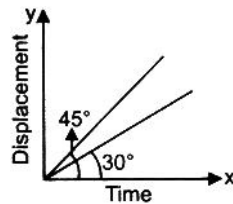




## PART-A : PHYSICS

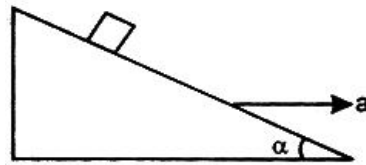
- The speed of light ( $c$ ), gravitational constant ( $G$ ) and planck's constant ( $h$ ) are taken as fundamental units in a system. The dimensions of time in this new system should be :  
 (A)  $G^{1/2}h^{1/2}c^{-5/2}$       (B)  $G^{-1/2}h^{1/2}c^{1/2}$       (C)  $G^{1/2}h^{1/2}c^{-3/2}$       (D)  $G^{1/2}h^{1/2}c^{1/2}$
- A physical quantity  $Q$  is found depend on observables  $x$ ,  $y$  and  $z$  obeying relation  $Q = \frac{x^3y^2}{z}$ .  
 The percentage error in the measurements of  $x$ ,  $y$  and  $z$  are 1%, 2% and 4% respectively. What is percentage error in the quantity  $Q$  ?  
 (A) 4%      (B) 3%      (C) 11%      (D) 1%
- A particle moving in a stright line covers half the distance with speed of  $3 \text{ ms}^{-1}$ . The other half of the distance is covered in two equal time intervals with speed of  $4.5 \text{ ms}^{-1}$  and  $7.5 \text{ ms}^{-1}$  respectively. The average speed of the particle during this motion is :  
 (A)  $4 \text{ ms}^{-1}$       (B)  $5 \text{ ms}^{-1}$       (C)  $5.5 \text{ ms}^{-1}$       (D)  $4.8 \text{ ms}^{-1}$
- The dispalacement - time graph of two moving particles make angles of  $30^\circ$  and  $45^\circ$  with the X-axis. The ratio of their velocities is :



- (A)  $\sqrt{3} : 2$       (B)  $1 : 1$       (C)  $1 : 2$       (D)  $1 : \sqrt{3}$
- A ball is thrown upwards, it takes 4 s to reach back to the ground. Find its initial velocity  
 (A)  $30 \text{ ms}^{-1}$       (B)  $10 \text{ ms}^{-1}$       (C)  $40 \text{ ms}^{-1}$       (D)  $20 \text{ ms}^{-1}$
  - Two equal vectors have a resultant equal to either of the two. The angle between them is :  
 (A)  $90^\circ$       (B)  $60^\circ$       (C)  $120^\circ$       (D)  $0^\circ$

Space for rough work

7. The unit vector parallel to the resultant of the vectors  $\vec{A} = 4\hat{i} + 3\hat{j} + 6\hat{k}$  and  $\vec{B} = -\hat{i} + 3\hat{j} - 8\hat{k}$  is :
- (A)  $\frac{1}{7}(3\hat{i} + 6\hat{j} - 2\hat{k})$  (B)  $\frac{1}{7}(3\hat{i} + 6\hat{j} + 2\hat{k})$  (C)  $\frac{1}{49}(3\hat{i} + 6\hat{j} - 2\hat{k})$  (D)  $\frac{1}{49}(3\hat{i} - 6\hat{j} + 2\hat{k})$
8. A projectile can have the same range  $R$  for two angles of projection. If  $t_1$  and  $t_2$  be the time of flights in the two case, then the product of the two time of flights is proportional to :
- (A)  $\frac{1}{R^2}$  (B)  $R^2$  (C)  $R$  (D)  $\frac{1}{R}$
9. A stationary body of mass 3 kg explodes into three equal pieces. Two of the pieces fly off in two mutually perpendicular directions, one with a velocity of  $3\hat{i} \text{ ms}^{-1}$  and the other with a velocity of  $4\hat{j} \text{ ms}^{-1}$ . If the explosion occurs in  $10^{-4}$  s, the average force acting on the third piece in newton is :
- (A)  $(3\hat{i} + 4\hat{j}) \times 10^{-4}$  (B)  $(3\hat{i} - 4\hat{j}) \times 10^{-4}$  (C)  $(3\hat{i} + 4\hat{j}) \times 10^4$  (D)  $-(3\hat{i} + 4\hat{j}) \times 10^4$
10. Two bodies of masses of 4 kg and 6 kg are tied to the ends of a massless string. The string passes over a frictionless pulley. The acceleration of the system is :
- (A)  $\frac{g}{2}$  (B)  $\frac{g}{3}$  (C)  $\frac{g}{5}$  (D)  $\frac{g}{10}$
11. A block is kept on a frictionless inclined surface with angle of inclination ' $\alpha$ '. The incline is given an acceleration ' $a$ ' to keep the block stationary. Then  $a$  is equal to :

