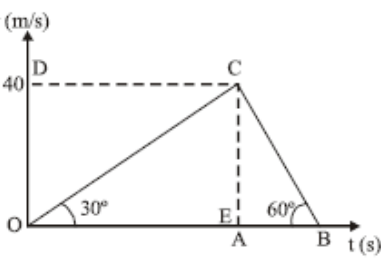# PHYSICS

1. The velocity-time graph of a body is shown in fig. The ratio of average acceleration during the intervals OA and AB is
   (a) 1
   (b) $\frac{1}{2}$
   (c) $\frac{1}{3}$
   (d) 3

2. A body covers 26, 28, 30, 32 meters in 10th, 11th, 12th and 13th seconds respectively. The body starts

   (a) from rest and moves with uniform velocity
   (b) from rest and moves with uniform acceleration
   (c) with an initial velocity and moves with uniform acceleration
   (d) with an initial velocity and moves with uniform velocity

3. The distance time graph of a particle at time t makes angles 45° with the time axis. After one second, it makes angle 60° with the time axis. What is the acceleration of the particle?
   (a) $\sqrt{3}-1$ (b) $\sqrt{3}+1$ (c) $\sqrt{3}$ (d) 1

4. In 1.0 s, a particle goes from point A to point B, moving in a semicircle of radius 1.0 m (see Figure). The magnitude of the average velocity is

   (a) 3.14 m/s

   (b) 2.0 m/s

   (c) 1.0 m/s

   (d) Zero
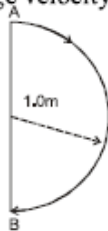
5. A man of height h walks in a straight path towards a lamp post of height H with velocity v. Then velocity of the edge of the shadow on the ground will be

   (a) $\frac{hv}{H+h}$
   (b) $\frac{Hv}{H-h}$
   (c) $\frac{H+h}{Hv}$
   (d) $\frac{(H-h)}{Hh}$

6. An athlete completes one round of a circular track of radius R in 40 sec. What will be his displacement at the end of 3 min. 20 sec ?
   (a) Zero (b) 2 R (c) $2\pi R$ (d) $7\pi R$

7. A particle moves in straight line with velocity 6 m/s and 3 m/s for time intervals which are in ratio 1:2. Find average velocity.
   (a) 2 m/s (b) 3 m/s (c) 4 m/s (d) 5 m/s

8. Which of the following is not possible for a body in uniform motion?

   (a)   (b)
   (c) Both (a) & (b)   (d) None of these

9. A point traversed half of the distance with a velocity v_0. The half of remaining part of the distance was covered with velocity v_1 & second half of remaining part by v_2 velocity. The mean velocity of the point, averaged over the whole time of motion is
   (a) $\frac{v_0+v_1+v_2}{3}$
   (b) $\frac{2v_0+v_1+v_2}{3}$
   (c) $\frac{v_0+.2v_1+2v_2}{3}$
   (d) $\frac{2v_0(v_1+v_2)}{(2v_0+v_1+v_2)}$

10. A person moves 30 m north and then 20 m towards east and finally $30\sqrt{2}$ m in south-west direction. The displacement of the person from the origin will be
    (a) 10 m along north (b) 10 m along south
    (c) 10 m along west   (d) zero

11. A bird flies with a speed of 10 km/h and a car moves with uniform speed of 8 km/h. Both start from B towards A (BA = 40km) at the same instant. The bird having reached A, flies back immediately to meet the approaching car. As soon as it reaches the car, it flies back to A. The bird repeats this till both the car and the bird reach A simultaneously. The total distance flown by the bird is

    (a) 80 km (b) 40 km (c) 50 km (d) 30 km

12. Three elephants A, B and C are moving along a straight line with constant speed in same direction as shown in figure. Speed of A is 5 m/s and speed of C is 10 m/s. Initially separation between A and B is 'd' and between B and C is also d. When 'B' catches 'C' separation between A and C becomes 3d. Then the speed of B will be
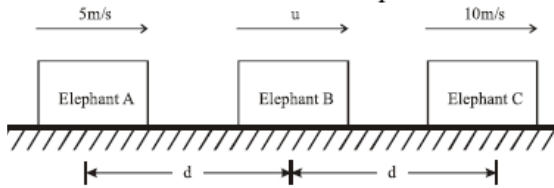
   (a) 7.5 m/s (b) 15 m/s (c) 20 m/s (d) 5 m/s

13. A bus starts moving with acceleration 2 m/s^2. A cyclist 96 m behind the bus starts simultaneously towards the bus at 20 m/s. After what time will he be able to overtake the bus?
   (a) 4 sec (b) 8 sec (c) 18 sec (d) 16 sec

14. Stopping distance of a moving vehicle is directly proportional to
   (a) square of the initial velocity
   (b) square of the initial acceleration
   (c) the initial velocity
   (d) the initial acceleration

15. The displacement of a particle is represented by the following equation: $S = 3t^3 + 7t^2 + 5t + 8$ where S is in meter and t in second. The acceleration of the particle at t = 15 is
   (a) 14 m/s^2 (b) 18 m/s^2
   (c) 32 m/s^2 (d) zero

16. The distance travelled by a particle starting from rest and moving with an acceleration $\frac{4}{3}$ ms^{-2}, in the third second is:
   (a) 6m   (b) 4m   (c) $\frac{10}{3}$ m (d) $\frac{19}{3}$ m

17. The displacement x of a particle along a straight line at time t is given by : $x = a_0 + \frac{a_1 t}{2} + \frac{a_2}{3} t^2$. The acceleration of the particle is
   (a) $\frac{a_2}{3}$ (b) $\frac{2a_2}{3}$ (c) $\frac{a_1}{2}$ (d) $a_0 + \frac{a_2}{3}$

18. A car accelerates from rest at a constant rate α for some time, after which it decelerates at a constant rate β and comes to rest. If the total time elapsed is t, then the maximum velocity acquired by the car is
   (a) $\left(\frac{\alpha^2 + \beta^2}{\alpha\beta}\right) t$ (b) $\left(\frac{\alpha^2 - \beta^2}{\alpha\beta}\right)$
   (c) $\frac{(\alpha+\beta)t}{\alpha\beta}$ (d) $\frac{\alpha\beta t}{\alpha+\beta}$

19. The displacement of a particle as a function of time is shown in figure. It indicates that
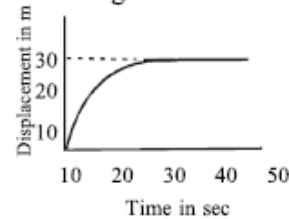

   (a) the velocity of the particle is constant throughout
   (b) the acceleration of the particle is constant throughout
   (c) the particle starts with a constant velocity and is accelerated
   (d) the motion is retarded and finally the particle stops

20. A particle moves a distance x in time t according to equation $x = (t + 5)^{-1}$. The acceleration of particle is proportional to
   (a) (velocity)$^{3/2}$ (b) (distance)^2
   (c) (distance)$^{-2}$ (d) (velocity)$^{2/3}$

