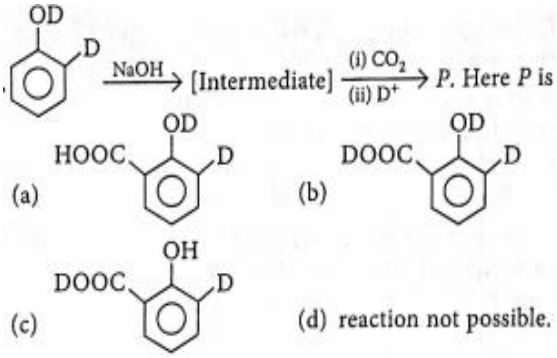
63. 8 mole of a gas AB_3 are introduced into a 1.0 dm^3 vessel. It dissociates as $2AB_{3(g)} \rightleftharpoons A_2(g) + 3B_{2(g)}$
At equilibrium, 2 mole of A_2 is found to be present. The equilibrium constant for the reaction is
(a) $2mol^2\ L^{-2}$ (b) $3mol^2\ L^{-2}$
(c) $27\ mol^2L^{-2}$ (d) 36 mol^2L^{-2}

64. Which of the following adsorption isotherms represents the adsorption of a gas by a solid involivig multilayers of formation? (P_5 = saturation pressure)



65. When condensation product of hexamethylenediamine and adipic acid is heated to 525 K in an atmosphere of nitrogen for about 4 – 5 hours, the product obtained is
(a) solid polymer of nylon 6, 6
(b) liquid polymer of nylon 6, 6
(c) gaseous polymer of nylon 6, 6
(d) liquid polymer of nylon – 6

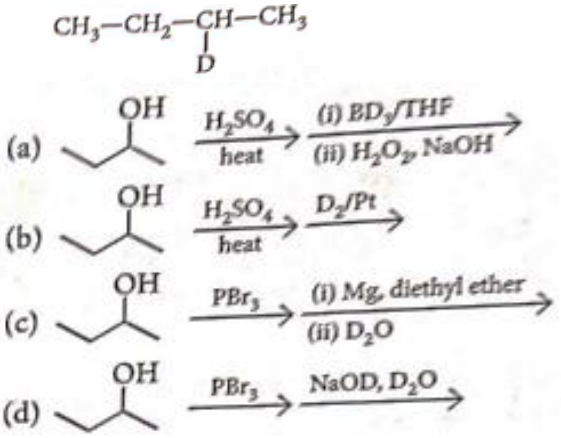
66. Organisilicon compound can be prepared by which of the following methods?
(i) $Mg_2Si + H_2SO_4 \rightarrow$
(ii) $SiCl_4 + Li(AlH_4) \rightarrow$
(iii) $CH_3\ SiCl_3MgCl \rightarrow$
(iv) $Si + CH_3Cl \xrightarrow[280-300°C]{Cu\ catalyst}$
(a) (i) and (iii) (b) (i), (iii) and (iv)
(c) (iii) and (iv) (d) Only (iv)

67. 

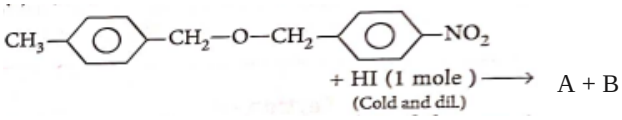
68. Consider the reaction, 2A + B → products. When concentration of B alone was doubled, the half-life did not change. When the concentration of A alone was doubled, the rate increased by two times. The unit of rate constant for this reaction is
(a) s^{-1} (b) L $mol^{-1}\ s^{-1}$
(c) no unit (d) mol $L^{-1}\ s^{-1}$

69. In $HS^-, I^-, RNH_2\ and\ NH_3$, order or proton accepting tendecy will be
(a) $I^- > NH_2 > RNH_2 > HS^-$
(b) $HS^- > RNH_2 > NH_3 > I^-$
(c) $RNH_2 > NH_3 > HS^- > I^-$
(d) $NH_3 > RNH_2 > HS^- > I^-$

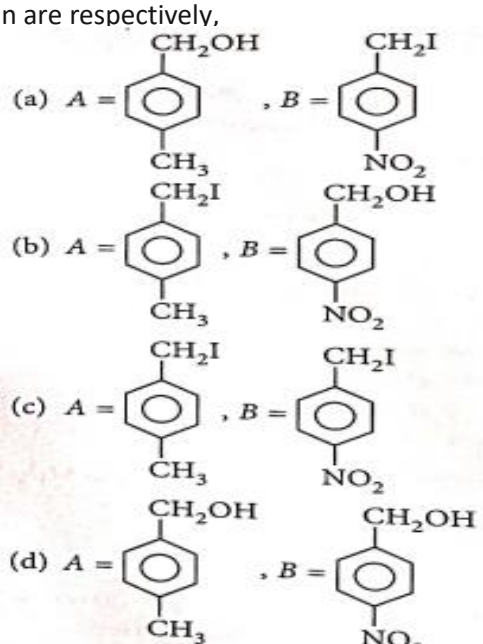
70. Which of the following reactions would convet 2 – butanol into deuterated compound



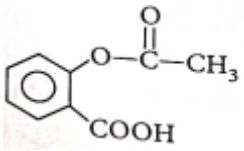
71. The set of three elements having successive atomic number and having the ionization energies of 2372, 520 and 890 kJ per mol is
(a) H, He, Li (b) He, Li, Be
(c) Li, Be, B (d) B, C, N

72. 