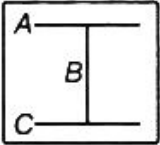


- (A)  $g$  (B)  $g \tan \alpha$  (C)  $g / \tan \alpha$  (D)  $g \cos \alpha$

Space for rough work

12. A smooth block is released at rest on a  $45^\circ$  incline and then slides a distance 'd'. The time taken to slide is 'n' times as much to slide on rough incline than on a smooth incline. The coefficient of friction is :
- (A)  $\mu_k = \sqrt{1 - \frac{1}{n^2}}$       (B)  $\mu_k = 1 - \frac{1}{n^2}$       (C)  $\mu_s = \sqrt{1 - \frac{1}{n^2}}$       (D)  $\mu_s = 1 - \frac{1}{n^2}$
13. If a vector  $2\hat{i} + 3\hat{j} + 8\hat{k}$  is perpendicular to the vector  $4\hat{j} - 4\hat{i} + \alpha\hat{k}$ , then the value of  $\alpha$  is :
- (A)  $-1$       (B)  $\frac{1}{2}$       (C)  $-\frac{1}{2}$       (D)  $1$
14. A car starts from rest, moves with an acceleration  $a$  and then decelerates at a constant rate  $b$  for sometime to come to rest. If the total time taken is  $t$ . The maximum velocity of car is given by:
- (A)  $\frac{abt}{(a+b)}$       (B)  $\frac{a^2t}{(a+b)}$       (C)  $\frac{at}{(a+b)}$       (D)  $\frac{b^2t}{(a+b)}$
15. A particle moving along X-axis has acceleration  $f$ , at time  $t$ , given by  $f = f_0 \left(1 - \frac{t}{T}\right)$ , where  $f_0$  and  $T$  are constants. The particle at  $t = 0$  has zero velocity. In the time interval between  $t = 0$  and the instant when  $f = 0$ , the particle's velocity ( $v_x$ ) is :
- (A)  $f_0T$       (B)  $f_0T^2$       (C)  $f_0^2T^2$       (D)  $\frac{1}{2}f_0T$
16. A plate of mass  $m$ , length  $b$  and breadth  $a$  is initially lying on a horizontal floor with length parallel to the floor and breadth perpendicular to the floor. The work done by gravity to stand it on its breadth is :
- (A)  $-mg \left[\frac{b}{2}\right]$       (B)  $-mg \left[a + \frac{b}{2}\right]$       (C)  $-mg \left[\frac{b-a}{2}\right]$       (D)  $-mg \left[\frac{b+a}{2}\right]$
17. When a long spring is stretched by 2 cm, its potential energy is  $U$ . If the spring is stretched by 10cm, the potential energy stored in it will be :
- (A)  $25U$       (B)  $U/5$       (C)  $5U$       (D)  $10U$

Space for rough work

18. A force of 250 N is required to lift a 75 kg mass through a pulley system. In order to lift the mass through 3 m, the rope has to be pulled through 12 m. The efficiency of system is :  
 (A) 50% (B) 75% (C) 33% (D) 90%
19. A particle falls from a height  $h$  upon a fixed horizontal plane and rebounds. If  $e$  is the coefficient of restitution, the total distance travelled before rebounding has stopped is :  
 (A)  $h\left(\frac{1+e^2}{1-e^2}\right)$  (B)  $h\left(\frac{1-e^2}{1+e^2}\right)$  (C)  $\frac{h}{2}\left(\frac{1-e^2}{1+e^2}\right)$  (D)  $\frac{h}{2}\left(\frac{1+e^2}{1-e^2}\right)$
20. A box is moved along a straight line by a machine delivering constant power. The distance moved by the body in time  $t$  is proportional to :  
 (A)  $t^{1/2}$  (B)  $t^{3/4}$  (C)  $t^{3/2}$  (D)  $t^2$
21. Two persons of masses 55 kg and 65 kg respectively are at the opposite ends of a boat. The length of the boat is 3.0 m and weighs 100 kg. The 55 kg man walks up to the 65 kg man and sits with him. If the boat is in still water the centre of mass of the system shifts by :  
 (A) 0.75 m (B) 3.0 m (C) 2.3 m (D) Zero
22. A straight rod of length  $L$  has one of its ends at the origin and the other end at  $x = L$ . If the mass per unit length of the rod is given by  $Ax$ , here  $A$  constant. Then where does the centre of mass lies?  
 (A)  $L/3$  (B)  $L/2$  (C)  $2L/3$  (D)  $3L/4$
23. In the diagram shown below all three rods are of equal length  $L$  and equal mass  $M$ . The system is rotated such that rod B is the axis. What is the moment of inertia of the system ?  
 (A)  $\frac{ML^2}{6}$  (B)  $\frac{4}{3}ML^2$   
 (C)  $\frac{ML^2}{3}$  (D)  $\frac{2}{3}ML^2$
- 
24. A particle of mass  $m = 5$  units is moving with a uniform speed  $v = 3\sqrt{2}$  units in the XY-plane along the line  $y=x+4$ . The magnitude of the angular momentum of the particle about the origin is:  
 (A) 60 units (B)  $40\sqrt{2}$  units (C) Zero (D) 7.5 units

