



## NEET Part Test-03

### TOPIC COVERED

<b>Physics:</b>	Mechanical Properties of Solids, Mechanical Properties of Fluids, Thermal Properties of Matter,
<b>Chemistry:</b>	Equilibrium, Redox Reactions, Hydrogen, The s-Block Elements, The p-Block Elements,
<b>Botany:</b>	Cell Cycle and Cell Division, Transport in Plants, Mineral Nutrition
<b>Zoology:</b>	Body Fluids and Circulation, Excretory Products and their, Locomotion and Movement

**Duration: 3 hr 20 min**

**Max Marks: 720**

### General Instructions:

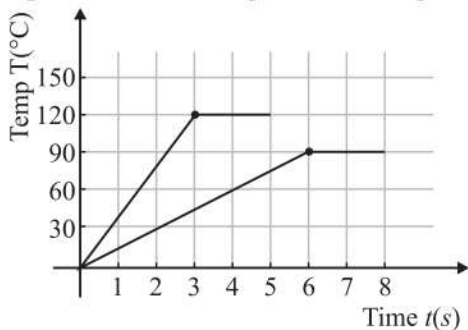
- The test will contain 200 Questions of Physics, Chemistry, Botany, and Zoology & The test will be objective type. (Attempt only 180).
- Every subject contains two Part A- 35 Questions and Part B-15 Questions (Attempt only 10).
- All 35 Questions of Part-A are Compulsory to attempt
- Time given for test is 200 minutes..
- Marking is +4 for every correct answer, – 1 for every wrong answer.
- You can reattempt the test in case of any technical issue.
- Test will start at 2:00 pm and students can attempt test at any time of their own preferences

## PHYSICS

### SECTION - A

1. A uniform heavy rod of weight  $10 \text{ kg ms}^{-2}$ , cross-sectional area  $100 \text{ cm}^2$  and length  $20 \text{ cm}$  is hanging from a fixed support. Young modulus of the material of the rod is  $2 \times 10^{11} \text{ Nm}^{-2}$ . Neglecting the lateral contraction, find the elongation of rod due to its own weight.  
(1)  $2 \times 10^{-9} \text{ m}$       (2)  $5 \times 10^{-8} \text{ m}$   
(3)  $4 \times 10^{-8} \text{ m}$       (4)  $5 \times 10^{-10} \text{ m}$
2. The cylindrical tube of a spray pump has radius  $R$ , one end of which has  $n$  fine holes, each of radius  $r$ . If the speed of the liquid in the tube is  $v$ , the speed of the ejection of the liquid through the holes is  
(1)  $vR^2/n^2r^2$       (2)  $vR^2/nr^2$   
(3)  $vR^2/n^3r^2$       (4)  $v^2R/nr$
3. When two soap bubbles of radii  $a$  and  $b$  ( $b > a$ ) coalesce, the radius of curvature of common surface is:  
(1)  $\frac{b}{ab} a$       (2)  $\frac{a}{ab} b$   
(3)  $\frac{ab}{a} b$       (4)  $\frac{ab}{b} a$
4. Two non-mixing liquids of densities  $\rho$  and  $n\rho$  ( $n > 1$ ) are put in a container. The height of each liquid is  $h$ . A solid cylinder floats with its axis vertical and length  $pL$  ( $p < 1$ ) in the denser liquid. The density of the cylinder is  $d$ . The density  $d$  is equal to  
(1)  $\{2+(n+1)p\}\rho$   
(2)  $\{2+(n-1)p\}\rho$   
(3)  $\{1+(n-1)p\}\rho$   
(4)  $\{1+(n+1)p\}\rho$
5. The normal density of a material is  $\rho$  and its bulk modulus of elasticity is  $K$ . The magnitude of increase in density of material, when a pressure  $P$  is applied uniformly on all sides, will be:  
(1)  $\frac{K}{P}$   
(2)  $\frac{PK}{K}$   
(3)  $\frac{P}{K}$   
(4)  $\frac{K}{P}$

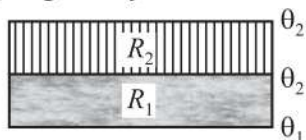
6. Two different metal bodies  $A$  and  $B$  of equal mass are heated at a uniform rate under similar conditions. The variation of temperature of the bodies is graphically represented as shown in the figure. The ratio of specific heat capacities is:



- (1)  $8/3$  (2)  $3/8$   
 (3)  $3/4$  (4)  $4/3$
7. A fluid is flowing through a horizontal pipe of varying cross-section, with speed  $v$   $\text{ms}^{-1}$  at a point where the pressure is  $P$  pascal. At another point where pressure is  $P/2$  Pascal its speed is  $V$   $\text{ms}^{-1}$ . If the density of the fluid is  $\rho$   $\text{kg m}^{-3}$  and the flow is streamline, then  $V$  is equal to:

- (1)  $\sqrt{\frac{P}{2\rho} + v^2}$  (2)  $\sqrt{\frac{P}{\rho} + v^2}$   
 (3)  $\sqrt{\frac{2P}{\rho} + v^2}$  (4)  $\sqrt{\frac{P}{\rho} - v^2}$

8. The temperature  $\theta$  at the junction of two insulating sheets, having thermal resistances  $R_1$  and  $R_2$  as well as top and bottom temperatures  $\theta_1$  and  $\theta_2$  (as shown in figure) is given by:



- (1)  $\frac{\theta_1 R_2 + \theta_2 R_1}{R_1 + R_2}$   
 (2)  $\frac{\theta_1 R_1 + \theta_2 R_2}{R_1 + R_2}$   
 (3)  $\frac{\theta_1 R_2 - \theta_2 R_1}{R_2 - R_1}$   
 (4)  $\frac{\theta_2 R_2 - \theta_1 R_1}{R_2 - R_1}$
9. In an experiment to verify Stokes law, a small spherical ball of radius  $r$  and density  $\rho$  falls under gravity through a distance  $h$  in air before entering a tank of water. If the terminal velocity of the ball inside water is same as its velocity just before entering the water surface, then the value of  $h$  is proportional to: (ignore viscosity of air)

- (1)  $r$  (2)  $r^4$   
 (3)  $r^3$  (4)  $r^2$

10. Pressure inside two soap bubbles are 1.01 and 1.02 atmosphere, respectively. The ratio of their volumes is:

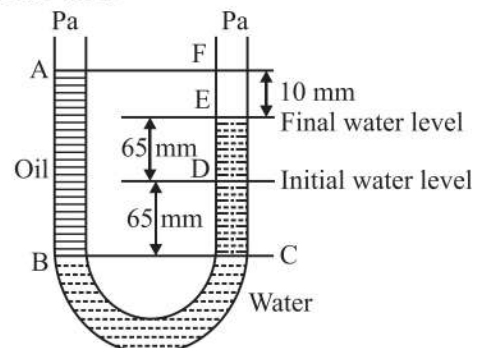
(Take atmospheric pressure = 1 atm)

- (1) 4 : 1 (2) 8 : 1  
 (3) 2 : 1 (4) 0.8 : 1

11. Two steel wires having same length are suspended from a ceiling under the same load. If the ratio of their energy stored per unit volume is 1 : 4, the ratio of their diameters is:

- (1) 1 : 2 (2) 2 : 1  
 (3)  $1 : \sqrt{2}$  (4)  $\sqrt{2} : 1$

12. A U tube with both ends open to the atmosphere, is partially filled with water. Oil, which is immiscible with water, is poured into one side until it stands at a distance of 10 mm above the water level on the other side. Meanwhile the water rises by 65 mm from its original level (see diagram). The density of the oil is



- (1)  $650 \text{ kg m}^{-3}$  (2)  $425 \text{ kg m}^{-3}$   
 (3)  $800 \text{ kg m}^{-3}$  (4)  $928 \text{ kg m}^{-3}$

13. A uniform cylindrical rod of length  $L$  and radius  $r$ , is made from a material whose Young's modulus of Elasticity equals  $Y$ . When this rod is heated by temperature  $T$  and simultaneously subjected to a net longitudinal compressional force  $F$ , its length remains unchanged. The coefficient of volume expansion, of the material of the rod, is (nearly) equal to:

- (1)  $\frac{3F}{(\pi r^2 Y T)}$  (2)  $\frac{6F}{(\pi r^2 Y T)}$   
 (3)  $\frac{F}{(3\pi r^2 Y T)}$  (4)  $9F(\pi r^2 Y T)$

14. A steel wire having a radius of 2.0 mm, carrying a load of 4 kg, is hanging from a ceiling. Given that  $g = 3.1 \pi \text{ ms}^{-2}$ , what will be the tensile stress that would be developed in the wire?

