

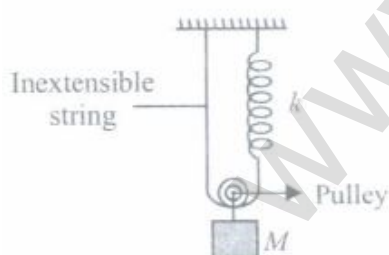
## Ravi Maths Tuition Centre

Time : 180 Mins

T4 1

Marks : 749

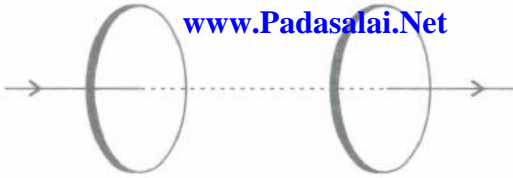
1. The terminal velocity of a sphere moving through a viscous medium is
  - a) Directly proportional to viscosity
  - b) Inversely proportional to viscosity
  - c) Directly proportional to the square of the radius of sphere
  - d) Inversely proportional to the square of viscosity
2. Given that  $A = B$ . What is the angle between  $\vec{A} + \vec{B}$  and  $\vec{A} - \vec{B}$ ?
  - a)  $30^\circ$
  - b)  $60^\circ$
  - c)  $90^\circ$
  - d)  $180^\circ$
3. A telescope has an objective lens of 10 cm diameter and is situated at a distance of one kilometre from two objects. The minimum distance between these two objects, which can be resolved by the telescope, when the mean wavelength of light is  $5000 \text{ \AA}$ , is of the order of \_\_\_\_\_.
  - a) 5 cm
  - b) 0.5 m
  - c) 5 m
  - d) 5 mm
4. Two particles are projected from the ground simultaneously with speeds  $20 \text{ m/s}$  and  $20\sqrt{3} \text{ m/s}$  at angles  $30^\circ$  and  $60^\circ$  with the horizontal in the same direction. The maximum distance between them till both of them strike the ground is approximate: ( $g = 10 \text{ m/s}^2$ )
  - a) 23.09 m
  - b) 16.4 m
  - c) 30.2 m
  - d) 10.4 m
5. Motion of an oscillating liquid in a U tube is:
  - a) periodic but not simple harmonic.
  - b) non-periodic.
  - c) simple harmonic and time period is independent of the density of the liquid.
  - d) simple harmonic and time period is directly proportional to the density of the liquid.
6. The time period of mass  $M$  when displaced from its equilibrium position and then released for the system as shown in figure is



- a)  $2\pi\sqrt{\frac{M}{k}}$
  - b)  $2\pi\sqrt{\frac{M}{2k}}$
  - c)  $2\pi\sqrt{\frac{M}{4l}}$
  - d)  $2\pi\sqrt{\frac{2M}{k}}$
7. If two tuning forks A and B are sounded together, they produce 4 beats per second. A is then slightly loaded with wax, they produce beats when sounded again. The frequency of A is 256 Hz. The frequency of B will be:
    - a) 250 Hz
    - b) 252 Hz
    - c) 260 Hz
    - d) 262 Hz
  8. Pick out the incorrect statement from the following.
    - a)  $\beta^-$  from the nucleus is always accompanied with a neutrino.
    - b) The energy of the  $\alpha$  particle emitted from a given nucleus is always constant.

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- c)  $\gamma$ -ray emission makes the nucleus more stable d) Nuclear force is charge-independent.
9. The additional kinetic energy to be provided to a satellite of mass  $m$  revolving around a planet of mass  $M$ , to transfer it from a circular orbit of radius  $R_1$  to another of radius  $R_2$  ( $R_2 > R_1$ ) is  
 a)  $GmM\left(\frac{1}{R_1^2} - \frac{1}{R_2^2}\right)$  b)  $GmM\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$  c)  $2GmM\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$  d)  $\frac{1}{2}GmM\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$
10. Water falls from a height of 60 m at the ratio of 15 kg/s to operate a turbine. The losses due to frictional forces are 10% of energy. How much power is generated by the turbine? ( $g = 10 \text{ m/s}^2$ )  
 a) 12.3 kW b) 7.0 kW c) 8.1 kW d) 10.2 kW
11. Physical independence of force is a consequence of \_\_\_\_\_  
 a) third law of motion b) second law of motion c) first law of motion d) All of these
12. A solid cylinder is rolling without slipping on a plane having inclination  $\theta$  and the coefficient of static friction  $\mu_s$ , The relation between  $\theta$  and  $\mu_s$  is  
 a)  $\tan\theta > 3\mu_s$  b)  $\tan\theta \leq 3\mu_s$  c)  $\tan\theta < 3\mu_s^2$  d) None of these
13. The temperature at which a black body ceases to radiate energy, is  
 a) 0 K b) 273 K c) 30 K d) 400 K
14. The refractive index of the material of a prism is  $\sqrt{2}$  and its refracting angle is  $30^\circ$ . One of the refracting surfaces of the prism is made a mirror inwards. A beam of monochromatic light entering the prism from the other face will retrace its path after reflection from the mirrored surface, if its angle of incidence on the prism is  
 a)  $45^\circ$  b)  $60^\circ$  c)  $0^\circ$  d)  $30^\circ$
15. The velocity ' $v$ ' of a particle at time  $t$  is given by  $v = at + [b/(t + c)]$ , where  $a, b, c$  are constants then dimensions of  $a, b, c$  are respectively :  
 a)  $L^2, T$  and  $LT^2$  b)  $LT^2, LT$  and  $L$  c)  $L, LT$  and  $T^2$  d)  $LT^2, L$  and  $T$
16. The vector sum of two forces is perpendicular to their vector differences. In that case, the forces \_\_\_\_\_  
 a) cannot be predicted b) are equal to each other c) are equal to each other in magnitude d) are not equal to each other in magnitude
17. Assertion: The work done by a conservative force such as gravity depends on the initial and final positions only.  
 Reason: The work done by a force can not be calculated if the exact nature of the force is not known.  
 a) If both assertion and reason are true and reason is the correct explanation of assertion.  
 b) If both assertion and reason are true but reason is not the correct explanation of assertion.  
 c) If assertion is true but reason is false. d) If both assertion and reason are false
18. A car runs at a constant speed on a circular track of radius 100 m, taking 62.8 seconds in every circular loop. The average velocity and average speed for each circular loop respectively is \_\_\_\_\_  
 a) 0, 10m/s b) 10m/s, 10m/s c) 10m/s, 0 d) 0, 0
19. A capacitor made of two circular plates each of radius 12 cm and separated by 5 mm. The capacitor is being charged by an external source. The charging current is constant and equal to 0.15 A. The capacitance of the parallel plate capacitor is



- a) 40 pF   b) 45 pF   c) 70 pF   d) 80 pF
20. (A) Escape velocity of a satellite is greater than its orbital velocity.  
 (R) Orbit of a satellite is within the gravitational field of planet whereas escaping is beyond the gravitational field of planet.
- a) If both assertion and reason are true and reason is the correct explanation of assertion.  
 b) If both assertion and reason are true but reason is not the correct explanation of assertion.  
 c) If assertion is true but reason is false.   d) If both assertion and reason are false.  
 e) If assertion is false but reason is true.
21. Which of the following processes is reversible:  
 a) Transfer of heat by radiation   b) Electrical heating of a nichrome wire  
 c) Transfer of heat by conduction   d) Isothermal compression
22. Gravitational force between two point masses  $m$  and  $M$  separated by a distance is  $F$ . Now if a point mass  $2m$  is placed next to  $m$  in contact with it, the force on  $M$  due to  $m$  and the total force on  $M$  are:  
 a)  $2F, F$    b)  $F, 2F$    c)  $F, 3F$    d)  $F, F$
23. Which of the following process is correct for the given P - V diagram.



- a) Adiabatic process   b) Isothermal process   c) Isobaric process   d) Isochoric process
24. A mass of 1 kg is suspended by a thread. It is  
 1. Lifted up with an acceleration  $4.9 \text{ m/s}^2$ ,  
 2. lowered with an acceleration  $4.9 \text{ m/s}^2$ .  
 The ratio of the tensions is \_\_\_\_\_  
 a) 3:1   b) 1:3   c) 1:2   d) 2:1
25. A wave of length 2 m is superposed on its reflected wave to form a stationary wave. A node is located at  $x = 3 \text{ m}$ ; the next node will be located at  $x$  equal to:  
 a) 3.25 m   b) 3.50 m   c) 3.75 m   d) 4 m
26. A position dependent force  $F = (7 - 2x + 3x^2) \text{ N}$  acts on a small object of mass 2 kg to displace it from  $x = 0$  to  $x = 5 \text{ m}$ . The work done in joule is:  
 a) 70 J   b) 270 J   c) 35 J   d) 135 J
27. A missile is fired for maximum range with an initial velocity of 20 m/s. If  $g = 10 \text{ m/s}^2$ , the range of the missile is \_\_\_\_\_.  
 a) 40m   b) 50m   c) 60m   d) 20m
28. (A) Two identical spheres, one solid and the other hollow are immersed completely in water. The solid sphere will experience greater upthrust.  
 (R) The upthrust is directly proportional to mass of the body.
- a) If both assertion and reason are true and reason is the correct explanation of assertion.  
 b) If both assertion and reason are true but reason is not the correct explanation of assertion.