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Space for rough work

25. A thin circular ring of mass  $M$  and radius  $r$  is rotating about its axis with a constant angular velocity  $\omega$ . Four objects each of mass  $m$ , are kept gently to the opposite ends of two perpendicular diameters of the ring. The angular velocity of the ring will be :
- (A)  $\frac{M\omega}{M+4m}$       (B)  $\frac{(M+4m)\omega}{M}$       (C)  $\frac{(M-4m)\omega}{M+4m}$       (D)  $\frac{M\omega}{4m}$
26. A small object of uniform density rolls up a curved surface with an initial velocity  $v$ . It reaches up to a maximum height of  $\frac{3v^2}{4g}$  with respect to the initial position. The object is :
- (A) Ring      (B) Solid sphere      (C) Hollow sphere      (D) Disc
27. Water from a tap emerges vertically downward with an initial speed of  $1.0 \text{ ms}^{-1}$ . The cross sectional area of the tap is  $10^{-1} \text{ m}^2$ . Assume that the pressure is constant throughout the stream of water and that the flow is steady. What is the cross-sectional area of the stream  $0.15 \text{ m}$  below the tap ?
- (A)  $5 \times 10^{-5} \text{ m}^2$       (B)  $2.5 \times 10^{-3} \text{ m}^2$       (C)  $5 \times 10^5 \text{ m}^2$       (D)  $2.5 \times 10^{-3} \text{ m}^2$
28. A body weighs  $50\text{g}$  in air and  $40\text{g}$  in water. How much would it weigh in a liquid of specific gravity  $1.5$  ?
- (A)  $30\text{g}$       (B)  $35\text{g}$       (C)  $65\text{g}$       (D)  $45\text{g}$
29. A soap bubble A of radius  $0.03 \text{ m}$  and another bubble B of radius  $0.04 \text{ m}$  are brought together so that the combined bubble has a common interface of radius  $r$ , then the value of  $r$  is
- (A)  $0.24 \text{ m}$       (B)  $0.48 \text{ m}$       (C)  $0.12 \text{ m}$       (D) None of these
30. What is the velocity  $v$  of a metallic ball of radius  $r$  falling in a tank of liquid at the instant when its acceleration is one-half that of a freely falling body ?
- (The densities of metal and of liquid are  $\rho$  and  $\sigma$ , respectively and the viscosity of liquid is  $\eta$ .)
- (A)  $\frac{r^2g}{9\eta}(\rho - 2\sigma)$       (B)  $\frac{r^2g}{9\eta}(2\sigma - 2\rho)$       (C)  $\frac{r^2g}{9\eta}(\rho - \sigma)$       (D)  $\frac{2r^2g}{9\eta}(\rho - \sigma)$

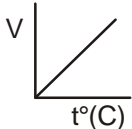
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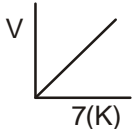
Space for rough work

**PART-B : CHEMISTRY**

31. Number of atoms in 12 g  $^{24}_{12}\text{Mg}$  is equal to  
 (A) oxygen atoms in 11g  $\text{CO}_2$  (B) hydrogen atoms in 4g  $\text{CH}_4$   
 (C) nitrogen atoms in 46g  $\text{N}_2\text{O}_4$  (D) sulphur atom in 79g  $\text{Na}_2\text{S}_2\text{O}_3$
32. Equal weights of  $\text{SO}_2$  and  $\text{SO}_3$  are present in a flask. Mole fraction of  $\text{SO}_2$  in the mixture  
 (A) is greater than that of  $\text{SO}_3$   
 (B) is smaller than that of  $\text{SO}_3$   
 (C) is equal to that of  $\text{SO}_3$   
 (D) is smaller than that of  $\text{C}_5\text{H}_{12}$ , if  $\text{SO}_3$  is replaced by same amount of  $\text{C}_5\text{H}_{12}$ .
33. Aqueous urea solution is 3 molal. Hence, mole fraction of urea is  
 (A) 0.25 (B) 0.33 (C) 0.66 (D) 0.051
34. The correct set of four quantum numbers for the valence electron of rubidium ( $Z = 37$ ) is  
 (A)  $n = 5, l = 0, m = 0, m_s = +\frac{1}{2}$  (B)  $n = 5, l = 1, m = 0, m_s = +\frac{1}{2}$   
 (C)  $n = 5, l = 1, m = 1, m_s = +\frac{1}{2}$  (D)  $n = 6, l = 0, m = 0, m_s = +\frac{1}{2}$
35. Covalent radius of nitrogen is 70 pm. Hence, covalent radius of boron is about  
 (A) 60 pm (B) 110 pm (C) 50 pm (D) 40 pm
36. Which represents alkali metal based on  $(\text{IE})_1$  and  $(\text{IE})_2$  values ?
- |       | $(\text{IE})_1$ | $(\text{IE})_2$ |
|-------|-----------------|-----------------|
| (A) X | 100             | 110             |
| (B) Y | 100             | 110             |
| (C) Z | 195             | 500             |
| (D) M | 200             | 250             |