- (1)  $3.1 \times 10^6 \text{ Nm}^{-2}$   
 (2)  $6.2 \times 10^6 \text{ Nm}^{-2}$   
 (3)  $4.8 \times 10^6 \text{ Nm}^{-2}$   
 (4)  $5.2 \times 10^6 \text{ Nm}^{-2}$

15. An object of mass  $m$  is suspended at the end of a massless wire of length  $L$  and area of cross section  $A$ . Young modulus of the material of the wire is  $Y$ . If the mass is pulled down slightly its frequency of oscillation along the vertical direction is:

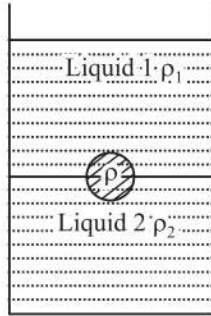
$$(1) f = \frac{1}{2\pi} \sqrt{\frac{YA}{mL}} \quad (2) f = \frac{1}{2\pi} \sqrt{\frac{mL}{YA}}$$

$$(3) f = \frac{1}{2\pi} \sqrt{\frac{YL}{mA}} \quad (4) f = \frac{1}{2\pi} \sqrt{\frac{mA}{YL}}$$

16. Water flows into a large tank with flat bottom at the rate of  $10^{-4} \text{ m}^3 \text{ s}^{-1}$ . Water is also leaking out of a hole of area  $1 \text{ cm}^2$  at its bottom. If the height of the water in the tank remains steady, then this height is:

- (1) 2.9 cm                      (2) 5.1 cm  
(3) 4 cm                         (4) 1.7 cm

17. A jar is filled with two non-mixing liquids 1 and 2 having densities  $\rho_1$  and  $\rho_2$  respectively. A solid ball, made of a material of density  $\rho_3$ , is dropped in the jar. It comes to equilibrium in the position shown in the figure. Which of the following is true for  $\rho_1$ ,  $\rho_2$  and  $\rho_3$ ?



- (1)  $\rho_3 < \rho_1 < \rho_2$             (2)  $\rho_1 > \rho_3 > \rho_2$   
(3)  $\rho_1 < \rho_2 < \rho_3$             (4)  $\rho_1 < \rho_3 < \rho_2$

18. A 20 cm long capillary tube is dipped in water. The water rises up to 8 cm. If the entire arrangement is put in a freely falling elevator the length of water column in the capillary tube will be

- (1) 10 cm                      (2) 8 cm  
(3) 20 cm                      (4) 4 cm

19. The pressure acting on a submarine is  $3 \times 10^5 \text{ Pa}$  at a certain depth. If the depth is doubled, the percentage increase in the pressure acting on the submarine would be:

(Assume that atmospheric pressure is  $1 \times 10^5 \text{ Pa}$  density of water is  $10^3 \text{ kg m}^{-3}$ ,  $g = 10 \text{ ms}^{-2}$ )

- (1)  $\frac{200}{5} \%$                       (2)  $\frac{200}{3} \%$   
(3)  $\frac{3}{200} \%$                       (4)  $\frac{5}{200} \%$

20. Three stars  $A$ ,  $B$  and  $C$  have surface temperatures  $T_A$ ,  $T_B$  and  $T_C$  respectively. Star  $A$  appears bluish, star  $B$  appears reddish and star  $C$  yellowish. Hence,

- (1)  $T_A > T_B > T_C$   
(2)  $T_B > T_C > T_A$   
(3)  $T_C > T_B > T_A$   
(4)  $T_A > T_C > T_B$

21. Two series of same length and radius are joined end to end and loaded. The Young's moduli of the materials of the two wires are  $Y_1$  and  $Y_2$ . The combination behaves as a single wire then its Young's modulus is:

$$(1) Y = \frac{2Y_1Y_2}{3(Y_1 + Y_2)} \quad (2) Y = \frac{2Y_1Y_2}{Y_1 + Y_2}$$

$$(3) Y = \frac{Y_1Y_2}{2(Y_1 + Y_2)} \quad (4) Y = \frac{Y_1Y_2}{Y_1 + Y_2}$$

22. Coefficient of linear expansion of brass and steel rods are  $\alpha_1$  and  $\alpha_2$ , lengths of brass and steel rods are  $l_1$  and  $l_2$  respectively. If  $(l_2 - l_1)$  is maintained same at all temperatures, Which one of the following relations holds good?

- (1)  $\alpha_1 l_2^2 = \alpha_2 l_1^2$   
(2)  $\alpha_1^2 l_2 = \alpha_2^2 l_1$   
(3)  $\alpha_1 l_1 = \alpha_2 l_2$   
(4)  $\alpha_1 l_2 = \alpha_2 l_1$

23. A piece of iron is heated in a flame. It first becomes dull red then becomes reddish yellow and finally turns to white hot. The correct explanation for the above observation is

- (1) Stefan's law  
(2) Wien's displacement law  
(3) Kirchoff's law  
(4) Newton's law of cooling

24. A bullet of mass 5 g, travelling with a speed of 210 m/s, strikes a fixed wooden target. One half of its kinetic energy is converted into heat in the bullet while the other half is converted into heat in the wood. The rise of temperature of the bullet if the specific heat of its material is  $0.030 \text{ cal}/(\text{g } ^\circ\text{C})$  ( $1 \text{ cal} = 4.2 \times 10^7 \text{ ergs}$ ) close to:

- (1)  $87.5 \text{ }^\circ\text{C}$                       (2)  $83.3 \text{ }^\circ\text{C}$   
(3)  $38.4 \text{ }^\circ\text{C}$                       (4)  $119.2 \text{ }^\circ\text{C}$

25. Two small drops of mercury each of radius  $R$  coalesce to form a single large drop. The ratio of total surface energy before and after the change is:

- (1)  $2^{1/3} : 1$                       (2)  $1 : 2^{1/2}$   
(3)  $2 : 1$                          (4)  $1 : 2$

26. A body takes 4 min. to cool from  $61^\circ\text{C}$  to  $59^\circ\text{C}$ . If the temperature of the surroundings is  $30^\circ\text{C}$ , the time taken by the body to cool from  $51^\circ\text{C}$  to  $49^\circ\text{C}$  is:

- (1) 4 min  
(2) 3 min  
(3) 8 min  
(4) 6 min

27. The specific heat of water =  $4200 \text{ J kg}^{-1} \text{ K}^{-1}$  and the latent heat of ice =  $3.4 \times 10^5 \text{ J kg}^{-1}$ . 100 grams of ice at  $0^\circ\text{C}$  is placed in 200 g of water of  $25^\circ\text{C}$ . The amount of the ice that will melt as the temperature of water reaches  $0^\circ\text{C}$  is close to (in grams):

- (1) 63.8
- (2) 61.7
- (3) 69.3
- (4) 64.6

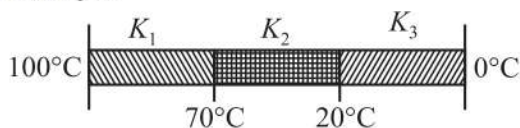
28. Two different wires having lengths  $L_1$  and  $L_2$ , and respective temperature coefficient of linear expansion  $\alpha_1$  and  $\alpha_2$ , are joined end-to-end. Then the effective temperature coefficient of linear expansion is:

- (1)  $2\sqrt{\alpha_1\alpha_2}$
- (2)  $4 \frac{\alpha_1\alpha_2}{\alpha_1 + \alpha_2} \frac{L_2L_1}{(L_2 + L_1)^2}$
- (3)  $\frac{\alpha_1 + \alpha_2}{2}$
- (4)  $\frac{\alpha_1L_1 + \alpha_2L_2}{L_1 + L_2}$

29. Each side of a box made of metal sheet in cubic shape is 'a' at room temperature 'T', the coefficient of linear expansion of the metal sheet is ' $\alpha$ '. The metal sheet is heated uniformly, by a small temperature  $\Delta T$ , so that its new temperature is  $T + \Delta T$ . Calculate the increase in the volume of the metal box.

- (1)  $3a^3\alpha\Delta T$
- (2)  $4\pi a^3\alpha\Delta T$
- (3)  $\frac{4}{3}\pi a^3\alpha\Delta T$
- (4)  $4a^3\alpha\Delta T$

30. Three rods of identical cross-section and lengths are made of three different materials of thermal conductivity  $K_1$ ,  $K_2$  and  $K_3$ , respectively. They are joined together at their ends to make a long rod (see figure), One end of the long rod is maintained at  $100^\circ\text{C}$  and the other at  $0^\circ\text{C}$  (see figure). If the joints of the rod are at  $70^\circ\text{C}$  and  $20^\circ\text{C}$  in steady state and there is no loss of energy from the surface of the rod, the correct relationship between  $K_1$ ,  $K_2$  and  $K_3$  is:



- (1)  $K_1 : K_3 = 2 : 3$       (2)  $K_1 < K_2 < K_3$   
 $K_2 : K_3 = 2 : 5$
- (3)  $K_1 : K_2 = 5 : 2$       (4)  $K_1 > K_2 > K_3$   
 $K_1 : K_3 = 3 : 5$

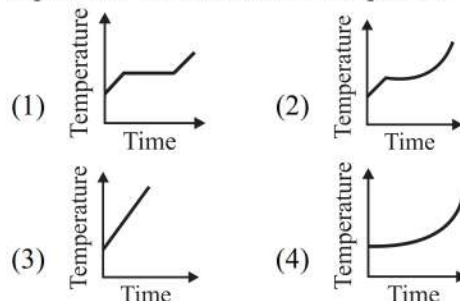
31. Given below are two statements: one is labelled as *Assertion A* and the other is labelled as *Reason R*.  
*Assertion A*: When a rod lying freely is heated, no thermal stress is developed in it.