- c) If assertion is true but reason is false. d) If both assertion and reason are false.  
e) If assertion is false but reason is true.
29. **Assertion:** An object has given two velocities  $\vec{v}_1$  and  $\vec{v}_2$  has a resultant velocity  $\vec{v} = \vec{v}_1 + \vec{v}_2$   
**Reason:**  $\vec{v}_1$  and  $\vec{v}_2$  should be velocities with reference to some common reference frame.  
a) If both assertion and reason are true and reason is the correct explanation of assertion.  
b) If both assertion and reason are true but reason is not the correct explanation of assertion.  
c) If assertion is true but reason is false. d) If both assertion and reason are false.
30. The rate of mass of the gas emitted from rear of a rocket is initially 0.1 kg/sec. If the speed of the gas relative to the rocket is 50 m/sec and mass of the rocket is 2 kg, then the acceleration of the rocket (in  $\text{m/sec}^2$ ) is:  
a) 5 b) 5.2 c) 2.5 d) 25
31. The component of a vector  $\vec{r}$  along x-axis will have maximum value if  
a)  $\vec{r}$  is along positive y-axis b)  $\vec{r}$  is along positive x-axis  
c)  $\vec{r}$  makes an angle of  $45^\circ$  with the x-axis d)  $\vec{r}$  is along negative y-axis
32. When a charged particle moving with velocity  $\vec{v}$  is subjected to a magnetic field of induction  $\vec{B}$ , the force on it is non-zero. This implies that \_\_\_\_\_  
a) angle between  $\vec{v}$  and  $\vec{B}$  can have any value other than  $90^\circ$   
b) angle between  $\vec{v}$  and  $\vec{B}$  can have any value other than zero and  $180^\circ$   
c) angle between  $\vec{v}$  and  $\vec{B}$  is either zero or  $180^\circ$  d) angle between  $\vec{v}$  and  $\vec{B}$  is necessarily  $90^\circ$
33. The centre of mass of a body:  
a) depends on the choice of co-ordinate system  
b) is independent of the choice of co-ordinate system  
c) may or may not depend on the choice of co-ordinate system d) none of the above
34. **Assertion:** A girl sits on a rolling chair, when she stretch her arms horizontally, her speed is reduced.  
**Reason:** Principle of conservation of angular momentum is applicable in this situation.  
a) If both assertion and reason are true and reason is the correct explanation of assertion  
b) If both assertion and reason are true but reason is not the correct explanation of assertion  
c) If assertion is true but reason is false d) If both assertion and reason are false
35. The count rate of a radioactive sample falls from  $4.0 \times 10^6 \text{ s}^{-1}$  to  $1.0 \times 10^6 \text{ s}^{-1}$  in 20 hours. What will be the count rate after 100 hours from beginning?  
a)  $3.91 \times 10^3 \text{ s}^{-1}$  b)  $3.91 \times 10^2 \text{ s}^{-1}$  c)  $3.91 \times 10^4 \text{ s}^{-1}$  d)  $3.91 \times 10^6 \text{ s}^{-1}$
36. If the earth is supposed to be a sphere of radius R, g 300 is the value of acceleration due to gravity at latitude of  $30^\circ$  and g at the equator, the value of  $g - g_{30^\circ}$  is:  
a)  $(1/4) \omega^2 R$  b)  $(3/4) \omega^2 R$  c)  $\omega^2 R$  d)  $(1/2) \omega^2 R$
37. The pole strength of 12 cm long bar magnet is 20 A m. The magnetic induction at a point 10 cm away from the centre of the magnet on its axial line is  $\left[ \frac{\mu_0}{4\pi} = 10^{-7} \text{ Hm}^{-1} \right]$   
a)  $1.17 \times 10^{-3} \text{ T}$  b)  $2.20 \times 10^{-3} \text{ T}$  c)  $1.17 \times 10^{-2} \text{ T}$  d)  $2.20 \times 10^{-2} \text{ T}$
38. A particle is released from a height S. At certain height its kinetic energy is three times its potential energy. The height and speed of the particle at that instant are respectively:  
a)  $\frac{S}{4}, \frac{3gs}{2}$  b)  $\frac{S}{4}, \sqrt{\frac{3gs}{2}}$  c)  $\frac{S}{2}, \sqrt{\frac{3gs}{2}}$  d)  $\frac{S}{4}, \sqrt{\frac{3gs}{2}}$
39. A particle moves in a plane with uniform acceleration having direction different from that of the instantaneous velocity. What is the nature of trajectory?

a) Straight line b) Parabola c) Circle d) Ellipse

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40. A coil of inductive reactance 31 W has a resistance of 8 W. It is placed in series with a condenser of capacitive reactance 25 W. The combination is connected to an a.c. source of 110 volt. The power factor of the circuit is \_\_\_\_\_  
a) 0.64 b) 0.80 c) 0.33 d) 0.56
41. What are the units of  $K = \frac{1}{4\pi\epsilon_0}$   
a)  $C^2N^{-1}m^{-2}$  b)  $N \cdot m^2 C^{-2}$  c)  $N \cdot m^2C^2$  d) Unitless
42. Dimensional formula of a physical quantity x is  $[M^{-1} L^3 T^{-2}]$ . The errors in measuring the quantities M, L and T respectively are 2%, 3% and 4%. The maximum percentage of error that occurs in measuring the quantity x is:  
a) 14% b) 19% c) 9% d) 10%
43. Two particles are projected in air with speed u at angles  $\theta_1$  and  $\theta_2$  (both acute) to the horizontal, respectively. If the height reached by the first particle is greater than that of the second, then which one of the following is correct?  
a)  $\theta_1 > \theta_2$  b)  $\theta_1 = \theta_2$  c)  $T_1 < T_2$  d)  $T_1 = T_2$
44. A short bar magnet has a magnetic moment of  $0.39 \text{ JT}^{-1}$ . The magnitude and direction of the magnetic field produced by the magnet at a distance of 20 cm from the centre of the magnet on the equatorial line of the magnet is  
a) 0.049 G, N-S direction b) 4.95 G, S-N direction c) 0.0195 G, S-N direction  
d) 19.5 G, N-S direction
45. Two particles which are initially at rest, move towards each other under the action of their internal attraction. If their speeds are v and 2 v at any instant, then the speed of centre of mass of the system will be \_\_\_\_\_.  
a) 2 v b) zero c) 1.5 d) v
46. A resistance wire connected in the left gap of metre bridge balances a 10W resistance in the right gap at a point which divides the bridge wire in the ratio 3 : 2. If the length of the resistance wire is 1.5 m, then the length of IW of the resistance wire is \_\_\_\_\_.  
a)  $1.5 \times 10^{-2} \text{ m}$  b)  $1.0 \times 10^{-2} \text{ m}$  c)  $1.0 \times 10^{-1} \text{ m}$  d)  $1.5 \times 10^{-1} \text{ m}$
47. The voltage over a cycle varies as  
 $V = V_0 \sin \omega t$  for  $0 \leq t \leq \frac{\pi}{\omega}$   
 $= -V_0 \sin \omega t$  for  $\frac{\pi}{\omega} \leq t \leq \frac{2\pi}{\omega}$   
The average value of the voltage for one cycle is  
a)  $\frac{V_0}{\sqrt{2}}$  b)  $\frac{V_0}{2}$  c) Zero d)  $\frac{2V_0}{\pi}$
48. A current carrying closed loop of an irregular shape lying in more than one plane when placed in uniform magnetic field, the force acting on it  
a) will be more in the plane where its larger position is covered. b) is zero. c) is infinite.  
d) may or may not be zero.
49. A circular loop of radius 0.3 cm lies parallel to a much bigger circular loop of radius 20 cm. The centre of the small loop is on the axis of the bigger loop. The distance between their centres is 15 cm. If a current of 2.0 A flows through the smaller loop, then the flux linked with bigger loop is  
a)  $6.6 \times 10^{-9}$  weber b)  $9.1 \times 10^{-11}$  weber c)  $6 \times 10^{-11}$  weber d)  $3.3 \times 10^{-11}$  weber
50. In the given figure, the angle of reflection is  
a)  $30^\circ$  b)  $60^\circ$  c)  $45^\circ$  d) None of these
51. Which of the following is known as fusion mixture?

