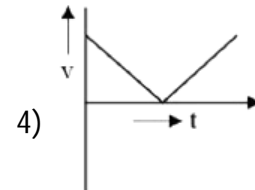
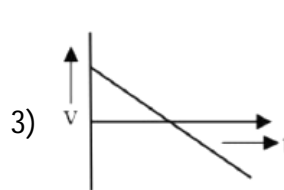
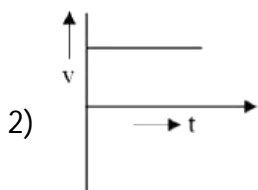
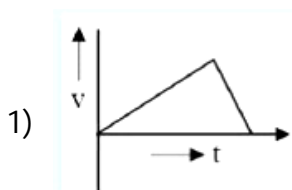
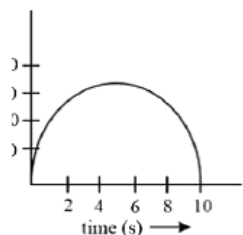


**NTA NEET MOCK TEST - 1**  
**PHYSICS**

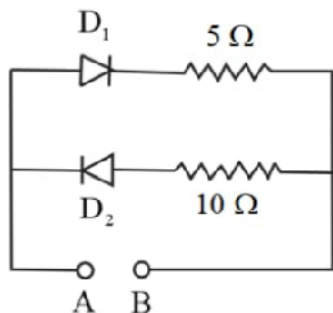
1. The displacement-time graph of a moving object is shown figure. Which of the velocity-time graphs shown in figure could represent the motion of the body?



2. Charge is distributed uniformly in some space. The net flux passing through the surface of an imaginary cube of side  $a$  in the space is  $\phi$ . The net flux passing through the surface of an imaginary sphere of radius  $a$  in the space will be

- 1)  $\phi$                       2)  $\frac{3}{4\pi}\phi$                       3)  $\frac{2\pi}{3}\phi$                       4)  $\frac{4\pi}{3}\phi$

3. A 2V battery is connected across AB as shown in the figure. The value of the current supplied by the battery when in first case battery's positive terminal is connected to A and in second case when positive terminal of battery is connected to B will respectively be:



- 1) 0.2 A and 0.1 A            2) 0.1 A and 0.2 A            3) 0.2 A and 0.4 A            4) 0.4A and 0.2 A
4. The velocity of sound in air at NTP is 330m/s. What will be its value when temperature is doubled and pressure is halved?

- 1) 330 m/s                      2) 165 m/s                      3)  $330\sqrt{2}$  m/s                      4)  $330/\sqrt{2}$  m/s

5. The total mechanical energy of a spring-mass system in simple harmonic motion is  $E = \frac{1}{2}m\omega^2 A^2$ . Suppose the oscillating particle is replaced by another particle of double the mass while the amplitude  $A$  remains the same. The new mechanical energy will

- 1) become  $2E$                       2) become  $\frac{E}{2}$                       3) become  $\sqrt{2}E$                       4) remain  $E$

6. In a physical balance working on the principle of moments, when 5mg weight is placed on the left pan, the beam becomes horizontal. Both the empty pans of the balance are of equal mass. Which of the following statements is correct?

- 1) Every object that is weighed using this balance appears lighter than its actual weight

- 2) Left arm is shorter than the right arm
- 3) Both the arms are of same length
- 4) Left arm is longer than the right arm

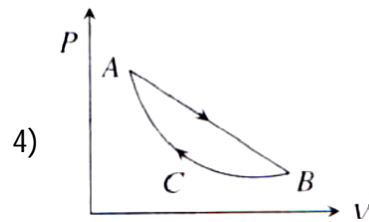
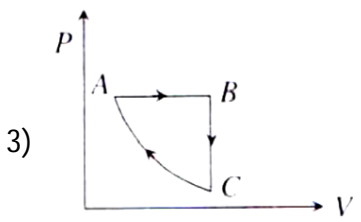
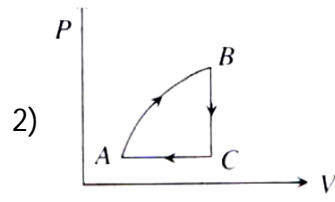
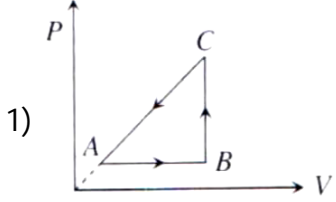
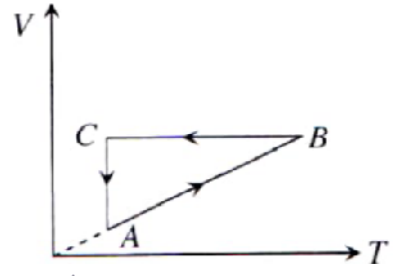
7. According to Bohr's theory of hydrogen atoms, the product of the binding energy of the electron in the  $n^{\text{th}}$  orbit and its radius in the  $n^{\text{th}}$  orbit.

- 1) is proportional to  $n^2$
- 2) is inversely proportional to  $n^3$
- 3) has a constant value of  $102. \text{ eV } \overset{\circ}{\text{A}}$
- 4) has constant value  $7.2 \text{ eV } \overset{\circ}{\text{A}}$

8. A satellite of mass  $m$  is orbiting the earth (of radius  $R$ ) at a height  $h$  from its surface. The total energy of the satellite in term of  $g_0$ , the value of acceleration due to gravity at the earth's surface, is

- 1)  $\frac{mg_0 R^2}{2(R+h)}$
- 2)  $-\frac{mg_0 R^2}{2(R+h)}$
- 3)  $\frac{2mg_0 R^2}{R+h}$
- 4)  $-\frac{2mg_0 R^2}{R+h}$

9. A cyclic process ABCA is shown in the V-T diagram. Process on the P-V diagram is



10. Consider a compound slab consisting of two different materials having equal lengths, thicknesses, cross section and thermal conductivities  $K$  and  $2K$  respectively, are connected in series. The equivalent thermal conductivity of the slab is

- 1)  $\sqrt{2}K$
- 2)  $3K$
- 3)  $\frac{4}{3}K$
- 4)  $\frac{2}{3}K$

11. Two identical satellites A and B revolve round the earth in circular orbits at distance  $R$  and  $3R$  from the surface of the earth. The ratio of the linear moment of A and B is ( $R =$  radius of the earth)

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

12. A body is in simple harmonic motion with time period  $T = 0.5\text{s}$  and amplitude  $A = 1\text{cm}$ . Find the average velocity in the interval in which it moves from equilibrium position to half of its amplitude.

- 1)  $16 \text{ cm/s}$
- 2)  $6 \text{ cm/s}$
- 3)  $4 \text{ cm/s}$
- 4)  $12 \text{ cm/s}$

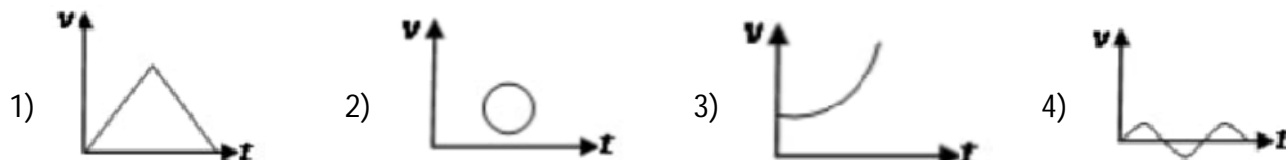
13. A current  $I$  flows through a thin wire shaped as regular polygon of  $n$  sides which can be inscribed in a circle of radius  $R$ . The magnetic field induction at the centre of polygon due to one side of the polygon is

1)  $\frac{\mu_0 I}{\pi R} \left(\tan \frac{\pi}{n}\right)$       2)  $\frac{\mu_0 I}{4\pi R} \left(\tan \frac{\pi}{n}\right)$       3)  $\frac{\mu_0 I}{2\pi R} \left(\tan \frac{\pi}{n}\right)$       4)  $\frac{\mu_0 I}{2\pi R} \left(\cos \frac{\pi}{n}\right)$

14. A coil of inductive reactance  $31 \Omega$  has a resistance of  $8 \Omega$ . It is placed in series with a condenser of capacitive reactance  $25 \Omega$ . The combination is connected to an ac source of  $110V$ . The power factor of the circuit is

1) 0.33      2) 0.56      3) 0.64      4) 0.80

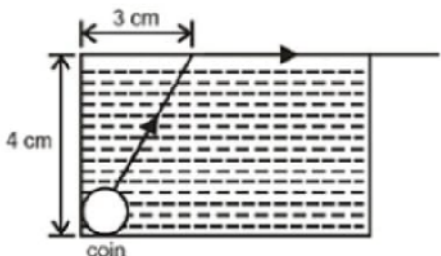
15. Which of the following curve does not represent motion in one dimension?



16. A satellite is revolving round the earth in an orbit of radius  $r$  with time period  $T$ . If the satellite is revolving round the earth in an orbit of radius  $r + \Delta r$  ( $\Delta r \ll r$ ) with time period  $T + \Delta T$  ( $\Delta T \ll T$ ) then

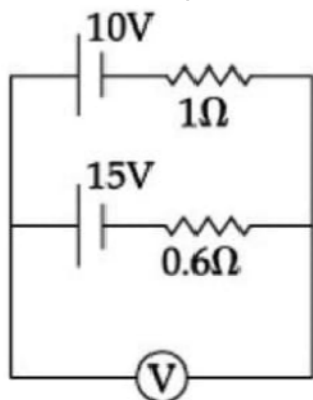
1)  $\frac{\Delta T}{T} = \frac{3}{2} \frac{\Delta r}{r}$       2)  $\frac{\Delta T}{T} = \frac{2}{3} \frac{\Delta r}{r}$       3)  $\frac{\Delta T}{T} = \frac{\Delta r}{r}$       4)  $\frac{\Delta T}{T} = -\frac{\Delta r}{r}$

17. A small coin is resting on the bottom of a beaker filled with liquid. A ray of light from the coin travels upto the surface of the liquid and moved along its surface. How fast is the light travelling in the liquid?



1)  $2.4 \times 10^8 \text{ m/s}$       2)  $3.0 \times 10^8 \text{ m/s}$       3)  $1.2 \times 10^8 \text{ m/s}$       4)  $1.8 \times 10^8 \text{ m/s}$

18. A  $10V$  battery with internal resistance  $1 \Omega$  and a  $15V$  battery with internal resistance  $0.6 \Omega$  are connected in parallel to a voltmeter (see figure). The reading in the voltmeter will be close to:

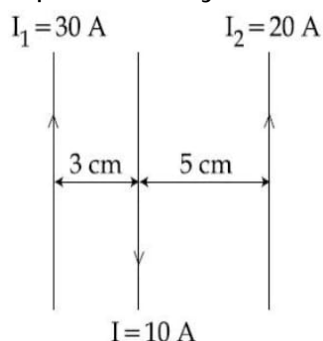


1) 11.9 V      2) 13.1 V      3) 12.5 V      4) 24.5

19. A copper ball of mass 100g is at a temperature  $T$ . It is dropped in a copper calorimeter of mass 100g, filled with 170g of water at room temperature. Subsequently, the temperature of the system is found to be  $75^\circ\text{C}$ .  $T$  is given by:

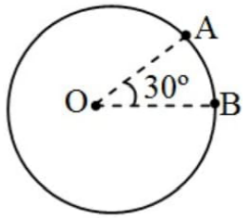
(Given: room temperature =  $30^\circ\text{C}$ , specific heat of copper =  $0.1\text{ cal/g}/^\circ\text{C}$ )

- 1)  $825^\circ\text{C}$                       2)  $800^\circ\text{C}$                       3)  $885^\circ\text{C}$                       4)  $1250^\circ\text{C}$
20. Dimensions of resistance in an electrical circuit, in terms of dimension of mass  $M$ , of length  $L$ , of time  $T$  and current  $I$ , would be
- 1)  $[ML^2T^{-3}I^{-1}]$               2)  $[ML^2T^{-2}]$               3)  $[ML^2T^{-1}I^{-1}]$               4)  $[ML^2T^{-3}I^{-2}]$
21. The process of superimposing signal frequency (i.e., audio wave) on the carrier wave is known as:
- 1) Transmission              2) Reception              3) Modulation              4) Detection
22. A ray of light is incident at an angle of  $60^\circ$  on one face of a prism of angle  $30^\circ$ . The emergent ray of light makes an angle of  $30^\circ$  with incident ray. The angle made by the emergent ray with second face of prism will be:
- 1)  $0^\circ$                               2)  $90^\circ$                               3)  $30^\circ$                               4)  $45^\circ$
23. Three straight parallel current carrying conductors are shown in the figure. The force experienced by the middle conductor of length 25cm is