*Reason R*: On heating, the length of the rod increases.

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

- (1) *A* is true but *R* is false
- (2) *A* is false but *R* is true
- (3) Both *A* and *B* are true but *R* is NOT the correct explanation of *A*
- (4) Both *A* and *R* are true and *R* is the correct explanation of *A*

32. Liquid oxygen at  $50 \text{ K}$  is heated to  $300 \text{ K}$  at constant pressure of  $1 \text{ atm}$ . The rate of heating is constant. Which one of the following graphs represents the variation of temperature with time?



33. When  $M_1$  gram of ice at  $-10^\circ\text{C}$  (specific heat =  $0.5 \text{ cal g}^{-1} \text{ }^\circ\text{C}^{-1}$ ) is added to  $M_2$  gram of water at  $50^\circ\text{C}$ , finally no ice is left and the water is at  $0^\circ\text{C}$ . The value of latent heat of ice, in  $\text{cal g}^{-1}$  is:

- (1)  $\frac{50M_2}{M_1} - 5$       (2)  $\frac{50M_2}{M_1}$
- (3)  $\frac{5M_2}{M_1} - 5$       (4)  $\frac{5M_1}{M_1} - 50$

34. Two wires are made of the same material and have the same volume. The first wire has cross-sectional area  $A$  and the second wire has cross-sectional area  $3A$ . If the length of the first wire is increased by  $\Delta l$  on applying a force  $F$ , how much force is needed to stretch the second wire by the same amount?

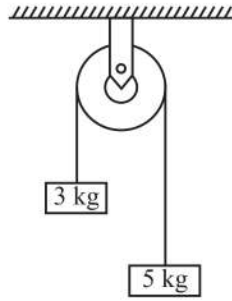
- (1)  $9F$       (2)  $6F$
- (3)  $4F$       (4)  $F$

35. The power radiated by a black body is  $P$  and it radiates maximum energy at wavelength  $\lambda_0$ . If the temperature of the black body is now changed so that it radiates maximum energy at the wavelength  $3/4 \lambda_0$ . The power radiated by it becomes  $nP$ . The value of  $n$  is:

- (1)  $3/4$       (2)  $4/3$
- (3)  $256/81$       (4)  $81/256$

**SECTION - B**

36. Two blocks of masses 3 kg and 5 kg are connected by a metal wire going over a smooth pulley. The breaking stress of the metal is  $24/\pi \times 10^2 \text{ Nm}^{-2}$ . What is the minimum radius of the wire? (Take  $g = 10 \text{ ms}^{-2}$ )



- (1) 125 cm                      (2) 1250 cm  
(3) 12.5 cm                      (4) 1.25 cm

37. A cylinder of radius  $R$  is surrounded by a cylindrical shell of inner radius  $R$  and outer radius  $2R$ . The thermal conductivity of the material of the inner cylinder is  $K_1$  and the of the outer cylinder is  $K_2$ . Assuming no loss of heat, the effective thermal conductivity of the system for heat flowing along the length of the cylinder is:

- (1)  $K_1 + K_2$                       (2)  $\frac{K_1 + 3K_2}{4}$   
(3)  $\frac{K_1 + K_2}{2}$                       (4)  $\frac{2K_1 + 3K_2}{5}$

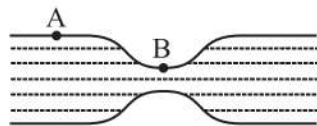
38. The velocity of a small ball of mass  $M$  and density  $d$ , when dropped in a container filled with glycerine becomes constant after some time. If the density of glycerine is  $d/2$ , then the viscous force acting on the ball will be:

- (1)  $3/2 \text{ Mg}$                       (2)  $2 \text{ Mg}$   
(3)  $\text{Mg}/2$                       (4)  $\text{Mg}$

39. Ice at  $-20^\circ\text{C}$  is added to 50 g of water at  $40^\circ\text{C}$ . When the temperature of the mixture reaches  $0^\circ\text{C}$ , it is found that 20 g of ice is still unmelted. The amount of ice added to the water was close to (Specific heat of water =  $4.2 \text{ J/g}^\circ\text{C}$  Specific heat of Ice =  $2.1 \text{ J/g}^\circ\text{C}$  Heat of fusion of water at  $0^\circ\text{C} = 334 \text{ J/g}$ )

- (1) 100 g                      (2) 60 g  
(3) 50 g                      (4) 40 g

40. Water flows in a horizontal tube (see figure). The pressure of water changes by  $700 \text{ Nm}^{-2}$  between A and B where the area of cross section are  $40 \text{ cm}^2$  and  $20 \text{ cm}^2$ , respectively. Find the rate of flow of water through the tube.



- (density of water =  $1000 \text{ kgm}^{-3}$ )  
(1)  $1810 \text{ cm}^3/\text{s}$   
(2)  $2420 \text{ cm}^3/\text{s}$   
(3)  $3020 \text{ cm}^3/\text{s}$   
(4)  $2720 \text{ cm}^3/\text{s}$

41. A pendulum clock loses 12s a day if the temperature is  $40^\circ\text{C}$  and gains 4s a day if the temperature is  $20^\circ\text{C}$ . The temperature at which the clock will show correct time, and the co-efficient of linear expansion ( $\alpha$ ) of the metal of the pendulum shaft are respectively:

- (1)  $30^\circ\text{C}$ ;  $\alpha = 1.85 \times 10^{-3}/^\circ\text{C}$   
(2)  $55^\circ\text{C}$ ;  $\alpha = 1.85 \times 10^{-2}/^\circ\text{C}$   
(3)  $25^\circ\text{C}$ ;  $\alpha = 1.85 \times 10^{-5}/^\circ\text{C}$   
(4)  $60^\circ\text{C}$ ;  $\alpha = 1.85 \times 10^{-4}/^\circ\text{C}$

42. If the temperature of the sun were to increase from  $T$  to  $2T$  and its radius from  $R$  to  $2R$ , then the ratio of the radiant energy received on earth to what it was previously will be

- (1) 32                      (2) 16  
(3) 4                      (4) 64

43. A force  $F$  is needed to break a copper wire having radius  $R$ . The force needed to break a copper wire of radius  $2R$  will be

- (1)  $F/2$                       (2)  $2F$   
(3)  $4F$                       (4)  $F/4$

44. According to Newton's law of cooling, the rate of cooling of a body is proportional to  $(\Delta\theta)^n$ , where  $\Delta\theta$  is the difference of the temperature of the body and the surrounding, and  $n$  is equal to

- (1) two                      (2) three  
(3) four                      (4) one

45. A capillary tube of radius  $r$  is immersed in water and water rises in it to a height  $h$ . The mass of the water in the capillary is 5g. Another capillary tube of radius  $2r$  is immersed in water. The mass of water that will rise in this tube is:

- (1) 5.0 g                      (2) 10.0 g  
(3) 20.0 g                      (4) 2.5

46. Two spheres of the same material have radii 1 m and 4 m and temperatures 400 K and 200 K respectively. The ratio of the energy radiated per second by the first sphere to that by the second is

- (1) 1 : 1                      (2) 16 : 1  
(3) 4 : 1                      (4) 1 : 9

47. A thermometer graduated according to a linear scale reads a value  $x_0$  when in contact with boiling water, and  $x_0/3$  when in contact with ice. What is the temperature of an object in  $^\circ\text{C}$ , if this thermometer in the contact with the object reads  $x_0/2$ ?