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- a) Mixture of  $\text{Na}_2\text{CO}_3 + \text{NaHCO}_3$     b)  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$   
 c) Mixture of  $\text{K}_2\text{CO}_3 + \text{Na}_2\text{CO}_3$     d)  $\text{NaHCO}_3$

52. On addition of small amount of  $\text{KMnO}_4$  to concentrated  $\text{H}_2\text{SO}_4$ , a green oily compound is obtained which is highly explosive in nature. Identify the compound from the following.  
 a)  $\text{Mn}_2\text{O}_7$     b)  $\text{MnO}_2$     c)  $\text{MnSO}_4$     d)  $\text{Mn}_2\text{O}_3$
53. Nitrogen is used to fill electric bulbs because  
 a) it is lighter than air    b) it makes the bulb to glow    c) it does not support combustion  
 d) it is non-toxic.
54.  $\text{CuSO}_4$  when reacts with  $\text{KCN}$  forms  $\text{CuCN}$  which is insoluble in water. It is soluble in excess of  $\text{KCN}$  due to the formation of the complex:  
 a)  $\text{K}_2[\text{Cu}(\text{CN})_4]$     b)  $\text{K}_3[\text{Cu}(\text{CN})_4]$     c)  $\text{Cu}(\text{CN})_2$     d)  $\text{Cu}[\text{KCu}(\text{CN})_4]$
55. Volume occupied by one molecule of water (density =  $1 \text{ g cm}^{-3}$ ) is :  
 a)  $9.0 \times 10^{-23} \text{ cm}^3$     b)  $6.023 \times 10^{-23} \text{ cm}^3$     c)  $3.0 \times 10^{-23} \text{ cm}^3$     d)  $5.5 \times 10^{-23} \text{ cm}^3$
56. Which of the following statements is not correct?  
 a) 5% aqueous solutions of  $\text{NaCl}$  and  $\text{KCl}$  are said to be isomolar.  
 b) 1M sucrose solution and 1M glucose solution are isotonic.  
 c)  
 Molecular mass of acetic acid and benzoic acid is higher than normal mass in cryoscopic methods.  
 d) For the same solution,  $\frac{\Delta T_b}{\Delta T_f} = \frac{K_b}{K_f}$
57. The pressure exerted by 6.0g of methane gas in a  $0.03 \text{ m}^3$  vessel at  $129^\circ\text{C}$  is (Atomic masses : C = 12.01, H = 1.01 and R =  $8.314 \text{ JK}^{-1} \text{ mol}^{-1}$ )  
 a) 31684 pa    b) 21521 pa    c) 13409 pa    d) 41648 pa
58.  $E^0$  Value of  $\text{Ni}^{2+}/\text{Ni}$  is - 0.25 V and  $\text{Ag}^+/\text{Ag}$  is +0.80 V. If a cell is made by taking the two electrodes what is the feasibility of the reaction?  
 a) Since  $E^0$  value for the cell will be positive, redox reaction is feasible.  
 b) Since  $E^0$  value for the cell will be negative, redox reaction is not feasible.  
 c)  $\text{Ni}$  cannot reduce  $\text{Ag}^+$  to  $\text{Ag}$  hence reaction is not feasible.  
 d)  $\text{Ag}$  can reduce  $\text{Ni}^{2+}$  to  $\text{Ni}$  hence reaction is feasible.
59. The energy of a photon is  $3 \times 10^{-12}$  ergs. What is its wavelength in nm? ( $h = 6.62 \times 10^{-27} \text{ erg}\cdot\text{sec}$ ;  $c = 3 \times 10^{10} \text{ cm}\cdot\text{s}^{-1}$ )  
 a) 662 nm    b) 1324 nm    c) 66.2 nm    d) 6.62 nm
60. Which among the following is the most stable carbocation?  
 a)  $\text{CH}_3-\overset{+}{\text{C}}(\text{CH}_3)_2$     b)  $\text{CH}_3-\overset{+}{\text{C}}(\text{CH}_3)$     c)  $\overset{+}{\text{C}}\text{H}_3$     d)  $\text{CH}_3\overset{+}{\text{C}}\text{H}_2$
61. Assertion:  $\text{BeSO}_4$  and  $\text{MgSO}_4$  are insoluble in water.  
 Reason:  $\text{Be}^{2+}$  and  $\text{Mg}^{2+}$  have low hydration enthalpies.  
 a) If both assertion and reason are true and reason is the correct explanation of assertion  
 b) If both assertion and reason are true but reason is not the correct explanation of assertion  
 c) If assertion is true but reason is false    d) If both assertion and reason are false
62. In the following reaction using isotopic O in  $\text{H}_2\text{O}_2$ , isotopic oxygen goes \_\_\_\_\_  
 $2\text{MnO}_4 + 3\text{H}_2\text{O}_2^{18} \rightarrow 2\text{MnO}_2 + 3\text{O}_2 + 2\text{H}_2\text{O} + 2\text{OH}^-$   
 a) with  $\text{O}_2$     b) with  $\text{MnO}_2$     c) with  $\text{OH}^-$     d) one with  $\text{O}_2$  and one with  $\text{MnO}_2$
63. The best method to prepare 3-methylbutan-2-ol from 3-methylbut -1-ene is  
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- a) addition of water in presence of dil.  $H_2SO_4$   
 b) addition of HCl followed by reaction with dil. NaOH c) hydroboration - oxidation reaction  
 d) Reimer-Tiemann reaction.
64. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
- Assertion:** Inert electrolytes like KCl,  $KNO_3$  are used in salt bridge.  
**Reason:** Salt bridge provides an electric contact between the two solutions without allowing them to mix with each other.
- a) If both assertion and reason are true and reason is the correct explanation of assertion.  
 b) If both assertion and reason are true but reason is not the correct explanation of assertion.  
 c) If assertion is true but reason is false. d) If both assertion and reason are false
65. Boron is unable to form  $BF_6^{3-}$  ions due to  
 a) non-availability of d-orbitals b) small size of boron atom c) non-metallic nature  
 d) less reactivity towards halogens.
66. Monoclinic sulphur is an example of monoclinic crystal system. What are the characteristics of the crystal system?  
 a)  $a \neq b \neq c, \alpha = \beta = \gamma = 90^\circ$  b)  $a \neq b \neq c, \alpha \neq \beta \neq \gamma \neq 90^\circ$  c)  $a = b \neq c, \alpha = \beta = \gamma = 90^\circ$  d)  $a \neq b \neq c, \alpha = \beta = \gamma = 90^\circ, \beta \neq 90^\circ$
67. Which one is not in agreement with Bohr's model of the atom?  
 a) Line spectra of hydrogen atom b) Pauli's exclusion principle c) Planck's theory  
 d) Heisenberg's uncertainty principle
68. 0.02 mole of  $[Co(NH_3)_5Br]Cl_2$  and 0.02 mole of  $[Co(NH_3)_5Cl]SO_4$  are present in 200 cc of a solution X. The number of moles of the precipitates Y and Z that are formed when the solution X is treated with excess silver nitrate and excess barium chloride are respectively:  
 a) 0.02, 0.02 b) 0.01, 0.02 c) 0.02, 0.04 d) 0.04, 0.02
69. If  $E^\circ Fe^{2+}/Fe = -0.441 V$  and  $E^\circ Fe^{3+}/Fe^{2+} = 0.771 V$  the standard EMF of the reaction  $Fe + 2Fe^{3+} \rightarrow 3Fe^{2+}$  will be  
 a) 1.653V b) 1.212V c) 0.111V d) 0.330V
70. Gammexane is :  
 a) bromobenzene b) benzyl chloride c) chlorobenzene d) benzene hexachloride
71. Assertion: Low density polythene is used to make buckets, dustbins, bottles etc.  
 Reason: Low density polythene consists of linear molecules and has close packing.  
 a) If both assertion and reason are true and reason is the correct explanation of assertion  
 b) If both assertion and reason are true but reason is not the correct explanation of assertion  
 c) If assertion is true but reason is false d) If both assertion and reason are false
72. Which one of the following arrangements is the incorrect representation of the property indicated with it?  
 a)  $Br < Cl < F$  : Electro negativity b)  $F < Br < Cl$  : Electron - affinity  
 c)  $F_2 < Br_2 < Cl_2$  : Bond energy d)  $Br_2 < Cl_2 < F_2$  : Oxidising strength
73. Equal masses of  $H_2$ ,  $O_2$  and methane have been taken in a container of volume V at temperature  $27^\circ C$  in identical conditions. The ratio of the volumes of gases  $H_2 : O_2 : CH_4$  would be  
 a) 8 : 16 : 1 b) 16 : 8 : 1 c) 16 : 1 : 2 d) 8 : 1 : 2
74. An electron is revolving in the 2<sup>nd</sup> orbit of  $He^+$  ion. To this if 12.1 eV of energy supplied. Then to which orbit it will be excited