21. It is given that $t = px^2 + qx$, where x is displacement and t is time. The acceleration of particle at origin is
   (a) $-\frac{2p}{q^3}$ (b) $-\frac{2q}{p^3}$ (c) $\frac{2p}{q^3}$ (d) $\frac{2q}{p^3}$

22. A bike accelerates from rest at a constant rate 5 m/s^2 for some time after which it decelerates at a constant rate 3 m/s^2 to come to rest. If the total time elapsed is 8 second, the maximum velocity acquired by the bike is given by
   (a) 5 m/s   (b) 10 m/s   (c)   12 m/s (d) 15 m/s

23. A car, starting from rest, accelerates at the rate f through a distance S, then continues at constant speed for time t and then decelerates at the rate $\frac{f}{2}$ to come to rest. If the total distance traversed is 15 S , then
   (a) $S = \frac{1}{6} ft^2$ (b) $S = ft$
   (c) $S = \frac{1}{4} ft^2$ (d) $S = \frac{1}{72} ft^2$

24. The velocity of an object moving rectilinearly is given as a function of time by $v = 4t - 3t^2$, where v is in m/s and t is in seconds. The average velocity of particle between $t = 0$ to $t = 2$ seconds is
   (a) 0   (b) −2m/s (c) −4m/s (d) 8 m/s

25. The acceleration of a particle, starting from rest, varies with time according to the relation $a = -s\omega^2 \sin\omega t$. The displacement of this particle at a time t will be
   (a) $s \sin \omega t$ (b) $s \omega \cos \omega t$
   (c) $s \omega \sin \omega t$ (d) $-\frac{1}{2}(s\omega^2 \sin\omega t) t^2$

26. A car of mass 1000 kg is moving at a speed of 30 m/s. Brakes are applied to bring the car to rest. If the deceleration is 5 m/s^2 the car comes to stop after travelling d m in t s. Then
(a) $d = 150, t = 5$
(b) $d = 120, t = 8$
(c) $d = 180, t = 6$
(d) $d = 90, t = 6$

27. Starting from rest a particle moves in a straight line with acceleration a $= (25 - t^2)^{1/2}$ m/s^2 for $0 \le t \le 5$s,

$a = \dfrac{3\pi}{8}$ m/s^2 for t > 5s. The velocity of particle at t = 7s is:
(a) 11 m/s
(b) 22 m/s
(c) 33 m/s
(d) 44 m/s

28. A truck has to carry a load in the shortest time from one station to another station situated at a distance L from the first. It can start up or slowdown at the same acceleration or deceleration a. What maximum velocity must the truck attain to satisfy this condition?

(a) $\sqrt{La}$
(b) $\sqrt{2La}$
(c) $\sqrt{3La}$
(d) $\sqrt{5La}$

29. The graph shown below represent
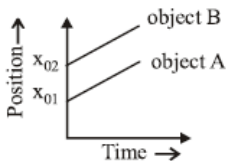
(a) A and B are moving with same velocity in opposite directions
(b) velocity of B is more than A in same direction
(c) velocity of A is more than B in same direction
(d) velocity of A and B is equal in same direction

30. A train of 150 m length is going towards north direction at a speed of 10 ms^{-1}. A parrot flies at a speed of 5 ms^{-1} towards south direction parallel to the railway track. The time taken by the parrot to cross the train is equal to

(a) 12 s
(b) 8 s
(c) 15 s
(d) 10 s

31. Two trains are each 50 m long moving parallel towards each other at speeds 10 m/s and 15 m/s respectively. After what time will they pass each other?

(a) $5\sqrt{\dfrac{2}{3}}$ sec
(b) 4 sec
(c) 2 sec
(d) 6 sec

32. A bus is moving with a velocity of 10 ms^{-1} on a straight road. A scootorist wishes to overtake the bus in one minute. If the bus is at a distance of 1.2 km ahead, then the velocity with which he has to chase the bus is
(a) 20 ms^{-1}
(b) 25 ms^{-1}
(c) 60 ms^{-1}
(d) 30 ms^{-1}

33. A body A begins to move with initial velocity 2 m/sec and continues to move at a constant acceleration a. $\Delta t = 10$ seconds after the body A begins to move a body B departs from the same point with an initial velocity 12 m/sec and moves with the same acceleration a. What is the maximum acceleration a at which the body B can overtake A?
(a) 1 m/s^2
(b) 2 m/s^2
(c) 1/2 m/s^2
(d) 3 m/s^2

34. A man travelling in a car with a maximum constant speed of 20m/s watches the friend start off at a distance 100m ahead on a motor cycle with constant acceleration 'a'. The maximum value of 'a' for which the man in the car can reach his friend is
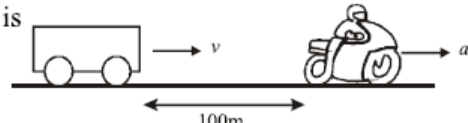
(a) 2 m/s^2
(b) 1 m/s^2
(c) 4 m/s^2
(d) 8 ms^{-2}

35. A body is thrown upwards and reaches half of its maximum height. At that position
(a) its acceleration is minimum
(b) its velocity is maximum
(c) its velocity is zero
(d) its acceleration is constant

36. The ball is projected up from ground with speed 30 m/sec. What is the average velocity for time 0 to 4 sec?
(a) 10 m/sec
(b) 20 m/sec
(c) 15 m/sec
(d) zero

37. Two balls A and B of same mass are thrown from the top of the building. A thrown upward with velocity v and B, thrown down with velocity v, then
(a) velocity A is more than B at the ground
(b) velocity of B is more than A at the ground
(c) both A & B strike the ground with same velocity
(d) None of these

38. A man throws balls with same speed vertically upwards one after the other at an interval of 2 sec. What should be the speed of throw so that more than two balls are in air at any time?
(a) Only with speed 19.6 m/s
(b) More than 19.6 m/s
(c) At least 9.8 m/s
(d) Any speed less then 19.6 m/s.

39. Let A, B, C, D be points on a vertical line such that AB = BC = CD. If a body is released from position A, the times of descent through AB, BC and CD are in the ratio.
(a) $1 : \sqrt{3} - \sqrt{2} : \sqrt{3} + \sqrt{2}$
(b) $1 : \sqrt{2} - 1 : \sqrt{3} - \sqrt{2}$
(c) $1 : \sqrt{2} - 1 : \sqrt{3}$
(d) $1 : \sqrt{2} : \sqrt{3} - 1$

40. A boy standing at the top of a tower of 20m height drops a stone. Assuming $g = 10\,ms^{-2}$, the velocity with which it hits the ground is
    (a) 10.0 m/s (b) 20.0 m/s (c) 40.0 m/s (d) 5.0 m/s

41. From a balloon moving upwards with a velocity of $12\,ms^{-1}$, a packet is released when it is at a height of 65 m from the ground. The time taken by it to reach the ground is $(g = 10\,ms^{-2})$
    (a) 5 s   (b) 8 s   (c) 4 s   (d) 7 s

42. A ball is dropped from a high rise platform at $t = 0$ starting from rest. After 6 seconds another ball is thrown downwards from the same platform with a speed v. The two balls meet at $t = 18s$. What is the value of v? (take $g = 10\,m/s^2$)
    (a) 75 m/s (b) 55 m/s (c) 40 m/s (d) 60 m/s

43. From a building two balls A and B are thrown such that A is thrown upwards and B downwards (both vertically). If T_A and T_B are their respective time of flights then
    (a) $T_A > T_B$ (b) $T_A = T_B$ (c) $T_A < T_B$
    (d)   their time of flights depend on their masses.