The most probable products A and B of this reaction are respectively,



73. The following compound is used as

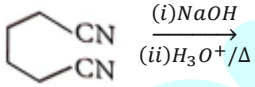


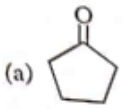
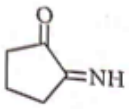
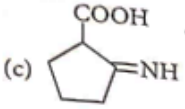
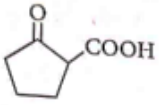
(a) an anti-inflammatory compound
(b) analgesic
(c) hypnotic
(d) antiseptic

74. Cyanide after acid catalysed hydrolysis gives RCOOH

$$R - CN \xrightarrow{H_3O^+} RCOOH$$

What would be the expected product of the following reaction?



(a) 
(b) 
(c) 
(d) 

75. Which gas shows real behaviour?
(a) 16 g O_2 at 1 atm and 273 K occupies 11.2 L
(b) 1 g H_2 in 0.5 L flask exerts pressure of 24.63 atm at 300K
(c) 1 mole NH_3 at 300 K and 1 atm occupies volume 22.4 L
(d) 5.6 L of CO_2 at 1 atm and 273 K is equal to 11 g

76. In conversion of lime – stone to lime, $CaCO_{3(s)} \rightarrow CaO_{(s)} + CO_{2(g)}$ the value of $\Delta H°$ and $\Delta S°$ are + 179. Kj mol^{-1} and 160.2 J/k respectively at 298 K and 1 bar. Assuming that $\Delta H°$ and $\Delta S°$ do not change with the temperature, temperature above which conversion of lime stone to lime will be spontaneous is
(a) 1119 K (b) 1008 K
(c) 1200 K (d) 845 K

77. What is Z in following reaction?
$CuSO_4 + Z \rightarrow Cu_3P_2 + H_2SO_4$
$HgCl_2 + Z \rightarrow Hg_3P_2 + HCl$
(a) White phosphorus
(b) Red phosphorus
(c) Phosphine
(d) Orthophosphoric acid

78. 0.010 M solution of an acid HA freezes at – 0.0205°C. if K_f for water is 1.860 K kg mol^{-1}, the ionization constant of the conjugate base of the acid will be (assume 0.010 M = 0.010m)
(a) 1.1×10^{-4} (b) 1.1×10^{-3}
(c) 9.0×10^{-11} (d) 9.0×10^{-12}

79. Match Column I with Column II and select the correct option

Column I		Column II	
(A)	Oxides of sulphur	(p)	Global warming
(B)	Nitrogen dioxide	(q)	Damage to kidney
(C)	Carbon dioxide	(r)	Blue baby's syndrome
(D)	Nitrate in drinking water	(s)	Respiratory diseases
(E)	Lead	(t)	Red haze in traffic and congested areas

(a) A – t, B – p, C – r, D – s, E - q
(b) A – s, B – t, C – p, D – r, E – q
(c) A – s, B – q, C – p, D – t, E – r
(d) A – q, B – s, C – t, D – r, E – p

80. Normality of 1 volume H_2O_2 is
(a) 1.785 (b) 0.1785
(c) 17.85 (d) 0.01785

81. $C_6H_5CH = CHCHO \xrightarrow{X} C_6H_5 = CHCH_2OH$
In the above sequence X can be
(a) H_2/Ni (b) $NaBH_4$
(c) $K_2Cr_2O_7/H^+$ (d) Both (a) and (b)

82. In forming (i) $N_2 \rightarrow N_2^+$ and (ii) $O_2 \rightarrow O_2^+$; the electrons respectively are remove from
(a) $(\pi^*2P_y \text{ or } \pi^*2P_x) and (\pi^*2P_y \text{ or } \pi^*2P_x)$
(b) $(\pi 2P_y \text{ or } \pi 2P_x) and (\pi 2P_y \text{ or } \pi 2P_x)$
(c) $(\pi 2P_y \text{ or } \pi 2P_x) and (\pi^*2P_y \text{ or } \pi^*2P_x)$
(d) none of the above

83. Kjeldahl method is not applicable to which of the following?
(a) Nitro compounds (b) Azo compounds
(c) Pyridine (d) All of these

84. The rate constant, the activation energy and the arrhenius parameter of a chemical reaction at 25° C are $3.0 \times 10^{-4}\ s^{-1}$, 104.4 kJ mol^{-1} *and* $6.0 \times 10^{14} s^{-1}$ respectively. The value of the rate constant at $T \to \infty$ is
(a) $2.0 \times 10^{18}\ s^{-1}$ (b) $6.0 \times 10^{14}\ s^{-1}$
(c) infinity (d) $3.6 \times 10^{30} s^{-1}$

85. MF + $XeF_4 \to' A'(M^+ = Alkali\ metal\ cation)$
'The state of hybridisation of the central atom in 'A' and shape of the species are
(a) sp^3d, TBP
(b) sp^3d^3, distorted octahedral
(c) sp^3d^3, pentagonal planar
(d) no compound formed at all

SECTION B

86. To an acidic solution of an anion, a few drops of $KMnO_4$ solution are added. Which of the following, if present, will not decolourise the $KMnO_4$ solution?
(a) CO_3^{2-} (b) NO_2^-
(c) S^{2-} (d) Cl^-

87. A compound $C_5H_{10}O$ forms orange – red precipitate upon reaction with 2,4 – DNP, but does not give positive Tollen's test and iodoform test, Possible compound is
(a) 2, 2 – dimethylpropanal
(b) 3 – methylbutan – 2 – one
(c) pentan – 3 – one
(d) none of the above

88. Solution of oxalate is colourless. It is made acidic by adding excess of H^+, then titrated with $KMnO_4$. Now at a moment if some has added large amount of $KMnO_4$, in it then no. of possible products are
(a) CO_2, Mn^{2+}, H_2O
(b) CO_2, MnO_2H_2O
(c) MnO_2, H_2O, CO_2
(d) $CO_2, MnO_2, H_2O, Mn^{2+}$