Space for rough work

37. Which of the following sets of elements is arranged in order of increasing electronegativity ?  
 (A) S, Si, P (B) Si, P, S (C) S, P, Si (D) P, Si, S
38. Which set contains no ionic species ?  
 (A)  $\text{NH}_4\text{Cl}$ ,  $\text{OF}_2$ ,  $\text{H}_2\text{S}$  (B)  $\text{CO}_2$ ,  $\text{CCl}_4$ ,  $\text{Cl}_2$  (C)  $\text{BF}_3$ ,  $\text{AlF}_3$ ,  $\text{TlF}_3$  (D)  $\text{I}_2$ ,  $\text{CaO}$ ,  $\text{CH}_3\text{Cl}$
39. Which of the following compounds has both ionic and covalent bonding ?  
 (A)  $\text{NaBr}$  (B)  $\text{Ba}(\text{CN})_2$  (C)  $\text{PCl}_5$  (D)  $\text{CH}_3\text{CH}_2\text{OH}$
40. Which statement is not correct about  $\text{NO}_2$ ?  
 (A) It is paramagnetic  
 (B) It forms dimer and paramagnetism is lost  
 (C) It has one coordinate bond  
 (D) It has nitrogen oxygen triple bond
41. The geometry of the atoms in the species  $\text{PCl}_4^+$  is best described as  
 (A) tetrahedral (B) see-saw  
 (C) square (D) trigonal bipyramidal
42. Select the correct statement.  
 (A) Cations with 18-electron shell have greater polarising power than the cations with 8-electron shell  
 (B) Inner electrons have poor shielding effect on the nucleus and thus electronegativity of the 18-electron shell is increased  
 (C)  $\text{CuCl}$  is covalent and  $\text{NaCl}$  is ionic  
 (D) All the above are correct statements
43. Which does not represent isobar given by Charles' law ?
- (A) 

(B) 
- (C) Both (A) and (B) (D) None of these

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Space for rough work

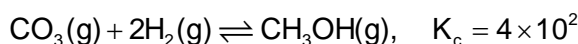


44. The average kinetic energy of an ideal gas per molecule is SI unit at 25°C will be  
 (A)  $6.17 \times 10^{-21}$  kJ (B)  $6.17 \times 10^{-21}$  J (C)  $6.17 \times 10^{-21}$  J (D)  $6.17 \times 10^{-21}$  kJ
45. Which of the following gases follows non-ideal behaviour ?  
 (A)  $N_2$  gas having density  $1.25 \text{ g L}^{-1}$  at STP  
 (B) 2.8 g CO gas in 0.1 L flask exerting a pressure of 24.63 atm at 300 K  
 (C) 1.6 g  $CH_4$  in 0.5 L flask at 273 K exerting a pressure of 4 atm  
 (D) 0.1 g  $H_2$  gas at STP occupies volume of 1.12 L

46.  $I^-$  reduces  $IO_3^-$  to  $I_2$  and itself oxidised to  $I_2$  in acidic medium. Final reaction is

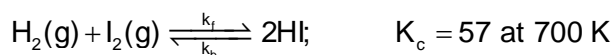
- (A)  $I^- + IO_3^- + 6H^+ \longrightarrow I_2 + 3H_2O$  (B)  $I^- + IO_3^- \longrightarrow I_2 + O_3$   
 (C)  $5I^- + IO_3^- + 6H^+ \longrightarrow 3I_2 + 3H_2O$  (D) None of the above
47.  $Cl_2$  changes of  $Cl^-$  and  $ClO^-$  in cold NaOH. Equivalent weight of  $Cl_2$  will be  
 (A) M (B)  $\frac{M}{2}$  (C)  $\frac{M}{3}$  (D)  $\frac{2M}{3}$

48.  $CH_3OH(g)$  can be prepared using equation



At equilibrium, a 5 L flask contains equal moles of  $CO(g)$  and  $CH_3OH(g)$ . Hence, number of moles of  $H_2$  at equilibrium is

- (A) 0.25 mol (B) 0.10 mol (C) 0.50 mol (D) 0.125 mol
49. The equilibrium constant  $K_c$  for the reaction of  $H_2$  with  $I_2$  is 57.0 at 700 K



Select the correct statement.

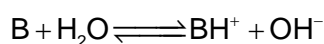
- (A) Rate constant  $k_f$  for the formation of HI is smaller than of rate constant  $k_b$  of the dissociation of HI  
 (B)  $k_f > k_b$   
 (C) Addition of catalyst increases value of  $K_c$   
 (D) Addition of catalyst decreases value of  $K_c$

Space for rough work

50. For a very small extent of dissociation of  $\text{PCl}_5$  into  $\text{PCl}_3$  and  $\text{Cl}_2$  is a gaseous phase reaction then degree of dissociation  $x$

- (A)  $x \propto p$                       (B)  $x \propto \frac{1}{p}$                       (C)  $x \propto \sqrt{p}$                       (D)  $x \propto \sqrt{\frac{1}{p}}$

51. In the following equilibrium,

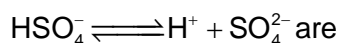
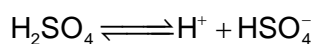


- (A) Arrhenius acid-base concept is observed  
 (B) Franklin's acid-base concept is observed  
 (C) Both (A) and (B)  
 (D) None of the above

52. Which has maximum pH ?

- (A) 0.01 M  $\text{H}_2\text{SO}_4$       (B) 0.01 M HCl      (C) 0.01 M  $\text{Ca}(\text{OH})_2$       (D) 0.01 M NaOH