44. A stone is dropped into a well in which the level of water is h below the top of the well. If v is velocity of sound, the time T after which the splash is heard is given by

    (a) $T = 2h/v$

    (b) $T = \sqrt{\left(\dfrac{2h}{g}\right)} + \dfrac{h}{v}$

    (c) $T = \sqrt{\left(\dfrac{2h}{v}\right)} + \dfrac{h}{g}$

    (d) $T = \sqrt{\left(\dfrac{h}{2g}\right)} + \dfrac{2h}{v}$

45. The balls are released from the top of a tower of height H at regular interval of time. When first ball reaches at the ground, the nth ball is to be just released and $\left(\dfrac{n+1}{2}\right)^{th}$ ball is at same distance 'h' from top of the tower. The value of h is.

    (a) $\dfrac{2}{3}H$ (b) $\dfrac{3}{4}H$ (c) $\dfrac{4}{5}H$ (d) $\dfrac{5H}{6}$

CHEMISTRY

46. If a reaction involves only solids and liquids which of the following is true ?
(a) $\Delta H < \Delta E$
(b) $\Delta H = \Delta E$
(c) $\Delta H > \Delta E$
(d) $\Delta H = \Delta E + \Delta nRT$

47. A gas expands adiabatically at constant pressure such that $T \propto V^{-1/2}$. The value of γ $(C_{p,m}/C_{v,m})$ of the gas will be :
(a) 1.30 (b) 1.50 (c) 1.70 (d) 2

48. Which of the following statements/relationships is **not** correct in thermodynamic changes?
(a) $\Delta U = 0$ (isothermal reversible expansion of a gas)
(b) $w = -nRT \ln \dfrac{V_2}{V_1}$ (isothermal reversible expansion of an ideal gas)
(c) $w = nRT \ln \dfrac{V_2}{V_1}$ (isothermal reversible expansion of an ideal gas)
(d) For a system of constant volume heat involved directly changes to internal energy.

49. Following reaction occurs in an automobile
$2C_8H_{18}(g) + 25O_2(g) \rightarrow 16CO_2(g) + 18H_2O(g)$.
The sign of $\Delta H, \Delta S$ and ΔG would be
(a) +,−,+ (b) −,+,− (c) −,+,+ (d) +,+,−

50. For which one of the processes represented by the following equations the enthalpy (heat) change is likely to be negative
(a) $Cl^-(g) + aq \rightarrow Cl^-(aq)$
(b) $Cl(g) \rightarrow Cl^+(g) + e^-$
(c) $1/2 Cl_2(g) \rightarrow Cl(g)$
(d) $Cl_2(l) \rightarrow Cl_2(g)$

51. Given :
(I) $H_2(g) + \dfrac{1}{2}O_2(g) \rightarrow H_2O(l)$;
$\Delta H°_{298K} = -285.9 \, kJ \, mol^{-1}$
(II) $H_2(g) + \dfrac{1}{2}O_2(g) \rightarrow H_2O(g)$;
$\Delta H°_{298K} = -241.8 \, kJ \, mol^{-1}$
The molar enthalpy of vapourisation of water will be :
(a) $241.8 \, kJ \, mol^{-1}$
(b) $22.0 \, kJ \, mol^{-1}$
(c) $44.1 \, kJ \, mol^{-1}$
(d) $527.7 \, kJ \, mol^{-1}$

52. Fixed mass of an ideal gas contained in a 24.63 L sealed rigid vessel at 1 atm is heated from −73°C to 27°C. Calculate change in gibb's energy if entropy of gas is a function of temperature as $S = 2 + 10^{-2} T$ (J/K): (Use 1 atm L = 0.1 kJ)
(a) 1231.5 J
(b) 1281.5 J
(c) 781.5 J
(d) 0

53. Hydrogen has an ionisation energy of 1311 kJ mol^{-1} and for chlorine it is 1256 kJ mol^{-1}. Hydrogen forms H^+ (aq) ions but chlorine does not form Cl^+ (aq) ions because
(a) H^+ has lower hydration enthalpy
(b) Cl^+ has lower hydration enthalpy
(c) Cl has high electron affinity
(d) Cl has high electronegativity

54. Calculate the heat produced (in kJ) when 224 g of CaO is completely converted to $CaCO_3$ by reaction with CO_2 at 27°C in a container of fixed volume.

Given : $\Delta H°_f (CaCO_3, s) = -1207$ kJ/mol; $\Delta H°_f (CaO, s) = -635$ kJ/mol, $\Delta H°_f (CO_2, g) = -394$ kJ/mol; [Use R = 8.3 $JK^{-1} mol^{-1}$]
(a) 702.04 kJ
(b) 721.96 kJ
(c) 712 kJ
(d) 721 kJ

55. Substance $A_2B(g)$ can undergoes decomposition to form two set of products :

$A_2B(g)$ →
$A_2(g) + B(g)$; $\Delta H° = 40$ kJ/mol
$A(g) + AB(g)$; $\Delta H° = 50$ kJ/mol

If the molar ratio of A_2 (g) to A (g) is 5 : 3 in a set of product gases, then the energy involved in the decomposition of 1 mole of A_2B (g) is :
(a) 48.75 kJ/mol
(b) 43.73 kJ/mol
(c) 46.25 kJ/mol
(d) None of these

56. For the combustion reaction at 298 K
$2Ag(s) + 1/2 O_2(g) \longrightarrow 2Ag_2O(s)$
Which of the following alternatives is correct?

(a) $\Delta H = \Delta U$
(b) $\Delta H > \Delta U$
(c) $\Delta H < \Delta U$
(d) ΔH and ΔU has no relation with each other

57. Enthalpy of neutralisation of HCl with NaOH is x. The heat evolved when 500 mL of 2 N HCl are mixed with 250 mL of 4N NaOH will be.
(a) 500 x   (b) 100x   (c) x   (d) 10 x

58. What is Δn_{gas} for the combustion of 1 mole of benzene, when both the reactants and the products are at 298 K ?
(a) 0   (b) 1/2   (c) 3/2   (d) −3/2

59. A certain reaction is non spontaneous at 298K. The entropy change during the reaction is 121 JK^{-1}. Is the reaction is endothermic or exothermic ? The minimum value of ΔH for the reaction is
(a) endothermic, $\Delta H = 36.06$ kJ
(b) exothermic, $\Delta H = -36.06$ kJ
(c) endothermic, $\Delta H = 60.12$ kJ
(d) exothermic, $\Delta H = -60.12$ kJ

60. The enthalpies of formation of Al_2O_3 and Cr_2O_3 are −1596 kJ and −1134 kJ respectively. ΔH for the reaction $2Al + Cr_2O_3 \rightarrow 2Cr + Al_2O_3$ is

(a) − 2730 kJ   (b) − 462 kJ
(c) − 1365 kJ   (d) + 2730 kJ

61. A reaction is spontaneous at low temperature but non-spontaneous at high temperature. Which of the following is true for the reaction?