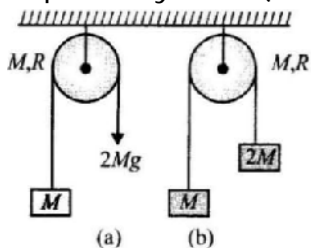


- 1)  $9 \times 10^{-4}\text{ N}$  toward left                      2)  $3 \times 10^{-4}\text{ N}$  toward right
- 3)  $6 \times 10^{-4}\text{ N}$  toward right                      4) Zero
24. Light of wavelength  $5000\text{ \AA}$  is falling on a photosensitive surface. If the surface has received  $10^{-7}\text{ J}$  of energy, then the number of photons striking the surface will be
- 1)  $5 \times 10^{11}$                       2)  $2.5 \times 10^{11}$                       3)  $3 \times 10^{11}$                       4) None of these
25. Which among the following has a hydrogen-like spectrum and whose lines have wavelengths four times shorter than those of atomic hydrogen?
- 1) Helium ion                      2) Hydrogen                      3) Lithium ion                      4) None of these
26. A negative test charge is moving near a long straight wire carrying a current. The force acting on the test charge is parallel to the direction of the current. The motion of the charge is:
- 1) Away from the wire                      2) Towards the wire
- 3) Parallel to the wire along the current                      4) Parallel to the wire opposite to the current
27. A metal ball falls from a height of 1m on to a steel plate and jumps upto a height of 81cm. The coefficient of restitution of the ball and steel plate is
- 1) 0.2                              2) 9                              3) 0.9                              4) 90

28. One mole of a diatomic gas undergoes a thermodynamic process, whose process equation is  $P \propto V^2$ . The molar specific heat of the gas is
- 1)  $\frac{17R}{3}$                       2)  $\frac{17R}{6}$                       3)  $\frac{15R}{4}$                       4)  $\frac{15R}{8}$
29. In materials like aluminium and copper, the correct order of magnitude of various elastic moduli is:
- 1) Young's moduli < shear moduli < bulk moduli  
 2) Bulk moduli < shear moduli < Young's moduli  
 3) Shear moduli < Young's moduli < bulk moduli  
 4) Bulk moduli < Young's moduli < shear moduli
30. A uniform wire of resistance  $36\Omega$  is bent in the form of a circle. The effective resistance between A and B is (O is the centre of circle):

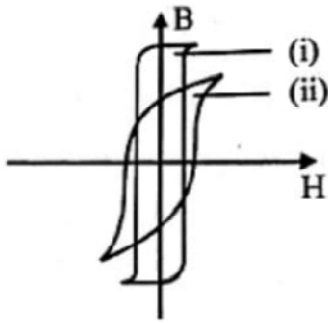


- 1)  $2.75\Omega$                       2)  $3\Omega$                       3)  $33\Omega$                       4)  $36\Omega$
31. The relative error in the determination of the surface area of a sphere is  $\alpha$ , then the relative error in the determination of its volume is
- 1)  $\frac{3}{2}\alpha$                       2)  $\frac{2}{3}\alpha$                       3)  $\alpha$                       4)  $\frac{5}{2}\alpha$
32. The water drops fall at regular intervals from a tap 5m above the ground. The third drop is leaving the tap at an instant when the first drop touches the ground. How far above the ground is the second drop at that instant? (Take  $g = 10\text{ m/s}^2$ )
- 1) 1.25 m                      2) 2.50m                      3) 3.75 m                      4) 5.00 m
33. A cord is wrapped on a pulley (disk) of mass M and radius R as shown in figure. To one end of the cord, a block of mass M is connected as shown and to other end in (a) a force of  $2Mg$  and in (b) a block of mass  $2M$ . Let angular acceleration of the disk in A and B is  $\alpha_A$  and  $\alpha_B$  respectively, then (cord is not slipping on the pulley)

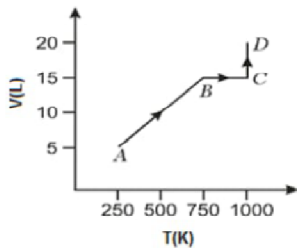


- 1)  $\alpha_A = \alpha_B$                       2)  $\alpha_A > \alpha_B$                       3)  $\alpha_A < \alpha_B$                       4) None of these

34. The B-H curve (i) and (ii) shown in the figure is associated with



- 1) (i) diamagnetic and (ii) paramagnetic substance  
 2) (i) paramagnetic and (ii) ferromagnetic substance  
 3) (i) soft iron and (ii) steel respectively  
 4) (i) steel and (ii) soft iron respectively
35. A stone tied to a string of length  $L$  is whirled in a vertical circle with the other end of the string at the center. At a certain instant of time, the stone is at its lowest position, and has a speed  $u$ . The magnitude of the change in its velocity as it reaches a position where the string is horizontal is (assume  $g$  as acceleration due to gravity)
- 1)  $\sqrt{u^2 - 2gL}$                       2)  $\sqrt{2gL}$                       3)  $\sqrt{u^2 - gL}$                       4)  $\sqrt{2(u^2 - gL)}$
36. Which one of the following phenomenon is not explained by Huygen's construction of wavefront?
- 1) Refraction                      2) Reflection                      3) Diffraction                      4) Origin of spectra
37. Two moles of helium gas are taken along the path ABC (as shown in diagram). The work done by the gas is

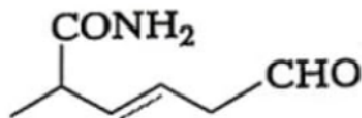


- 1)  $2000R\left(\frac{1}{2} + \ln\frac{4}{3}\right)$                       2)  $500R(3 + \ln 4)$                       3)  $500R\left(2 + \ln\frac{16}{9}\right)$                       4)  $2000R\left(1 + \ln\frac{16}{9}\right)$
38. A train of weight  $10^7 \text{ N}$  is running on a travel track with uniform speed of  $36 \text{ kmh}^{-1}$ . The frictional force is  $0.5 \text{ kg f}$  per quintal. If  $g = 10 \text{ ms}^{-2}$ , power of engine is
- 1) 500 kW                      2) 50 kW                      3) 5 kW                      4) 0.5 kW
39. A body of mass  $m$  is accelerated uniformly from rest to a speed  $v$  in a time  $T$ . The instantaneous power delivered to the body as a function of time  $t$ , is given by
- 1)  $\frac{mv^2}{T^2}t$                       2)  $\frac{mv^2}{T^2}t^2$                       3)  $\frac{1}{2} \frac{mv^2}{T^2}t$                       4)  $\frac{1}{2} \frac{mv^2}{T^2}t^2$
40. In a nuclear reaction of  $\alpha$ -decay, the daughter nuclei  ${}^A_Z X$  is moving with kinetic energy  $E$ . The total energy released if parent nuclei was at rest will be
- 1)  $E\left(1 + \frac{4}{A}\right)$                       2)  $\frac{E}{4}(A)$                       3)  $\frac{E}{4}(A-4)$                       4)  $\frac{E}{4}(A+4)$
41. If  $A$  is the amplitude of the wave coming from a point source at distance  $r$  then
- 1)  $A\alpha r^{-2}$                       2)  $A\alpha r^{-1}$                       3)  $A\alpha r^2$                       4)  $A\alpha r^1$

42. A source of sound of frequency 600 Hz is placed inside water. The speed of sound in water is 1500m/s and in air it is 300 m/s. The frequency of sound recorded by an observer who is standing in air is  
 1) 200 Hz                      2) 3000 Hz                      3) 120 Hz                      4) 600 Hz
43. A projectile is fired with a velocity  $u$  at an angle  $\theta$  with the ground. At some instant during motion, its velocity makes an angle  $\alpha$  with the horizontal direction. The speed of the particle at this time will be  
 1)  $u \cos \theta \sec \alpha$                       2)  $u \cos \theta \cos \alpha$                       3)  $u^2 \cos^2 \alpha \sin^2 \alpha$                       4)  $u \sin \theta \sin \alpha$
44. At room temperature, copper has free electron density of  $8.4 \times 10^{28} m^{-3}$ . The electron drift velocity in a copper conductor of cross-sectional area  $10^{-6} m^2$  and carrying a current of 5.4 A, will be-  
 1)  $4 m s^{-1}$                       2)  $0.4 m s^{-1}$                       3)  $4 cm s^{-1}$                       4)  $0.4 cm s^{-1}$
45. Water rises upto a height  $h$  in a capillary tube of certain diameter. This capillary tube is replaced by a similar tube of half the diameter. Now water will rise to the height of  
 1)  $4h$                       2)  $3h$                       3)  $2h$                       4)  $\frac{h}{2}$

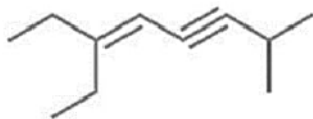
### CHEMISTRY

46. Setting of plaster of Paris is  
 1) Dehydration                      2) Oxidation with atmospheric oxygen  
 3) Combination with atmospheric  $CO_2$                       4) Hydration to yield another hydrate
47. At STP, 0.50 mole  $H_2$  gas and 1.0 mole He gas  
 1) Have equal effusion rates                      2) Occupy equal volumes  
 3) Have equal molecular speeds                      4) Have equal average kinetic energies
48. Suppose 5g of acetic acid are dissolved in one liter of ethanol. Assume no reaction in between them. Calculate molality of resulting solution if density of ethanol is 0.789 g/ml?  
 1) 0.1056                      2) 0.056                      3) 0.156                      4) 0.16
49. The IUPAC name of the following compound is



- 1) 2 - Carbamoylhexanal                      2) 2 - Carbamoylhex -3 - enal  
 3) 2 - Methy - 6 - oxohex - 3 - enamide                      4) 6 - keto - 2 - methyl hexamide
50. In the equilibrium which one of the following options is correct  
 $CH_3COOH + HF \rightleftharpoons CH_3COO^+ + F^-$   
 1)  $F^-$  is the conjugate acid of  $CH_3COOH$                       2)  $F^-$  is the conjugate base of HF  
 3)  $CH_3COOH$  is the conjugate acid of  $CH_3COO^+$   
 4)  $CH_3COO^+$  is the conjugate base of  $CH_3COOH$
51. 20 mL of 0.2 M  $Al_2(SO_4)_3$  is mixed with 20 mL of 0.6 M  $BaCl_2$ . Calculate the concentration of each ion in the solution.  
 1) No concentration of  $Ba^{2+}$  or  $SO_4^{2-}$                       2)  $Ba^{2+} = 0.6M$ ;  $SO_4^{2-} = 0.3M$   
 3)  $Ba^{2+} = 0.6M$ ;  $SO_4^{2-} = 0.6M$                       4) None of these

52. The ionic radii (in  $\overset{0}{\text{Å}}$ ) of  $N^{3-}$ ,  $O^{2-}$  and  $F^{-}$  are respectively:  
 1) 1.71, 1.36 and 1.40  
 2) 1.36, 1.40 and 1.71  
 3) 1.36, 1.71 and 1.40  
 4) 1.71, 1.40 and 1.36
53. The maximum number of alkene isomers possible for an alkene with molecular formula  $C_4H_8$  is  
 1) 2  
 2) 3  
 3) 4  
 4) 5
54. The fermentation of starch to give alcohol occurs mainly with the help of  
 1)  $O_2$   
 2) Air  
 3)  $CO_2$   
 4) Enzymes
55. In compounds of type  $ECl_3$ , where E is B, P, As or Bi. The angles Cl-E-Cl for different E are in order  
 1)  $B > P = As = Bi$   
 2)  $B < P = As = Bi$   
 3)  $B < P < As < Bi$   
 4)  $B > P > As > Bi$
56. For the reaction,  $Cl_2 + 2I^{-} \rightarrow I_2 + 2Cl^{-}$ , the initial concentration of  $I^{-}$  was  $0.20 \text{ mol L}^{-1}$  and the concentration after 20 min was  $0.18 \text{ mol L}^{-1}$ . Then the rate of formation of  $I_2$  in  $\text{mol L}^{-1} \text{ min}^{-1}$  would be  
 1)  $1 \times 10^{-4}$   
 2)  $5 \times 10^{-4}$   
 3)  $1 \times 10^{-3}$   
 4)  $5 \times 10^{-3}$
57. The half-life of a radioactive isotope is four hours. If the initial mass of the isotope was 200g, the mass remaining after 24 hours is  
 1) 1.042 g  
 2) 2.084 g  
 3) 3.125 g  
 4) 4.167 g
58. Which metal is found in free state  
 1) Iron  
 2) Gold  
 3) Aluminium  
 4) Sodium
59. 2-Phenylpropene on acidic hydration, gives -  
 1) 2-Phenyl-2-propanol  
 2) 2-Phenyl-1-propanol  
 3) 3-Phenyl-1-propanol  
 4) 1-Phenyl-2-propanol
60. The total pressure of a mixture of  $H_2$  and  $O_2$  is 1.00 bar. The mixture is allowed to react to form water which is completely removed to leave only pure  $H_2$  at a pressure of 0.35 bar. Assuming ideal gas behavior and that all pressure measurements were made under the same conditions of temperature and volume. The mole fraction of  $H_2$  in the original mixture is  
 1) 0.78  
 2) 0.28  
 3) 0.22  
 4) 0.72
61. 2, 4-Dichlorophenoxyacetic acid is used as a  
 1) Fungicide  
 2) Insecticide  
 3) Herbicide  
 4) Moth repellent
62. Which is the current IUPAC name of this compound?