53.  $[\text{H}_3\text{O}^+]$  in 0.1 M  $\text{H}_2\text{SO}_4$  at two stage



- (A) 0.1 M, 0.1 M                      (B) 0.1 M, > 0.01 M  
 (C) > 0.1 M, > 0.1 M                      (D) 0.1 M, < 0.1 M

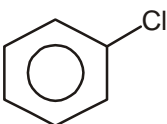
54. pH of a mixture which is 0.1 M in  $\text{CH}_3\text{COOH}$  and 0.05 M in  $(\text{CH}_3\text{COO})_2\text{Ba}$  is [ $\text{pK}_a$  of  $\text{CH}_3\text{COOH} = 4.74$ ]

- (A) 4.74                      (B) 5.04                      (C) 4.44                      (D) 7.00

55.  $K_{sp}$  of  $\text{Al}(\text{OH})_3$  is  $1.0 \times 10^{-15}$ . pH of the saturated solution is about

- (A) 5.0                      (B) 9.0                      (C) 4.1                      (D) 10.4

Space for rough work

56. Select the correct statement(s).
- (A)  $\text{H}_2\text{O}_2$  reduces  $\text{MnO}_4^-$  to  $\text{Mn}^{2+}$  in acidic medium
  - (B)  $\text{H}_2\text{O}_2$  reduces  $\text{MnO}_4^-$  to  $\text{MnO}_2$  in acidic medium
  - (C)  $\text{H}_2\text{O}_2$  can be used to bleach blackened oil paintings
  - (D) All the above are correct statements
57. Select the correct statement(s).
- (A) Temporary hardness is due to dissolved bicarbonates of  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$
  - (B) Permanent hardness is due to dissolved sulphates and chlorides of  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$
  - (C) Hardness can be removed by Calgon's method
  - (D) All of the above are correct statements
58. Which of the following statements is correct about inductive effect ?
- (A) Polarization of a  $\sigma$ -bond caused by polarization of adjacent  $\sigma$ -bond is called inductive effect.
  - (B) Inductive effect is transmitted through  $\sigma$ -bonds.
  - (C) Inductive effect is transmitted through  $\pi$ -bond.
  - (D) both (A) and (B)
59. Which of the following statements is true about inductive effect?
- (A) Inductive effect originates due to electronegativity difference between an atom or group and H - atom.
  - (B) Inductive effect originates due to electronegativity difference between an atom or group and N - atom.
  - (C) Both (A) and (B)
  - (D) None of these
60. Inductive effect of Cl-atom operates in
- (A)  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{Cl}$
  - (B)  $\text{CH}_2 = \text{CH} - \text{CH} = \text{CH} - \text{Cl}$
  - (C) 
  - (D) all of these

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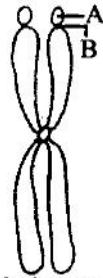
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## PART-C : BIOLOGY

61. The plant bearing clinging roots, is  
 (A) Trapa (B) Orchid (C) Screw pine (D) Podostemon
62. Fibrous root system is better adopted than tap root system for  
 (A) Transport of organic matter (B) Absorption of water and minerals  
 (C) Storage of food (D) Anchorage of plant to soil
63. Root hairs are ontogenetically  
 (A) Exogenous (B) Endogenous (C) Both (A) and (B) (D) None of these
64. New banana plants develop from  
 (A) Rhizome (B) Sucker (C) Stolon (D) Seed
65. Reserve food is mainly found in  
 (A) Underground stems (B) Underground modified tap roots  
 (C) Underground modified adventitious roots (D) All of the above
66. The floral formula of solanaceae is  
 (A)  $E_{br\oplus} \overset{\curvearrowright}{K}_{(5)} \overset{\curvearrowright}{C}_{(5)} A_5 \underline{G}_{(2)}$  (B)  $E_{br\oplus} \overset{\curvearrowright}{K}_{(4)} \overset{\curvearrowright}{C}_{2+2} A_{2+4} \underline{G}_{(2)}$   
 (C)  $E_{br\oplus} \overset{\curvearrowright}{K}_{(4)} C_{2+2} A_{2+4} \underline{G}_{(2)}$  (D)  $Br \% K_{(5)} C_{(5)} A_{(10)} G_1$
67. Aerenchyma provides  
 (A) Flexibility to plants (B) Mechanical strength to plants  
 (C) Buoyancy to hydrophytic plants (D) Promoting nature of photosynthesis
68. Cambium of root is an example of  
 (A) Apical meristem (B) Intercalary meristem  
 (C) Primary meristem (D) Secondary meristem

Space for rough work

69. Mesophyll is usually differentiated in  
 (A) Monocot leaf (B) Isobilateral leaf (C) Dorsiventral leaf (D) Both (A) and (B)
70. Cork is formed from  
 (A) Cork cambium (phellogen) (B) Vascular cambium  
 (C) Phloem (D) Xylem
71. Vascular cambium produces  
 (A) Primary xylem and primary phloem  
 (B) Secondary xylem and secondary phloem  
 (C) Primary xylem and secondary phloem  
 (D) Secondary xylem and primary phloem
72. Commercial cork is obtained from  
 (A) *Berberis/Barberry* (B) *Salix/Willow* (C) *Quercus/Oak* (D) *Betula/Birch*
73. The following diagram represents a chromosome. Identify the structures A, B, and type of chromosome (C)