75. In Castner-Kellner cell for production of sodium hydroxide

- a) Brine is electrolysed with Pt electrodes b) Brine is electrolysed using graphite electrodes  
c) Molten sodium chloride is electrolysed d) Sodium amalgam is formed at mercury cathode

76. The d-electron configuration of  $\text{Cr}^{2+}$ ,  $\text{Mn}^{2+}$ ,  $\text{Fe}^{2+}$  and  $\text{Ni}^{2+}$  are  $3d^4$ ,  $3d^5$ ,  $3d^6$  and  $3d^8$  respectively. Which one of the following aqua complexes will exhibit the minimum paramagnetic behaviour?

(At. No. Cr = 24, Mn = 25, Fe = 26, Ni = 28 )

- a)  $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$  b)  $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$  c)  $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$  d)  $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$

77. A mixture of 1.57 mol of  $\text{N}_2$ , 1.92 mol of  $\text{H}_2$  and 8.13 mol of  $\text{NH}_3$  is introduced into a 20 L reaction vessel at 500 K. At this temperature, the equilibrium constant, K, for the reaction,

$\text{N}_{2(\text{g})} + 3\text{H}_{2(\text{g})} \rightleftharpoons 2\text{NH}_{3(\text{g})}$  is  $1.7 \times 10^2$ . What is the direction of the net reaction?

- a) Forward b) Backward c) At equilibrium d) Data is insufficient

78. The ionisation energy of nitrogen is more than that of oxygen because:

- a) of the extra stability of half-filled p orbitals in nitrogen b) more number of energy levels  
c) less number of valence electrons d) smaller size

79. Mark the incorrect statement.

- a) Inner orbital (low spin) complexes involve  $d^2sp^3$  hybridisation.  
b) Outer orbital (high spin) complexes involve  $sp^3d^2$  hybridisation.  
c) Tetrahedral complexes generally involve  $dsp^2$  hybridisation.  
d) Stereoisomerism involves geometrical and optical isomerism.

80. The correct sequence of the oxidation state of underlined elements is

$\text{Na}_2[\text{Fe}(\text{CN})_5\text{NO}]$ ,  $\text{K}_2\text{TaF}_7$ ,  $\text{Mg}_2\text{ZrO}_7$ ,  $\text{Na}_2\text{S}_4\text{O}_6$ ,  $\text{N}_3\text{H}$

- a) +3, +5, +5, +2.5,  $-\frac{1}{3}$  b) +5, +3, +5, +3,  $+\frac{1}{3}$  c) +3, +3, +5, +5,  $-\frac{1}{3}$  d) +5, +5, +3, +2.5,  $+\frac{1}{3}$

81. Which of the following will not show cis-trans-isomerism?

- a)  $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_3$  b)  $\text{CH}_3 - \text{CH}_2 - \text{CH} = \text{CH} - \text{CH}_2 - \text{CH}_3$   
c)  $\begin{array}{c} \text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_2 - \text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$  d)  $\begin{array}{c} \text{CH}_3 - \text{CH} - \text{CH} = \text{CH} - \text{CH}_2 - \text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$

82. The correct order of the mobility of the alkali metal ions in aqueous solution is:

- a)  $\text{Li}^+ > \text{Na}^+ > \text{K}^+ > \text{Rb}^+$  b)  $\text{Na}^+ > \text{K}^+ > \text{Rb}^+ > \text{u}^+$  c)  $\text{K}^+ > \text{Rb}^+ > \text{Na}^+ > \text{Li}^+$   
d)  $\text{Rb}^+ > \text{K}^+ > \text{Na}^+ > \text{u}^+$

83. Fill up the blanks with appropriate choices. Lithium and magnesium react slowly with water. Their hydroxides are \_\_\_\_\_ soluble in water. Carbonates of Li and Mg \_\_\_\_\_ easily on heating. Both  $\text{LiCl}$  and  $\text{MgCl}_2$  are \_\_\_\_\_ in ethanol and are \_\_\_\_\_. They crystallise from their aqueous solutions as \_\_\_\_\_

- a) more, do not decompose, soluble, hygroscopic, hydrates  
b) less, decompose, soluble, deliquescent, hydrates  
c) freely, sublime, insoluble, deliquescent, anhydrous  
d) freely, decompose, soluble, hygroscopic, crystals

84. The correct difference between first and second order reactions is that :

- a) A first-order reaction can be catalyzed; a second-order reaction cannot be catalyzed.  
b)

The half-life of a first-order reaction does not depend on  $[\text{A}]_0$ ; the half-life of a second-order reaction does depend on  $[\text{A}]_0$ .



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The rate of a first-order reaction does not depend on reactant concentrations; the rate of a second-order reaction does depend on reactant concentrations.

d)

The rate of a first-order reaction does depend on reactant concentrations; the rate of a second order reaction does not depend on reactant concentrations.

85. Though the five d-orbitals are degenerate, the first four d-orbitals are similar to each other in shape whereas the fifth d-orbital is different from others. What is the name of the fifth orbital?

a)  $d_{x^2-y^2}$  b)  $d_z^2$  c)  $d_{xz}$  d)  $d_{xy}$

86. Match the complex ions given in column I with their colour given in column II and mark the appropriate choice.

	Column - I (Complex ion)		Column - II (colour)
(A)	$[\text{CoF}_6]^{3-}$	(i)	Blue-green
(B)	$[\text{Co}(\text{NH}_3)_6]^{3+}$	(ii)	Pale yellow
(C)	$[\text{Co}(\text{H}_2\text{O})_6]^{3+}$	(iii)	Green
(D)	$[\text{Co}(\text{CN})_6]^{3-}$	(iv)	Yellow-orange

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

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

87. During halogenation of alkanes the halogens and alkane show a specific trend. Which of the following statements is not correct?

a) The reactivity of halogens is in the order  $\text{F}_2 > \text{Cl}_2 > \text{Br}_2 > \text{I}_2$

b) For a given halogen the reactivity of hydrocarbon is in the order of  $3^\circ > 2^\circ > 1^\circ$ .

c) Bromine is less reactive than chlorine towards a particular alkane.

d)

On chlorination monosubstituted product is formed while on bromination disubstituted products are formed.

88. The statement "The change of enthalpy of a chemical reaction is same whether the reaction takes place in one or several steps" is

a) Le Chatelier's law b) van't Hoff's law c) first law of thermodynamics d) Hess's law.

89. Calculate the pOH of solution at 25°C that contains  $1 \times 10^{-10} \text{M}$  of hydronium ion?

a) 7.00 b) 4.00 c) 9.00 d) 1.00

90. Identify the hydrophilic and hydrophobic parts in the following non-ionic detergent present in liquid detergents and wetting agents.



a)

Hydrophobic part	Hydrophilic part
$-\text{CH}_2\text{CH}_2\text{OH}$	$\text{C}_9\text{H}_{19}-\text{C}_6\text{H}_4-\text{O}(\text{CH}_2\text{CH}_2\text{O})_{10}-$

b)


Hydrophobic part	Hydrophilic part
$\text{C}_9\text{H}_{19}-\text{C}_6\text{H}_4-\text{O}-$	$-\text{O}(\text{CH}_2\text{CH}_2\text{O})_{10}\text{CH}_2\text{CH}_2\text{OH}$

c)

Hydrophobic part	Hydrophilic part
$\text{C}_9\text{H}_{19}-\text{C}_6\text{H}_4-\text{O}-$	$-(\text{CH}_2\text{CH}_2\text{O})_{10}\text{CH}_2\text{CH}_2\text{OH}$

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d)

Hydrophobic part	Hydrophilic part
$-(\text{CH}_2\text{CH}_2\text{O})_{10}\text{CH}_2\text{CH}_2\text{OH}$	$\text{C}_9\text{H}_{19}$ 