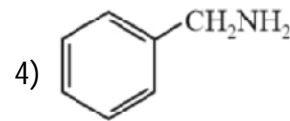
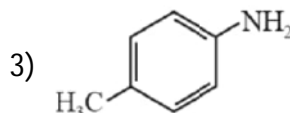
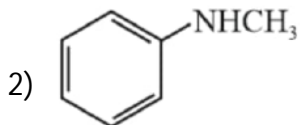
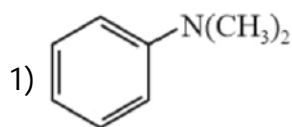
- 1) 3-Ethyl-3-pentyl-1, 4-pentadiene  
 2) 6-Ethyl-3-(1-methylbutyl)-4, 6-octadien-1-yne  
 3) 6-Ethyl-2-methyl-5-octen-3-yne  
 4) 1-(1-Methylcyclopropyl)-2-(2-methylcyclopropyl) cyclopropene
63. The equilibrium constant for the following reaction is  $1.6 \times 10^5$  at 1024K  

$$H_2(g) + Br_2(g) \rightleftharpoons 2HBr(g)$$
 Find the equilibrium pressure of HBr (g) if 10 bar of HBr is introduced into a sealed container at 1024K.  
 1) 10  
 2) 10.1  
 3) 9.8  
 4) 9.9

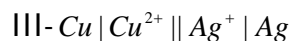
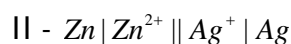
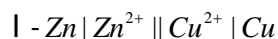


64. The angular momentum of electron in 3d orbital is  
 1)  $\frac{\sqrt{3}}{\sqrt{5}} \cdot \frac{h}{\pi}$                       2)  $\frac{\sqrt{5}}{\sqrt{4}} \cdot \frac{h}{\pi}$                       3)  $\frac{\sqrt{3}}{\sqrt{2}} \cdot \frac{h}{\pi}$                       4)  $\frac{h}{\pi}$
65. The solubility of Calcium phosphate (molecular mass = M) in water is W g per 100mL at 25°C. Its solubility product at 25°C will be approximately-  
 1)  $10^9 \left(\frac{W}{M}\right)^5$                       2)  $10^7 \left(\frac{W}{M}\right)^5$                       3)  $10^5 \left(\frac{W}{M}\right)^5$                       4)  $10^3 \left(\frac{W}{M}\right)^5$
66. Acetaldehyde cannot show  
 1) Iodoform test                      2) Lucas test                      3) Benedict's test                      4) Tollen's test
67. Which of the following statements is false?  
 1) Increase of pressure of a gas causes the amount of adsorption to increase  
 2) Increase of temperature may increase or decrease the amount of adsorption  
 3) The adsorption may be monolayer or multilayer  
 4) Particle size of the adsorbent does not affect the amount of adsorption
68. Equal volumes of monoatomic and diatomic gases are taken at same temperature and pressure. The ratio of adiabatic exponents of the gases will be-  
 1) 1                      2) 2                      3) 1.67                      4) 1.19
69. At 27°C, one mole of an ideal gas is compressed isothermally and reversibly from a pressure of 2 atm to 10 atm. The values of  $\Delta E$  and q are:  
 (R = 2 and  $\log 5 = 0.698$ )  
 1) 0, -965.84 Cal                      2) -965.84 Cal, -865.58 Cal  
 3) +865.58 Cal, -865.58 Cal                      4) 0, -865.58 Cal
70. The angular momentum of an electron in a Bohr's orbit of  $He^+$  is  $3.1652 \times 10^{-34} \text{ kg m}^2 / \text{sec}$ . What is the wave number in terms of Rydberg constant (R) of the spectral line emitted when an electron falls from this level to the first excited state.  
 [Use  $h = 6.626 \times 10^{-34} \text{ J.s}$ ]  
 1) 3R                      2)  $\frac{5R}{9}$                       3)  $\frac{3R}{4}$                       4)  $\frac{8R}{9}$
71. In a planar tetra-atomic molecule  $PQ_3$ , P is at the centroid of the equivalent triangle formed by the atoms, Q. If the P-Q bond distance is  $2 \text{ \AA}$ , What is the distance between the centers of any two Q atoms?  
 1)  $1.155 \text{ \AA}$                       2)  $\frac{2}{0.155} \text{ \AA}$                       3)  $\frac{1.155}{2} \text{ \AA}$                       4)  $\frac{1}{\sqrt{3}} \text{ \AA}$
72. The factor of  $\Delta G$  values is important in metallurgy. The  $\Delta G$  values for the following reactions at 800°C are given as:  
 $S_2(s) + 2O_2(g) \rightarrow 2SO_2(g); \Delta G = -544 \text{ kJ}$   
 $2Zn(s) + S_2(s) \rightarrow 2ZnS(s); \Delta G = -293 \text{ kJ}$   
 $2Zn(s) + O_2(s) \rightarrow 2ZnO(s); \Delta G = -480 \text{ kJ}$   
 Then  $\Delta G$  for the reaction:  
 $2ZnS(s) + 3O_2(g) \rightarrow 2ZnO(s) + 2SO_2(g)$  will be  
 1) -357 KJ                      2) -731 KJ                      3) -431 KJ                      4) -541 KJ

73. Which of the following is nucleophilic addition reaction?  
 1) Hydrolysis of ethyl chloride by NaOH      2) Purification of acetaldehyde by  $NaHSO_3$   
 3) Alkylation of anisole      4) Decarboxylation of acetic acid
74. Amongst the compounds given, the one that would form a brilliant coloured dye on treatment with  $NaNO_2$  in dil. HCl followed by addition to an alkaline solution of  $\beta$ -naphthol is

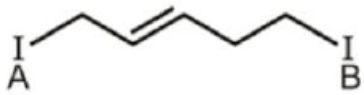


75. The calculated value of magnetic moment of  $Fe^{+3}$  is  
 1) 1.73 BM      2) 3.87 BM      3) 4.90 BM      4) 5.92 BM
76. A metal crystallizes in BCC lattice. The % fraction of edge length not covered by atom is  
 1) 10.4%      2) 13.4%      3) 12.4%      4) 11.4%
77. pH of 0.1 M BOH (weak base) is found to be 12. The solution at temperature T K will display an osmotic pressure equal to:  
 1) 0.01 RT      2) 0.01 (RT)<sup>2</sup>      3) 0.11 RT      4) 1.1 RT
78. The standard reduction potentials of  $Zn^{2+} | Zn$ ,  $Cu^{2+} | Cu$  and  $Ag^+ | Ag$  are respectively -0.76, 0.34 and 0.8V. The following cells were constructed



What is the correct order of  $E_{cell}^0$  of these cells?

- 1) II > III > I      2) II > I > III      3) I > II > III      4) III > I > II
79. Which one of the following is expected to exhibit optical isomerism? (en = ethylenediamine)  
 1) cis -  $[Pt(NH_3)_3Cl_2]$       2) trans -  $[Pt(NH_3)_3Cl_2]$       3) cis -  $[Co(en)_2Cl_2]^+$       4) trans -  $[Co(en)_2Cl_2]^+$
80. How much chlorine will be liberated on passing one ampere current for 30 minutes through NaCl solution?  
 1) 0.66 mole      2) 0.33 mole      3) 0.66 g      4) 0.33 g
81. The heat of dissociation of benzene in isolated gaseous atoms is 5335 kJ/mol. The bond enthalpies of C - C, C = C and C - H bonds are 347.3, 615 and 416.2 kJ respectively. Magnitude of resonance energy of benzene is  
 1) 1.15 kJ      2) 15.1 kJ      3) -49.1 kJ      4) 1511 kJ
82. For a reaction equilibrium,  $N_2O_4(g) \rightleftharpoons 2NO_2(g)$ , the concentration of  $N_2O_4$  and  $NO_2$  at equilibrium are  $4.8 \times 10^{-2}$  and  $1.2 \times 10^{-2}$  mol / L respectively. The value of  $K_c$  for the reaction is  
 1)  $3 \times 10^{-3}$  mol / L      2)  $3.3 \times 10^{-3}$  mol / L      3)  $3 \times 10^{-1}$  mol / L      4)  $3.3 \times 10^{-1}$  mol / L
83. An azeotropic solution of two liquids has boiling point lower than either of them when it  
 1) shows negative deviation from Raoult's law  
 2) shows no deviation from Raoult's law  
 3) shows positive deviation from Raoult's law  
 4) is saturated

84. The rate law for the reaction below is given by the expression  $K[A][B]$   
 $A + B \rightarrow \text{Product}$   
 If the concentration of B is increased from 0.1 to 0.3 mole, keeping the value of A at 0.1 mole, the rate constant will be  
 1) 3K                              2) 9K                              3) K/3                              4) K
85. Nylon – 6, 6 and polythene are examples of  
 1) Copolymerisation biomolecules and Additional polymersiation respectively  
 2) Condensation polymerization and Copolymerisation polymerization respectively  
 3) Condensation polymerization and Additional polymerization respectively  
 4) None of these
86. In the equation:  
 $NO_2^\ominus + H_2O \rightarrow NO_3^\ominus + 2H^\oplus + ne^-$  where “n” is  
 1) 1                              2) 2                              3) 3                              4) 4
87. If Dichloromethane (DCM) and water  $H_2O$  are used for differential extraction, which one of the following statements is correct?  
 1) DCM and  $H_2O$  would stay as upper and lower layer respectively in the separating funnel (S.F.)  
 2) DCM and  $H_2O$  will be miscible clearly  
 3) DCM and  $H_2O$  would stay as lower and upper layer respectively in the S.F.  
 4) DCM and  $H_2O$  will make turbid/colloidal mixture
88. Hard water can block radiators due to the formation of  
 1) Insoluble calcium and Magnesium salts              2) Insoluble Sodium salts  
 3) Insoluble Phosphate salts                              4) Insoluble Potassium salts
89. Which one of the two Iodine atoms will be more reactive in the  $SN^1$  and  $SN^2$  reaction?  
  
 1) A will be faster in  $SN^1$  reaction but slower in  $SN^2$   
 2) A will be faster both in  $SN^1$  and  $SN^2$  reaction  
 3) A and B will be equally reactive  
 4) B will be faster in both  $SN^1$  and  $SN^2$  reaction
90. The alkali metal that reacts with Nitrogen directly to form Nitride is  
 1) Li                              2) K                              3) Na                              4) Rb

### BIOLOGY

91. Which of the following statement is true regarding the role of acetylcholine in nerve physiology?  
 1) It increases the selective permeability of the cell membrane  
 2) It increases the potassium concentration inside the axon  
 3) It reduces activity of Na-K pump  
 4) It increases the sodium concentration outside the axon

92. A bicollateral vascular bundle is characterized by
- 1) Phloem surrounded on both sides by xylem
  - 2) Transverse splitting of vascular bundle
  - 3) Longitudinal splitting of vascular bundle
  - 4) Xylem surrounded on both sides by phloem
93. A few statements describing certain features of reproduction are given below:
- i. Gametic fusion takes place
  - ii. Transfer of genetic material takes place.
  - iii. The reduction division takes place.
  - iv. Progeny has a resemblance to parents.
- Select the options that are true for both asexual and sexual reproduction.
- 1) I and ii
  - 2) ii and iii
  - 3) ii and iv
  - 4) I and iii
94. Root does not help in the absorption of water in which of the following plant?
- 1) Pistia
  - 2) Pea
  - 3) Wheat
  - 4) Sunflower
95. Artificial induction of roots on stems before it is separated from the parent plant for propagation is called
- 1) Cutting
  - 2) Layering
  - 3) Plant tissue culture
  - 4) Grafting
96. Generally, the number of integuments in the ovule of angiosperms and gymnosperms is
- 1) One and two
  - 2) One and one
  - 3) Two and one
  - 4) Two and two
97. Cartilage is formed by
- 1) Osteoblasts
  - 2) Chondrocytes
  - 3) Fibroblasts
  - 4) Epithelium
98. The leghaemoglobin that imparts pink-red colour to the root nodules is located in
- 1) The wall of bacteria
  - 2) The wall of host cell
  - 3) The cytoplasm of host cell
  - 4) Between bacteroids and surrounding
99. A fall in glomerular filtration rate (GFR) activates
- 1) Adrenal cortex to release aldosterone
  - 2) Adrenal medulla to release adrenaline
  - 3) Juxta-glomerular cells to release renin
  - 4) Posterior pituitary to release vasopressin
110. Ephemerals are xerophytes that are
- 1) Drought resisting
  - 2) Drought enduring
  - 3) Drought escaping
  - 4) None of these
101. What is true about Bt toxin?
- 1) Bt protein exists as active toxin in the Bacillus
  - 2) The activated toxin enters the ovaries of the pest to sterilize it and thus prevent its multiplication.
  - 3) The concerned Bacillus has antitoxins.
  - 4) The inactive protoxin gets converted into an active form in the insect gut.
102. Identity the wrong statement regarding post-fertilization development.
- 1) The ovary wall develops into pericarp
  - 2) The outer integument of the ovule develops into a tegmen
  - 3) The fusion nucleus (triple nucleus) develops into endosperm
  - 4) The ovule develops into seed