Types of Chromosome - C

- (A) A–Satellite, B–Primary constriction, C–Acrocentric  
 (B) A–Satellite, B–Secondary constriction, C–Metacentric  
 (C) A–Satellite, B–Centromere, C–Telocentric  
 (D) A–Satellite, B–Centromere, C–Submetacentric

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74. Select the wrong statement from the following
- (A) Both chloroplasts and mitochondria have internal compartment, the thylakoid space bound thylakoid membrane
  - (B) Both chloroplasts and mitochondria contain DNA
  - (C) The chloroplasts are generally much larger than mitochondria
  - (D) Both chloroplasts and mitochondria contain an inner and an outer membrane
75. Stroma in the chloroplasts of higher plant contains
- (A) Light-dependent reaction enzymes
  - (B) Ribosomes
  - (C) Chlorophyll
  - (D) Light- independent reaction enzymes
76. What is common between chloroplasts, chromoplasts and leucoplasts ?
- (A) Presence of pigments
  - (B) Possession of thylakoids and grana
  - (C) Storage of starch, proteins and lipids
  - (D) Ability to multiply by a fission-like process
77. Important site for formation of glycoproteins and glycolipids is
- (A) Vacuole
  - (B) Golgi apparatus
  - (C) Plastid
  - (D) Lysosome
78. Element required for bringing about union of ribosome subunit is
- (A)  $\text{Ca}^{2+}$
  - (B)  $\text{Mg}^{2+}$
  - (C)  $\text{Fe}^{2+}$
  - (D)  $\text{Cu}^{+}$
79. Ribosomal RNA is actively synthesized in
- (A) Lysosomes
  - (B) Nucleolus
  - (C) Nucleoplasm
  - (D) Ribosomes
80. Which one of the following does not differ in E.coli and Chlamydomonas
- (A) Ribosomes
  - (B) Chromosomal Organization
  - (C) Cell wall
  - (D) Cell membrane

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- 81.** What is true about ribosomes ?
- (A) The prokaryotic ribosomes are 80S, where "S" stands for sedimentation coefficient
  - (B) These are composed of ribonucleic acid and proteins
  - (C) These are found only in eukaryotic cells
  - (D) These are self-splicing introns of some RNAs

- 82.** Difference between prokaryote and eukaryote is in
- (A) Cell size
  - (B) Cell shape
  - (C) Chemical composition of protoplasm
  - (D) Organisation of nuclear material

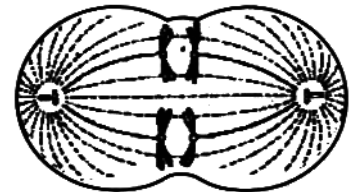
**83.** Match the items in column I with column II and choose the correct option.

- |                         |   |
|-------------------------|---|
| (1) Sap vacuole         | (i) Contain digestive enzyme                          |
| (2) Contractile vacuole | (ii) Store metabolic gases                            |
| (3) Food vacuole        | (iii) Osmoregulation                                  |
| (4) Air vacuole         | (iv) Store lipids                                     |
| (5) Spherosomes         | (v) Store and concentrate mineral salts and nutrients |

- |     |          |          |          |          |          |     |      |       |       |     |      |
|-----|----------|----------|----------|----------|----------|-----|------|-------|-------|-----|------|
|     | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> |     |      |       |       |     |      |
| (A) | (v)      | (iii)    | (i)      | (ii)     | (iv)     | (B) | (ii) | (iii) | (iv)  | (v) | (i)  |
| (C) | (v)      | (iii)    | (ii)     | (iv)     | (i)      | (D) | (iv) | (i)   | (iii) | (v) | (ii) |

**84.** The diagram shows a cell whose diploid chromosome number is four. Which one of the following option shows correct stage of cell

- (A) Metaphase
- (B) Anaphase of mitosis
- (C) First anaphase of meiosis
- (D) Second anaphase of meiosis



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85. Meiosis is evolutionary significant because it results in  
(A) Genetically similar daughters (B) Four daughter cells  
(C) Egg and sperm (D) Recombinations
86. During cell division, the spindle fibres attach to the chromosome at a region called  
(A) Chromocentre (B) Kinetochore (C) Centriole (D) Chromomere
87. The correct sequence of cell cycle is  
(A) S, G<sub>1</sub>, G<sub>2</sub>, M (B) S, M, G<sub>1</sub>, G<sub>2</sub> (C) G<sub>1</sub>, S, G<sub>2</sub>, M (D) M, G<sub>1</sub>, G<sub>2</sub>, S
88. G<sub>0</sub> phase is  
(A) Phase after G<sub>2</sub>  
(B) Phase after M phase in which daughter cell enters new cell cycle  
(C) Arrest of cell cycle on the onset of differentiation  
(D) All of the above
89. Meiosis II performs  
(A) Separation of sex chromosomes  
(B) Synthesis of DNA and centromere  
(C) Separation of homologous chromosomes  
(D) Separation of chromatids
90. The exchange of genetic material between chromatids of paired homologous chromosomes during first meiotic division is called  
(A) Transformation (B) Chiasmata (C) Crossing over (D) Synapsis
91. Which of the following is **not** correct w.r.t. Echinodermata?  
(A) In Echinoderms parasitic forms are absent  
(B) Pedicellariae are present in asteroidea  
(C) Dipleura larva is found in class echinoidea  
(D) In holothurians cloacal respiratory trees help in gaseous exchange