91. What is the coordination number in a square close packed structure in two dimensions?  
a) 2 b) 3 c) 4 d) 6
92. The role of a catalyst is to change \_\_\_\_\_  
a) Gibbs energy of reaction b) enthalpy of reaction c) activation energy of reaction  
d) equilibrium constant
93. The more basic oxide is  
a) CaO b) MgO c) K<sub>2</sub>O d) Na<sub>2</sub>O
94. Assertion : Nickel is purified by reacting it with CO.  
Reason : Impurities present, form a volatile complex.  
a) If both assertion and reason are true and reason is the correct explanation of assertion.  
b) If both assertion and reason are true but reason is not the correct explanation of assertion  
c) If assertion is true but reason is false. d) If both assertion and reason are false
95. The radius of first Bohr's orbit for hydrogen is  $0.53\text{Å}$ . The radius of third Bohr's orbit would be  
a)  $0.79\text{Å}$  b)  $1.59\text{Å}$  c)  $3.18\text{Å}$  d)  $4.77\text{Å}$
96. The mass of a particle is  $10^{-10}\text{g}$  and its radius is  $2 \times 10^{-4}\text{cm}$ . If its velocity is  $10^{-6}\text{cm sec}^{-1}$  with 0.0001% uncertainty in measurement. the uncertainty in its position is:  
a)  $5.2 \times 10^{-8}\text{m}$  b)  $5.2 \times 10^{-7}\text{m}$  c)  $5.2 \times 10^{-6}\text{m}$  d)  $5.2 \times 10^{-9}\text{m}$
97. **Assertion:** The conductivity of electrolytic solutions increases with increase of temperature.  
**Reason :** Electronic conductance decreases with increase of temperature.  
a) If both assertion and reason are true and reason is the correct explanation of assertion.  
b) If both assertion and reason are true but reason is not the correct explanation of assertion.  
c) If assertion is true but reason is false. d) If both assertion and reason are false.
98. The elements with atomic numbers 90 to 103 are known as :  
a) d-block elements b) lanthanides c) actinides d) transition elements
99. Which one of the following has the shortest carbon - carbon bond length?  
a) Benzene b) Ethene c) Ethyne d) Ethane
100. The order of reactivity of following alcohols with halogen acids is \_\_\_\_\_  
(I)  $\text{CH}_3\text{CH}_2\text{-CH}_2\text{-OH}$   
(II)  $\text{CH}_3\text{CH}_2 - \text{C}(\text{H}) - \text{OH}$   
 $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$   
(III)  $\text{CH}_3\text{CH}_2 - \text{C} - \text{OH}$   
 $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$   
a) (I) > (II) > (III) b) (III) > (II) > (I) c) (II) > (I) > (III) d) (I) > (III) > (II)
101. Match the following columns and select the correct option.

Column-I	Column-II
(a) 6-15 pairs of gill slits	(i) Trygon
(b) Heterocercal caudal fin	(ii) Cyclostomes
(c) Air bladder	(iii) Chondrichthyes
(d) Poison sting	(iv) Osteichthyes

Select the correct option.

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- a)                      b)                      c)                      d)
- (a)(b)(c)(d)      (a)(b)(c)(d)      (a)(b)(c)(d)      (a)(b)(c)(d)
- (a)(iv)(ii)(iii)(i)      (b)(i)(iv)(iii)(ii)      (c)(ii)(iii)(iv)(i)      (d)(iii)(iv)(i)(ii)
102. Flower with radical symmetry is  
a) Cassia    b) Datura    c) Pea    d) Canna
103. E.coli cells with a mutated z gene of the lac operon cannot grow in medium containing only lactose as the source of energy because \_\_\_\_\_  
a) the lac operon is constitutively active in these cells.  
b) they cannot synthesise functional beta - galactosidase.  
c) in the presence of glucose, E.coli cells do not utilize lactose.  
d) they cannot transport lactose from the medium into the cell.
104. A man with blood group 'A' marries a woman with blood group 'B'. What are all the possible blood group of their offsprings?  
a) A, B and AB only    b) A, B, AB and O    c) O only    d) A and B only
105. Botanical name of cauliflower is \_\_\_\_\_ .  
a) Brassica oleracea var. capitata    b) Brassica campestris    c) Brassica oleracea var. botrytis  
d) Brassica oleracea var. gemmifera
106. Some important events that take place during fertilisation are given below. Arrange the events in a proper sequence and select the correct option.  
(i) Cortical reaction  
(ii) Sperm entry  
(iii) Karyogamy  
(iv) Acrosomal reaction  
a) (iv) → (i) → (ii) → (iii)    b) (i) → (ii) → (iii) → (iv)    c) (iv) → (ii) → (i) → (iii)  
d) (ii) → (i) → (iii) → (iv)
107. Which one of the following pairs is wrongly matched while the remaining three are correct?  
a) Agave-Bulbils    b) Grass-Runner    c) Water hyacinth-Runner    d) Bryophyllum-Leaf buds
108. In a polymerase chain reaction, temperature required for the steps  
(i) Denaturation,  
(ii) Annealing and  
(iii) Extension are respectively  
a) (i) 94°C (ii) 40°C (iii) 72°C    b) (i) 40°C (ii) 72°C (iii) 94°C    c) (i) 94°C (ii) 72°C (iii) 40°C  
d) (i) 72°C (ii) 94°C (iii) 40°C
109. Carcinoma refers to \_\_\_\_\_  
a) benign tumours of the connective tissue    b) malignant tumours of the connective tissue  
c) malignant tumours of the skin or mucous membrane    d) malignant tumours of the colon
110. In the following question, a statement of assertion is followed by a statement of reason.  
Mark the correct choice as :  
**Assertion:** The direction of movement of organic solutes in the phloem is bi-directional.  
**Reason:** The transportation depends on variability of source-sink relationship.  
a) If both assertion and reason are true and reason is the correct explanation of assertion.  
b) If both assertion and reason are true but reason is not the correct explanation of assertion.  
c) If assertion is true but reason is false.    d) If both assertion and reason are false.

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111. Consider the following four statements (i-iv) and select the option that correctly identifies the true (T) and false (F) ones.

- (i) Atrial natriuretic factor can cause vasodilation (dilation of blood vessels) and thereby decreases the blood pressure.
- (ii) On an average, 60-70 gm of urea is excreted out per day.
- (iii) Sebaceous glands eliminate certain substances like NaCl, urea and lactic acid through sebum.
- (iv) PCT is lined by simple cuboidal brush border epithelium which increases the surface area for reabsorption.

a)	b)	c)	d)
(i)(ii)(iii)(iv)	(i)(ii)(iii)(iv)	(i)(ii)(iii)(iv)	(i)(ii)(iii)(iv)
F F T T	F T T T	T F F T	T T F T

112. Which of the following statements are correct?

- (i) Reabsorption of water occurs passively in the initial segment of nephron.
- (ii) Nitrogenous wastes are absorbed by passive transport.
- (iii) Conditional reabsorption of Na<sup>+</sup> and water takes place in DCT.
- (iv) DCT reabsorbs  $HOC_3^-$ .
- (v) DCT is capable of selective secretion of H<sup>+</sup>, K<sup>+</sup> and NH<sub>3</sub> to maintain pH and Na<sup>+</sup> - K<sup>+</sup> balance in blood.
- (vi) Substances like glucose, amino acids, Na<sup>+</sup>, etc., in the filtrate are reabsorbed actively.

a) (i) and (ii)    b) (ii) and (iii)    c) (iv) and (v)    d) All of these

113. The polymerase chain reaction is a technique used for

- a) amplification of DNA    b) amplification of enzymes    c) amplification of proteins
- d) all of these.

114. The oxygen - haemoglobin dissociation curve will show a right shift in case of

- a) high PCO<sub>2</sub>    b) high PO<sub>2</sub>    c) low PCO<sub>2</sub>    d) less H<sup>+</sup> concentration

115. Select the correctly matched pair

- a) Zinc - Helps to maintain the ribosome structure
- b) Magnesium - Needed during the formation of mitotic spindle
- c) Calcium - Plays a role in the opening and closing of stomata
- d) Manganese - Needed in the splitting of water to liberate oxygen during photosynthesis

116. Which of the following is not a characteristic of humus?

- a) It is rich in organic matter such as lignin and cellulose.
- b) It is colloidal in nature and serves as a reservoir of nutrients.
- c) It is highly resistant to microbial action and undergoes slow decomposition.
- d) It is further degraded by the process of humification.