- (1) 60                      (2) 35  
(3) 25                      (4) 40

48. A hollow spherical shell at outer radius  $R$  floats just submerged under the water surface. The inner radius of the shell is  $r$ . If the specific gravity of the shell material is  $27/8$  w.r.t water, the value of  $r$  is :

- (1)  $\frac{2}{3}R$                       (2)  $\frac{4}{9}R$   
(3)  $\frac{1}{3}R$                       (4)  $\frac{8}{9}R$

49. The length of metallic wire is  $l_1$  when tension in it is  $T_1$ . It is  $l_2$  when the tension is  $T_2$ . The original length of the wire will be:

- (1)  $\frac{T_1 l_1 - T_2 l_2}{T_2 - T_1}$                       (2)  $\frac{l_1 + l_2}{2}$   
(3)  $\frac{T_2 l_1 + T_1 l_2}{T_1 + T_2}$                       (4)  $\frac{T_2 l_1 - T_1 l_2}{T_2 - T_1}$

50. A wind with speed  $40$  m/s blows parallel to the roof of a house. The area of the roof is  $250$  m<sup>2</sup>. Assuming that the pressure inside the house is atmospheric pressure, the force exerted by the wind on the roof and the direction of the force will be ( $P_{\text{air}} = 1.2$  kg/m<sup>3</sup>)

- (1)  $4.8 \times 10^5$  N, downwards  
(2)  $4.8 \times 10^5$  N, upwards  
(3)  $2.4 \times 10^5$  N, upwards  
(4)  $2/4 \times 10^5$  N, downwards

**CHEMISTRY**

**SECTION - A**

- 51.** Boric acid is polymeric due to:
- (1) its acidic nature
  - (2) the presence of hydrogen bonds
  - (3) its monobasic nature
  - (4) its geometry
- 52.** On the addition of mineral acid to an aqueous solution of borax, which of the following compound is formed?
- (1) Boron hydride
  - (2) Orthoboric acid
  - (3) Metaboric acid
  - (4) Pyroboric acid
- 53.** When borax is heated in a Bunsen burner flame with CoO on a loop of platinum wire:
- (1) a coloured CoBO<sub>2</sub> bead is formed.
  - (2) a coloured Co(BO<sub>2</sub>)<sub>3</sub> bead is formed.
  - (3) a coloured CoBO bead is formed.
  - (4) a coloured Co(BO<sub>2</sub>)<sub>2</sub> bead is formed.
- 54.** Borax is used:
- (1) in making enamel and pottery glazes
  - (2) as a flux in soldering
  - (3) in making optical glasses.
  - (4) All of these
- 55.** From the B<sub>2</sub>H<sub>6</sub> all the following can be prepared except:
- (1) H<sub>3</sub>BO<sub>3</sub>
  - (2) [BH<sub>2</sub>(NH<sub>3</sub>)<sub>2</sub>]<sup>+</sup> [BH<sub>4</sub>]<sup>-</sup>
  - (3) B<sub>2</sub>(CH<sub>3</sub>)<sub>6</sub>
  - (4) NaBH<sub>4</sub>
- 56.** Identify the correct statement.
- (1) Gypsum contains a lower percentage of calcium than Plaster of Paris
  - (2) Gypsum is obtained by heating Plaster of Paris
  - (3) Plaster of Paris is obtained by hydration of gypsum
  - (4) Plaster of Paris is obtained by partial oxidation of gypsum
- 57.** When Al is added to sodium hydroxide solution:
- (1) no reaction takes place
  - (2) oxygen is evolved
  - (3) water is produced
  - (4) hydrogen is evolved
- 58.** Correct formula of borax is:
- (1) Na<sub>2</sub> [B<sub>4</sub>O<sub>5</sub> (OH)<sub>4</sub>].8H<sub>2</sub>O
  - (2) Na[B<sub>4</sub>O<sub>5</sub> (OH)<sub>5</sub>].8H<sub>2</sub>O
  - (3) Na<sub>2</sub> [B<sub>4</sub>O<sub>5</sub> (OH)<sub>4</sub>].10H<sub>2</sub>O
  - (4) Na<sub>2</sub> [B<sub>4</sub>O<sub>5</sub> (OH)<sub>4</sub>].6H<sub>2</sub>O
- 59.** Identify the incorrect statement about the structure of diborane.
- (1) The four terminal hydrogen atoms and the two boron atoms lie in one plane.
  - (2) There are two bridging hydrogen atoms.
  - (3) All six B – H bond are regular two centre two electron bonds.
  - (4) The hybridisations of both the boron atoms are same and sp<sup>3</sup>.
- 60.** The stability of tetrahalides of Si, Ge, Sn and Pb increases in the order:
- (1) Pb<sup>4+</sup> < Sn<sup>4+</sup> < Ge<sup>4+</sup> < Si<sup>4+</sup>
  - (2) Si<sup>4+</sup> < Ge<sup>4+</sup> < Sn<sup>4+</sup> < Pb<sup>4+</sup>
  - (3) Pb<sup>4+</sup> < Ge<sup>4+</sup> < Si<sup>4+</sup> < Sn<sup>4+</sup>
  - (4) Sn<sup>4+</sup> < Ge<sup>4+</sup> < Pb<sup>4+</sup> < Si<sup>4+</sup>
- 61.** The set representing the correct order of first ionisation potential is:
- (1) Ca > Mg > Be
  - (2) Be > Mg > Ca
  - (3) Mg > Ca > Be
  - (4) Be > Ca > Mg
- 62.** Which of the following statements is correct with respect to the property of elements with increase in atomic number in the carbon family (group 14)?
- (1) Their metallic character decrease.
  - (2) The stability of +2 oxidation state increase.
  - (3) Their ionization energies increase.
  - (4) Their atomic size decrease.
- 63.** Which of the following is true for diamond?
- (1) It is a good conductor of electricity.
  - (2) It is soft.
  - (3) It is a good conductor of heat.
  - (4) It is made up of C, H and O.
- 64.** Carbon monoxide is:
- (1) acidic
  - (2) neutral
  - (3) amphoteric
  - (4) basic



65. Select the correct statement.
- (1) Density of alkali metals regularly increases in moving down the group from Li to Cs.
  - (2) Group 1 elements are the largest in their horizontal periods in the periodic table (exclude noble gases).
  - (3) The melting and boiling points of group 1 elements increases on moving down from Li to Cs.
  - (4) Alkali metals are harder than alkaline earth metals.
66. Glass is soluble in:
- (1) HF
  - (2) H<sub>2</sub>SO<sub>4</sub>
  - (3) HClO<sub>4</sub>
  - (4) aqua-regia
67. Which of the following statement is incorrect:
- (1) At equilibrium, concentration of reactants must be equal to concentration of products.
  - (2) Equilibrium can be attained in both homogenous and heterogenous reaction.
  - (3) Approach to the equilibrium is fast in initial state but gradually it decreases.
  - (4) Equilibrium is dynamic in nature
68. Na and Li are placed in dry air. We get:
- (1) NaOH, Na<sub>2</sub>O, Li<sub>2</sub>O
  - (2) Na<sub>2</sub>O, Li<sub>2</sub>O
  - (3) Na<sub>2</sub>O, Li<sub>2</sub>O, Li<sub>3</sub>N, NH<sub>3</sub>
  - (4) Na<sub>2</sub>O, Li<sub>3</sub>N, Li<sub>2</sub>O, Na<sub>2</sub>O<sub>2</sub>
69.  $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$   
 In above reaction, at equilibrium condition mole fraction of PCl<sub>5</sub> is 0.4 and mole fraction of Cl<sub>2</sub> is 0.3. Then find out mole fraction of PCl<sub>3</sub>
- $$\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$$
- (1) 0.3
  - (2) 0.7
  - (3) 0.4
  - (4) 0.6
70. The reaction,  $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$  is started in a five litre container by taking one mole of PCl<sub>5</sub>. If 0.3 mole of PCl<sub>5</sub> is there at equilibrium, concentration of PCl<sub>3</sub> and K<sub>C</sub> will respectively be:
- (1) 0.14,  $\frac{49}{150}$
  - (2) 0.12,  $\frac{23}{100}$
  - (3) 0.07,  $\frac{23}{100}$
  - (4) 20,  $\frac{49}{150}$
71. The equilibrium constant for the reaction  $\text{Br}_2 \rightleftharpoons 2\text{Br}$  at 500 K and 700 K are  $1 \times 10^{-10}$  and  $1 \times 10^{-5}$  respectively. The reaction is:
- (1) Endothermic
  - (2) Exothermic
  - (3) Fast
  - (4) Slow
72. In the following reversible reaction  
 $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g}) + Q \text{ cal}$   
 Most suitable condition for the higher production of SO<sub>3</sub> is
- (1) High temperature and high pressure
  - (2) High temperature and low pressure
  - (3) Low temperature and high pressure
  - (4) Low temperature and low pressure
73. The gas used in the hydrogenation of oils presence of nickel as a catalyst is:
- (1) Methane
  - (2) Ethane
  - (3) Ozone
  - (4) Hydrogen
74. Which of the following cannot decompose on heating to give CO<sub>2</sub>?
- (1) Li<sub>2</sub>CO<sub>3</sub>
  - (2) Na<sub>2</sub>CO<sub>3</sub>
  - (3) KHCO<sub>3</sub>
  - (4) BaCO<sub>3</sub>
75. Ostwald's dilution law gives satisfactory results with the solution of which electrolyte?
- (1) HCl
  - (2) HNO<sub>3</sub>
  - (3) CH<sub>3</sub>COOH
  - (4) NaOH
76. On adding 0.04 g solid NaOH to a 100 mL, M/200 Ba(OH)<sub>2</sub> solution, determine change in pH:
- (1) 0
  - (2) +0.3
  - (3) -0.3
  - (4) +0.7
77. Pure water is kept in a vessel and it remains exposed to atmospheric CO<sub>2</sub> which is absorbed. Then its pH will be:
- (1) Greater than 7
  - (2) Less than 7
  - (3) 7
  - (4) Depends on ionic product of water
78. For two weak acid A and B, the ratio of their percent ionization is 4 : 9. The ratio of their K<sub>a</sub> would be:
- (1) 4: 9
  - (2) 2: 3
  - (3) 16: 81
  - (4) 3: 2
79. Which of the following statements is true for all the alkali metals?
- (1) Their nitrates decompose on heating to give the corresponding nitrites and oxygen.
  - (2) Their chlorides are deliquescent and crystallise as hydrates.
  - (3) They react with water to form hydroxide and hydrogen.
  - (4) They readily react with halogens to form ionic halides, M<sup>+</sup>X<sup>-</sup>.