103. Selaginella has a tendency to form seed, called seed habit because it follows  
 1) Retention of megaspore permanently inside the megasporangium  
 2) Heterospory  
 3) Both (A) and (B)  
 4) None of the above
104. Cytokinin was first discovered by  
 1) Skoog and Miller  
 2) Boyer  
 3) Benson and Calvin  
 4) Went
105. The term surrogate mother is used for  
 1) Induction of lactation  
 2) Artificially inseminated female  
 3) Future mother with transplanted embryo  
 4) Mother two provides ovum
106. Which of the following palindromic sequence is recognized by ECoRI?  
 1)  $\begin{array}{ccc} 5' & & 3' \\ & \downarrow & \\ & \text{G AATTC} & \\ & \text{CTTAA G} & \\ 3' & & 5' \end{array}$   
 2)  $\begin{array}{ccc} 5' & & 3' \\ & \downarrow & \\ & \text{CCC GGG} & \\ & \text{GGG CCC} & \\ 3' & & 5' \end{array}$   
 3)  $\begin{array}{ccc} 5' & & 3' \\ & \downarrow & \\ & \text{AGT ACT} & \\ & \text{TCA TGA} & \\ 3' & & 5' \end{array}$   
 4)  $\begin{array}{ccc} 5' & & 3' \\ & \downarrow & \\ & \text{G GATTC} & \\ & \text{CCTAG G} & \\ 3' & & 5' \end{array}$
107. Removal of calcium from freshly collected blood would  
 1) Cause delayed clotting  
 2) Prevent clotting  
 3) Cause immediate clotting  
 4) prevent destruction of haemoglobin
108. Synapsis is pairing of  
 1) Any two chromosomes  
 2) Non homologous chromosomes  
 3) Acentric chromosomes  
 4) Homologous chromosomes
109. The endometrium is found in  
 1) Placenta of mammals  
 2) Nipple of mammals  
 3) Uterus of mammals  
 4) None of these
110. Consider the statements given below regarding contraception and answer as directed thereafter:  
 A. Medical termination of pregnancy (MTP) during the first trimester is generally safe.  
 B. Generally, chances of conception are nil until the mother breast-feeds in infant for up to two years.  
 C. Intrauterine devices like copper-T are effective contraceptives.  
 D. Emergency contraceptive pills may be taken up to one week after coitus to prevent conception.  
 Which two of the above statements are incorrect?  
 1) 1 and 2  
 2) 2 and 3  
 3) 3 and 4  
 4) 2 and 4
111. When succinyl-CoA is converted into succinic acid, the energy-storing compound formed is  
 1) ADP  
 2) GDP  
 3) AMP  
 4) GTP
112. Find the incorrect pair.  
 1) Bowman's capsule – Glomerular filtration  
 2) PCT – Absorption of  $\text{Na}^+$  and  $\text{K}^+$   
 3) DCT – Absorption of glucose  
 4) None of these
113. Which part of the human brain controls the urge for eating and drinking?  
 1) Forebrain  
 2) Midbrain  
 3) Hindbrain  
 4) Spinal cord

114. The haploid cell which divides by mitosis to form embryosac is
- 1) Megaspore mother cell
  - 2) Microspore mother cell
  - 3) Functional megaspore
  - 4) Non-functional megaspore
115. The most common indicator organism that represents polluted water is
- 1) E.coli
  - 2) P.typhi
  - 3) C.vibrio
  - 4) Entamoeba
116. A DNA strand is directly involved in the synthesis of all of the following, except
- 1) Another DNA
  - 2) Protein synthesis
  - 3) tRNA molecule
  - 4) mRNA molecule
117. In Bryophytes, antherozoids are
- 1) Biflagellate
  - 2) Multiflagellate
  - 3) Sometimes biflagellate and sometimes multiflagellate
  - 4) Biflagellate in a few species and multiflagellate in the rest
118. Lichens are ecologically important as they
- 1) Purify air
  - 2) Are pioneers of barren rocks
  - 3) Are symbionts of algae and fungi
  - 4) Are associated with mycorrhizal roots
119. The loosely arranged non-chlorophyllous parenchyma cells present in lenticels are called
- 1) Complementary cells
  - 2) Passage cells
  - 3) Water stomata
  - 4) Albuminous cells
120. By the use of biotechnology, the production of  $B_2$  vitamins has been increased to about 20,000 times in which of the following organism?
- 1) *Ashbya gossypii*
  - 2) *Escherichia coli*
  - 3) *Pseudomonas denitrificans*
  - 4) *Propionibacterium shermanii*
121. The role of bacteria in carbon cycle is
- 1) photosynthesis
  - 2) chemosynthesis
  - 3) decomposition of organic compounds
  - 4) evolution of  $O_2$
122. Which of the following is the closest relative of man?
- 1) Chimpanzee
  - 2) Gorilla
  - 3) Orangutan
  - 4) Gibbon
123. For transformation with recombinant DNA, the bacterial cells must first be made competent which means
- 1) should increase their metabolic reactions
  - 2) should decrease their metabolic reactions
  - 3) increase efficiency with which DNA enters the bacterium
  - 4) Ability to divide fast
124. If a colour blind woman marries a normal visioned man, their sons will be
- 1) one-half colour blind and one-half normal
  - 2) Three-fourth colour blind and one fourth normal
  - 3) All colour blind
  - 4) All normal visioned
125. If both ovaries are removed from the rat, the concentration of which hormone is decreased in blood?
- 1) Oxytocin
  - 2) Prolactin
  - 3) Estrogen
  - 4) Gonadotropin releasing factor
126. Which of the following crops has been brought to India from the New world?
- 1) Cashewnut, potato, rubber
  - 2) Mango, tea
  - 3) Tea, rubber, mango
  - 4) Coffee



140. Select the correct statement related to flowering in plants.
- Some plants require a periodic exposure to light to induce flowering.
  - The flowering is either quantitatively or qualitatively dependent on exposure to low temperature.
  - The site of perception of light/dark duration is the stem apex.
  - Flowering in plants is due to the hormones produced in the shoot apex.
- 1) i, ii and iii are correct
  - 2) i and ii are correct
  - 3) i, ii and iv are correct
  - 4) All are correct
141. Which statement is not true for binomial system of nomenclature?
- 1) Biological names are generally in Latin or Latinised or derived from Latin irrespective of their origin
  - 2) The first word in a biological name represents the species while the second word denotes the genus.
  - 3) The first word of biological name starts with capital letter and the first letter of second word starts with small letter
  - 4) Name of the author is written in abbreviated form after the specific epithet
142. Air layering is performed in case of
- 1) Jasmine
  - 2) Grapevine
  - 3) Gooseberry
  - 4) Litchi
143. Blood group AB has
- 1) No antigen
  - 2) No antibody
  - 3) Neither antigen nor antibody
  - 4) Both antigen and antibody
144. Which of the following is a flowering plant with nodules containing filamentous nitrogen-fixing microorganisms?
- 1) *Casuarina equisetifolia*
  - 2) *Crotalaria juncea*
  - 3) *Cycas revoluta*
  - 4) *Cicer arietinum*
145. The mammary gland is a modification of
- 1) Sweat gland
  - 2) Salivary gland
  - 3) Lacrimal gland
  - 4) None of these
146. Which of the following plant material is widely used in the preparation of the culture medium?
- 1) *Pinus longifolia*
  - 2) *Cocos nucifera*
  - 3) *Borassus flabellifer*
  - 4) *Cycas revolute*
147. Which of the following show higher rate of respiration?
- 1) Collenchyma
  - 2) Leaf
  - 3) Dry seeds
  - 4) Germinating seeds
148. The main function of lacteals in the human small intestine is the absorption of
- 1) Glucose and vitamins
  - 2) Amino acids and glucose
  - 3) Water and vitamins
  - 4) Fatty acids and glycerol
149. Hammerling's experiments of *Acetabularia* involved exchanging of
- 1) Cytoplasm
  - 2) Nucleus
  - 3) Rhizoid and stalk
  - 4) Gametes
150. Alpha diversity is biodiversity present
- 1) Within community
  - 2) Between community
  - 3) Ranges of communities
  - 4) All the above
151. Ranthambore National Park is situated in
- 1) Maharashtra
  - 2) Rajasthan
  - 3) Gujarat
  - 4) U.P.



152. Mycorrhiza is symbiotic association between  
 1) Bacteria and fungi  
 2) Algae and fungi  
 3) Fungi and roots of higher plants  
 4) Blue green algae and roots of higher plants
153. Adrenaline directly affects on  
 1) S.A. node  
 2)  $\beta$  -cells of Langerhans  
 3) The dorsal root of spinal cord  
 4) Epithelial cells of stomach
154. Which is the correct pair for an edible part?  
 1) Tomato – Thalamus  
 2) Maize – Cotyledons  
 3) Guava – Pericarp  
 4) Date palm – Mesocarp
155. Reproducing new plants by cells instead of seeds is known as  
 1) Mutation  
 2) Tissue culture  
 3) Anitbiotics  
 4) Biofertilizer
156. Who discovered “ribosomes” in animal cells?  
 1) Watson  
 2) Temin  
 3) Chaudhary  
 4) Palade
157. GIFT involves a transfer of  
 1) A mixture of sperms and ova into the uterus  
 2) Embryo into the uterus  
 3) A mixture of sperms and ova into the fallopian tube  
 4) Zygote into the fallopian tube
158. Contractile vacuole of Amoeba placed in salt water will  
 1) Burst  
 2) Disappear  
 3) Enlarge  
 4) Multiply
159. Eutrophication is caused by  
 1) Phosphate rocks only  
 2) Agriculture fertilizers only  
 3) Sewage and phosphate rocks  
 4) Sewage and agriculture fertilizer
160. When you hold your breath, which of the following gas changes in blood would first lead to the urge to breathe?  
 1) Falling  $O_2$  concentration  
 2) Rising  $CO_2$  concentration  
 3) Falling  $CO_2$  concentration  
 4) Rising  $CO_2$  and falling  $O_2$  concentration
161. Weberian ossicles are found in  
 1) Frogs  
 2) Snakes  
 3) Fishes  
 4) Birds
162. In Dorsophila, the allele for normal grey body colour (G) is dominant to the ebony body (g). The following table summarises the results of several crosses:

Cross	Result
Strain in 1 $\times$ gg	All Grey type
Strain in 2 $\times$ gg	1 Grey : 1 ebony
Strain in 3 $\times$ gg	All ebony type
Strain in 4 $\times$ gg	1 Grey : 1 ebony

Which strains have the genotype Gg?

- 1) 1 and 3  
 2) 1 and 4  
 3) 2 and 3  
 4) 2 and 4
163. Which type of mouthparts is present on the lateral side of the pre-oral cavity in cockroach?  
 1) Labrum and mandibles  
 2) Mandibles and labium  
 3) Mandibles and 1<sup>ST</sup> maxillae  
 4) Mandibles and hypopharynx

164. The biomass available for consumption by the herbivores and the decomposers is called  
1) Net primary productivity  
2) secondary productivity  
3) Standing crop  
4) Gross primary productivity
165. Which of the following wavelength of light is absorbed maximum for photosynthesis?  
1) Red light  
2) Blue light  
3) Green light  
4) Yellow light
166. Cytochrome oxidase contain  
1) Fe  
2) Hg  
3) Co  
4) Mo
167. Tetanolysin is produced by  
1) Mycobacterium  
2) Clostridium botulinum  
3) Clostridium tetani  
4) None of these
168. What is true about Nereis, scorpion, cockroach and silver-fish?  
1) They all possess a dorsal heart  
2) None of them aquatic  
3) They all belong to the same phylum  
4) They all have jointed paired appendages
169. Passive absorption of water is related to all, except  
1) Apoplastic pathway  
2) Transpiration pull plays the major role  
3) Development of a positive pressure in xylem  
4) Water absorption through the roots
170. Emerson's enhancement effect and Red drop have been instrumental in the discovery of:  
1) Photophosphorylation and non - cyclic electron transport  
2) Two photosystems operating simultaneously  
3) Photophosphorylation and cyclic electron transport  
4) Oxidative phosphorylation
171. Biopiracy means  
1) Use of biopatents  
2) Thefts of plants and animals  
3) Stealing of bioresources  
4) Exploitation of bioresources without authentic permission
172. The chief water conducting elements of xylem in gymnosperms are  
1) Vessels  
2) Fibers  
3) Transfusion tissue  
4) Tracheids
173. When a cell is plasmolysed, it becomes  
1) Flaccid and its TP becomes zero  
2) Turgid and its becomes zero  
3) Turgid and TP becomes equal to OP  
4) Flaccid and DPD becomes zero
174. Khorana got the Nobel Prize for  
1) t-RNA  
2) Genetic code  
3) Carbohydrate metabolism  
4) Protein synthesis
175. Gause's principal of competitive exclusion states that:  
1) More abundant species will exclude the less abundant species through competition  
2) Competition for the same resources excludes species having different food preferences  
3) No two species can occupy the same niche indefinitely for the same limiting resources  
4) Larger organisms exclude smaller once through competition
176. In tissue culture medium, the embryoids formed from pollen grains is due to  
1) Cellular totipotency  
2) Organogenesis  
3) Double fertilization  
4) Test - tube culture