(a) $\Delta H > 0, \Delta S > 0$ (b) $\Delta H < 0, \Delta S > 0$
(c) $\Delta H > 0, \Delta S = 0$ (d) $\Delta H < 0, \Delta S < 0$

62. At 25°C, the dissociation constant of a base, BOH, is 1.0×10^{-12}. The concentration of hydroxyl ions in 0.01 M aqueous solution of the base would be
(a) 1.0×10^{-5} mol L^{-1} (b) 1.0×10^{-6} mol L^{-1}
(c) 2.0×10^{-6} mol L^{-1} (d) 1.0×10^{-7} mol L^{-1}

63. In some solutions, the concentration of H_3O^+ remains constant even when small amounts of strong acid or strong base are added to them. These solutions are known as:
(a) Ideal solutions   (b) Colloidal solutions
(c) True solutions   (d) Buffer solutions

64. A buffer solution is prepared by mixing 10 mL of 1.0 M CH_3COOH and 20 mL of 0.5 M CH_3COONa and then diluted to 100 mL with distilled water. If pK_a of CH_3COOH is 4.76, what is the pH of the buffer solution ?
(a) 5.8   (b) 4.34   (c) 5.21   (d) 4.76

65. Consider the following equilibrium
$$AgCl\downarrow + 2NH_3 \rightleftharpoons \left[Ag(NH_3)_2\right]^+ + Cl^-$$
White precipitate of AgCl appears on adding which of the following?
(a) NH_3 (b) aqueous NaCl
(c) aqueous HNO_3 (d) aqueous NH_4Cl

66. A litre of solution is saturated with AgCl. To this solution if 1.0×10^{-4} mole of solid NaCl is added, what will be the $[Ag^+]$, assuming no volume change?
(a) More   (b) Less   (c) Equal   (d) Zero

67. How many gms of CaC_2O_4 will dissolve in one litre of saturated solution. K_{sp} of CaC_2O_4 is 2.5×10^{-9} $mol^2 lit^{-2}$
(a) 0.0064 g   (b) 0.0128 g
(c) 0.0032 g   (d) None of these

68. Solid $Ba(NO_3)_2$ is gradually dissolved in a 1.0×10^{-4} M Na_2CO_3 solution. At which concentration of Ba^{2+}, precipitate of $BaCO_3$ begins to form ? (K_{sp} for $BaCO_3 = 5.1 \times 10^{-9}$)
(a) 5.1×10^{-5} M   (b) 7.1×10^{-8} M
(c) 4.1×10^{-5} M   (d) 8.1×10^{-7} M

69. On addition of increasing amount of $AgNO_3$ to 0.1 M each of NaCl and NaBr in a solution, what % of Br^- ion get precipitated when Cl^- ion starts precipitating. K_{sp} $(AgCl) = 1.0 \times 10^{-10}$, K_{sp} $(AgBr) = 1 \times 10^{-13}$
(a) 0.11   (b) 99.9   (c) 0.01   (d) 9.99
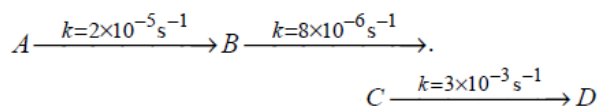
70. Which one of the following arrangements represents the correct order of solubilities of sparingly soluble salts Hg_2Cl_2, $Cr_2(SO_4)_3$, $BaSO_4$ and $CrCl_3$ respectively?
    (a) $BaSO_4 > Hg_2Cl_2 > Cr_2(SO_4)_3 > CrCl_3$
    (b) $BaSO_4 > Hg_2Cl_2 > CrCl_3 > Cr_2(SO_4)_3$
    (c) $BaSO_4 > CrCl_3 > Hg_2Cl_2 > Cr_2(SO_4)_3$
    (d) $Hg_2Cl_2 > BaSO_4 > CrCl_3 > Cr_2(SO_4)_3$

71. The concentration of hydroxyl ion in a solution left after mixing 100 mL of 0.1 M $MgCl_2$ and 100 mL of 0.2 M NaOH
    (K_{sp} of $Mg(OH)_2 = 1.2 \times 10^{-11}$) is
    (a) 2.8×10^{-4} (b) 2.8×10^{-3}
    (c) 2.8×10^{-2} (d) 2.8×10^{-5}

72. The solubility (in mol L^{-1}) of AgCl
    ($K_{sp} = 1.0 \times 10^{-10}$) in a 0.1 M KCl solution will be
    (a) 1.0×10^{-9} (b) 1.0×10^{-10}
    (c) 1.0×10^{-5} (b) 1.0×10^{-11}

73. If pK_b for fluoride ion at 25°C is 10.83, the ionisation constant of hydrofluoric acid in water at this temperature is
    (a) 3.52×10^{-3} (b) 6.75×10^{-4}
    (c) 5.38×10^{-2} (d) 1.74×10^{-5}

74. The dissociation constants of a weak acid HA and weak base BOH are 2×10^{-5} and 5×10^{-6} respectively. The equilibrium constant for the neutralisation reaction of the two is
    (a) 1.0×10^4 (b) 1.0×10^{-4}
    (c) 1.0×10^{-10} (d) 2.5×10^{-1}

75. What is the unit of K_p for the reaction?
    $CS_2(g) + 4H_2(g) \rightleftharpoons CH_4(g) + 2H_2S(g)$
    (a) atm   (b) atm^{-2} (c) atm^2 (d) atm^{-1}

76. The reactions rate $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$
    was measured $\frac{d[NH_3]}{dt} = 2 \times 10^{-4}$ mol sec^{-1}.
    The rates of reactions expressed in terms of N_2 and H_2 are

	Rate in terms of N_2. (mol $L^{-1}sec^{-1}$)	Rate in terms of H_2 (mol $L^{-1}sec^{-1}$)
(a)	2×10^{-4}	2×10^{-4}
(b)	3×10^{-4}	1×10^{-4}
(c)	1×10^{-4}	3×10^{-4}
(d)	2×10^{-1}	2×10^{-3}

77. For the reaction $H_2(g) + Br_2(g) \rightarrow 2HBr(g)$, the experimental data suggest, rate $= k[H_2][Br_2]^{1/2}$. The molecularity and order of the reaction are respectively
    (a) $2, \frac{3}{2}$ (b) $\frac{3}{2}, \frac{3}{2}$ (c) $1, 1$ (d) $1, \frac{1}{2}$

78. The rate law for a reaction between the substances A and B is given by rate $= k[A]^n[B]^m$. On doubling the concentration of A and halving the concentration of B, the ratio of the new rate to the earlier rate of the reaction will be as
    (a) $(m + n)$ (b) $(n - m)$
    (c) $2^{(n+m)}$ (d) $\frac{1}{2^{(m+n)}}$

79. The rate law for the reaction below is given by the expression k [A][B]
    $$A + B \rightarrow Product$$
    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:
    (a) 3k   (b) 9k   (c) k/3   (d) k