117. If number of aminoacids in a polypeptide chain is 50, what will be the number of nucleotides in its mRNA?

- a) 50    b) 100    c) 150    d) 200

118. The sequence of structural genes in lac operon is:

- a) Lac A, Lac Y, Lac Z    b) Lac A, Lac Z, Lac Y    c) Lac Y, Lac Z, Lac A    d) Lac Z, Lac Y, Lac A

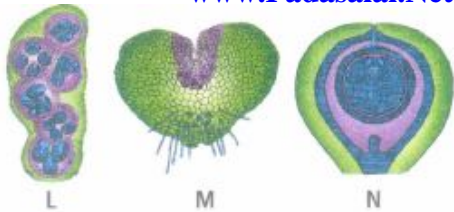
119. In pteridophytes, prothallus produces

- a) sporangia    b) antheridia and archegonia    c) vascular tissues    d) root, stem and leaf.

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120. Identify the given structures and select the correct option

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a)

L	M	N
Aplanospore of Ulothrix	Prothallus (2n) of pteridophyte	Ovule of angiosperm

b)

L	M	N
Palmella stage of Ulothrix	Prothallus (n) of bryophyte	Ovule of gymnosperm

c)

I	M	N
Akinetes of Chlamydomonas	Sporophyte (2n) of bryophyte	Endosperm of gymnosperm

d)

I	M	N
Palmella stage of Chlamydomonas	Prothallus (n) of pteridophyte	Ovule of gymnosperm

121. Read the following statements regarding particulate matter and select the incorrect ones.

- (i) Particulate matter (PM) consists of shoot, flyash, dust, spores, pollen grains, etc.
- (ii) Particulate matter is differentiated into settleable (larger than 10  $\mu$ m. remaining in air for less than one day) and suspended (less than 10  $\mu$ m remaining in air for more than one day to several weeks) particulate matter.
- (iii) SPM (Suspended particulate matter) consists of aerosol, dust and mist.
- (iv) Particulate matter causes respiratory diseases such as tuberculosis, allergy and many more diseases in animals and plants.
- (v) According to Central Pollution Control Board (CPCB), particulate size of 2.5  $\mu$ m or less in diameter are responsible for causing the greatest harm to human health.

a) (i) and (ii)    b) (iii) and (iv)    c) (ii) only    d) None of these

122. In EcoRI, R is stand for

a) Strain    b) Species    c) Genus    d) order

123. Stomata in angiosperms open and close due to \_\_\_\_\_

a) their genetic constitution    b) effect of hormones    c) change of turgor pressure in guard cells  
d) pressure of gases inside the leaves

124. Select the correct option to fill up the blanks.

- (i) \_\_\_\_\_ are used in detergent formulations and are helpful in removing oily stains from the laundry.
- (ii) \_\_\_\_\_ are ripened by growing *Penicillium roqueforti* on them.
- (iii) \_\_\_\_\_ are produced without distillation whereas, \_\_\_\_\_ are produced by distillation of the fermented broth.
- (iv) \_\_\_\_\_ antibiotic was used to treat American soldiers wounded in world war II.
- (v) \_\_\_\_\_ is also called as kusht rog.

a)

(i) Lipases, (ii) Camembert cheese, (iii) Whisky and rum, wine and beer, (iv) Penicillin, (v) Leprosy

b)

(i) Lipases, (ii) Roquefort cheese, (iii) Wine and beer, whisky and rum, (iv) Penicillin, (v) Leprosy

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(i) Streptokinases, (ii) Roquefort cheese, (iii) Wine and beer, whisky and rum, (iv) Streptomycin, (v) Whooping cough

d)

(i) Amylases, (ii) Swiss cheese, (iii) Whisky and rum, wine and beer, (iv) Penicillin, (v) Diphtheria

125. Rate of heartbeat is determined by

a) Purkinje fibres b) papillary muscles c) AV-node d) SA-node.

126. Cancer cells are more easily damaged by radiation than normal cells because they are \_\_\_\_\_

a) starved of mutation b) undergoing rapid division c) different in structure d) non-dividing

127. Assertion : All copulations do not lead to the fertilisation and pregnancy.

Reason: Fertilisation can occur only if the ovum and sperms are transported simultaneously to the ampullary isthmic junction.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b) If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

128. During prolonged fasting, in what sequence are the following organic compounds used up by the body?

a) First proteins, next lipids and lastly carbohydrates

b) First carbohydrates, next fats and lastly proteins

c) First fats, next carbohydrates and lastly proteins

d) First carbohydrates, next proteins and lastly lipids

129. According to Central Pollution Control Board (CPCB). Which particulate size in diameter (in micrometers) of the air pollutants is responsible for greatest harm to human health:

a) 2.5 or less b) 1.5 or less c) 1.0 or less d) 5.2 - 2.5

130. Read the following statements about cockroach.

(i) In male cockroach, a characteristic mushroom shaped gland is present in the 6th - 7th abdominal segments which functions as an accessory reproductive gland.

(ii) Cockroach is uricotelic.

(iii) The fat body and uricose glands are glandular in function.

(iv) Blood from sinuses enter heart through ostia and is pumped anteriorly to sinuses again.

Which of the above statements are correct?

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

131. The effect of today's radioactive fallout will probably be more harmful to children of future generation than to present day children because

a) infants are more susceptible to radiations b) susceptibility to radiations increase with age

c) mutated genes are usually recessive d) all of these

132. Which one is the most abundant protein in the animal world.

a) Trypsin b) Haemoglobin c) Collagen d) Insulin

133. A protozoan reproduces by binary fission. What will be the number of protozoans in its population after six generations?

a) 128 b) 24 c) 64 d) 32

134. Which tissue remains more active during aurture

a) Vascular cambium b) Cork cambium c) Parenphyma d) Sclerenchyma

135. An acromioclavicular joint is characteristically found in the [mail id - padasalai.net@gmail.com](mailto:padasalai.net@gmail.com)

- a) pelvic girdle of mammals   b) pectoral girdle of mammals   c) skull of frog  
 d) sperm of mammals

136. Which of the following statements are correct?

- (i) Benzene hexachloride (BHC) is a non-biodegradable pollutant.  
 (ii) Anthropogenic air pollutants are natural in origin.  
 (iii) Carbon monoxide is a primary air pollutant.  
 (iv) Sulphur dioxide causes brown air effect during traffic congestion in cities.  
 a) (i) and (iii)   b) (i) and (ii)   c) (ii) and (iii)   d) (ii) and (iv)

137. Cranium of human contains

- a) 8 bones   b) 14 bones   c) 12 bones   d) 20 bones

138. Excessively high heart rate (> 180) can reduce cardiac output because

- a) blood is moving too fast through the lungs to pick up enough oxygen  
 b) it tires out the heart muscles and so they pump slower  
 c) it reduces the time for ventricular filling which reduces stroke volume  
 d)

the PR-interval increases which leads to longer ventricular diastole and shorter ventricular systole

139. Identify the blank spaces A, B, C and D in the table given below and select the correct answer.

Type of microbe	Scientific name	Product	Medical application
Fungus	A	Cyclosporin A	B
C	Monascus purpureus	Statin	D

- A - Trichoderma polysporum,      A - Trichoderma polysporum,  
 B - As an immunosuppressive agent,      B - Lowering of blood cholesterol,  
 C - Yeast (Fungus),      C - Yeast (Fungus),  
 a) D - Lowering of blood cholesterol      b) D - As an immunosuppressive agent  
 A - Yeast (Fungus),      A - Streptococcus,  
 B - Lowering of blood cholesterol,      B - As an immunosuppressive agent,  
 C - Trichoderma polysporum,      C - Bacterium,  
 c) D - As an immunosuppressive agent      d) D - Lowering of blood cholesterol

140. Resolution power is the ability to \_\_\_\_\_ .

- a) Distinguish two trees   b) Distinguish two close objects   c) Distinguish amongst organelles  
 d) Magnify image

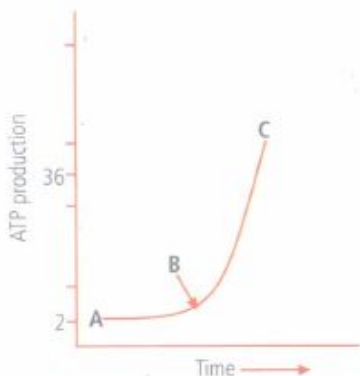
141. The sequence of communities of primary succession in water is

- a) phytoplankton, sedges, free-floating hydrophytes, rooted hydrophytes, grasses and trees  
 b) phytoplankton, free-floating hydrophytes, rooted hydrophytes, sedges, grasses and trees  
 c) free-floating hydrophytes, sedges, phytoplankton, rooted hydrophytes, grasses and trees  
 d)  
 phytoplankton, rooted submerged hydrophytes, floating hydrophytes, reed swamp, sedges, meadow and trees.