177. The embryo of man is protected by
- 1) Amniotic cavity
  - 2) Peritoneal cavity
  - 3) Pleural cavity
  - 4) Allantois
178. Select the correct statement regarding protein synthesis
- 1) When the small subunit of the ribosome encounters an mRNA the process of translation begins
  - 2) Peptidase catalyses the formation of peptide bond
  - 3) UTRs are present between the start codon and stop codon
  - 4) At the end of translation the release factor binds of the initiation codon
179. Chloride shift occurs in response to
- 1)  $\text{HCO}_3^-$
  - 2)  $\text{K}^+$
  - 3)  $\text{H}^+$
  - 4)  $\text{Na}^+$
180. An antiviral chemical produced by the animal cell is
- 1) Virion
  - 2) Interferon
  - 3) Repressor protein
  - 4) Hormone

**NTA NEET MOCK TEST - 1**  
**PHYSICS KEY**

1-10	3	4	4	3	4	2	4	2	3	3
11-20	3	4	3	4	2	1	4	2	3	4
21-30	3	2	2	2	1	2	3	2	3	1
31-40	1	3	2	3	4	4	1	1	1	1
41-45	2	4	1	4	3					

**CHEMISTRY**

46-55	4	4	1	3	2	1	4	3	4	4
56-65	2	3	2	1	1	3	3	1	3	2
66-75	2	4	4	1	2	1	2	2	3	4
76-85	2	3	2	3	3	3	1	3	4	3
86-90	2	3	1	2	1					

**BIOLOGY**

91-100	4	4	3	1	2	3	4	4	3	3
101-110	4	2	3	1	3	1	2	4	3	4
111-120	4	3	1	3	1	2	1	2	1	1
121-130	3	1	3	3	3	1	3	1	2	1
131-140	1	3	4	2	1	4	1	3	3	3
141-150	2	4	2	1	1	2	4	4	3	1
151-160	2	2	1	4	2	4	3	2	4	2
161-170	4	4	1	1	2	1	3	3	3	2
171-180	4	4	1	2	3	1	1	1	2	2

**PHYSICS SOLUTIONS**

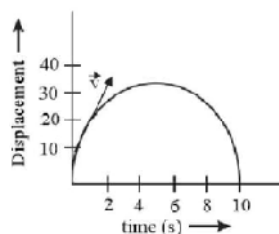
1. We know that,

$$v = \frac{dx}{dt}, \text{ it is slope of } x-t \text{ of graph}$$

From, 0s – 5s – slope will be decreasing

5s – slope is zero

5s – 10s – slope will be increasing in but a negative value



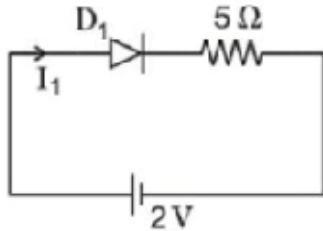
2. 
$$\text{flux} = \frac{\text{enclosed charge } e \text{ through closed surface}}{\epsilon_0}$$

$$\phi = \frac{\rho \times a^3}{\epsilon_0}$$

$$\phi_2 = \rho \times \frac{4\pi a^3}{3\epsilon_0}$$

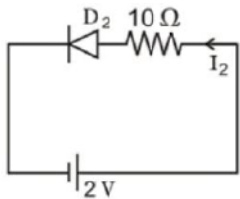
$$\phi_2 = \phi \times \frac{4}{3}\pi$$

3. When +ve polarity is connected to A  
Then  $D_1$  is forward biased and  $D_2$  is reversed biased i.e.,



$$\therefore I_1 \text{ current through } D_1 = \frac{2}{5} = 0.4A$$

- When +ve polarity is connected to B then  $D_2$  is forward biased and  $D_1$  is reverse biased then



$$\Rightarrow I_2 = \frac{2}{10} = 0.2A$$

4. As there is no effect of change in pressure on velocity of sound in air, and velocity  $\propto \sqrt{T}$ , therefore, when temperature is doubled, velocity becomes  $330\sqrt{2}$  m/s.

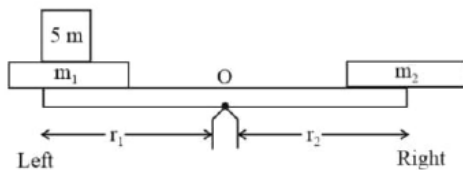
$$5. \quad E = \frac{1}{2} 2m\omega^2 A^2 = \frac{1}{2} 2m \left( \sqrt{\frac{k}{2m}} \right)^2 A^2$$

$$E = \frac{1}{2} kA^2$$

Total energy depends on k of spring and amplitude A. It is independent of mass.

6. Let  $m_1$  and  $m_2$  be the masses of pan.

It is given that  $m_1 = m_2$



Since balance is achieved so net torque about O should be zero

$$(5mg + m_1g)r_1 = (m_2g)r_2$$

$$(5m_1g + m_1g)r_1 = (m_1g)r_2$$

$$\frac{r_1}{r_2} = \frac{m_1g}{m_1g + 5mg}$$

$$\frac{r_1}{r_2} < 1$$

$$7. \quad E_n \propto \frac{1}{n^2} \text{ and } r_n \propto n^2$$

$\therefore E_n r_n$  is independent of  $n$

$$\text{Here, } E_1 r_1 = (13.6 \text{ eV})(0.53 \text{ \AA}^0)$$

$$7.2 \text{ eV \AA}^0 = \text{constant}$$

$$8. \quad \text{Total energy} = -\frac{GMm}{2r}$$

$$\text{Here, } r = R + hGM = g_0 R^2$$

$$\Rightarrow E = -\frac{mg_0 R^2}{2(R+h)}$$

9. From the given  $V - T$  diagram, we can see that in process AB,  $V \propto T$ . Therefore pressure is constant (as quantity of the gas remains same).

In process BC,  $V = \text{constant}$  and in process CA,  $T = \text{constant}$ .

Therefore these processes are correctly represented on P-V diagram by graph (3)

10. Equivalent thermal conductivity of the compound, slab

$$K_{eq} = \frac{l_1 + l_2}{\frac{l_1}{K_1} + \frac{l_2}{K_2}} = \frac{l+l}{\frac{l}{K} + \frac{l}{2K}} = \frac{2l}{\frac{3l}{2K}} = \frac{4}{3} K$$

11. Linear momentum of satellite,

$$p = mv_0 = m\sqrt{GM/r} \text{ i.e. } p \propto 1/\sqrt{r};$$

$$\therefore \frac{P_A}{P_B} = \sqrt{\frac{r_B}{r_A}} = \sqrt{\frac{R+3R}{R+R}} = \sqrt{2}$$

12.  $\therefore x = A \sin \omega t$

$$\frac{A}{2} = A \sin \omega t$$

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$$\omega t = \frac{\pi}{6}$$

$$t = \frac{\pi}{6\omega}$$

$$= \frac{\pi}{6 \times 2\pi}$$

$$t = \frac{t}{12}$$

$$\therefore \text{time taken to reach from } x = 0 \text{ to } x = \frac{A}{2} \text{ is } \frac{T}{12}$$

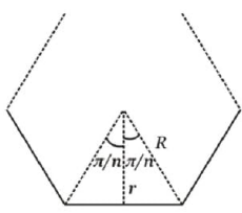
$$\therefore \text{Average velocity} = \frac{\text{Displacement}}{\text{Time}}$$

$$= \frac{A/2}{T/12}$$

$$= \frac{A}{T} \times 6$$

$$= \frac{6 \times 1}{0.5} = 12 \text{ cm/s}$$

$$13. \quad B = \frac{\mu_0 I}{4\pi r} \left[ 2 \sin \frac{\pi}{n} \right]$$



$$\text{But } \cos \frac{\pi}{n} = \frac{r}{R} \text{ or } r = R \cos \frac{\pi}{n}$$

$$\therefore B = \frac{\mu_0 I}{4\pi R \cos \frac{\pi}{n}} \left[ 2 \sin \frac{\pi}{n} \right] = \frac{\mu_0 I}{2\pi R} \left[ \tan \frac{\pi}{n} \right]$$

$$14. \quad X_L = 31\Omega, X_C = 25\Omega, R = 8\Omega$$

Impedance of series LCR is

$$Z = \sqrt{(R^2) + (X_L - X_C)^2}$$

$$= \sqrt{(8)^2 + (31 - 25)^2} = \sqrt{64 + 36} = 10\Omega$$

$$\text{Power factor, } \cos \phi = \frac{R}{Z} = \frac{8}{10} = 0.8$$

15. In one dimensional motion, the body can have at a time one velocity but not two values of velocities.

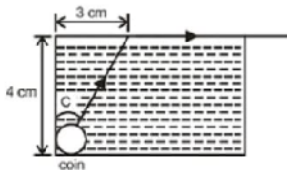
16. According to Kepler's third law

$$\text{Since, } T^2 = Kr^3$$

For small changes

$$\Rightarrow \frac{2\Delta T}{T} = \frac{3\Delta r}{r} \Rightarrow \frac{\Delta T}{T} = \frac{3}{2} \frac{\Delta r}{r}$$

17.



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$$\text{From figure, } \sin C = \frac{3}{\sqrt{(4)^2 + (3)^2}} = \frac{3}{5}$$

Where C is the critical angle.

$$\text{Also, } \sin C = {}^l \mu_a$$

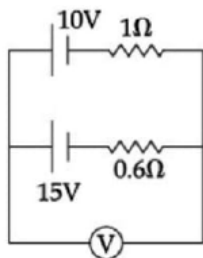
$$\sin C = \frac{1}{{}^l \mu_a} \left[ \text{since } {}^l \mu_a = \frac{1}{{}^a \mu_l} \right]$$

$$\text{Also, } {}^a \mu_l = \frac{\text{velocity of light in air (c)}}{\text{velocity of light in liquid (v)}}$$

$$\therefore \sin C = \frac{v}{c} = \frac{v}{3 \times 10^8}$$

$$\text{Or } v = 3 \times 10^8 \times \frac{3}{5} = 1.8 \times 10^8 \text{ ms}^{-1}$$

18.



The equivalent emf of the battery parallel combination is given as

$$\text{Equation} = \frac{\frac{E_1 + E_2}{\frac{1}{r_1} + \frac{1}{r_2}}}{\frac{1}{r_1} + \frac{1}{r_2}}$$

$$= \frac{\frac{10 + 15}{\frac{1}{1} + \frac{1}{0.6}}}{\frac{1}{1} + \frac{1}{0.6}} = \frac{10 + \frac{150}{6}}{1 + \frac{10}{6}} = \frac{105}{8} = 13.1\text{V}$$

∴ The reading measured by voltmeter = 13.1 V.

19.

$$m_{cb} = 100\text{g} \quad (T^{\circ}\text{C})$$

$$m_c = 100\text{g} \quad (30^{\circ}\text{C})$$

$$m_w = 170\text{g} \quad (30^{\circ}\text{C})$$

Net heat loss = Net heat gain

$$100\text{g} \times 0.1 \times (T - 75) = 100 \times 0.1$$

$$\times (75 - 30) + 170 \times 1 \times (75 - 30)$$

$$\Rightarrow T - 75 = 45 + 17 \times 45 = T = 885^{\circ}\text{C}$$

20.

$$\text{Resistance, } R = \frac{\text{Potential difference}}{\text{current}} = \frac{V}{i} = \frac{W}{Qi}$$

(∵ Potential difference is equal to work done)

$$\text{So, dimension of } R = \frac{[\text{Dimensions of work}]}{[\text{Dimensions of charge}][\text{Dimension}]}$$

$$= \frac{[ML^2T^{-2}]}{[IT][I]} = [ML^2T^{-3}I^{-2}]$$

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21.

The process of superimposing signal frequency (i.e., audio wave) on the carrier wave is known as a Modulation.