80. Which of the following statement is incorrect?
- (1) The superoxide ion (i.e.,  $O_2^-$ ) is stable only in presence of larger cations such as K, Rb, Cs.
  - (2) Alkali metals are normally kept in kerosene oil.
  - (3) All the alkali metal hydrides are ionic solids with high melting points.
  - (4) The concentrated solution of alkali metals in liquid ammonia are strong paramagnetic in nature.

81. The compound that can work both as an oxidising as well as a reducing agent is:
- (1)  $KMnO_4$
  - (2)  $H_2O_2$
  - (3)  $HNO_3$
  - (4)  $K_2Cr_2O_7$

82. In the ionic equation  $2K^+BrO_3^- + 12H^+ + 10e^- \rightarrow Br_2 + 6H_2O + 2K^+$ , the equivalent weight of  $KBrO_3$  will be:
- (1)  $M/5$
  - (2)  $M/2$
  - (3)  $M/6$
  - (4)  $M/4$

83. Zeolites are extensively used in –
- (1) Softening of water and catalyst
  - (2) Preparing heavy water
  - (3) Increasing the hardness of water
  - (4) Mond's process

84. Bleaching action of  $H_2O_2$  is due to its:
- (1) Oxidising nature
  - (2) Reducing nature
  - (3) Acidic nature
  - (4) thermal instability

85. Which of the following alkali metals gives hydrated salts?
- (1) Li
  - (2) Na
  - (3) K
  - (4) Cs

#### SECTION - B

86. Match the metals given in Column-I with their characteristic colour of flame in oxidising flame given in Column-II using the codes given.

Column-I	Column-II
(a) Li	(p) Violet or Lilac
(b) Na	(q) Red violet
(c) K	(r) Golden yellow
(d) Rb	(s) Crimson red

(A)	(B)	(C)	(D)
(1) s	p	q	r
(2) s	r	p	q
(3) s	r	q	p
(4) r	s	p	q

87. Identify the correct statement.
- (1) Sodium metal can be prepared by the electrolysis of an aqueous solution of NaCl.
  - (2) Sodium metal can be kept under ethyl alcohol.
  - (3) Sodium metal is insoluble in liquid  $NH_3$  at low temperature.
  - (4) Elemental sodium is easily oxidised.

88.  $K_{sp}$  of  $AgCl$  is  $1 \times 10^{-10}$ . Its solubility in 0.1 M  $KNO_3$  will be:
- (1)  $10^{-5}$  moles/litre
  - (2)  $> 10^{-5}$  moles/litre
  - (3)  $< 10^{-5}$  moles/litre
  - (4) None of these

89. Which of the following metals does give characteristic flame colouration?
- (1) Be
  - (2) Mg
  - (3) Ca
  - (4) All of these

90. Carbon forms a large number of compounds because it has:
- (1) fixed valency
  - (2) contains non-metallic nature
  - (3) high ionization potential
  - (4) contains property of catenation

91.  $N_2 + O_2 \rightleftharpoons 2NO$ . For this reaction  $K_p = 100$ , then  $K_p$  for reaction,  $2NO \rightleftharpoons N_2 + O_2$  will be:
- (1) 0.01
  - (2) 0.1
  - (3) 10
  - (4) 100

92. Identify the amphoteric species from the following?
- (I)  $H_2O$
  - (II)  $NH_3$
  - (III)  $H_2PO_4^-$
  - (IV)  $HCO_3^-$
- (1) I, II
  - (2) III, IV
  - (3) I, II, III
  - (4) I, II, III, IV

93. The correct order of melting point of alkali metal halides is:
- (1)  $MF > MCl > MBr > MI$
  - (2)  $MI > MBr > MCl > MF$
  - (3)  $MCl > MF > MBr > MI$
  - (4)  $MI > MF > MCl > MBr$

94. Which of the following is a redox reaction?
- (1)  $NaCl + KNO_3 \rightarrow NaNO_3 + KCl$
  - (2)  $CaC_2O_4 + 2HCl \rightarrow CaCl_2 + H_2C_2O_4$
  - (3)  $Mg(OH)_2 + 2NH_4Cl \rightarrow MgCl_2 + 2NH_4OH$
  - (4)  $Zn + 2AgCN \rightarrow 2Ag + Zn(CN)_2$

95. Which of the following salts on heating gives a mixture of two gases?  
(1)  $\text{Ca}(\text{NO}_3)_2$       (2)  $\text{NaNO}_3$   
(3)  $\text{KNO}_3$       (4)  $\text{RbNO}_3$
96. Diborane reacts with water to form:  
(1)  $\text{HBO}_2$       (2)  $\text{H}_3\text{BO}_3$   
(3)  $\text{H}_3\text{BO}_3 + \text{H}_2$       (4)  $\text{H}_2$
97. For the redox reaction  $\text{MnO}_4^- + \text{C}_2\text{O}_4^{2-} + \text{H}^+ \rightarrow \text{Mn}^{2+} + \text{CO}_2 + \text{H}_2\text{O}$ , the correct stoichiometric coefficients of  $\text{MnO}_4^-$ ,  $\text{C}_2\text{O}_4^{2-}$  and  $\text{H}^+$  are respectively:  
(1) 2, 5, 16      (2) 16, 5, 2  
(3) 5, 16, 2      (4) 2, 16, 5
98. When a mixture of air is passed over red hot coke, the outgoing gas is:  
(1) producer gas  
(2) water gas  
(3) coal gas  
(4) none of these gases
99. Select Polyprotic Arrhenius acids from the following:  
(1)  $\text{H}_3\text{PO}_2$       (2)  $\text{H}_3\text{PO}_3$   
(3)  $\text{H}_3\text{BO}_3$       (4)  $\text{HCOOH}$
100. Hydrogen peroxide is now generally prepared on industrial scale by the-  
(1) Action of  $\text{H}_2\text{SO}_4$  on barium peroxide  
(2) Action of  $\text{H}_2\text{SO}_4$  on sodium peroxide  
(3) Autooxidation of 2-Alkylanthraquinols  
(4) Burning hydrogen in excess of oxygen

## BOTANY

### SECTION-A

- 101.** Mark the mis-matched pair.
- (1) Alcohol dehydrogenase – Zinc
  - (2) PEP carboxylase – Magnesium
  - (3) Urease – Molybdenum
  - (4) Catalase – Iron
- 102.** Plants can be grown to maturity in nutrient solution in complete absence of soil was first demonstrated by
- (1) Priestley
  - (2) Blackman
  - (3) Von Sachs
  - (4) Engelmann
- 103.** Which one may not be a criterion for essentiality of elements?
- (1) Unavoidable
  - (2) Irreplaceable
  - (3) Involved in metabolism indirectly
  - (4) Requirement must be specific
- 104.** Essential elements that act as components of biomolecules and hence structural elements of cell are
- (1) Mg, Zn, C, H
  - (2) C, H, O, N
  - (3) K, C, H, Mg
  - (4) Fe, H, O, N
- 105.** Element that has its role in activation of enzyme nitrogenase is
- (1) Mn
  - (2) Mo
  - (3) Zn
  - (4) Mg
- 106.** Essential element as the common constituent of coenzyme A, biotin and thiamine is
- (1) Fe
  - (2) S
  - (3) Zn
  - (4) Cu
- 107.** Choose incorrect statement w.r.t. boron.
- (1) Absorbed as  $\text{BO}_3^{3-}$  or  $\text{B}_4\text{O}_7^{2-}$
  - (2) Required for uptake and utilisation of  $\text{Ca}^{2+}$
  - (3) Required for cell elongation
  - (4) Useful in pollen germination but not carbohydrate translocation
- 108.** *Nitrococcus* and *Nitrobacter* bacteria are
- (1) Capable of converting dinitrogen into  $\text{NH}_3$
  - (2) Chemoautotrophs
  - (3) Heterotrophs but increase soil fertility
  - (4) Free-living photoautotrophs in soil
- 109.** How many ATP are needed to reduce one molecule of dinitrogen into  $2\text{NH}_3$  by symbiotic  $\text{N}_2$  fixation with release of  $\text{H}_2$ ?
- (1) 8
  - (2) 16
  - (3) 4
  - (4) 1
- 110.** The best defined function of manganese in plant is
- (1) Splitting of water in light reaction of photosynthesis
  - (2) Respiration and nitrogen metabolism
  - (3) Synthesis of chlorophyll
  - (4) Component of enzymes involved in redox reactions
- 111.** In cell cycle, DNA replication takes place in
- (1)  $G_1$  phase
  - (2)  $G_2$  phase
  - (3) mitotic metaphase
  - (4) S phase
- 112.** During cell division, the spindle fibres attach to the chromosome at a region called
- (1) chromocentre
  - (2) kinetochore
  - (3) centriole
  - (4) chromomere
- 113.** The centromere is situated close to its ends and forming one extremely short and one very long arm in
- (1) Metacentric chromosome
  - (2) Sub-metacentric chromosome
  - (3) Acrocentric chromosome
  - (4) Telocentric chromosome
- 114.** In a cell that is not dividing, the chromosomes are visible as a tangle of fine threads called:
- (1) Chromatin
  - (2) Microtubules
  - (3) Nucleotin
  - (4) Microfilaments
- 115.** Series of changes that occur in a newly formed cell till it grows and divides to form the daughter cells are called:
- (1) Cell cycle
  - (2) Interphase
  - (3) Generation cycle
  - (4) Mitosis
- 116.** Chromosomes arrange at equatorial plate of division during:
- (1) Prophase
  - (2) Anaphase
  - (3) Metaphase
  - (4) Telophase
- 117.** What is the proper sequence in mitosis?
- (1) Telophase, anaphase, metaphase and prophase
  - (2) Anaphase, metaphase, telophase and prophase
  - (3) Prophase, metaphase, anaphase and telophase
  - (4) Metaphase, telophase, prophase and anaphase