80. Which of the following reactions is **not** of the first order?
    (a) Inversion of sucrose in the presence of acid
    (b) Acid-catalyzed hydrolysis of ethyl acetate
    (c) Hydrolysis of tertiary butyl halide using alkali
    (d) Oxidation of I^- ion by $S_2O_8^{2-}$ ion

81. A catalyst lowers the activation enegy of a reaction from 20 kJ mol^{-1} to 10 kJ mol^{-1}. The temperature at which the uncatalyzed reaction will have the same rate as that of the catalyzed at 27° C is
    (a) -123 °C   (b) 327 °C
    (c) 32.7 °C   (d) $+23$ °C

82. For a reaction A + 2B $\rightarrow$ C, the amount of C formed by starting the reaction with 5 moles of A and 8 moles of B is
    (a) 5 moles   (b) 8 moles
    (c) 16 moles   (d) 4 moles

83. For a reaction, activation energy $(E_a) = 0$ and rate constant $(k) = 3.2 \times 10^6 \, s^{-1}$ at 300 K. What is the value of the rate constant at 310 K
    (a) $3.2 \times 10^{-12} \, s^{-1}$
    (b) $3.2 \times 10^6 \, s^{-1}$
    (c) $6.4 \times 10^{12} \, s^{-1}$
    (d) $6.4 \times 10^6 \, s^{-1}$

84. Consider the consecutive reactions :
    $A \xrightarrow{k=2\times10^{-5}s^{-1}} B \xrightarrow{k=8\times10^{-6}s^{-1}}$.
    $C \xrightarrow{k=3\times10^{-3}s^{-1}} D$
    The rate determining step of the reaction is :
    (a) $A \to B$
    (b) $C \to D$
    (c) $B \to C$
    (d) $A \to D$

85. The reaction $2N_2O_5 \rightleftharpoons 2N_2O_4 + O_2$ is
    (a) bimolecular and of second order
    (b) unimolecular and of first order
    (c) bimolecular and of first order
    (d) bimolecular and of zero order

86. Units of rate constant of first and zero order reactions in terms of molarity M unit are respectively
    (a) sec^{-1}, $M.sec^{-1}$
    (b) sec^{-1}, M
    (c) $M.sec^{-1}$, sec^{-1}
    (d) M, sec^{-1}

87. The differential rate law for the reaction
    $H_2(g) + I_2(g) \to 2HI(g)$ is
    (a) $-\dfrac{d[H_2]}{dt} = -\dfrac{d[I_2]}{dt} = -\dfrac{d[HI]}{dt}$
    (b) $\dfrac{d[H_2]}{dt} = \dfrac{d[I_2]}{dt} = \dfrac{1}{2}\dfrac{d[HI]}{dt}$
    (c) $\dfrac{1}{2}\dfrac{d[H_2]}{dt} = \dfrac{1}{2}\dfrac{d[I_2]}{dt} = -\dfrac{d[HI]}{dt}$
    (d) $-2\dfrac{d[H_2]}{dt} = -2\dfrac{d[I_2]}{dt} = \dfrac{d[HI]}{dt}$
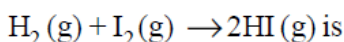
88. In the reaction, $A + 2B \longrightarrow 6C + 2D$, If the initial rate $-\dfrac{d[A]}{dt}$ at t = 0 is 2.6×10^{-2} M sec^{-1}, what will be the value of $\dfrac{d[B]}{dt}$ at t = 0?
    (a) 8.5×10^{-2} M sec^{-1}
    (b) 2.5×10^{-2} M sec^{-1}
    (c) 5.2×10^{-2} M sec^{-1}
    (d) 7.5×10^{-2} M sec^{-1}

89. A first order reaction is half-completed in 45 minutes. How long does it need for 99.9% of the reaction to be completed?
    (a) 20 hours
    (b) 10 hours
    (c) $7\dfrac{1}{2}$ hours
    (d) 5 hours

90. The plot that represents the zero order reaction is :

    (a)
    (b)
    (c)
    (d)
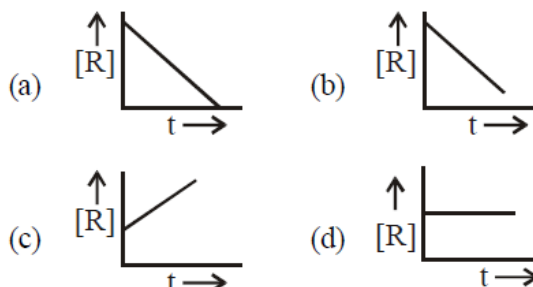
BIOLOGY:

91. The dominant stage in *Spirogyra* is the sporophytic stage.
    (a) It is correct.
    (b) It is incorrect.
    (c) *Spirogyra* does not display alternation of generation
    (d) Sometimes (a) and (b)

92. In the given Life cycle of an angiosperm, 1, 2, 3, 4 and 5 are respectively
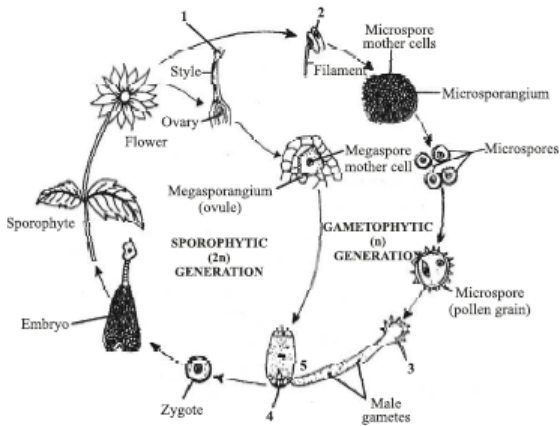
    (a) 1–Stigma, 2–Anther, 3–Male gametophyte, 4–Egg, 5–Female gametophyte
    (b) 1–Stigma, 2–Anther, 3–Female gametophyte, 4–Egg, 5–Male gametophyte
    (c) 1–Stigma, 2–Anther, 3–Male gametophyte, 4–Fertilised egg, 5–Female gametophyte
    (d) 1–Stigma, 2–Anther, 3–Embryo sac, 4–Egg, 5–Female gametophyte

93. Gemma cups are small receptacles that give rise to gemmae (asexual buds). These gemma cups are found in:
    (a) *Sphagnum* and *Marchantia*
    (b) *Marchantia*
    (c) *Funaria*
    (d) Fern

94. Number of cotyledons in *Zea mays*, *Cycas* and *Pinus* respectively are:
    (a) 1, 2, 4
    (b) 1, 2, many
    (c) 2, 2, many
    (d) 2, 1, 4

95. The main plant body in pteridophyte is:
    (a) sporophyte *(2n)* which is differentiated into root, stem and leaf.
    (b) gametophyte *(n)* which is differentiated into root, stem and leaf.
    (c) sporophyte having no root, stem and leaf.
    (d) gametophyte having no root but only stem and leaf.

96. Bryophytes can be separated from algae because they:
    (a) are thalloid forms.
    (b) have no conducting tissue.
    (c) possess archegonia with outer layer of sterile cells.
    (d) contain chloroplasts in their cells.