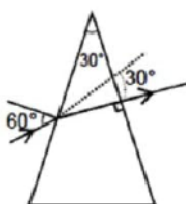
22.

$$\delta = i + e - A$$

$$30 = 60 + e - 30^{\circ}$$

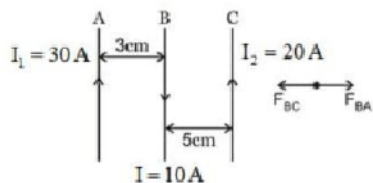
$$\Rightarrow e = 0$$

So angle with face =  $90^{\circ}$





23.



$$\therefore \text{Required force} = \frac{\mu_0}{2\pi} \left\{ \frac{I_2}{0.05} - \frac{I_1}{0.03} \right\} L$$

Assuming left side is the +ve direction

$$= 2 \times 0.25 \times 10^{-7} \left\{ \frac{10 \times 20}{0.05} - \frac{10 \times 30}{0.03} \right\} N \text{ toward left}$$

$$= 2 \times 0.25 \times 10^{-5} \left\{ \frac{200}{5} - \frac{300}{3} \right\}$$

$$= 2 \times 0.25 \times 10^{-5} \{40 - 100\} N \text{ toward left}$$

$$= 2 \times 0.25 \times 60 \times 10^{-5} \text{ toward right}$$

$$= 3 \times 10^{-4} \text{ toward right}$$

24. From Einstein's photoelectric effect concept the energy of these photons, for light of frequency

$\nu$  is  $E = h\nu$

Where  $h$  is Planck's constant.

$$\text{Also, frequency} = \frac{\text{velocity}}{\text{wavelength}} = \frac{c}{\lambda}$$

$$\therefore = \frac{hc}{\lambda}$$

$$\text{Energy of } n \text{ photons is } E = \frac{nhc}{\lambda}$$

$$\text{Given, } E = 10^{-7} J, \lambda = 5000 \text{ \AA}$$

$$= 5000 \times 10^{-10} m$$

$$\Rightarrow n = \frac{E\lambda}{hc}$$

$$= \frac{10^{-7} \times 5000 \times 10^{-10}}{6.6 \times 10^{-34} \times 3 \times 10^8}$$

$$= 2.5 \times 10^{11}$$

25. For Hydrogen like atom,

$$\frac{1}{\lambda'} = RZ^2 \left( \frac{1}{n_1^2} - \frac{1}{n_2^2} \right) \dots (i)$$

For hydrogen atom,

$$\frac{1}{\lambda} = R \left( \frac{1}{n_1^2} - \frac{1}{n_2^2} \right) \dots (ii)$$

Dividing Eqn (ii) by Eqn (i), we get

$$\frac{\lambda'}{\lambda} = \frac{R \left( \frac{1}{n_1^2} - \frac{1}{n_2^2} \right)}{RZ^2 \left( \frac{1}{n_1^2} - \frac{1}{n_2^2} \right)}$$

$$\text{Or, } \frac{\lambda'}{\lambda} = \frac{1}{Z^2}$$

According to problem,  $\lambda' = \frac{\lambda}{4}$

$$\therefore \frac{\lambda'}{4\lambda'} = \frac{1}{Z^2}$$

$$\therefore Z = 2$$

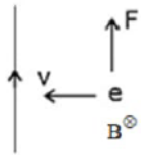
The atomic number of Helium atom is 2. Hence, required element is Helium

26.  $\vec{F} = q(\vec{v} \times \vec{B})$

$$\therefore q = -ve$$

$$\Rightarrow \vec{f} = -q(\vec{V} \times \vec{B})$$

$\therefore$  motion of  $-q$  is towards the wire



27.  $e = \frac{\text{Velocity of separation}}{\text{Velocity of approach}}$

$$e = \sqrt{\frac{h_2}{h_1}} = \sqrt{\frac{81}{100}} = 0.9$$

28. Given  $PV^{-2} = \text{const}$

Compared  $PV^N = \text{const}$

$$\therefore N = -2$$

$$C = C_v + \frac{R}{1-N} = \frac{5R}{2} + \frac{R}{1+2} = \frac{5R}{2} + \frac{R}{3}$$

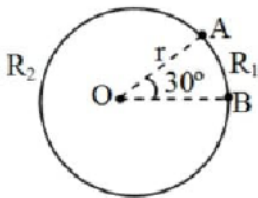
$$= \frac{15R + 2R}{6} = \frac{17R}{6}$$

29. For aluminium and copper magnitude of Shear moduli is less than Young's moduli and bulk moduli is maximum.

30.  $2\pi r$  length of wire has resistance =  $36\Omega$

$$\therefore \frac{r\pi}{6} \text{ length of wire has resistance}$$

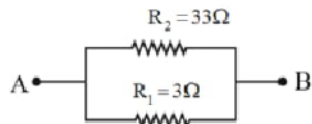
$$= \frac{36}{2\pi r} \times \frac{r\pi}{6} = 3\Omega$$



$$\therefore R_1 = 3\Omega$$

$$\therefore R_2 = 33\Omega$$

Both  $R_1$  and  $R_2$  are connected across AB



$$R_{eq} = \frac{3 \times 33}{3 + 33} = \frac{3 \times 33}{36} = 2.75\Omega$$

$$31. \quad \frac{\Delta s}{s} = 2 \times \frac{\Delta r}{r}$$

$$\frac{\Delta V}{V} = 3 \times \frac{\Delta r}{r}$$

$$\therefore \frac{\Delta V}{V} = \frac{3 \Delta S}{2 S}$$

$$\frac{\Delta V}{V} = \frac{3}{2} \alpha$$

$$32. \quad \text{Height of tap} = 5\text{m and } g = 10 \text{ ms}^{-2}$$

$$\text{For the first drop, } 5 = ut + \frac{1}{2}gt^2$$

$$\text{Or } 5 = (0 \times t) + \frac{1}{2} \times 10t^2 \Rightarrow 5 = 5t^2 \text{ or } t = 1\text{sec}$$

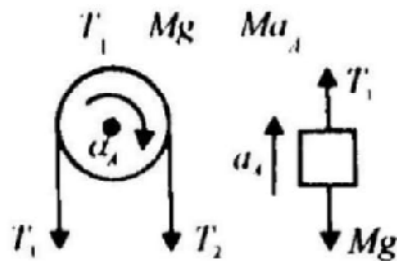
It means that the third drop leaves after one second of the first drop. Or, each drop leaves after every 0.5 sec.

Distance covered by the second drop in 0.5 sec

$$= ut + \frac{1}{2}gt^2 = (0 \times 0.5) + \frac{1}{2} \times 10 \times (0.5)^2$$

$$= 1.25\text{m}$$

Therefore, distance of the second drop above the ground =  $5 - 1.25 = 3.75 \text{ m}$



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33.

$$\text{In figure, } (T_2 - T_1)R = \frac{MR^2}{2} \alpha_A$$

$$T_1 - Mg = M \alpha_A$$

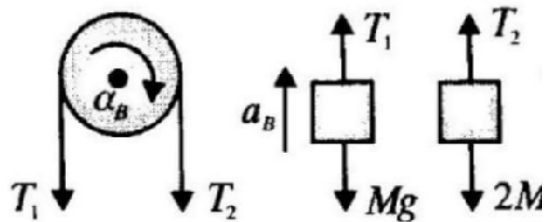
$$T_2 = 2Mg$$

$$\alpha_A = R \alpha_A$$

$$R(2Mg - Mg - M \alpha_A) = \frac{MR^2}{2} \alpha_A$$

$$g - R \alpha_A = \frac{R \alpha_A}{2}$$

$$\alpha_A = \frac{2g}{3R}$$



From figure,  $(T_2 - T_1) \times R = \frac{MR^2}{2} \alpha_B$

$$T_1 - Mg = M \alpha_B$$

$$2Mg - T_2 = 2M \alpha_B$$

$$\alpha_B = R \alpha_B$$

$$\Rightarrow \alpha_B = \frac{2g}{7R}$$

$$\text{So, } \alpha_A > \alpha_B$$

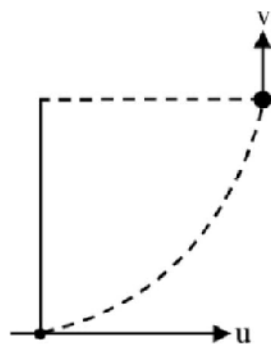
34. From the hysteresis curve of soft iron we get soft iron has high retentivity and low coercive force therefore the loop (i) is for soft iron and the loop (ii) is for steel in Fig.

35. From energy conservation

$$v^2 = u^2 - 2gL \dots \dots \dots (1)$$

Now since the two velocity vectors shown in figure are mutually perpendicular, hence the magnitude of change of velocity will be given by

$$|\Delta \vec{v}| = \sqrt{u^2 + v^2}$$



36. Hygen's construction of wavefront does not apply to origin of spectra which is explained by quantum theory.

37.  $A \rightarrow B$  is an isobaric process,

$$V \propto T$$

$$\text{So, } \Delta W_{AB} = nR\Delta T = 2 \times R \times (750 - 250) = 1000R$$

$B \rightarrow C$  is an isochoric process

$$\therefore \Delta W_{BC} = 0 \text{ and}$$

$C \rightarrow D$  is isothermal process

$$\Delta W_{CD} = nRT \ln \left( \frac{V_f}{V_i} \right)$$

$$= 2 \times R \times 1000 \ln \left( \frac{20}{15} \right) = 2000R \ln \left( \frac{4}{3} \right)$$

Total work done,

$$\Delta W = \Delta W_{AB} + \Delta W_{BC} + \Delta W_{CD}$$

38. Weight of train  $10^7 N = 10^6 \text{ kgf}$

$$\text{Frictional force, } F = \frac{0.5}{100} \times 10^6 = 5000 \text{ kgf}$$

$$F = 50000 \text{ N}$$

$$v = 36 \text{ kmh}^{-1} = 10 \text{ ms}^{-1}$$

$$P = F \times v = 50000 \times 10 = 5 \times 10^5 \text{ W} = 500 \text{ kW}$$

39.  $F = ma = \frac{mv}{T}$  ( $\because a = \frac{v-0}{T}$ )

$$\text{Instantaneous power} = Fv$$

$$= mav = \frac{mv}{T} at = \frac{mv}{T} \frac{v}{T} t = \frac{mv^2}{T^2} t$$

40.  $(A+4)$  Rest

$$\sqrt{2AE_A} \leftarrow (A) \quad (4) \rightarrow \sqrt{2(4)E}$$

$$\sqrt{2AE_A}$$

By momentum conservation

$$\sqrt{2AE_A} = \sqrt{2(4)E}$$

$$E_A = \frac{4}{A} E$$

So energy released

$$E_R = E + \frac{4}{A} E = E \left(1 + \frac{4}{A}\right)$$

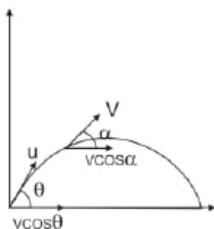
41. For a point source,  $I \propto \frac{1}{r^2}$

$$\text{And } A \propto \sqrt{I}$$

$$\therefore A \propto \sqrt{\frac{1}{r^2}} \text{ or } A \propto \frac{1}{r}$$

42. The frequency is a characteristic of source. It is independent of the medium. Hence, the correct option is (600 Hz).

43.



During the projectile motion,

Horizontal component of velocity is always same

$$\Rightarrow v \cos \alpha = u \cos \theta$$

$$\text{Or, } v = \frac{u \cos \theta}{\cos \alpha}$$

$$\text{Or, } v = u \cos \theta \sec \alpha$$

44. Use  $i = neAv_d$

$$\therefore V_d = \frac{i}{neA}$$

$$V_d = \frac{5.4}{8.4 \times 10^{28} \times 1.6 \times 10^{-19} \times 10^{-6}}$$

$$V_d = \frac{5.4 \times 10^{-3}}{8.4 \times 1.6}$$

$$V_d = 0.4 \text{ cm s}^{-1}$$

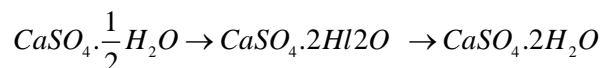
45. From capillary tube experiment, we know that

$$h = \frac{2S \cos \theta}{r \rho g} \text{ i.e., } h \propto \frac{1}{r}$$

$$\therefore \frac{h'}{h} = \frac{r}{r/2} = 2 \text{ or } h' = 2h$$

### CHEMISTRY SOLUTIONS

46. Setting of plaster of Paris is exothermic process.



*Plaster of Paris Orthorhombic Monoclinic gypsum*

47. Average translational kinetic energy (E) per molecule.

$$E = \frac{3}{2} kT$$

k is Boltzmann's constant, equal to  $1.38 \times 10^{-23}$

Average kinetic energy depends only on temperature ( $K.E = \frac{3}{2} kT$ )

48. Wt. of  $\text{CH}_3\text{COOH}$  dissolved = 5 g

$$\text{Eq. of } \text{CH}_3\text{COOH} \text{ dissolved} = \frac{5}{60}$$

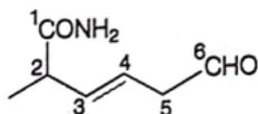
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Volume of ethanol = 1 litre = 1000 mL

$$\therefore \text{Weight of ethanol} = (1000 \times 0.789) \text{ g} = 789 \text{ g}$$

$$\therefore \text{Molality of solution} = \frac{\text{Moles of solute}}{\text{wt. of solvent in kg}}$$

$$= \left\{ \frac{5}{\frac{60 \times 789}{1000}} \right\} = 0.1056$$



49.

2 - Methyl - 6- oxohex - 3 - enamide (Priority: Amide > Aldehyde)



HF gives  $\text{H}^+$  to the  $\text{CH}_3\text{COOH}$ , so it is acid and its conjugate base is  $\text{F}^-$ .

51. No concentration of  $\text{Ba}^{2+}$  or  $\text{SO}_4^{2-}$  in solution since  $\text{BaSO}_4$  gets precipitated.