118. Correct sequence of stages in cell cycle is:

- (1) G<sub>1</sub>, S, G<sub>2</sub>, M
- (2) G<sub>1</sub>, G<sub>2</sub>, S, M
- (3) M, S, G<sub>1</sub>, G<sub>2</sub>
- (4) G<sub>2</sub>, G<sub>1</sub>, M, S

119. A phase which is reverse of prophase is:

- (1) Metaphase
- (2) Telophase
- (3) Anaphase
- (4) Interphase

120. Mitotic spindle is mainly composed of the protein:

- (1) Actin
- (2) Actomyosin
- (3) Tubulin
- (4) Myoglobin

121. Best stage to observe shape, size and number of chromosomes is:

- (1) Interphase
- (2) Metaphase
- (3) Prophase
- (4) Telophase

122. Synaptonemal complex is formed during:

- (1) Cytokinesis
- (2) Amitosis
- (3) Mitosis
- (4) Meiosis

123. Recombination of genes occur at:

- (1) Prophase in meiosis
- (2) Prophase I in meiosis
- (3) Prophase II in meiosis
- (4) Metaphase II in meiosis

124. Cell plate formation starts with:

- (1) Epiplast formation
- (2) Tonoplast formation
- (3) Protoplast formation
- (4) Phragmoplast formation

125. Facilitated diffusion is different from active transport in

- (1) Uphill transport
- (2) Down hill transport
- (3) Requirement of carrier proteins
- (4) Showing saturation kinetics

126. The positive hydrostatic pressure developing in xylem element is called \_\_\_\_\_ and is responsible for bleeding in plants

- (1) Osmotic pressure
- (2) Root pressure
- (3) Imbibitional pressure
- (4) Diffusion pressure

127. At night and early morning, excess water collects in the form of droplets around special opening of veins near the tip of grass blades and leaves of many herbaceous plants. Such water loss in its liquid phase is known as \_\_\_\_\_ at the result of \_\_\_\_\_

- (1) Bleeding, positive pressure
- (2) Guttation, negative pressure
- (3) Guttation, root pressure
- (4) Transpiration, negative pressure

128. Stomatal apparatus consists of

- (1) Guard cells and subsidiary cells
- (2) Permanent tissue differentiated from periblem meristem
- (3) Primary permanent tissue formed by calyptrogen
- (4) Stomatal aperture, guard cells and subsidiary cells

129. Diffusion is a \_\_\_\_\_ process and is not dependent on \_\_\_\_\_.

- (1) Slow, gradient of concentration
- (2) Slow, living system
- (3) Rapid, temperature
- (4) Rapid, pressure

130. Diffusion of gases

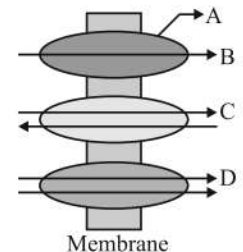
- (1) Occurs against the concentration gradient
- (2) Is due to random kinetic motion of particles
- (3) Are not independent of other gases
- (4) Does not depend upon temperature

131. The porins

- (1) Have been reported in eukaryotes only
- (2) Allow passage of very large sized solutes
- (3) Are protein lined pores present in all prokaryotes
- (4) Are proteins that form huge pores in outer membranes

132. Identify the structure and process labelled A, B, C and D in the diagram given

- (1) A-Carrier protein  
B-Uniport  
C-Antiport  
D-Symport
- (2) A-Transported molecule  
B-Uniport  
C-Symport  
D-Antiport
- (3) A-Carrier protein  
B-Symport  
C-Antiport  
D-Uniport
- (4) A-Transported molecule  
B-Antiport  
C-Symport  
D-Uniport



133. Control points where a plant adjusts the quantity and types of solutes that reach the xylem, are

- (1) Specific proteins of root hair membrane
- (2) Transport proteins of endodermal cells
- (3) Cytoplasm of epidermal cells
- (4) Wall of xylem

134. Numerically osmotic pressure is equivalent to the osmotic potential. Osmotic pressure is \_\_\_\_\_ pressure while osmotic potential is \_\_\_\_\_.
- (1) Positive, Negative
  - (2) Negative, Positive
  - (3) Zero, Negative
  - (4) Negative, Zero

135. Root hairs are thin-walled slender extensions of root epidermal cells that greatly increase the surface area for absorption. Water absorption by root hairs is purely by
- (1) Diffusion
  - (2) Osmosis
  - (3) Apoplast
  - (4) Symplast

### SECTION-B

136. The first stable product of biological nitrogen fixation by *Rhizobium* in root nodules of legumes is

- (1)  $N_2H_2$
- (2)  $N_2H_4$
- (3)  $NH_3$
- (4)  $NO_3$

137. Most common amides in plants are

- (1) Asparagine and glutamic acid
- (2) Glutamine and asparagine
- (3) Transported through phloem
- (4) Formed by transamination

138. Find out correct match

- (1) Necrosis – Ca, Mg, Na
- (2) Chlorosis – Zn, Mo, Mg
- (3) Delay in flowering – N, K, Si, Mo
- (4) Inhibition of cell division – Ca, Mg, Co, K

139. Prominent symptom of Mn toxicity in plants is

- (1) Brown spots surrounded by chlorotic veins
- (2) Chlorotic spots surrounded by brown veins
- (3) Increased translocation of  $Ca^{2+}$  to shoot apices
- (4) Inhibition of Mg absorption only

140. Ammonia is oxidised to nitrite by

- (1) *Nitrosomonas*
- (2) *Azotobacter*
- (3) *Rhodospirillum*
- (4) *Frankia*

141. Match Column-I with Column-II and select the correct option from the codes given below.

- | Column-I                              | Column-II       |
|---------------------------------------|-----------------|
| A. Disintegration of Nuclear membrane | I. Anaphase     |
| B. Appearance of nucleolus            | II. Prophase    |
| C. Division of centromere             | III. Telophase- |
| D. Replication of DNA                 | IV. S-phase     |

- (1) A-II; B-III; C-I; D-IV
- (2) A-II; B-III; C-IV; D-I
- (3) A-III; B-II; C-I; D-IV
- (4) A-III; B-II; C-IV; D-I

142. The stage between two meiotic divisions is called interkinesis and

- (1) Is long lived
- (2) Is followed by prophase I
- (3) Is generally short lived and followed by prophase II
- (4) Involves duplication of genes and centrioles

143. Which is correct w.r.t. anaphase?

- (1) Centromeres split and chromatids separate
- (2) Spindle fibres attach to kinetochores
- (3) Chromosomes are moved to spindle equator
- (4) Chromatid splits by recombinase activity

144. Mark the incorrect for pachytene-

- (1) Crossing over occur
- (2) Exchange of genetic material between non sister chromatids
- (3) Dissolution of synaptonemal complex
- (4) Recombinase active

145. Nuclear membrane disappear in ..... phase of mitosis

- (1) Early Prophase
- (2) Mid metaphase
- (3) Late prophase
- (4) Anaphase

146. Root pressure

- (1) Decreases by active salt secretion in xylem
- (2) Increases by increasing osmotic potential
- (3) Is positive hydrostatic pressure which can exceed beyond 2 atm
- (4) Does not generate in actively transpiring plants and tall trees

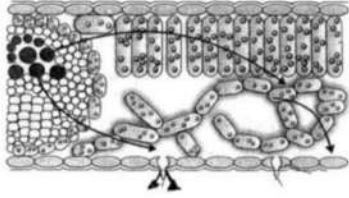
147. Loading and unloading in sieve tube at source and sink is respectively

- (1) Active, active
- (2) Active, passive
- (3) Passive, active
- (4) Passive, passive

148. A ring of bark upto the depth of phloem layer is removed carefully. This experiment will

- (1) Prove that phloem is responsible for food transport
- (2) Swelling of xylem part
- (3) Prove xylem transport food
- (4) All of these

149. Study the given diagram of water movement in the leaf. What force does a plant use to move water molecules into the leaf parenchyma?