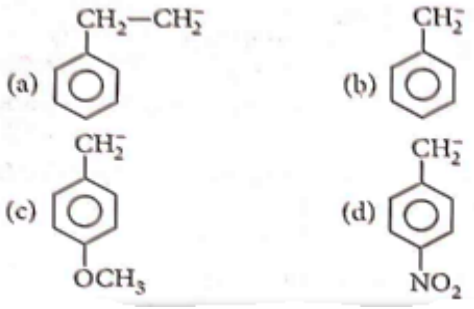
89. What will happen when $D-(+)-$ glucose is treated with methanolic - HCl followed by Tollen's reagent?
(a) A black ppt, will be formed
(b) A red ppt, will be formed
(c) A green colour will appear
(d) No characteristic colour or ppt. will be formed

90. If u_{rms} of a gas is $30\ R^{1/2}$ m s^{-1} at 27°C then, molar mass of gas is
(a) 0.02 kg/mol (b) 0.001 kg/mol
(c) 0.003 kg/mol (d) 1kg/mol

91. Among O, O^+, O^{2+} *and* O^{2-}, the species having most positive and most negative value of ΔH_{eg} are respectively
(a) O^+ *and* O (b) O^{2+} *and* O^{2-}
(c) O *and* O^{2-} (d) O^{2-} *and* O^{2+}

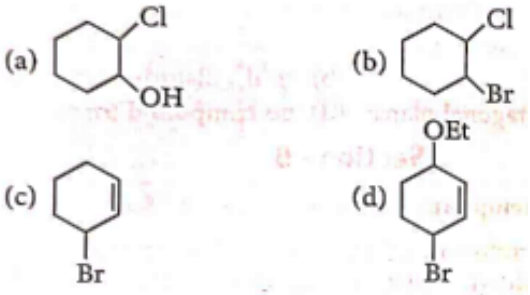
92. A metallic element exists as cubic lattice. Each edge of the unit cell is 2.88 Å. The density of the metal is 7.20 g cm^{-3}. How many unit cell will be present in 100g of the metal?
(a) 6.85×10^2 (b) 5.82×10^{23}
(c) 4.37×10^5 (d) 2.12×10^6

93. The most stable carbanion among the following is

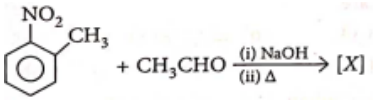


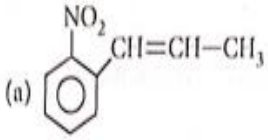
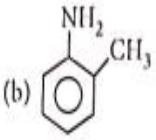
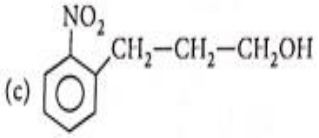
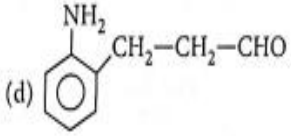
94. Hydrocarbo $+ Cl_2 \xrightarrow[(1\ mole)]{h\nu} [W] \xrightarrow[EtOH]{KOH} [X] \xrightarrow[h\nu]{NBS} [Y]$

What would be the most probable sructure of (Y) if hydrocarbon contains six carbon atom and can not react with Cl_2 in dark?

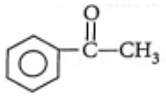


95. Consider the following four electrodes:
$P = Cu^{2+}\ (0.0001\ M)/Cu(s)$
$Q = Cu^{2+}\ (0.1M)/Cu(s)$
$R = Cu^{2+}(0.01\ M)/Cu(s)$
$S = Cu^{2+}\ (0.001\ M)/Cu(s)$
If the standard reduction potential of Cu^{2+}/Cu is +0.34 V, the reduction potential in volts of the above electrods follow the order.
(a) P > S > R > Q (b) S > R > Q > P
(c) R > S > Q > P (d) Q > R > S > P

96. 

In this reaction, $[X]$ will be
(a) 
(b) 
(c) 
(d) 

97. The products formed when diborane is hydrolysed is/are
(a) B_2O_3 and H_3BO_3
(b) B_2O_3 only
(c) H_3BO_3 and H_2
(d) H_3BO_3 only

98. $CH_3 - CH_2 - CH_2 - Cl + C_6H_6 \xrightarrow{AlCl_3} Major \xrightarrow[H_3O^+]{air} [X]$
[X] cannot be
(a) phenol (b) CH_3COCH_3
(c)  (d) all of these

99. Electrolysis of dilute aqueous NaCl solution was carried out by passing 10 milli ampere current. The time required to liberate 0.01 mol of H_2 gas at the cathode is
(1 Faraday = 96500 C mol^{-1})
(a) 9.65× 10^4 sec (b) 19.3 × 10^4sec
(c) 28.95 × 10^4 sec (d) 38.6 × 10^4 sec

100. The 0.001 M solution of Mg $(NO_3)_2$ is adjusted to pH 9, K_{sp} of $Mg(OH)_2$ is 8.9×10^{-12}. At this pH
(a) Mg $(OH)_2$ will be precipitated
(b) Mg $(OH)_2$ is not precipitated
(c) Mg $(OH)_3$ will be precipitated
(d) Mg $(OH)_3$ is not precipitated

BOTANY
SECTION - A

101. Match column – I (Biological name) with column – II (Class) and choose the correct option

Column – I (Biological name)	**Column – II (Class)**
A. Homo sapiens	(i)Dicotyledonate
B. Musca domestica	(ii) Mammalia
C. Mangifera indica	(iii) Monocoty-Ledonae
D. Triticum aestivum	(iv) Insects

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

102. A human bone marrow cell, in prophase of mitosis, contains 46 chromosomes. How many chromatids does it contain altogether?
(a) 46 (b) 92
(c) 23 (d) 23 or 46

103. In Chlorophycease, sexual reproduction occurs by
(a) isogamy and anisogamy
(b) isogamy, anisogamy and oogamy
(c) oogamy only
(d) anisogamy and oogamy

104. Ulothrix filaments produce
(a) isogametes (b) anisogametes
(c) heterogametes (d) basidiospores

105. According to widely accepted "fluid mosaic model" cell membranes are semi – fluid, where lipids and integral proteins can diffuse randomly.