142. Stroma in the chloroplasts of higher plants contain

- a) Chlorophyll   b) Light dependent reaction enzymes   c) Light independent reaction enzymes  
 d) Ribosomes

143. Animal cells are suspended in a culture medium that contains excess glucose. The graph below shows glucose utilisation under different growth conditions. (A), (B), and (C) in the graph indicate.



- A - Anaerobic respiration  
 B - Introduction of O<sub>2</sub> to culture medium  
 a) C - Aerobic respiration  
 A - Aerobic respiration  
 B - Supply of organic triphosphate  
 c) C - Aerobic respiration
- A - Aerobic respiration  
 B - Introduction of CO<sub>2</sub> to culture medium  
 b) C - Anaerobic respiration  
 A - Aerobic respiration  
 B - Introduction of CO to culture medium  
 d) C - Anaerobic respiration
144. Assertion: Cucurbita is a monoecious plant  
 Reason: In Cucurbita, both male and female flowers are present on the same plant  
 a) If both assertion and reason are true and reason is the correct explanation of assertion  
 b) If both assertion and reason are true but reason is not the correct explanation of assertion  
 c) If assertion is true but reason is false d) If both assertion and reason are false
145. A woman has an X-linked condition on one of her X chromosomes. This chromosome can be inherited by \_\_\_\_\_  
 a) only grand children b) only sons c) only daughters d) Both (b) and (c)
146. During cell growth, DNA synthesis takes place in:-  
 a) G<sub>2</sub> phase b) M phase c) S phase d) G<sub>1</sub> phase
147. Match column I with column II and select the correct option from the given codes.

Column I	Column II
A. Biopiracy	(i) Effort to fix the non-functional gene.
B. Biopatent	(ii) Gene silencing
C. Gene therapy	(iii) Illegal removal of biological materials
D. RNAi	(iv) Right granted for biological entities

- a) A-(iv), B-(ii), C-(i), D-(iii) b) A-(ii), B-(iv), C-(i), D-(iii) c) A-(iii), B-(iv), C-(i), D-(ii)  
 d) A-(iii), B-(iv), C-(ii), D-(i)
148. Antheridia and archegonia are absent in:-  
 a) Bryophyta b) Pteridophyta c) Gymnosperms d) Angiosperms
149. Match column I with column II and select the correct option from the codes given below.

Column I (Skeletal part)	Column II (Number of bones)
A. Cranium	(i) 29
B. Skull (Cranial and facial bones)	(ii) 8
C. Face	(iii) 14
D. Hind limb	(iv) 24
E. Ribs	(v) 30

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

150. The term "meiosis" was given by  
 a) Johannsen    b) Knoll and Ruska    c) A. Flemming    d) Farmer and Moore
151. What is true for cleavage \_\_\_\_\_  
 a) Size embryo increases    b) Size of cells decrease    c) Size of cells increase  
 d) Size of cells increase
152. During the primary treatment of sewage, solid particles that settle down are called  
 a) flocs    b) primary sludge    c) activated sludge    d) anaerobic sludge.
153. Synthesis of DNA on RNA template was first observed in  
 a) Bacteria    b) Plant    c) Virus    d) Both (1) & (2)
154. In animal cells, the first stage of glucose breakdown is \_\_\_\_\_  
 a) Krebs'cycle    b) glycolysis    c) oxidative phosphorylation    d) ETC
155. **Assertion:** Sporozoans may have silica shells on their surface.  
**Reason:** Shells of sporozoans help in protection from acidic environment of the host.  
 a) If both assertion and reason are true and reason is the correct explanation of assertion.  
 b) If both assertion and reason are true but reason is not the correct explanation of assertion.  
 c) If assertion is true but reason is false.    d) If both assertion and reason are false.
156. Microbes are present in  
 a) soil    b) thermal vents    c) polluted water    d) all of these.
157. A person with 47 chromosomes due to an additional Y chromosome suffers from a condition called \_\_\_\_\_ .  
 a) Down's syndrome    b) Super female    c) Turner's syndrome    d) Klinefelter's syndrome
158. Triploid primary endosperm nucleus is the characteristic feature of  
 a) Algae    b) Bryophytes    c) Gymnosperm    d) Angiosperm
159. The length of DNA molecule greatly exceeds the dimensions of the nucleus in eukaryotic cells. How is this DNA accommodated?  
 a) deletion of non-essential genes    b) super-coiling in nucleosomes    c) DNase digestion  
 d) through elimination of repetitive DNA
160. Match column I with column II and select the correct option from the given codes.

Column I (Category)	Column II (Secondary metabolites)
A. Pigments	(i) Concanavalin A
B. Terpenoides	(ii) Monoterpenes, diterpenes
C. Alkaloids	(iii) Morphine, codeine
D. Lectins	(iv) Carotenoids, anthocyanins

- a) A-(iv), B-(ii), C-(iii), D-(i)    b) A-(iv), B-(iii), C-(ii), D-(i)    c) A-(i), B-(iv), C-(iii), D-(ii)  
 d) A-(i), B-(iii), C-(ii), D-(iv)
161. The main aim of plant conservation is -  
 a) To conserve the necessary ecological activities and life supporting systems  
 b) To conserve species diversity and range of genetic material    c) Both the above  
 d) None of the above
162. Strobilanthus kunthiana differs from bamboo in  
 a) being monocarpic    b) length of juvenile phase    c) being polycarpic    d) none of these

163. Hypothalamus forms an important link between  
 a) Digestive system and nervous system    b) Digestive system and respiratory system  
 c) Digestive system and endocrine system    d) Integumentary system and reproductive system
164. Which of the following equations is correct?  
 a)  $CO_2 \rightarrow H_2O \rightarrow HCO_3^- + H^+$     b)  $CO_2 + H_2O \xrightleftharpoons[\text{anhydrase}]{\text{Carbonic}} H_2CO_3 \xrightleftharpoons[\text{anhydrase}]{\text{Carbonic}} H^+ + HCO_3^-$   
 c)  $CO_2 + H_2O \rightarrow CH_4 + 2O_2$     d)  $CO_2 + H_2O \rightleftharpoons CO + H_2O_2$
165. Which one of the following techniques made it possible to genetically engineer living organism?  
 a) Hybridization    b) Recombinant DNA techniques    c) X- ray diffraction  
 d) Heavier isotope labelling
166. Osmosis is a special kind of diffusion, through which water diffuses across the cell membrane. The rate and direction of osmosis depends upon  
 a) pressure gradient    b) concentration gradient    c) both (a) and (b)    d) none of these.
167. Motile zygote of Plasmodium occurs in \_\_\_\_  
 a) Gut of female Anopheles    b) Salivary glands of Anopheles    c) Human RBCs    d) Human liver
168. Match column I with column II and select the correct option from the codes given below.

Column I	Column II
A. Psilopsida	(i) Psilotum
B. Lycopsida	(ii) Equisetum
C. Sphenopsida	(iii) Selaginella
D. Pteropsida	(iv) Dryopteris

- a) A-(i), B-(ii), C-(iii), D-(iv)    b) A-(i), B-(iv), C-(iii), D-(ii)    c) A-(i), B-(iii), C-(ii), D-(iv)  
 d) A-(i), B-(iii), C-(iv), D-(ii)
169. Reserve food material in photosynthetic protistan having silicified cell wall is  
 a) Paramylum    b) Laminarin    c) Chrysolaminarin    d) Starch
170. Plants which possesses seeds but not fruits are  
 a) bryophytes    b) pteridophytes    c) gymnosperms    d) algae.
171. While in mitosis, the daughter cells resemble each other and also the parent cell; in meiosis they differ not only from parent cell in having half the number of chromosomes, but also differ among themselves qualitatively in genetic constitution due to  
 a) segregation and crossing over only    b) independent assortment and segregation only  
 c) independent assortment and crossing over only  
 d) crossing over, independent assortment and segregation
172. Laminarin and mannitol, the reserve food of brown algae are:  
 a) lipids    b) complex carbohydrates    c) proteins    d) lipoproteins.
173. The tiger counting in our national parks and tiger reserves is often based on  
 a) Pug marks    b) Manual counting    c) Fecal plates    d) Both 1 and 3
174. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
- Assertion:** Plants absorb calcium from soil in the form of calcium ions ( $Ca^{2+}$ ).  
**Reason:** Calcium is required by meristematic and differentiating tissues.
- a) If both assertion and reason are true and reason is the correct explanation of assertion  
 b) If both assertion and reason are true but reason is not the correct explanation of assertion
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- c) If assertion is true but reason is false. d) If both assertion and reason are false.