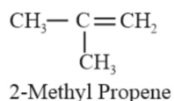
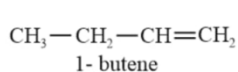
52. As  $\frac{Z}{e} \uparrow$  ionic radius decreases for isoelectronic species.

$$N^{3-} \left( \frac{Z}{e} \right) = \frac{7}{10}$$

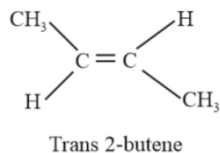
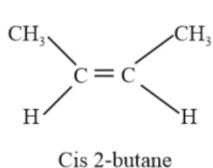
$$O^{2-} \left( \frac{Z}{e} \right) = \frac{8}{10}$$

$$F^{-} \left( \frac{Z}{e} \right) = \frac{9}{10}$$

Trend of ionic radius:  $N^{3-} > O^{2-} > F^{-}$



53.



54.  $\text{Starch} \xrightarrow{\text{Enzymes}} \text{Alcohol}$

55.  $\text{BCl}_3$  as per VSEPR

$H = \frac{1}{2}(3 + 3) = 3$ ,  $sp^2$  hybridized bond angle  $120^\circ$  and for others.

$H = \frac{1}{2}(5 + 3) = 4$ ,  $sp^3$  hybridization with lone pair. Pyramidal bond angle decreases as electronegative of central atom decreases.

56.  $\text{Cl}_2 + 2\text{I}^- \rightarrow \text{I}_2 + 2\text{Cl}^-$

Rate of formation of  $\text{I}_2 = \frac{d[\text{I}_2]}{dt} = -\frac{1}{2} \frac{d[\text{I}^-]}{dt}$

$$= \frac{1}{2} \times \frac{0.2 - 0.18}{20}$$

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$$= \frac{1}{2} \times \frac{0.02}{20}$$

$$= 5 \times 10^{-4} \text{ mol L}^{-1} \text{ min}^{-1}$$

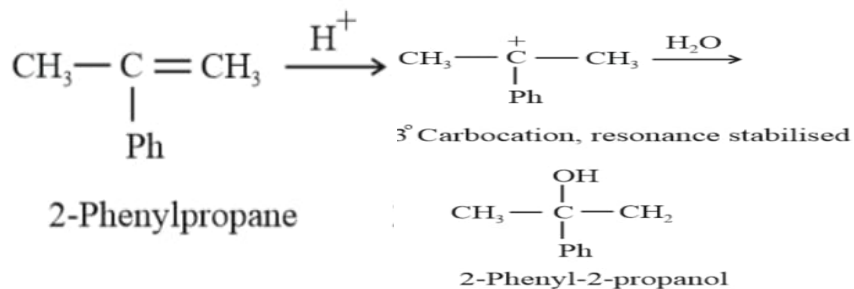
57.  $t_{1/2} = 4 \text{ hours}$

$$n = \frac{T}{t_{1/2}} = \frac{24}{4} = 6; N = N_0 \left( \frac{1}{2} \right)^n$$

$$\text{Or, } N = 200 \times \left( \frac{1}{2} \right)^6 = 3.125 \text{ g}$$

58. Gold, Ag and Pt are called noble metals. They are unreactive and found in free state.

59. Reaction proceeds through carbocation intermediate.



60. Let pressure of  $O_2$  be 'x'

∴ Pressure of  $H_2 = 1 - x$

$2H_2$	+	$O_2$	
$t=0$	(1-x)		x
	-2x		-x
-----		-----	
	1-3x		0

$$H_2 \text{ remaining} = 1 - 3x = 0.35$$

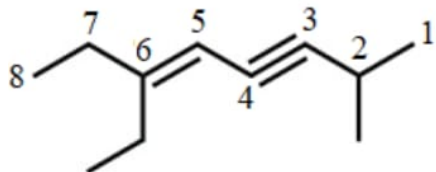
$$\therefore x = \frac{0.65}{3}$$

$$X_{O_2} = 0.217 \approx 0.22$$

$$X_{H_2} = 0.78$$

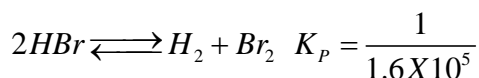
61. 2, 4 - Dichlorophenoxy acetic acid is used as a herbicide, it kill herbs.

62. This is the IUPAC name of the compound



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6-Ethyl-2-Methyl-5-Octen-3-yne



At eq.  $(10 - x) \quad \frac{x}{2} \quad \frac{x}{2}$

$$63. \quad K_p = \frac{1}{1.6 \times 10^5} = \frac{P_{H_2} \cdot P_{Br_2}}{P_{HBr}^2} = \frac{\frac{x}{2} \cdot \frac{x}{2}}{10^2}$$

$(10 - x) \approx 10$  as because magnitude of  $K_p$  is high.

$$x = 0.050$$

$$P_{HBr} = (10 - 0.050) = 9.95 \approx 10$$

64.  $l = 2$  for 3d orbital

Angular momentum of 3d orbital

$$= \sqrt{l(l+1)} \frac{h}{2\pi} = \frac{h}{2\pi} \sqrt{6} = \frac{\sqrt{3}}{\sqrt{2}} \cdot \frac{h}{\pi}$$



65.  $S = \frac{10W}{M}$  mole per litre

$$K_{sp} \text{ of } Ca_3(PO_4)_2 = 108S^5$$

$$= 108 \left( \frac{10W}{M} \right)^5$$

$$= 10^7 \left( \frac{W}{M} \right)^5 \text{ (Approximately)}$$

66. Acetaldehyde cannot show Lucas test because Lucas test is given by alcohols only. It is used in the distinction between primary, secondary and tertiary alcohols. Conc. HCl and anhydrous  $ZnCl_2$  is called Lucas reagent.

67. Surface area per gram solid decreases on increasing the particle size, and so also the amount of adsorption.

68. For monoatomic gas,  $\gamma_1 = \frac{C_p}{C_v} = 1.67$

For diatomic gas,  $\gamma_2 = \frac{C_p}{C_v} = 1.40$

$$\therefore \gamma_1 : \gamma_2 = \frac{1.67}{1.40} = 1.19 : 1$$

69.  $W = 2.303nRT \log \frac{P_2}{P_1}$

$$= 2.303 \times 1 \times 2 = 300 \log \frac{10}{2} = 965.84$$

At constant temperature,  $\Delta E = 0$

$$\Delta E = q + W;$$

$$q = -W = -965.84 \text{ cal}$$

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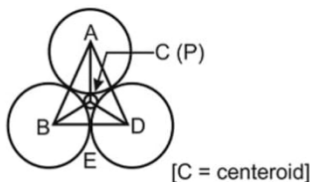
70. Angular momentum =  $\frac{nh}{2\pi}$

$$3.1652 \times 10^{-34} = \frac{n \times 6.626 \times 10^{-34}}{2\pi}$$

$$n = 3$$

$$\therefore \bar{v} = RZ^2 \left( \frac{1}{n_1^2} - \frac{1}{n_2^2} \right)$$

$$\bar{v} = R.(2)^2 \left( \frac{1}{2^2} - \frac{1}{3^2} \right) \Rightarrow \frac{5R}{9}$$



71.

P is at the triangular planar void

$$\text{Given : } r + R = 2 A^0 \dots (i)$$

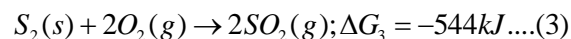
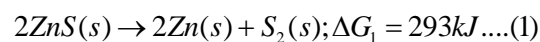
as  $\frac{r}{R} = 0.155$  for the triangular planar void.

$\Rightarrow r = 0.155R$  by putting this value in eq (1) we get

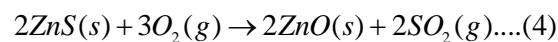
$$\therefore 1.155R = 2A^0$$

$$\therefore R = \frac{2}{1.155} A^0$$

72. For the reaction



$\Delta G$  for the reaction

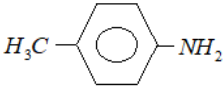


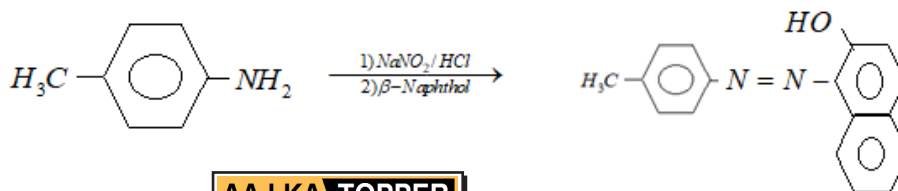
Eqn. (4) can be obtained by adding eqn. (1), (2) and (3), so,

$$\Rightarrow \Delta G = 293 - 480 - 544 = -731kJ$$

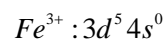
73. Sodium hydrogen sulphite adds to aldehydes and ketones to form crystalline bisulphite addition products. The product is water soluble and can be converted back to the original carbonyl compound by treating it with dilute mineral acid or alkali. Therefore, these are useful for separation and purification of aldehydes like acetaldehydes.

74. Aromatic  $1^0$  amines form azodyes.

Among the given options  can form azodye with  $\beta$ -Naphthol



75.  $Fe: 3d^6 4s^2$



$$n = 5$$

$$\mu = \sqrt{35} BM = 5.92 BM$$

76. In BCC,  $r = \frac{\sqrt{3}}{4} a$

Also, edge length of unit cell = a

radius of atom = r

$\therefore$  Edge length not covered by atom =  $a - 2r$

$$\text{Or } = a - \frac{\sqrt{3}}{2} \cdot a = a \left[ \frac{2 - \sqrt{3}}{2} \right]$$

$\therefore$  Percentage fraction not covered

$$= \frac{a \left[ \frac{2 - \sqrt{3}}{2} \right]}{a} \times 100 = 0.134 \times 100 = 13.4\%$$

77.  $\text{pH} = 12$ ,  $\text{pOH} = 14 - 12 = 2$ ,

$$[\text{OH}^-] = 10^{-2} = 0.1\alpha$$

Or  $\alpha = 0.1$

$$i = 1 + (n-1)\alpha = 1 + (2-1) \times 0.1 = 1.1$$

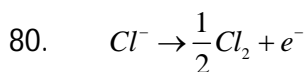
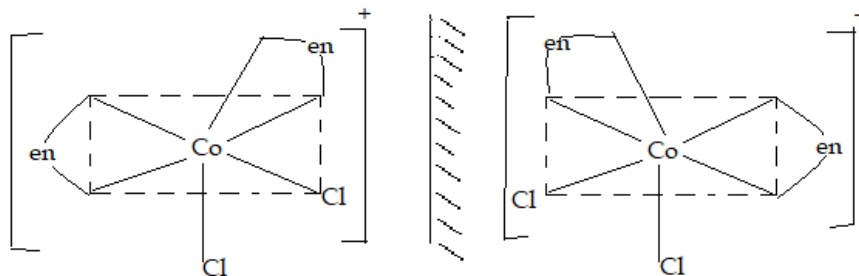
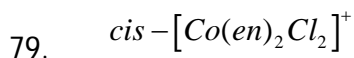
$$\pi = iCRT = 1.1 \times 0.1RT = 0.11RT$$

78.  $E_{\text{cell}}^0 = E_{\text{cathode}}^0 - E_{\text{anode}}^0$

$$I \quad E_{\text{cell}}^0 = +0.34 - (-0.76) = +1.10 \text{ V}$$

$$II \quad E_{\text{cell}}^0 = +0.80 - (-0.76) = +1.56 \text{ V}$$

$$III \quad E_{\text{cell}}^0 = +0.80 - (-0.34) = +0.46 \text{ V}$$



$$w = ZIt$$

$$= \frac{35.5}{96500} \times 1 \times 30 \times 60 = 0.66 \text{ g}$$

81. First, we calculate the expected bond dissociation energy of benzene molecules as-

$$3 \times \Delta H_{(\text{C}-\text{C})} + 3 \times \Delta H_{(\text{C}=\text{C})} + 6 \times \Delta H_{(\text{C}-\text{H})}$$

$$\therefore \text{Calculated value} = 3(347.3) + 3(615) + 6(416.2) = 5384.1 \text{ kJ}$$

$$\text{Resonance energy} = \text{Experimental value} - \text{calculated value}$$

$$= 5335 - 5384.1 = -49.1 \text{ kJ/mol}$$

82. According to law of mass action

$$K_c = \frac{[\text{NO}_2]^2}{[\text{N}_2\text{O}_4]} = \frac{[1.2 \times 10^{-2}]^2}{4.8 \times 10^{-2}} = 0.3 \times 10^{-2} = 3 \times 10^{-3} \text{ mol/L}$$

83. Minimum boiling azeotropic mixture possesses the boiling point lower than either of the liquids. This arises when intermolecular attractions of A-A and B-B are less than A-B attractions. This is called positive deviation from Raoult's law.