In recent years, this model has been modified in several respects. In this regard, which of the following statements is incorrect?
(a) Proteins in cell membranes can travel within the lipid bilayer
(b) Proteins can also undergo flip – flop movements in the lipid bilayer
(c) Proteins can remain confined within certain domains of the membrane
(d) Many proteins remain completely embedded within the lipid bilayer

106. Which one of the following animals is correctly matched with its particular named taxonomic category?
(a) Tiger – tigris, the species
(b) Cuttle fish – Mollusca, a class
(c) Humans – primate, the family
(d) Housefly – Musca, an order

107. Which of the following statement is **incorrect** about emasculation?
(a) During emasculation process, stigma is removed
(b) Emasulated fowers are bagged in order to prevent self – pollination
(c) Emasculation is the removal of statements before the maturation of selected bisexual flowers.
(d) It is one of the steps for artificial hybridization.

108. Which one of the following statements is correct for secondary succession?
(a) It begins on a bare rock
(b) It occurs on a deforested site
(c) it follows primary succession
(d) It is similar to primary succession except that it has a relatively fast pace

109. Which of the following class of fungi is being described by the given statements?
(i) They are found in aquatic habitats and on decaying wood in moist and damp places.
(ii) Mycelium is aseptate and coenocytic
(iii) Asexual reproduction takes place by zoospores (motile) or by aplanospores (non – motile)
(iv) some common examples are Mucor, Rhizopus and Albugo
(a) Ascomycetes (b) Phycomycetes
(c) Basidiomycetes (d) Deuteromycetes

110. The Parenchyma tissue which forms the bulk of ovule where the sporogenous tissue is produced is –
(a) Megaspore mother cell (b) Nucellus
(c) Ovule (d) Embryo sac

111. Movement of ions or molecules in a direction opposite to that of prevailing electrochemical gradient is known as
(a) diffusion (b) active transport
(c) pinocytosis (d) Brownian movment

112. Which one is the correct summary equation of photosynthesis?
(a) $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + energy$
(b) $C_6H_{12}O_6 + 6O_2 + 6H_2O \rightarrow 6CO_2 + 12\ H_2O$ + energy
(c) $6CO_2 + 6H_2O \rightarrow 6H_2O + C_6H_{12}O_6$
(d) $6CO_2 + 12H_2O \xrightarrow[Chlorophyll]{Light} 6O_2 + C_6H_{12}O_6$

113. Match the following:

Column I	Column II
A. lactose permease	(i) Z gene
B. Galactoside Transacetylase	(ii) Y gene
C. Repressor protein	(iii) A gene
D. β- Galactosidase	(iv) I gene

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

114. Which of the following statements concerning rubisco are true.
(a) Rubisco is an enzyme
(b) Rubisco catalyzes both the beginning steps of photorespiration and the Calvin – Benson cycle
(c) Rubisco is the most abundant protein on earth
(d) All of the above

115. Turgor pressure become equal to the wall pressure when
(a) Water leaves the cell
(b) water enters the cell
(c) no exchange of water takes place
(d) solute goes from cell into water

116. Which of the following statements is incorrect?
(a) C_3 plants respond to higher temperature, show higher photosynthetic rate while C_4 plants have lower optimum temperature
(b) Tropical plants have higher temperature optimum than the plants adapted to temperature climate
(c) Light reaction is less temperature sensitive than dark reaction

(d) The effect of water as a factor is most through its effect on plant, rathe than directly on photosynthesis.

117. DNA temperature sequence of CTGATAGC is transcribed over mRNA as
(a) GUCTUTCG (b) GACUAUCG
(c) GAUTATUG (d) UACTATCU

118. Which one of the following pesticides is banned now a – days?
(a) DDT (b) Eldrin
(c) Aldrin (d) Toxaphene

119. A functional piece of mRNA has 66 codons. What is the maximum number of amino acids that could be present in the protein coded for by this mRNA?
(a) 22 (b) 64
(c) 65 (d) 66

120. **Statement I:** Most –algal genera are haplonatic.
Statement II: The dominant phase in all Byophytes is gametophyte.
In the light of the above statements, choose the correct answer from the options given below.
(a) Both statement I and statement II are incorrect
(b) Statement I is correct but Statement II is incorrect
(c) Statement I is incorrect but Statement II is correct
(d) Both statement I and Statement II are correct

121. **Assertion:** Each cell of the embryo sac is haploid in angiosperms
Reason: In angiosperms, meiosis preceeds embryo sac formation.
In the light of the above statements, choose the correct anser from the options given below:
(a) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(b) (A) is correct but (R) is not correct
(c) (A) is not correct (R) is correct
(d) Both (A) and (R) are correct and (R) is the correct explanation of (A)

122. In Kreb's cycle, the FAD precipitates as elctron acceptor during the conversion of
(a) succinyl CoA to succinic acid
(b) α – ketoglutarate to succinic acid
(c) fumaric acid to malic acid
(d) succinic acid to fumaric acid