97. In some of the liverworts, there are special elongated cells called elaters that possess a helical thickening of the cell wall. As elaters lose water, they shrink longitudinally and compress the helical thickening like a spring. When the stress reaches a critical point, the compressed "spring" snaps back to its resting position, liberating hundreds of ___ in all directions.

    (a) Moisture particles
    (b) Spores
    (c) Sperm
    (d) Ova

98. "Botanical snakes" are:
    (a) Algae   (b) Fungi
    (c) Bryophytes   (d) Pteridophytes

99. During monsoon, ground becomes slippery because of :
    (a) Red algae   (b) Blue-green algae
    (c) Mosses   (d) Liverworts

100. Which of the following part of the *Funaria*, sporophyte is involved in the dispersal of spores?
    (a) Calyptra   (b) Peristome
    (c) Operculum   (d) Annulus

101. Fern plant is a:
    (a) Haploid gametophyte
    (b) Diploid gametophyte
    (c) Diploid sporophyte
    (d) Haploid sporophyte

102. Heterothallism is a term used for the symbiosis of :
    (a) Algae and *Cycas*
    (b) Algae and Fungi
    (c) Virus and Algae
   (d) Fungi and *Pinus*

103. Which one of the following is **correct**?
    (a) Protonema of moss and prothallus of *Dryopteris* are sporophytic.
    (b) Protonema of moss and prothallus of *Dryopteris* are gametophytic.
    (c) Moss protonema is sporophytic, *Pteris* prothallus is gametophytic but plant body of *Pteris* and *Funaria* are gametophytic.
    (d) Plant body of moss is gametophytic while *Dryopteris* is, both gametophytic and sporophytic.

104. Match column-I with column-II and select the correct answer using the codes given below.

	Column-I		Column-II
A.	*Gelidium*	I.	Peat moss
B.	*Sphagnum*	II.	Agar agar
C.	*Azolla*	III.	Polymorphism
D.	*Mycoplasma*	IV.	Aquatic fern
E.	*Zamia*	V.	Smallest gymnosperm plant

    (a) A – II; B – I; C – IV; D – III; E – V
    (b) A – I; B – II; C – IV; D – III, E – V
    (c) A – II; B – I; C – IV; D – V, E – III
    (d) A – II; B – IV; C – I; D – III, E – V

105. Fruits are not formed in gymnosperms because of :
    (a) Absence of pollination
    (b) Absence of seed
    (c) Absence of fertilisation
    (d) Absence of ovary

106. Which of the following is known as pond scum?
    (a) *Volvox*   (b) *Ulothrix*
    (c) *Nostoc*   (d) *Spirogyra*

107. Female reproductive part of bryophytes is:
    (a) Antheridium   (b) Oogonium
    (c) Archegonium   (d) Sporangium

108. Which of the following statements are **correct** regarding algae?
    (i) Green algae occur in fresh water, brackish water, salt water.
    (ii) Habitat of brown algae-fresh water (rare), brackish water, salt water.
    (iii) Some red algae are found in fresh water, mostly occur in salt water, some are in brackish water.
    (iv) Most of the red algae are multicellular.
    (v) Red alga may occur in both well lighted regions close to water-surface and also at great depths in oceans where light penetration is little.
    (vi) Cell wall of red algae consists of cellulose + agar.
    (a) All of the above
    (b) None of the above
    (c) (i) and (vi)
    (d) (ii), (iii) and (v)

109. Which of the following statements is/are **correct**?
    (i) In *Equisetum*, the female gametophyte is retained on the parent sporophyte.
    (ii) In *Ginkgo*, male gametophyte is not independent.
    (iii) The sporophyte in *Riccia* is more developed than that in *Polytrichum*.
    (iv) Sexual reproduction in *Volvox* is isogamous.
    (a) Two   (b) Three
    (c) Four   (d) One

110. The haploid and thallus like plant body of bryophytes have:
    (a) vascular tissues of xylem and phloem.
    (b) root, leaf and stem like structures.
    (c) complex tissues.
    (d) true root, stem and leaves which bear vascular tissues.

111. Which one is a parasitic algae?
    (a) *Vaucheria*
    (b) *Polysiphonia*
    (c) *Cephaleuros*
    (d) *Batrachospermum*

112. Vegetative reproduction in green algae occurs by:
    (a) Conidia
    (b) Fragmentation
    (c) Different types of spores
    (d) Both (b) and (c)

113. Read carefully the following statements about pteridophytes.
   (i)   They are used for medicinal purposes.
   (ii) They are frequently grown as ornaments.
   (iii) They are called vascular cryptogams.
   (iv) The produce spores rather than seeds.
   (v)   They are used as soil binders.
   Which of the statements given above are **correct**?
   (a)   (i), (ii) and (v)
   (b)   (ii), (iv) and (v)
   (c)   (ii), (iii), (iv) and (v)
   (d)   All of the above

114. Sexual reproduction in algae results in the formation of :
   (a)   Oospore   (b)   Zoospore
   (c)   Zygote   (d)   Zygospore

115. Asexual reproduction in brown algae happens by the formation of:
   (a)   multiflagellate gametes and are sickle-shaped.
   (b)   biflagellate gametes (pear-shaped and have two unequal flagella).
   (c)   aplanospore (apple-shaped and non-motile).
   (d)   endospores (round and have one flagella).

116. If the cells of root in wheat plant have 42 chromosomes, then the no. of chromosome in the cell of pollen grain is:

   (a)   14   (b)   21   (c)   28   (d)   42

117. Like angiospermic parasite such as *Cuscuta*, there are some parasitic forms of rhodophyta, which are colourless, heterotrophic and grow on other members of rhodophyta. Select which one is a parasitic form of red algae.
   (a)   *Gelidium*   (b)   *Harveyella*
   (c)   *Choridras*   (d)   Both (a) and (b)

118. The leaf gap in the vascular cylinder in ferns, is known as:
   (a)   Air space
   (b)   Parenchymatous zone
   (c)   Collenchymatous zone
   (d)   Area exclusively of phloem

119. Seeds are found in:
   (a)   Angiosperm   (b)   Bryophyte
   (c)   Pteridophyte   (d)   Algae

120. Mosses are:
   (a)   upright and radial in symmetry
   (b)   leafy
   (c)   green
   (d)   All of the above

121. Pyrenoids in green algal cells are related to:
   (a)   Starch storage
   (b)   Protein storage
   (c)   General metabolism
   (d)   Enzyme secretion

122. The unique feature of bryophytes that differentiates it from other green plant group is that:
   (a)   they lack roots.
   (b)   they lack vascular tissue.
   (c)   they produce spores.
   (d)   their sporophytes are attached to the gametophyte.