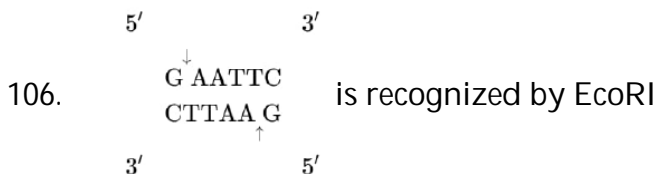
84. Rate constant is independent of concentration. It depends only on temperature.

85. Condensation polymerization: In this type of polymerisation, two or more bifunctional molecules undergo a series of independent condensation reactions with the elimination of simple molecules such as water, alcohol, hydrogen chloride, etc. to form a macromolecule. For example, nylon 6, 6  
Additional polymerisation: In this type of polymerisation, the polymers are formed by the repeated addition of monomer molecules possessing double or triple bonds. For example, formation of polythene from ethane.
86. An ionic equation is said to be balanced only when atoms, their types and charges at both the reactant and product side are equal.  
$$NO_2^{\ominus} + H_2O \rightarrow NO_3^{\ominus} + 2H^+(aq) + 2e^-$$
87. Dichloromethane and water are immiscible in nature. Also, Dichloromethane has higher density than water so forms bottom layer (Layer II) in the separating funnel.
88. Insoluble calcium and magnesium salts formation can block radiators.
89. Iodine is the best leaving group therefore both A and B
90.  $6Li + N_2 \rightarrow 2Li_3N$  Lithium nitride

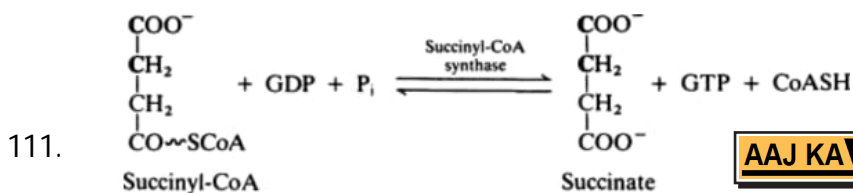
### BIOLOGY SOLUTIONS

91. Ach released from synaptic vesicle to enter synaptic cleft and attach with receptors on post synaptic membrane. It opens  $Na^+$  channels and hence  $Na^+$  concentration increases.
92. Bicollateral vascular bundles are conjoint bundles having phloem both on the outer and inner side of xylem. E.g., Cucurbita.
93. In both sexual and asexual reproductions, genetic material is transferred from parents to progeny. Progeny also resemble parents even though same variations occur in children in sexual reproduction.
94. In Pistia, roots are poorly developed as it is free-floating hydrophyte. **AAJ KA TOPPER**
95. In layering middle, part of a soft basal branch is defoliated, slightly injured, and pegged in the soil to develop adventitious roots. Later on, the branch of the layer is separated and planted.
96. In angiosperms, two integuments are found in the ovule, while in gymnosperms, only one integument is found.
97. Cartilage is a sound but semi-rigid and flexible connective tissue. Cartilage is a non-vascular connective tissue, consisting of chondrocytes cells embedded in a resilient matrix of chondrin. Chondrin is a protein of cartilage.
98. Leghaemoglobin pigment is closely related to haemoglobin and helpful in creating an optimal condition for nitrogen fixation. Like hemoglobin, leghaemoglobin is an oxygen scavenger. Fixation of nitrogen is done with the help of enzyme nitrogenase, which functions under anaerobic conditions. Leghaemoglobin combines with oxygen and protects nitrogenase.
99. A fall in G.F.R activate JG cells to release Renin.
100. Xerophytes are plants growing in water scarce environment.
101. Bacillus thuringiensis forms protein crystal during a particular phase of their growth. These crystal contain a toxic insecticidal protein.

102. The outer integument of the ovule develops into a testa. The inner integument of the ovule develops into a tegmen.
103. Selaginella shows many of the several adaptations required to produce seed. They are collectively called seed habit of Selaginella.
104. Cytokinin was discovered by Skoog and miller.
105. Surrogate mother receive embryo into her uterus whose the gestation occur.



107. The process of blood clotting starts when prothrombinase catalyzes the conversion of prothrombin (an inactive protein in the blood plasma) into thrombin (Active protein) in the presence of  $\text{Ca}^{2+}$  ion (blood clotting factor IV).
108. Synapsis occurs in the zygotene stage of prophase – of meiosis – I. The homologous chromosome comes close to each other and forms a pair. This pairing is called synapsis and the pair of the homologous chromosomes is called bivalent.
109. Endometrium is the internal lining of uterus in mammals.
110. Chances of conception is nil until the mother breast feed the infant only for 6 months  
Emergency



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112. Glucose from filtrate is absorbed in P.C.T, but not DCT
113. The hypothalamus contains a number of centers that control body temperature, urge for eating, and drinking. The hypothalamus is the part of the forebrain.
114. After meiotic division four haploid megaspores are formed. Only one megaspore (near the chalazal end) becomes functional and the other three degenerate. Functional megaspore undergoes three successive mitotic divisions to form 7 celled and 8 nuclei embryo sac.
115. Coliform bacteria are found in human faeces. Presence of such bacteria (E. coli is a member of the faecal coliform group) in the surface water is a common indicator of faecal contamination.
116. The process by which the information in genes flows into proteins:  $\text{DNA} \rightarrow \text{RNA} \rightarrow \text{protein}$ . The sequence of amino acids during protein synthesis is directly dependent on the sequence of nucleotides on mRNA, and indirectly by the sequence of nucleotides on DNA.
117. The male sex organs in bryophytes are called antheridia. They are borne on short multicellular stalks.
118. Lichens are considered as pioneers in initiating a plant succession on rocks.
119. The tissue inside the lenticle is more loosely packed called filling tissue or complementary tissue. Each lenticle acts as a pathway through which gases can diffuse to the living cells of the bark.

120. Ashbya gossypii is a filamentous fungus that is successfully used in the production of B<sub>2</sub> vitamins.
121. Bacteria are decomposers that break down organic compounds. They decompose plant and animal waste products and return carbon back in the environment.
122. Chimpanzee is more closely related to human being compared to others.
123. As DNA is a hydrophilic molecule. It cannot pass through cell membrane as it is hydrophobic in nature. Therefore, the bacterial cells should be made capable of uptaking DNA i.e., they should be competent.
124. All the sons of a colour blind woman are colour blind.
125. Removal of both ovaries in a rat results in a decrease in estrogen. Oxytocin and prolactin are released from the pituitary gland and GnRH is released from the hypothalamus.
126. The phrase "New World Crops" is usually used to describe crops that were native to North and South America before 1492 and not found anywhere else in the world at that time. Cashewnut, potato, rubber crops have been brought to India from the new world.
127. Cauliflower has the scientific name Brassica oleracea belonging to the variety botrytis.
128. Chlorosis is the appearance of yellow colour due to the non-synthesis or destruction of chlorophyll. It is caused due to deficiency of Mg, N, Fe, Ca, S. If chlorosis occurs due to deficiency of nitrogen then the first older leaves become yellow.
129. Adenine = Thymine =  $60/2 = 30\%$   
Guanine = Cytosine =  $40/2 = 20\%$
130. Kala-azar is caused by Leishmania donovani and its vector is sand fly.
131. Restriction endonucleases are the enzymes that cut at specific positions called restriction sites within the DNA molecule.
132. The first line of defence is provided by skin.
133. Filiform papillae on the tongue of a human being do not possess taste buds.
134. The chemiosmotic theory explains the functioning of electron transport chains. According to this theory, the transfer of electrons down an electron transport system through a series of oxidation-reduction reactions releases energy.
135. Dogfish and whale show convergent evolution as both of them live in the same habitat.
136. In a human being, the 11<sup>th</sup> and 12<sup>th</sup> pair of ribs are floating ribs as they are ventrally free, not attached to the sternum.
137. Spindle fibres originate from pole to pole attachment with kinetochores that are disc-shaped structures found in the sides of the centromere of chromosomes.
138. When the ligaments are broken, the bones become unattached and unfixed.
139. Biogas typically refers to a mixture of different gases produced by the breakdown of many organic matters in the absence of some oxygen. It has 50% - 70% methane, 30% - 40% carbon dioxide and 1 other gas.
140. The site of perception of light/dark duration is leaves.
141. Binomial nomenclature or "two-name" naming system or the binary nomenclature is the formal way of naming the organisms and is given by Carolus Linnaeus. Here the first word represents the genus while the second word denotes the species.
142. Air layering is a mode of vegetative propagation used to form new trees and shrubs.

143. AB person possess antigens A and B on RBC but not antibodies in the plasma.
144. The root nodules of Casuarina has nitrogen –fixing filamentous bacteria called Frankia. This organism converts the atmospheric dinitrogen to ammonia with the help of the enzyme nitrogenase.
145. Mammary gland is modified sweat gland.
146. The liquid endosperm of Cocos nucifera possess kinetin (cytokinin) growth hormone which is responsible for rapid cell division in the culture medium.
147. Respiration rate high at growing regions like a floral and vegetative bud, germinating seedlings, young leaves stems and root apices.
148. Lacteals of small intestine in human beings helps in the absorption of Fatty acids and Glycerols.
149. The cell of Acetabularia has three segments, the base rhizoid containing a nucleus, the stalk and a cap. Hammering grafted the stalk of one species to the rhizoid of others.
150. Alpha diversity is a diversity with in a community and Beta diversity exist between the communities.
151. Ranathambore Nation park is located in Rajasthan.
152. Mycorrhiza is a symbiotic association between a green plant (algae) and Fungus.
153. Adrenalin directly affects SA node thereby increasing heart rate.
154. In guava, mesocarp and endocarp form the edible part. In maize seed coat is fused with fruit wall.
155. Culture is the term generally used for artificial growth. The plant tissue culture actually refers to the growth of plant cells, tissues and organs on synthetic media.
156. Ribosomes were discovered by George Emil Palade and hence are also called as the Palade particles. The ribosome is a complex molecular machine, found within all living cells, that serves as the site of biological protein synthesis.
157. In GIFT, egg removed from donar's ovaries placed in one of the Fallopian tubes along with man's sperms.
158. When Amoeba is placed in salt water, its contractile vacuole disappear because there is no endosmosis in salt water.
159. Rise in CO<sub>2</sub> concentration stimulates chemoreceptors present in aorta and carotid artery which stimulates respiratory centre. Respiratory centre is not directly sensitive to oxygen concentration & hence desire to breath is induced by rise in CO<sub>2</sub> concentration of blood.
160. When we hold the breath, CO<sub>2</sub> concentration increases which is harmful and hence to remove CO<sub>2</sub>, urge for breathing increases.
161. Weberian ossicles refer to a paired chain of three or four small bones in certain fishes e.g. carps and catfishes. It connects the air bladder with the internal ear on either side.
162. Strain 2 and 4 have the genotype Gg where grey body colour (G) is dominant to the ebony body colour (g). (Strain 2 x gg = Gg : gg = 1:1, and Strain 4 x Gg = GG : Gg : gg = 1 : 2 : 1)
163. Mandibles and first pair of Maxillae are laterally arranged mouthparts in cockroach.
164. NPP of producers is the available source of food to herbivores and decomposers.
165. Blue light is the wavelength of light that is absorbed maximum for photosynthesis.

166. Cytochrome oxidase is a transmembrane protein in the inner mitochondrial membrane. It is a dimer with two identical chemical units containing two hemes, and three copper ions.
167. Tetanolysin is a toxin produced by *Clostridium tetani* bacteria. It is believed to contribute to the pathogenesis of tetanus.
168. Nereis, Scorpion, cockroach and silver fish are all invertebrates and thus possess a dorsal heart.
169. Passive absorption of water is related to development of a positive pressure in roots.
170. The red drop effect occurs due to decreased functioning of PS-II beyond 680 nm and when both PS-I and PS-II are functioning together there is an enhancement in quantum yield.
171. Biopiracy is the unlawful exploitation of bio-resource, already awarded biopatent and also biopatenting of bio-resource of other nation without proper permission of the concerned nation.
172. The chief water conducting elements of xylem in gymnosperms are tracheids. These are elongated cells with tapering ends and are dead because of the deposition of lignin.
173. The shrinkage of the protoplast of a living cell from its cell wall due to exosmosis under the influence of a hypertonic solution is called plasmolysis.
174. Marshall Nirenberg and Hargobind Khorana have determined which sequence of bases coded for which amino acids with the help of experiments.
175. Causes principle states that two species that compete for the exact same resources cannot stably coexist.
176. Cellular totipotency is the ability, shown by many living cells to form all types of tissue that constitute the mature organism.
177. In human beings, embryo is protected by Amniotic cavity. Pleural cavities exist around lungs. Peritoneal cavity in coelome. Allantois is excretory in function.
178. Chloride shift occurs in response to  $\text{HCO}_3^-$ . To maintain electrostatic neutrality of plasma, many chloride ions diffuse from plasma into RBCs and bicarbonate ions pass out.
179. During chloride shift, bicarbonate ions shift from RBC to plasma in exchange for chloride ions.
180. Interferons (IFNs) are a group of signaling proteins made and released by host cells in response to the presence of several pathogens, such as viruses, parasites, and also tumor cells.