123. **Statement I:** Hormone is concerned chiefly with root initiation is IBA
Statement II: Phototropic and geotropic movements in plants have been traced to be linked with Auxins.
In the light of the above statements, choose the correct answer from the options given below
(a) Both Statement I and Statement II are incorrect
(b) Statement I is correct but Statement II is incorrect
(c) Statement I is incorrect but Statement II is correct
(d) Both Statement I and Statement II are correct

124. **Assertion:** The inner membrane of mitochondria contains system involving electron transport
Reason: The mitochondrial matrix contains enzymes of Kreb's cycle
In the light of the above statements, choose the correct anser from the options given below:
(a) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(b) (A) is correct but (R) is not correct
(c) (A) is not correct but (R) is correct
(d) Both (A) and (R) are correct and (R) is the correct explanation of (A)

125. Which of the following statements (i - iv) regarding "Splitting of water" is/are correct?
(i) It is photolysis of water which provides H^+ ions for synthesis of NADPH.
(ii) It provides electrons for photophosphorlation and activation of NADP^+
(iii) O_2 is evolved during this process
(iv) It replenishes O_2 consumed by living being and combustion
(v) it take place during light reaction photosynthesis
(a) (i) (b) (ii)
(c) (iii) (d) All

126. The product (s) of reaction catalyzed by nitrogenase in root nodules of leguminuous plants is/are
(a) Nitrate alone
(b) Ammonia and oxygen
(c) Ammonia and hydrogen
(d) Ammonia alone

127. Which of the following groups of plants play an important role in plant succession on bare rocks/soil?
(a) Algae (b) Bryophytes

(c) Pteridophytes (d) Gymmosperms

128. A person with the sex chromosomes XXY suffers from
(a) Down's syndrome
(b)Klinefelter's syndrome
(c) Turner's syndrome
(d) Gynandromorphism

129. Producitivity at the second trophic level is always
(a) greater than the productivity at the first trophic level
(b) less than the productivity at the first trophic level
(c) equal to the productivity at the first trophic level
(d) Extremely variable compared to the productivity at the first trophic level

130. Stomata of CAM plants
(a) never open
(b) are always open
(c) open during the day and close at night
(d) openduring the night and close during the day

131. During mitosis ER and nucleolus begin to disappear at
(a) late prophase (b) early metaphase
(c) late metaphase (d) early prophase

132. **Statement I:** Sutton and Boveri noted that the behavior of chromosomes was parallel to the behavior of genes.
Statement II: Sutton gave chromosomal theory of inheritance and he united the knowledge of chromosomal segregation with Mendalian principle of segregation
In the light of the above statements, choose the correct answer from the options given below:
(a) Both **Statement I** and **Statement II** are incorrect
(b) **Statement I** is correct but **Statement II** is incorrect
(c) **Statement I** is incorrect but **Statement II** is correct
(d) Both **Statement I** and **Statement II** are correct

133. Fermentation is anaerobic production of
(a) protein and acetic acid
(b) alcohol, lactic acid or similar compounds
(c) ethers and acetones
(d) alcohol and lipoproteins

134. Out of 38 ATP molecules produced per glucose, 32 ATP molecules are formed from NADH/$FADH_2$ in
(a) respiratory chain (b) krebs cycle
(c) oxidative decarboxylation (d) EMP

135. Cork is formed from
(a) cork cambium (phellogen)
(b)vascular cambium
(c) phloem
(d) xylem

SECTION - B

136. Match the following columns.

Column I	Column II
A. Terminalisation	(i) Metaphase - I
B. Histone synthesis	(ii) Anaphase – I
C. Disjunction	(iii) Diakinesis
D. Interkinesis	(iv) G_1 – phase

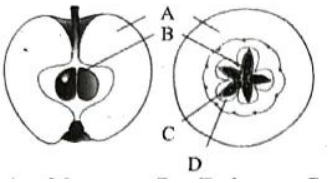
(a) A – (v), B – (ii), C – (i), D – (iii)
(b) A – (iii), B – (v), C – (ii), D – (iv)
(c) A – (ii), B – (v), C – (iv), D –(i)
(d) A – (iii), B – (v), C – (iv), D –(ii)

137. Match the name of the activities listed under column I with the description of activity given under column II

Column I	Column II
A. Transpiration	(i) Anaerobic respiration in yeast
B. Guttation	(ii) Active absorption of water
C. Exuation	(iii) Loss of water vapor from plants parts
D. Fermentation	(iv) Loss of liquid water from leaves
	(v) Loss of water from injured plant parts

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

138. Identify A, B, C and D



(a) A – Mesocarp; B – Endocarp; C –Seed; D - Thalamus
(b) A – Seed; B – Thalamus; C – Mesocarp; D – Endocarp
(c) A – Thalamus; B – Seed; C – Endocarp; D – Mesocarp
(d) A – Mesocarp; B – Endocarp; C – Seed; D – Thalamus

139. Biochemical Oxygen Demand (BOD) in a river water
(a) has no relationship with concentration of oxygen in the water.
(b) gives a measure of Salmonella in the water.
(c) increases when sewage gets mixed with river water
(d) remains unchanged when algal bloom occurs.