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92. Which of the following is **incorrect** w.r.t. Hemichordata?
- (A) In hemichordates stomochord is present in proboscis
  - (B) In hemichordates respiratory pigments are absent
  - (C) In hemichordates development is direct
  - (D) In hemichordates excretory organ is proboscis gland
93. Which of the following is correct w.r.t annelids?
- a. Schizocoel is present
  - b. Exchange of gases takes place through the body wall
  - c. Segmental nephridia help in excretion and osmoregulation
  - d. Parapodia are locomotory structure present in class oligochaeta
- (A) a and b                      (B) a, b and d                      (C) b, c and d                      (D) a, b and c
94. In annelids the nervous system has cerebral ganglia which are linked to \_\_\_\_\_
- (A) Double ventral nerve cord                      (B) Notochord
  - (C) Double dorsal nerve cord                      (D) All of these
95. Kingdom animalia is classified on the basis of the all of the following **except**
- (A) Body plan                      (B) Number of cells
  - (C) Body symmetry                      (D) Nature of coelom
96. In some animals, the body cavity is not lined by mesoderm, instead, the mesoderm is present as scattered pouches in between the ectoderm and endoderm, such a body cavity is called
- (A) Schizocoel                      (B) Enterocoel                      (C) Pseudocoel                      (D) Haemocoel
97. Cephalization developed due to creeping habit in animal ancestors that encountered all the obstacles in the front part. It is characteristic of higher phyla but first time developed in
- (A) Flat worms                      (B) Round worms                      (C) Arthropods                      (D) Sponges
98. Some of larva show retrogressive metamorphosis during course of development. Which of the following is correct pair of larva showing retrogressive metamorphosis and its adult?
- (A) Tadpole - Frog                      (B) Ascidian tadpole - *Herdmania*
  - (C) Ammocoete - *Petromyzon*                      (D) Tornaria - *Balanoglossus*

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99. A tissue is a group of cells that are similar in  
(A) Structure (B) Origin (C) Function (D) All of these
100. Consider the following statements concerning epithelial tissues
- These tissues have a free surface, which face either a body fluid or the outside environment
  - It provides a covering or a lining for some part of the body
  - They have least regenerating power
  - Without exception all epithelial tissue rest on basement membrane
- Which of the above two statements are correct?  
(A) a & b (B) b & c (C) c & d (D) a & d
101. Which of the following function is not performed by simple epithelial tissues?  
(A) They protect the underlying tissues from mechanical injuries mainly  
(B) Germinal layer of gonads produce gametes  
(C) They help in gaseous exchange  
(D) Some epithelial cells get specialised for secretion
102. Match the following
- | Column I                        | Column II                 |
|---------------------------------|---------------------------|
| a. Simple cuboidal epithelium   | (i) Eustachian tube       |
| b. Simple columnar epithelium   | (ii) Terminal bronchioles |
| c. Simple squamous epithelium   | (iii) Thyroid vesicle     |
| d. Ciliated columnar epithelium | (iv) Gastric gland        |
- (A) a(iii), b(iv), c(ii), d(i) (B) a(iv), b(ii), c(iii), d(i)  
(C) a(ii), b(iii), c(i), d(iv) (D) a(iii), b(ii), c(iv), d(i)

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Space for rough work

- 103.** Which of the following cell junctions are found in epithelial tissues?  
(A) Tight junction (B) Adhering junction  
(C) Gap junction (D) All of these
- 104.** Which of the following is correct about myoepithelium?  
a. Cells contain actin and myosin filaments  
b. It serves to expel secretion  
c. Arises from the mesoderm  
d. Helps in secretion of gastric glands  
(A) a & b (B) b & c (C) c & d (D) a & d
- 105.** Following are the examples of primary metabolites **except**  
(A) Protein (B) Nucleic acid (C) Cellulose (D) Fat
- 106.** Which of the following tests is/are used to detect the presence of glucose in urine?  
a. Benedict's test  
b. Fehling's test  
c. Feulgen's test  
(A) Only a (B) a & c (C) a & b (D) a, b & c
- 107.** A oligosaccharide consists of  
(A) 2 - 9 molecules of monosaccharides  
(B) 10 - 20 molecules of monosaccharides  
(C) More than 50 but less than 100 molecules of monosaccharides  
(D) 10 - 20 molecules of monosaccharides along with protein
- 108.** Which of the following monosaccharide is fruit sugar?  
(A) Fructose (B) Glycogen (C) Glucose (D) Mannose
- 109.** Dental carries is prevented by  
(A) Fluorine (B) Iron (C) Calcium (D) Silica