123. In *Funaria*, 20 chromosomes are present in rhizoids, then the number of chromosome in calyptra, theca and foot will be:

   (a)   20, 40, 40 respectively
   (b)   40, 20, 20 respectively
   (c)   20, 40, 20 respectively
   (d)   40, 10, 20 respectively

124. In *Ulothrix*, meiosis (reduction division) occurs in:
   (a)   Gamete   (b)   Zygospore
   (c)   Zoospore   (d)   Thallus

125. The members of brown algae are found primarily in/on:
   (a)   Moist rock
   (b)   Marine habitat
   (c)   Freshwater habitat
   (d)   Terrestrial habitat

126. In ferns, the vascular bundles are:
   (a)   Radial   (b)   Conjoint
   (c)   Hadrocentric   (d)   Leptocentric

127. Sporocarp is a reproductive structure of :
   (a)   Some algae
   (b)   Some aquatic ferns having sori
   (c)   Angiosperms having spores
   (d)   Bryophytes

128. Mosses are indicator of:
   (a)   Air pollution
   (b)   Water pollution
   (c)   Radioactive pollution
   (d)   Soil pollution

129. The type of chloroplasts observed in class-Chlorophyceae is:
   (a)   Discoid and plate-like.
   (b)   Spiral or ribbon-shaped.
   (c)   Reticulate and cup-shaped.
   (d)   All of the above

130. Apophysis in moss capsule is:
   (a) Upper part   (b) Middle part
   (c) Lower part   (d) Fertile part

131. In mosses, vegetative reproduction takes place by:
   (a) fragmentation and budding in the secondary protonema.
   (b) gemmae and tuber formation
   (c) protonema and endospore
   (d) gemmae formation

132. In pteridophytes, phloem is without:
   (a) Sieve cells
   (b) Sieve tubes
   (c) Companion cells
   (d) Both (b) and (c)

133. In the five-kingdom classification *Chlamydomonas* and *Chlorella* have been included in
   (a) Protista   (b) Algae
   (c) Plantae   (d) Monera

134. How many organisms in the list given below are autotrophs?
   Lactobacillus, Nostoc, Chara, Nitrosomonas, Nitrobacter, Streptomyces, Saccharomyces, Trypanosoma, Porphyra, Wolffia
   (a) Four   (b) Five
   (c) Six   (d) Three

135. Golden brown protists belong to
   (a) Chrysophytes   (b) Euglenoids
   (c) Dinoflagellates   (d) Diatoms

136. On the basis of organisation, animals are grouped into:
   (a) Metazoa and eumetazoa
   (b) Protozoa and metazoa
   (c) Protozoa and parazoa
   (d) Parazoa and metazoa

137. An animal having diploblastic acoelomic condition is:
   (a) *Ascaris*   (b) sea anemone
   (c) *Planaria*   (d) *Periplaneta*

138. Which of the following statement(s) is/are **correct** regarding phylum aschelminthes?
   (i) The body is circular in cross-section hence known as roundworms.
   (ii) Alimentary canal is complete with a well-developed muscular pharynx.
   (iii) Sexes are separate (dioecious), i.e., males and females are distinct.
   (iv) Nephridia help in osmoregulation and excretion.
   (a) (i) and (ii)   (b) (iii) and (iv)
   (c) (i), (ii) and (iii) (d) All of these

139. Match column-I with column-II and select the correct answer using the codes given below.

Column-I		Column-II
A. *Millipedes*	I.	Roundworm, pseudocoelomate
B. *Ascaris*	II.	Diplopoda
C. *Asterias*	III.	Softbody animals, mantle
D. *Hirudinaria*	IV.	Radial symmetry, water vascular system, tube feet
E. *Pila*	V.	Botryoidal tissues, temporary clitellum

   (a) A — II; B — I; C — IV; D — V; E — III
   (b) A — II; B — I; C — IV; D — III; E — V
   (c) A — II; B — IV; C — I; D — V; E — III
   (d) A — II; B — I; C — V; D — IV; E — III

140. Which of the following statement(s) (i) to (iv) is/are **incorrect**?
   (i) Circulatory system in arthropods is of closed type.
   (ii) Parapodia in annelids helps in swimming.
   (iii) Phylum mollusca is the second largest animal phylum.
   (iv) Aschelminthes are dioecious.
   (a) (i) only   (b) (iii) only
   (c) (i) and (iii)   (d) (iii) and (iv)

141. Cleavage in mammals is:
   (a) Holoblastic equal
   (b) Holoblastic unequal
   (c) Superficial
   (d) Discoidal

142. Which of the following statement(s) is/are **correct**?
   (i) Organ systems in different group of animals show various patterns of complexities.

(ii) The digestive system in platyhelminthes has only a single opening to the outside of the body that serve as both mouth and anus, and is hence called complete.

(iii) In open type of circulatory system, the blood is pumped out of the heart and the cells and tissues are directly bathed in it.

(iv) In closed circulatory type, the blood is circulated through a series of vessels of varying diameters (arteries, veins and capillaries).

(a) Only (i) (b) Both (ii) and (iii)
(c) (i), (iii) and (iv) (d) All of these

143. In which of the following animal, post anal tail is found?
(a) Earthworm (b) Lower invertebrate
(c) Scorpion (d) Snake

144. Sense organs of *Aurelia* are:
(a) Tentacle (b) Tentaculocyst
(c) Nematocyst (d) Otolith

145. In animals of which class, the number of body segments is definite?
(a) Oligochaeta (b) *Hirudinaria*
(c) Polychaeta (d) None of these

146. Which of the following sets of animals give birth to young ones?
(a) *Platypus*, Penguin, Bat, *Hippopotamus*
(b) Shrew, Bat, Cat, Kiwi
(c) Kangaroo, Hedgehog, Dolphin, *Loris*
(d) Lion, Bat, Whale, Ostrich

147. In which of the following classes, locomotory organs are absent?
(a) Rhizopoda (b) Sporozoa
(c) Suctoria (d) Mastigophora

148. The given figures 1, 2, 3 and 4 are the examples of first true land vertebrates. They are dominant in mesozoic era and belong to phylum 'X'. Identify 'X' and the animals which have four chambered heart.

1   2

3   4
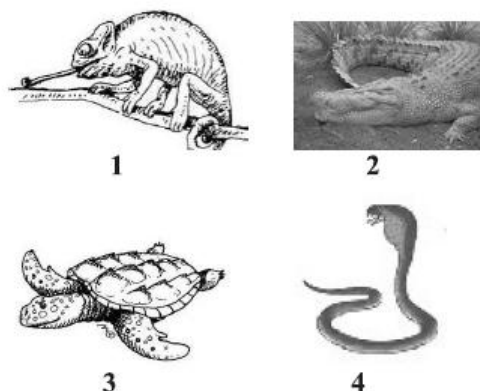
(a) X – Reptile; 2 (b) X – Reptile; 1
(c) X – Amphibia; 3 (d) X – Pisces; 4

149. Locomotion in Kangaroo is:
(a) Volant (b) Saltatorial
(c) Cursorial (d) Graviportal

150. A student has identified a triploblastic coelomate segmented animal as an arthropod. Which additional character the student should have verified before identifying that animal as an arthropod?
(a) Presence of wings
(b) Presence of antenna
(c) Type of coelom
(d) Type of symmetry

151. Elephantiasis is caused by:
(a) *Trichinella* (b) *Desmoscolex*
(c) *Enterobius* (d) *Wuchereria*

152. Identify the characteristic feature marked as 1, 2, 3 and 4 in the given figure.
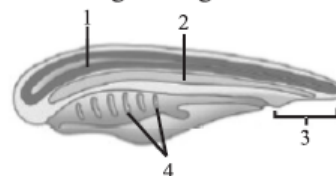
(a) 1-Notochord; 2-Post-anal part; 3-Gill slits; 4-Nerve cord
(b) 1-Nerve cord; 2-Notochord; 3-Post-anal part; 4-Gill slits
(c) 1-Notochord; 2-Nerve cord; 3-Gill slits; 4-Post-anal part
(d) 1-Gill slits; 2-Post-anal part; 3-Nerve cord; 4-Notochord