140. Which of the following mineral is associated with the characters/functions given below?
(i) Helps in formation of middle lamella
(ii) Needed in mitotic spindle formation
(iii) Accumulates in older leaves
(iv) Involves in normal functioning of the cell membranes.
(v) Activate certain enzymes
(a) K^+ (b) Fe^{3+}
(c) NO^{3-} (d) Ca^{2+}

141. Which of the following statements about Rhizobium legume nodule formation is not true?
(a) *Rhizobium* can only fix nitrogen after it becomes a bacteroid within a root cortex cell
(b) *Rhizobium* induces invagination of root hairs
(c) Within an infection thread, *Rhizobium* is still extracellular to the plant
(d) The infection thread can fuse with any root cell of an appropriate legume species

142. Match the following columns

Column I	Column II
A. Primary succession	(i) Colonisation of a new environment
B. Climax community	(ii)Ecosystem development
C. Pioneer community on	(iii)Crustose lichens lithosphere
D. Ecological succession	(iv)Community that has completed succession

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

143. Match the following and choose the correct option

Column I	Column II
A. Aleurone layer	(i) Without fertilization
B. Parthenocarpic fruit	(ii) Nutrition
C. Ovule	(iii) Double fertilization
D. Endosperm	(iv) Seed

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

144. Pick out the correct statement:
(i) Cytokinin especially help in delaying senescence
(ii) Auxin are involved in regulating apical dominance
(iii) Ethylene is especially useful in enhancing seed germination
(iv) Gibberellin are responsible for immature falling of leaves
(a) (i) and (iii) (b) (i) and (iv)
(c) (ii) and (iii) (d) (i) and (ii)

145. Microbes are used in
(i) primary treatement of sewage
(ii) secondary treatement of sewage
(iii) anaerobic sludge digester
(iv) production of bioactive molecule
(a) (i), (iii) and (iv) (b) (i), (ii), (iii) and (iv)
(c) (ii), (iii) and (iv) (d) (iii) and (iv)

146. Which of the following statements is correct?
(a) Some of the organisms can fix atmospheric nitrogen in specialized cells called sheath cells
(b) Fusion of two cells is called Karyogamy
(c) Fusion of protoplasms between two motile on non – motile gametes is called plasmogamy
(d) Organisms that depend on living plants are called saprophytes

147. **Assertion:** Cross of F1 individual with recessive homozygous parent is a test cross.
Reason: No recessive individual is obtained in the monohybrid test cross
In the light of the above statements, choose the correct answer from the options given below:
(a) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

(b) (A) is correct but (R) is not correct
(c) (A) is not correct but (R) is correct
(d) Both (A) and (R) are correct and (R) is the correct explanation of (A)

148. **Assertion:** In sigmoid growth curve, growth rate stabilizes itself.
Reason: Finally, the death rate increases than the birth rate.
(a) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(b) (A) is correct but (R) is not correct
(c) (A) is not correct but (R) is correct
(d) Both (A) and (R) are correct and (R) is the correct explanation of (A)

149. The products of ecosystem process are called as
(a) Standing state (b) Ecosystem services
(c) Nutrient cycling (d) All of them

150. Which one of the following does not represent biodiversity of a geographical region?
(i) Genetic diversity present is in the dominant species of the region
(ii) Species endemic to the region
(iii) endangered species found in the region
(iv) The diversity in the organisms living in the region
(a) (i) & (ii) (b) (iii) & (iv)
(c) (ii) only (d) (iv) only

SECTION – A(Zoology)

151. Opium is obtained from
(a) Papaver somniferum
(b) Rauwolfia serpentine
(c) Cannabis sativus
(d) Claviceps purpurea

152. Waves of muscle contractions that move the intestinal content are:
(a) caused by contraction of skeletal muscle.
(b) regulated by liver secretions
(c) called peristalsis
(d) voluntary

153. Which of the following cations is required for the conversion of prothrombin into active thrombin by thromboplastin?
(a) Cu^{2+} (b) Fe^{3+}
(c) Fe^{2+} (d) Ca^{2+}

154. Which one of the following statement regarding coelom of given animals is correct?
(a) Round worms (aschelminthes) are pseudocoelomates
(b) Molluscs are acoelomates
(c) Insects are pseudocoelomates
(d) Flatworms (Platyhelminthes) are coelomates

155. Lymph differs from blood in
(a) absence of RBC (b) absence of WBC
(c) excess of water (d) absence of protein

156. Hardening of the arteries due to deposition of cholesterol is called
(a) thrombosis (b) atherosclerosis
(c) rhinitis (d) angina

157. Which one of the following is NOT a characteristic of phylum Annelida?
(a) Closed circulatory system
(b) Segmentation
(c) Pseudocoelom
(d) Ventral nerve cord

158. **Statement I:** Vulva consists of the external genital organs of a women.
Statement II: The valve includes mons pubis, labia mayera labia minora, clitoris and hymen.
In the light of the above statements, choose the correct answer from the options given below:
(a) both **Statement I** and **Statement II** are incorrect
(b) **Statement I** is correct but **Statement II** is incorrect
(c) **Statement I** is incorrect but **Statement II** is correct
(d) Both **Statement I and Statement II** are correct

159. A person which shows the secondary sexual characters of both male and female is called –
(a) Intersex (b) Hermaphrodite
(c) Bisexual (d) Gynandromorph

160. Read the following statement having two columns (A and B) "A drug used for (A) patients is obtained from a species of the organism (B)." The one correct option for the two columns is

Column – A	**Column – B**
(a) Swine flu	Monacus
(b) AIDS	Pseudomonas
(c) Heart	Penicillium

(d) Organ – transplant Trichoderma

161. The transfer of zygote or early embryo (up to 8 blastomere) inot fallopian tube is
(a) IVF and ET (b) ZIFT
(c) GIFT (d) IUT

162. The embryonic membrane involved in the formation of placenta in human is
(a) yolk sac (b) allantois
(c) amnion (d) chorion

163. Identical twins are produced when
(a) One fertilized egg divides and two blastomers separate
(b) One sperm fertilizes two eggs
(c) One egg is fertilized with two sperms
(d) Two eggs are fertilized