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Space for rough work

110. Homo polysaccharides are those complex carbohydrates which are formed by polymerisation of only one kind of monosaccharide monomers **except** in  
(A) Cellulose (B) Agar (C) Glucan (D) Xylan
111. Which of the following statements are correct w.r.t. glycogen?  
a. It has 1 – 4 $\alpha$  linkages in the straight part  
b. It has 1 – 6 linkages in the area of branching  
c. The straight part is helically twisted with each turn having six glucose units  
(A) Only a & c (B) Only b & c (C) Only a & b (D) All a, b & c
112. Oxyntic cells or parietal cells of gastric gland secretes  
(A) HCl (B) Pepsinogen  
(C) Castle intrinsic factor (D) Both (A) & (C)
113. Which of the following enzyme is **not** secreted from the gut wall of any vertebrates?  
(A) Maltase (B) Cellulase (C) Lactase (D) Sucrase
114. Mark the odd one on the basis of their substrate type  
(A) Pepsin (B) Trypsin (C) Erepsin (D) Steapsin
115. The absorbed fat from intestinal cells are released into  
(A) Blood capillaries as micelles (B) Blood capillaries as chylomicrons  
(C) Lacteals as micelles (D) Lacteals as chylomicrons
116. Mark the **incorrect** statement w.r.t. secretin hormone  
(A) Released in duodenum  
(B) Increases gastric secretion and motility  
(C) First hormone to be discovered  
(D) Releases bicarbonates in the pancreatic juice

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Space for rough work

117. Pernicious anaemia caused due to deficiency of
- (A) Phylloquinone (B) Calciferol  
(C) Riboflavin (D) Cyanocobalamin
118. Sodium glycocholate and sodium taurocholate are sodium salts of cholic acid found in bile. Mark correct statements regarding them
- a. Cause emulsification of fats b. Increase lipase activity  
c. Help in absorption of fat product d. Stimulate peristalsis
- (A) Both a & c (B) a, c & d (C) Only a (D) a, b, c & d
119. The children who are suffering from galactocemia are advised to take
- (A) Sugar free diet (B) Protein deficient diet  
(C) Milk free diet (D) Low caloric diet
120. Protein and calories deficiency in infants cause marasmus which is characterised by all of the following symptoms **except** one
- (A) Emaciated body (B) Prominent ribs  
(C) Dry, thin and wrinkled skin (D) Oedema of face and limbs

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## ANSWER - KEY

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### PART-A : PHYSICS

- |         |         |         |         |         |
|---------|---------|---------|---------|---------|
| 1. (A)  | 2. (C)  | 3. (A)  | 4. (D)  | 5. (D)  |
| 6. (C)  | 7. (A)  | 8. (C)  | 9. (D)  | 10. (C) |
| 11. (B) | 12. (B) | 13. (C) | 14. (A) | 15. (D) |
| 16. (C) | 17. (A) | 18. (B) | 19. (A) | 20. (C) |
| 21. (A) | 22. (C) | 23. (A) | 24. (A) | 25. (A) |
| 26. (D) | 27. (A) | 28. (B) | 29. (C) | 30. (A) |

### PART- B : CHEMISTRY

- |         |         |         |         |         |
|---------|---------|---------|---------|---------|
| 31. (A) | 32. (A) | 33. (D) | 34. (A) | 35. (B) |
| 36. (C) | 37. (B) | 38. (B) | 39. (B) | 40. (D) |
| 41. (A) | 42. (D) | 43. (A) | 44. (B) | 45. (C) |
| 46. (C) | 47. (A) | 48. (A) | 49. (B) | 50. (D) |
| 51. (A) | 52. (C) | 53. (D) | 54. (A) | 55. (D) |
| 56. (D) | 57. (D) | 58. (D) | 59. (A) | 60. (D) |

### PART- C : BIOLOGY

- |          |          |          |          |          |
|----------|----------|----------|----------|----------|
| 61. (B)  | 62. (D)  | 63. (A)  | 64. (B)  | 65. (D)  |
| 66. (A)  | 67. (C)  | 68. (D)  | 69. (C)  | 70. (A)  |
| 71. (B)  | 72. (C)  | 73. (B)  | 74. (A)  | 75. (D)  |
| 76. (C)  | 77. (B)  | 78. (B)  | 79. (B)  | 80. (D)  |
| 81. (B)  | 82. (D)  | 83. (A)  | 84. (C)  | 85. (D)  |
| 86. (B)  | 87. (C)  | 88. (C)  | 89. (D)  | 90. (C)  |
| 91. (C)  | 92. (C)  | 93. (D)  | 94. (A)  | 95. (B)  |
| 96. (C)  | 97. (A)  | 98. (B)  | 99. (D)  | 100. (A) |
| 101. (A) | 102. (A) | 103. (D) | 104. (A) | 105. (C) |
| 106. (C) | 107. (A) | 108. (A) | 109. (A) | 110. (B) |
| 111. (D) | 112. (D) | 113. (B) | 114. (D) | 115. (D) |
| 116. (B) | 117. (D) | 118. (D) | 119. (C) | 120. (D) |