- (1) Positive pressure generated in root is responsible
- (2) The root pressure which re-establishes the continuous chain of water molecules in the xylem which often breaks under the enormous tensions

- (3) Evaporation from the leaf sets up a pressure gradient
- (4) Both (1) & (2)

150. Which is incorrect w.r.t facilitated diffusion?

- (1) Requires special membrane protein
- (2) Always downhill
- (3) Transport protein does not move like carriers of active transport
- (4) Highly selective but not affected by protein inhibitors

## ZOOLOGY

### SECTION - A

**151.** Which one of the following gives its correct total number?

- (1) Floating Ribs-4
- (2) True Ribs-22
- (3) False Ribs-1
- (4) Cervical Vertebrae in humans-10

**152.** Glomerular filtrate is

- (1) Blood minus blood corpuscles and plasma protein
- (2) Blood minus corpuscles
- (3) Mixture of water, ammonia and corpuscles
- (4) Urine

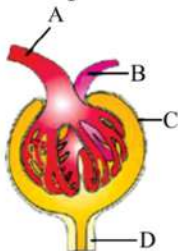
**153.** A large quantity of fluid is filtered every day by the nephrons in the kidneys. Only about 1% of it is excreted as urine. The remaining 99% of the filtrate

- (1) Gets collected in the renal pelvis
- (2) Is lost as sweat
- (3) Is stored in the urinary bladder
- (4) Is reabsorbed into the blood

**154.** Which of the following organs synthesizes urea?

- (1) Duodenum
- (2) Kidney
- (3) Liver
- (4) Pancreas

**155.** Identify A to D in the following structure and choose the correct option for A, B, C and D



- (1) A-Afferent-arteriole, B-Efferent-arteriole, C-Bowman's capsule, D-Proximal convoluted tubule
- (2) A-Efferent arteriole, B-Afferent arteriole, C-Bowman's DTC
- (3) A-Efferent arteriole, B-Efferent arteriole, C-Bowman's capsule, D-DCT
- (4) A-Efferent arteriole, B-Afferent arteriole, C-Bowman's capsule, D-DCT

**156.** ANF mechanism checks on

- (1) Oxytocin – renin mechanism
- (2) Counter – current mechanism
- (3) Renin – angiotensin mechanism
- (4) Oxytocin – angiotensin mechanism

**157.** I. Glucose                      II. Amino acid  
III. Na<sup>+</sup>                         IV. Nitrogenous waste

Which of them reabsorbed actively in the nephron?

Choose the correct option

- (1) I and II
- (2) I, II and III
- (3) I and III
- (4) Only I

**158.** PCT is lined by

- (1) Cuboidal epithelium
- (2) Squamous epithelium
- (3) Columnar epithelium
- (4) Stratified epithelium

**159.** Percentage of electrolytes and water reabsorbed by PCT is

- (1) 60-70
- (2) 70-80
- (3) 80-90
- (4) 90-95

**160.** Glucose and amino acids are reabsorbed in the

- (1) Proximal convoluted tubule
- (2) Distal convoluted tubule
- (3) Collecting duct
- (4) Loop of Henle

**161.** In which part of nephron, reabsorption is minimum from filtrate?

- (1) Henle's loop
- (2) Proximal convoluted tubule
- (3) Distal convoluted tubule
- (4) Collecting duct

**162.** Angiotensin-II activates the ....A.... and release .....B.....

Choose the correct option for A and B to complete the given statement

- (1) A-adrenal cortex; B-aldosterone
- (2) A-adrenal medulla; B-aldosterone
- (3) A-adrenal capsule; B-aldosterone
- (4) A-adrenal medulla; B-oxytocin

**163.** Ca<sup>2+</sup> bind ...A... in skeletal muscles and leads to the exposure of binding site for ...B... on the filament ...C...

Identify A, B and C, so as to complete the given statements

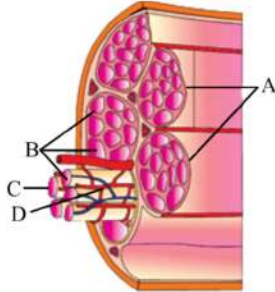
- (1) A-troponin, B-actin, C-relaxin
- (2) A-actin, B-myosin, C-troponin
- (3) A-troponin, B-myosin, C-actin
- (4) A-tropomyosin, B-myosin, C-actin



164. The membrane sarcolemma is found over

- (1) Heart (2) Muscle fiber  
(3) Both (1) & (2) (4) Nerve fiber

165. Identify *A, B, C* and *D* in the given diagram and choose the correct option



- (1) A-Fascicle, B-Muscle fibre, C-Sarcolemma, D-Blood capillary  
(2) A-Muscle fibre, B-Fascicle, C-Sarcolemma, D-Blood capillary  
(3) A-Muscle fibre, B-Fascicle, C-Sarcoplasm, D-Blood capillary  
(4) A-Muscle fibre, B-Endoplasmic reticulum, C-Sarcolemma, D-Blood capillary

166. Select the correct statement with reference to muscle structure

- I. Each myosin is a polymerized protein  
II. Many meromyosin constitutes one thick filament (myosin)  
III. Each meromyosin's tail is called heavy meromyosin (HMM) and head is called light meromyosin (LMM)  
IV. The globular head is an active ATPase enzyme and has binding sites for ATP and active sites for actin

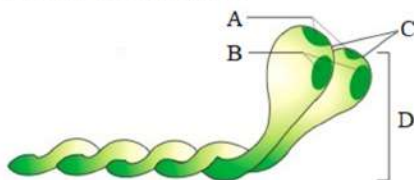
Choose the option with correct statements

- (1) All except I and II  
(2) All except III and IV  
(3) All except III  
(4) All except I and IV

167. In the centre of each I-band there is an elastic fibre called

- (1) I-line (2) Z-line  
(3) A-line (4) H-zone

168. Identify *A, B, C* and *D*, in the given diagram and choose the correct option



- (1) A-Actin binding site, B-ATP binding site, C-Head, D-Cross arm  
(2) A-Actin binding site, B-ATP binding site, C-Head, D-Side arm

- (3) A-Actin binding site, B-ATP binding site, C-Head, D-Long arm  
(4) A-Actin binding site, B-ATP binding site, C-Head, D-Short arm

169. The machine taking the reading of electrical activity of heart is known as

- (1) MRI  
(2) Biopsy  
(3) Electrocardiograph  
(4) X-ray

170. Bowman's capsule is found in

- (1) Kidney (2) Brain  
(3) Heart (4) Lungs

171. In a vertebrate, which germ layer forms the skeletal muscles?

- (1) Ectoderm (2) Endoderm  
(3) Mesoderm (4) Both (1) and (3)

172. The number of bones present in Skull

- (1) 24 (2) 22  
(3) 30 (4) 32

173. Which of the following is important for muscle contraction and nerve impulse transmission?

- (1)  $\text{Ca}^{2+}$  ions (2)  $\text{Mg}^{2+}$  ions  
(3)  $\text{Mn}^{2+}$  ions (4)  $\text{Fe}^{2+}$  ions

174. Each myofibrils of muscles contains

- (1) Regular dark bands  
(2) Regular light bands  
(3) Both (1) and (2)  
(4) Alternate dark and light bands

175. Polyuria is a condition in which

- (1) Amount of urine pass out is more  
(2) Amount of urine pass out is less  
(3) No urine pass out  
(4) No urine formation

176. Major proteins in the human blood are

- I. fibrinogen  
II. globulins  
III. albumins

Choose the correct combination of option

- (1) I and II  
(2) II and III  
(3) I and III  
(4) I, II and III

177. Plasma is a straw coloured viscous fluid constituting nearly ...A...% of the blood, ...B...% of the plasma is water and the protein constitutes ...C...% of it.

Choose the correct option for the blanks A, B & C

- (1) A-55, B-90-92, C-6-8
- (2) A-45, B-70-80, C-6-8
- (3) A-35, B-90-92, C-6-8
- (4) A-45, B-90-92, C-6-8

178. Match the following columns

Column-I	Column-II
(A) Fibrinogen	(1) Clotting or coagulation of blood
(B) Globulins	(2) Defence mechanism of body
(C) Albumins	(3) Osmotic balance

Codes:

	A	B	C
(1)	3	2	1
(2)	3	1	2
(3)	2	1	3
(4)	1	2	3

179. In reptiles and amphibians, there is no clear cut separation of oxygenated and deoxygenated blood because they have

- (1) Only one atrium
- (2) Only one ventricle
- (3) Only two atria
- (4) Only two ventricles

180. Cardiac output is

- (1) Stroke volume  $\times$  Heart rate = 72 mL/m
- (2) Stroke volume  $\times$  Heart rate = 5 L/m
- (3) Stroke volume  $\times$  Heart rate = 500 mL/m
- (4) Stroke volume  $\times$  Heart rate = 3 L/m

181. Open circulatory system is present in

- (1) Arthropods and mammals
- (2) Mollusca and aves
- (3) Arthropods and Mollusca
- (4) Mammals and aves

182. In the ventricular diastole, the ...A... valve closes. This causes the second heart sound ...B.... Choose the correct option for A and B

- (1) A-Semilunar; B-Dub
- (2) A-Mitral; B-Dub
- (3) A-Bicuspid; B-Dub
- (4) A-Tricuspid; B-Dub

183. A specialised cardiac musculature called ...A... tissue is also distributed in the heart. A patch of this tissue is present in the right upper corner of the right atrium called ...B.... Another mass of this tissue is seen in the lower left corner of the right atrium close to the atrio-ventricular septum called ...C...