164. Child death may occur in the marriage between
(a) Rh^+ man and Rh^+ woman
(b) Rh^+ man and Rh^- woman
(c) Rh^- man and Rh^- woman
(d) Rh^- man and Rh^+ woman

165. **Statement I:** Disease or infections which are transmitted through sexual intercourse are collectively called sexually transmitted disease.
Statement II: STD's if not properly treated may lead to pelvic inflammatory diseases, abortion, still birtyh, Ectopic pregnancies, infertility or even cancer of reproductive tract
In the light of the above statements, choose the correct answer from the options given below
(a) Both Statement I and Statement II are incorrect
(b) Statement I is correct but Statement II is incorrect
(c) Statement I is incorrect but Statement II is correct
(d) Both Statement I and Statement iI are correct

166. A person who is one along hunger strike and is surviving only on water, will have
(a) less amino acids in his urine
(b) more glucose in his blood
(c) less urea in his urine
(d) more sodium in his urine

167. Haemolglobin is having maximum affinity with:
(a) NH_3 (b) O_2
(c) CO_2 (d) CO

168. Which region of the kidney nephron is the main site of amino acid reabsorption?
(a) Glomerulus
(b) Bowman's capsule
(c) proximal convoluted tubule
(d) distal convoluted tubule

169. Which of the following statement is incorrect?
(i) Rheumatoid arthritis is an autoimmune disease
(ii) The use of drugs like antihistamine, adrenaline, and steroids quickly reduces the symptomos of bacterial infection
(iii) Several genes (called cellular oncogenes) have been identified in normal cells which when activated under certain conditons, could lead to oncogenic transformation of the cells
(iv) The vaccine also generates memory – B and T cells that recognize the pathogen quickly on subsequent exposure and overwhelm the invaders with a massive production of antibodies
(a) (i) (b) (ii)
(c) (i), (ii) and (iii) (d) All of these

170. In live stock breeding experiments the following stage is transferred to surrogate mothers
(a) Unfertilized eggs (b) Fertilized eggs
(c) 8 to 32 celled embryo (d) Frozen semen

171. The presence of gill slits, in the embryos of all vertebrates, supports the theory of
(a) biogenesis (b) recapitulation
(c) metamorphosis (d) organic evolution

172. The change of te light – coloured variety of peppered moth (Biston betularia) to its darker varicty (Bistom carbonaria) is due to
(a) mutation (b) regeneration
(c) Genetic isolation (d) temporal isolation

173. **Assertion:** In the condition of obstructive jaundice, large amouns of unabsorbed fats are eliminated out of the body
Reason: Entry of bile into the small intestine is prevented during obstructive jaundice.
In the light of the above statements, choose the correct answer from the options given below:
(a) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(b) (A) is correct but (R) is not correct
(c) (A) is not correct but (R) is correct
(d) Both (A) and (R) are correct and (R) is the correct explanation of (A)

174. Hormones generally cause a response in a cell by
(a) interacting directly with the cell's DNA

(b) binding with a receptor and stimulating protein production
(c) Changing the polarity of the cell membrane and causing a cascade of events within the cell.
(d) halting all other cellular activity except the required response

175. The largest quantity of air that canbe expired after a maximal inspiratory effort is called
(a) residual volume (b) tidal volume
(c) vital capacity (d) total lung volume

176. **Assertion:** Persons suffering from haemophilia fail to produce blood clotting factor VIII.
Reason: Prothrombin producing platelets in such persons are found in very low concentration.
In the light of the above statements, choose the correct answer from the options given below:
(a) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(b) (A) is correct but (R) is not correct
(c) (A) is not correct but (R) is correct
(d) Both (A) and (R) are crrect and (R) is the correct explanation of (A)

177. Which one of the following does NOT change in length when a muscle fibre contracts?
(a) I band (b) H zone
(c) A band (d) Sarcomere

178. Which of the following correctly described the role of myelin in the nervous system?
(a) Myelin insulates and speeds transmission along dendrites
(b) Myelin insulates and speeds transmission along axons
(c) Myelin slows down depolarization of an axon
(d) All of the above

179. In which one of the following pairs of diseases both are caused by viruses?
(a) Tetanus and typhoid
(b) Whooping cough and sleeping sickness
(c) Syphilis and AIDS
(d) Measles and Rabies

180. Electroporation procedure involves
(a) fast passage of food through sieve pores in phloem elements with the help of electric stimulation
(b) Opening of stomatal pores during night by artificial light
(c) making transient pores in the cell membrane to introduce gene constructs
(d) purification of saline water with the help of a membrane system

181. Match the following columns

Column I	Column II
A. Earthworm	(i) Moist cuticle
B. Aquatic arthropods	(ii) Gills
C. Fishes	(iii) Lungs
D. Birds/Reptiles	(iv) Trachea

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

182. Increased asthmatics attacks in certain seasons are related to
(a) eating fruits preserved in tin containers
(b) inhalation of seasonal pollen
(c) low temperature
(d) hot and humid environment

183. For transformation, micro-particles coated with DNA to tbe bombarded with gene gun are made up of:
(a) Silver or Platinum (b) Platinum or Zinc
(c) Silicon or Platinum (d) Gold or Tungsten

184. Match the items given in Column I with those in Column II and select the correct option given below:

Column I (Function)	**Column II (Part of Excretory System)**
A. Ultrafiltration	(i) Henle's loop
B. Concentration Of urine	(ii) Ureter
C. Transport of Urine	(iii) urinary bladder
D. Sotrage of urine	(iv) Malpighian Corpuscle
	(v) Proximal convoluted tubule