175. The protein products of the following Bt toxin genes cryIAc and cryIIAb are responsible for controlling:  
 a) Balloworm b) Roundworm c) Moth d) Fruit fly

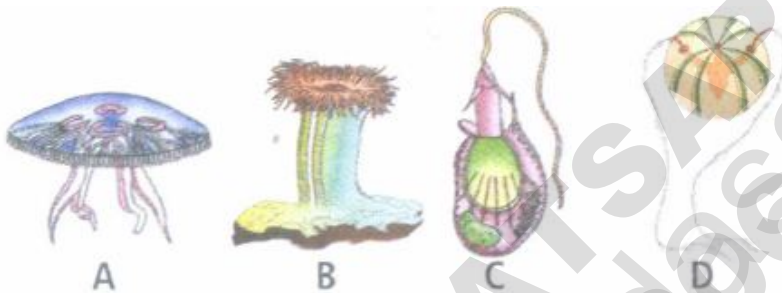
176. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:

**Assertion:** Secondary treatment of sewage is also called biological treatment while primary treatment is called physical treatment.

**Reason:** Primary sewage treatment depends only upon sedimentation properties of materials present in sewage and filtration.

- a) If both assertion and reason are true and reason is the correct explanation of assertion  
 b) If both assertion and reason are true but reason is not the correct explanation of assertion  
 c) If assertion is true but reason is false. d) If both assertion and reason are false.
177. Which of the following glands are present in the brain?  
 a) Parathyroid gland and thyroid gland b) Pituitary gland and thymus  
 c) Hypophysis and pineal gland d) Pineal gland and thymus

178. Identify the figures A, B, C and D and select the correct option.



- a)
- | A             | B          | C       | D       |
|---------------|------------|---------|---------|
| Pleurobrachia | Cnidoblast | Aurelia | Adamsia |
- b)
- | A       | B       | C          | D             |
|---------|---------|------------|---------------|
| Aurelia | Adamsia | Cnidoblast | Pleurobrachia |
- c)
- | A          | B             | C       | D       |
|------------|---------------|---------|---------|
| Cnidoblast | Pleurobrachia | Adamsia | Aurelia |
- d)
- | A       | B       | C             | D          |
|---------|---------|---------------|------------|
| Adamsia | Aurelia | Pleurobrachia | Cnidoblast |

179. Value of RQ in succulents is

- a) unity b) infinite c) less than unity d) zero

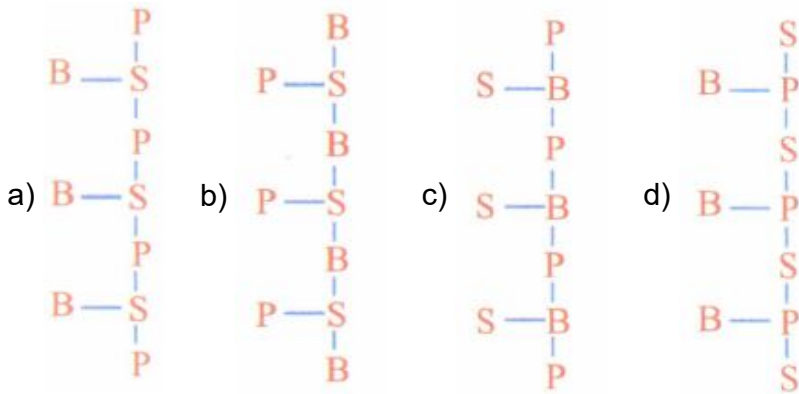
180. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:

**Assertion:** Reductive amination involves the transfer of amino group from one amino acid to the keto group of a keto acid.

**Reason:** In reductive amination, transfer of  $\text{NH}_2$  from glutamic acid takes place

- a) If both assertion and reason are true and reason is the correct explanation of assertion  
 b) If both assertion and reason are true but reason is not the correct explanation of assertion  
 c) If assertion is true but reason is false. d) If both assertion and reason are false
181. If you remove the cell wall from a plant cell and place it into a drop of water  
 a) the cell would begin to grow b) the cell would shrink c) the cell would burst  
 d) nothing would happen

182. Which of the following shows the correct positions of the phosphate (P), sugar (S) and base (B) molecules in the given line diagrams representing the structure of DNA?



183. Which of the following is both a growth promoter as well as a growth inhibitor?

- a) Auxin    b) Gibberellic acid    c) ABA    d) Ethylene

184. Which is a part of pectoral girdle?

- a) Glenoid cavity    b) Sternum    c) Ileum    d) Acetabulum

185. Which of the following set represents micronutrients?

- a) B, Ni, Mo, Mn, Fe    b) B, N, Mo, Mn, P    c) S, Ca, B, Mo, Fe    d) N, Mo, Mn, K, Mg

186. Structure connecting the fetus to placenta is

- a) umbilical cord    b) amnion    c) yolk sac    d) chorion

187. Which of the following STIs are not completely curable?

- a) Chlamydiasis, gonorrhoea, trichomoniasis    b) Chancroid, syphilis, genital warts  
c) AIDS, syphilis, hepatitis B    d) AIDS, genital herpes, hepatitis B

188. In a cereal grain the single cotyledon of embryo is represented by \_\_\_\_\_.

- a) scutellum    b) prophyll    c) coleoptile    d) coleorhiza

189. An allele is the

- a) Total number of genes for a trait    b) Total number of genes on chromosome  
c) Alternative forms of a gene    d) Alternative forms of a character

190. Reaction centre of PSI is \_\_\_\_\_ and reaction centre of PS II is \_\_\_\_\_.

- a) P680, P700    b) P700, P680    c) P800, P600    d) P700, P900

191. Select the mismatched pair.

a)

Name of the plant	Plant part	Drug obtained
Erythroxylon coca	Leaves and young twigs	Cocaine

b)

Name of the plant	Plant part	Drug obtained
Claviceps purpurea	Fruiting bodies	Lysergic acid diethylamide (LSD)

c)

Name of the plant	Plant part	Drug obtained
Cannabis sativa	Leaves, resin and inflorescence	Bhang, hashish

d)

Name of the plant	Plant part	Drug obtained
Thea chinensis	Dried seeds	Mescaline

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192. **Assertion:** Second trimester abortions are much more complicated.  
**Reason:** After 12 weeks the foetus becomes intimately associated with the maternal tissues.
- a) If both assertion and reason are true and reason is the correct explanation of assertion  
b) If both assertion and reason are true but reason is not the correct explanation of assertion.  
c) If assertion is true but reason is false. d) If both assertion and reason are false.
193. Which of the following statements is/are incorrect?  
(i) The liver fluke, a parasite, depends on intermediate hosts (a snail) to complete its life cycle.  
(ii) The malarial parasite needs a vector (mosquito) to spread to other host organisms.  
(iii) In case of brood parasitism, the eggs of parasitic birds are not detected and removed from the nest because the parasite's eggs resemble the host's eggs in morphology and colour.  
(iv) A population of frogs protected from all predators would increase indefinitely.  
a) (i) and (iv) b) (iii) and (iv) c) Only (i) d) None of these
194. Which one of the following is considered important in the development of seed habit?  
a) Heterospory b) Halplontic life cycle c) Free-living gametophyte d) Dependent sporophyte
195. Which of the following is a correct sequence of decreasing order of number of species?  
a) Aves, pisces, reptiles, amphibians, mammals b) Pisces, aves, reptiles, mammals, amphibians  
c) Pisces, mammals, reptiles, amphibians, aves d) Amphibians, aves, pisces, mammals, reptiles
196. Reappearance of nuclear membrane & nucleolus along with thinning & elongation in chromosomes are diagnostic characters for the phase;  
a) Anaphase b) Metaphase c) Interphase d) Telophase
197. The kidney of an adult frog is\_\_\_\_\_  
a) pronephros b) mesonephros c) metanephros d) opisthonephros
198. Which one of the following phenomena supports Darwin's concept of natural selection in organic evolution?  
a) Development of transgenic animals b) Production of 'Dolly', the sheep by cloning  
c) Prevalence of pesticide resistant insects  
d) Development of organs from 'stem cells' for organ transplantation
199. The Eyes, of the potato tuber are \_\_\_\_\_  
a) root buds b) flower buds c) shoot buds d) axillary buds
200. Which of the following statements is incorrect regarding enzymatic activity?  
a) It initially increases with increase in temperature and then decreases  
b) It increases with increase in substrate concentration upto the saturation point  
c) It is highest at optimum pH value d) It initially decreases with increase in pH value