Choose the correct option for A, B and C

- (1) A-Nodal tissue, B-SAN, C-AVN
- (2) A-Nodal tissue, B-AVN, C-SAN
- (3) A-AVN, B-Nodal tissue, C-SAN
- (4) A-SAN, B-AVN, C-Nodal tissue

184. Most abundant cells in the human blood are

- (1) WBC
- (2) Plasma cells
- (3) RBC
- (4) Platelets

185. RBCs have an average life span of

- (1) 90 days
- (2) 100 days
- (3) 120 days
- (4) 140 days

#### SECTION - B

186. The functioning of the kidneys is efficiently monitored and regulated by the hormonal feedback mechanism involving

- (1) Hypothalamus
- (2) JGA
- (3) Heart
- (4) All of the above

187. Average pH of human urine is

- (1) 6.0
- (2) 9.0
- (3) 3.0
- (4) 8.0

188. In micturition,

- (1) Urethral sphincter relaxes
- (2) Ureter relaxes
- (3) Ureter contracts
- (4) Urethral sphincter contracts

189. RAAS secretes which of the following hormone?

- (1) Mineralocorticoids
- (2) Glucocorticoids
- (3) Both (1) and (2)
- (4) None of the above

190. What is glycosuria?

- (1) Low amount of sugar in urine
- (2) Low amount of fat in urine
- (3) Average amount of carbohydrate in urine
- (4) High amount of sugar in urine

- 191.** Hydra can use its tentacles for  
 (1) Capturing its prey  
 (2) Locomotion  
 (3) Digestion  
 (4) Both (1) and (2)
- 192.** Striated appearance of the myofibrils is due to  
 (1) Actin proteins  
 (2) Myosin proteins  
 (3) Both (1) and (2)  
 (4) None of these
- 193.** About \_\_\_\_\_ of the body weight of a human adult is contributed by \_\_\_\_\_?  
 (1) 60-70% , muscles  
 (2) 60-70% , cartilage  
 (3) 40-50% , muscles  
 (4) 80-90% , muscles
- 194.** Choose the correct properties of muscle fibres  
 I. Muscle fibre is lined by the plasma membrane called sarcolemma  
 II. Cytoplasm of the muscle fibre is called protoplasm  
 III. Sarcolemma of the muscle fibre encloses the sarcoplasm  
 IV. Muscle fibre is syncytium  
 Select the correct option  
 (1) All except II  
 (2) All except I  
 (3) All except III  
 (4) All except IV
- 195.** Actin and myosin filaments of muscles are also called  
 (1) Thick and thin filaments respectively  
 (2) Thin and thick filaments respectively  
 (3) Black and white filaments respectively  
 (4) White and black filaments respectively
- 196.** Renal calculi is  
 (1) Soluble mass of crystallised salts in kidney  
 (2) Soluble mass of protein in kidney  
 (3) Insoluble mass of proteins in kidney  
 (4) Insoluble mass of crystallised salt in kidney
- 197.** If the stroke volume of human heart is considered 80ml and to pump 5L of blood how many beats are required?  
 (1) 100                      (2) 80  
 (3) 63                        (4) 72
- 198.** I. Excess loss of water from body  
 II. Hypothalamus  
 III. Osmoreceptors  
 IV. ADH  
 V. Neurohypophysis  
 VI. Water reabsorption DCT and CT  
 VII. Prevention of diuresis  
 Arrange the given processes in correct sequence for regulation in kidney  
 (1) I→II→III→IV→V→VI→VII  
 (2) VII→VI→V→IV→III→II→I  
 (3) I→III→II→V→IV→VI→VII  
 (4) I→III→II→IV→V→VII→VI
- 199.** Which of the following statements regarding locomotion and movements is wrong?  
 (1) All the locomotion are movements  
 (2) All the movements are locomotion  
 (3) Locomotion and movements in higher organisms are brought by skeletal muscles  
 (4) None of the above
- 200.** Layers between the glomerular and Bowman's capsule through which the filtration takes place are  
 I. endothelium of the glomerular blood vessel  
 II. middle lamella  
 III. basement membrane between the endothelium of glomerular blood vessels and epithelium of the Bowman's capsule  
 IV. epithelium of the Bowman's capsule  
 (1) I, II and III            (2) II, III and IV  
 (3) I, III and IV         (4) I, II and IV

**PHYSICS**

**ANSWERS**

**SECTION - A**

1. (4)
2. (2)
3. (4)
4. (3)
5. (3)
6. (2)
7. (2)
8. (1)
9. (2)
10. (2)
11. (4)
12. (4)
13. (1)
14. (1)
15. (1)
16. (2)
17. (4)
18. (3)
19. (2)
20. (4)
21. (2)
22. (3)
23. (2)
24. (1)
25. (1)
26. (4)

27. (2)
28. (4)
29. (1)
30. (1)
31. (3)
32. (1)
33. (1)
34. (1)
35. (3)

**SECTION - B**

36. (3)
37. (2)
38. (3)
39. (4)
40. (4)
41. (3)
42. (4)
43. (3)
44. (4)
45. (2)
46. (1)
47. (3)
48. (4)
49. (4)
50. (3)

## CHEMISTRY

### ANSWERS

#### Section-A

51. (2)  
52. (2)  
53. (4)  
54. (4)  
55. (3)  
56. (1)  
57. (4)  
58. (1)  
59. (3)  
60. (1)  
61. (2)  
62. (2)  
63. (3)  
64. (2)  
65. (2)  
66. (1)  
67. (1)  
68. (4)  
69. (1)  
70. (1)  
71. (1)  
72. (3)  
73. (4)  
74. (2)  
75. (3)  
76. (2)

77. (2)  
78. (3)  
79. (3)  
80. (4)  
81. (2)  
82. (1)  
83. (1)  
84. (1)  
85. (1)

#### Section-B

86. (2)  
87. (4)  
88. (1)  
89. (3)  
90. (4)  
91. (1)  
92. (4)  
93. (1)  
94. (4)  
95. (1)  
96. (3)  
97. (1)  
98. (1)  
99. (2)  
100. (3)

## BOTANY

### ANSWERS

#### Section-A

- 101. (3)
- 102. (3)
- 103. (3)
- 104. (2)
- 105. (2)
- 106. (2)
- 107. (4)
- 108. (2)
- 109. (2)
- 110. (1)
- 111. (4)
- 112. (2)
- 113. (3)
- 114. (1)
- 115. (1)
- 116. (3)
- 117. (3)
- 118. (1)
- 119. (2)
- 120. (3)
- 121. (2)
- 122. (4)
- 123. (2)
- 124. (4)
- 125. (2)
- 126. (2)
- 127. (3)

- 128. (4)
- 129. (2)
- 130. (2)
- 131. (4)
- 132. (1)
- 133. (2)
- 134. (1)
- 135. (1)

#### Section-B

- 136. (3)
- 137. (2)
- 138. (2)
- 139. (1)
- 140. (1)
- 141. (1)
- 142. (3)
- 143. (1)
- 144. (4)
- 145. (3)
- 146. (4)
- 147. (1)
- 148. (1)
- 149. (3)
- 150. (4)

## ZOOLOGY

### ANSWERS

#### Section-A

- 151. (1)
- 152. (1)
- 153. (4)
- 154. (3)
- 155. (1)
- 156. (3)
- 157. (2)
- 158. (1)
- 159. (2)
- 160. (1)
- 161. (1)
- 162. (1)
- 163. (3)
- 164. (2)
- 165. (1)
- 166. (3)
- 167. (2)
- 168. (1)
- 169. (3)
- 170. (1)
- 171. (3)
- 172. (2)
- 173. (1)
- 174. (4)
- 175. (1)
- 176. (4)

- 177. (1)
- 178. (4)
- 179. (2)
- 180. (2)
- 181. (3)
- 182. (1)
- 183. (1)
- 184. (3)
- 185. (3)

#### Section-B

- 186. (4)
- 187. (1)
- 188. (1)
- 189. (1)
- 190. (4)
- 191. (4)
- 192. (3)
- 193. (3)
- 194. (1)
- 195. (2)
- 196. (4)
- 197. (3)
- 198. (3)
- 199. (2)
- 200. (3)