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

185. **Statement I:** Crop is the largest part of the foregut of cockroach

Statement II: Hepatic caecea of cockroach produce digestive enzyme

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

(a) Both **Statement I** and **Statement II** are incorrect

(b) **Statement I** is correct but **Statement II** is incorrect

(c) **Statement I** is incorrect but **Statement II** is correct

(d) Both **Statement I** and **Statement II** are correct

SECTION B(

186. Match the following human spinal nerves in column I with the number of pairs in column II and choose the correct options

Column I	**Column II**
A. cervical neves	(i) 5 pairs
B. thoracic nerves	(ii) 1 pair
C. lumbar nerves	(iii) 12 pairs
D. coccygeal nerves	(iv) 8 pairs

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

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

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

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

187. **Statement I:** Restriction endonuclease enzyme recognize a specific palindromic nucleotide sequence in the DNA

Statement II: Restriction endonuclease enzymes are called as molecular scissors or a biological scissors

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

(a) Both **Statement I** and **Statement II** are incorrect

(b) **Statement I** is correct but **Statement II** is incorrect

(c) **Statement I** is incorrect but **Statement II** is correct

(d) Both **Statement I** and **Statement II** are correct

188. Identify the true **Statements** from the below **Statements**

(i) There are many side affects of tubectomy and vasectomy

(ii) Purpose of tubectomy is to prevent egg formation

(iii) The most important component of the oral contraceptive pills is progesterone

(iv) Contraceptive oral pills help in birth control by preventing ovulation

(v) Genital warts is a sexually transmitted disease caused by herpes virus

(a) (i), (ii) and (iii) (b) (i), (ii) and (iv)

(c) (iii) and (iv) (d) (iv) and (v)

189. Which one of the following pairs of structure is incorrectly matched with their correct description?

Structure	**Description**
A. Tibia and fibula	Both form parts of knee joint
B. Cartilage and Cornea	No blood supply but do require oxygen for respiratory need
C. Shoulder joint	Ball and socket type of joint and elbow joint D.
Premolars and	20 in all and 3^- rooted molars

190. **Assertion:** Restriction endonucleases are also called 'molecular scissors'.

Reason: When fragments generated by restriction endonucleases are mixed, they join together due to their sticky ends

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

(a) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

(b) (A) is correct but (R) is not correct

(c) (A) is not correct but (R) is correct

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

191. A population is in Hardy – weinberg equilibrium for an gene with only two alleles. If the gene frequency of an allele A is 0.7, the genotype frequency of Aa is

(a) 0.21 (b) 0.42

(c) 0.36 (d) 0.7

192. Transgenic animals are produced

(i) to study how genes are regulated and how they affect the normal function of body and its development

(ii) To study diseases

(iii) to obtain useful biological products

(iv) to test vaccine safetly and chemical safety.

(a) (i), (ii), (iii) and (iv) (b) (i) and (iv)

(c) (ii) and (iv) (d) Only (i)

193. There are set of healthcare products. Match them with organisms which are genetically engineered for respective product

A. Insulin	(i)Escherichia coli/ Saccharomyces
B. Somatotropin	(ii)Escherichia coli/yeast
C. Interferom	(iii) GM Escherichia coli
D. Interleukins	(iv)hGR in Escherichia coli
	(v) Humulin through Escherichia coli

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

194. **Statement I:** Fatty acids and glycerols cannot be absorbed into the blood
Statement II: Specialized lymphatic capillaris called lacteals carry chylomicrons into lymphatic vessels and ultimately inot the blood
In the ligh of the above **Statement,** Choose the most appropriate answer from the options given below
(a) Both **Statement I** and **Statement II** are incorrect
(b) **Statement I** is correct but **Statement II** is incorrect
(c) **Statement I** is incorrect but **Statement II** is correct
(d) Both **Statement I** and **Statement II** are correct

195. Which one of the following is a matching pair?
(a) **Lubb** – Sharp closure of AV values at the beginning of ventricular systole
(b) **Dup** – Sudden opening of semilunar valves at the beginning of ventricular diastole
(c) Pulsation of the radial artery – Valves in the blood vessels
(d) Initiation of the heart beat – **Purkinje fibres**

196. Which of the following has been recently used for increasing productivity of super milk cows?
(a) Artifical insemination by pedigreed bull only
(b) Superovulation of a high production cow only
(c) Embryo transplantation only
(d) A combination of superovulation, artificial insemination and embryo transplantation into a 'carrier cow' (surrogate mother)

197. Which one of the following statements is correct?
(i) Benign tumors shown the property of metastasis
(ii) Heroin accelerates body functions
(iii) Malignant tumors occurs any exhibit metastasis
(iv) Patients who have undergone surgery are given cannabinoids to relieve pain
(a) Only (i) and (ii) (b) Only (iii) and (iv)
(c) Only (iii) (d) Only (i) and (iv)

198. Match the following (w.r.t. insert size)

A. Plasmid	(i) 9 – 23 kb
B. λ phage	(ii) 0.5 – 8 kb
C. Cosmid	(iii) 30 – 40 kb
D. BAC	(iv) 50 – 300 kb

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

199. Which one of the following pairs is incorrect?
(a) Plasmid – small piece of extrachromosomal DNA in bacteria
(b) Interferon – an enzyme that interferes with DNA replication
(c) Cosmid – A vector for carrying large DNA fragments inot host cells
(d) Myeloma – antibody producing tumor cells

200. Which one of the following **Statements** is correct with respect to AIDS?
(a) The HIV can be transmitted through eating food together with an infected person
(b) Drug addicts are least susceptible to HIV infection
(c) AIDS patients are being fully cured with proper care and nutrition
(d) The causative HIV retrovirus enters helper T – lymphocytes thus reducing their numbers

MANAS Studies