153. Which of the following statements (i) to (v) are **incorrect**?
    (i) Parapodia are lateral appendages in arthropods used for swimming.
    (ii) In molluscs radula is responsible for the process of excretion.
    (iii) Aschelminthes are dioecious.
    (iv) Echinoderm adults show radial symmetry.
    (v) Ctenophorans are diploblastic.
    (a) (i) and (ii)
    (b) (i) and (iii)
    (c) (i), (iv) and (v)
    (d) (iii) and (v)

154. Read the following statements and answer the question.
    (i) They are exclusively marine, radially symmetrical, diploblastic organisms with tissue level of organisation.
    (ii) Body bears eight external rows of ciliated comb plates, which help in locomotion.
    (iii) Digestion is both extracellular and intracellular.
    (iv) Reproduction takes place only by sexual means.
    Which of the following phylum is being described by above statements?
    (a) Platyhelminthes
    (b) Arthropoda
    (c) Mollusca
    (d) Ctenophora

155. In which one of the following the genus name, its two characters and phylum are **incorrectly** matched?

	Genus name	Two characters	Phylum
(a)	Pila	(i) Body segmented; Mouth with radula	Mollusca
(b)	Asterias	(ii) Spiny skinned; Water vascular system	Echinodermata
(c)	Sycon	(iii) Pore bearing; Canal system	Porifera
(d)	Periplaneta	(iv) Jointed appendages; Chitinous exoskeleton	Arthropoda

156. Hemichordates have now been placed with the non-chordates, close to echinoderms, because true
    (a) notochord is absent.
    (b) pharyngeal gill-slits are lacking.
    (c) dorsal nerve cord is absent.
    (d) heart is lacking.

157. Which of the following is deuterostomate and enterocoelomate invertebrate?
    (a) Pila
    (b) Ascaris
    (c) Aphrodite
    (d) Asterias

158. Which of the following is a living fossil?
    (a) Latimeria
    (b) Lamprey
    (c) Shark
    (d) Eel

159. "Portuguese man of war" is:
    (a) soldier of world war I
    (b) portuguese soldier
    (c) a sponge
    (d) a polymorphic, colonial, colenterata

160. Which of the following snake is not poisonous?
    (a) Naja-naja
    (b) Python
    (c) Bungarus
    (d) Hydrophis

161. Which one of the following statement of animals is **correctly** described with no single exception in it?
    (a) In chondrichthyes, notochord is persistent throughout life.
    (b) All mammals are viviparous and possess diaphragm for breathing.
    (c) All sponges are marine.
    (d) All reptiles possess scales, have a three chambered heart and are cold blooded (poikilothermal).

162. Which of the following characteristic is probably most responsible for the great diversification of insects on land?
    (a) Segmentation
    (b) Antennae
    (c) Bilateral symmetry
    (d) Exoskeleton

163. Which of the following statement(s) is/are **correct** for class amphibia?
    (i) Body is divisible into head and trunk.
    (ii) Respiration is through gills only.
    (iii) The heart is two chambered *i.e.* one auricle and one ventricle.
    (iv) Fertilisation is internal.
    (a) Only (i)   (b) Only (iv)
    (c) (i), (ii) and (iii)   (d) All of these

164. Refer the following animals and identify those which have a fluid filled body cavity with a complete lining derived from mesoderm?

    (i) *Sycon*   (ii) Butterfly
    (iii) *Nereis*   (iv) Sea fan
    (v) Scorpion   (vi) *Pila*
    (a) (i) and (iii) only
    (b) (ii) and (iv) only
    (c) (ii), (iii), (v) and (vi) only
    (d) All of the above

165. Carapace is present on the dorsal surface of:
    (a) Elephant   (b) Tortoise
    (c) Python   (d) Alligator

166. What distinguishes an insect from a crustacean?
    (a) Number of eye
    (b) Arrangement of nerve cord
    (c) Number of appendages
    (d) Presence of wings

167. What is common in whale, bat and rat?
    (a) Absence of neck
    (b) Muscular diaphragm between thorax and abdomen
    (c) Extra abdominal testes to avoid high temperature of body
    (d) Presence of external ears

168. Which of the following statement(s) is/are **correct** regarding class aves?
    (i) The forelimbs are modified into wings and the hindlimbs generally have scales and are modified for walking, swimming or clasping the tree branches.
    (ii) Heart is completely four-chambered.
    (iii) They are warm- blooded (homoiothermous) animals *i.e.*, they are able to maintain a constant body temperature.
    (iv) They are oviparous and development is direct.
    (a) Both (i) and (iii)   (b) Both (i) and (iv)
    (c) (i), (ii) and (iii)   (d) All of these

169. Poisonous fangs of a snake are modified:
    (a) Mandible   (b) Maxillary teeth
    (c) Canines   (d) Nasals

170. The free swimming larva of coelenterates is:
    (a) Onchosphere   (b) Hydrula
    (c) Planula   (d) Amphiblastula

171. Which one of the following sets of animals belongs to the same class of a phylum?
    (a) *Hydra*, jelly fish, cray fish
    (b) Bat, pigeon, whale
    (c) Spider, scorpion, centipede
    (d) Whale, otter, kangaroo

172. Amphiblastula is larva of:
    (a) *Leucosolenia*   (b) *Sycon*
    (c) Both (a) and (b) (d) *Clathrina*

173. Uricotelism is found in:
    (a) fishes and fresh water protozoans.
    (b) birds, reptiles and insects.
    (c) frogs and toads.
    (d) mammals and birds.

174. Similarity between fish and tadpole is:
    (a) Legs   (b) Fins
    (c) Lateral line   (d) Scales

175. Mesogloea of *Hydra* is made up of :
    (a) Mucopolysaccharides
    (b) Protein
    (c) Protein and fat
    (d) Reticulate tissue

176. Match column-I (contains the characteristics features) and column-II (contains the function/ location) and select the correct match from the option given below.

Column-I (Characteristic feature)		Column-II (Function/ Location)
A.	Water canal system	I.	Sponges
B.	Comb plates	II.	Help in swimming
C.	Nephridia	III.	Present in mollusca
D.	Jointed appendages	IV.	Characteristics of roundworm
E.	Muscular foot	V.	A body part of arthropoda
		VI.	Helps in reproduction
		VII.	Platyhelminthes
		VIII.	Helps in osmoregulation and excretion
		IX.	Eight ciliated external rows present in a body of ctenophora.

(a) A – I; B – IX; C – VIII; D – V; E – III
(b) A – II; B – III; C – VI; D – IX; E – V
(c) A – II; B – V; C – I; D – IV; E – IX
(d) A – III: B – VI: C – IV: D – V: E – I

177. Ruminants belongs to order:
(a) Proboscida
(b) Artiodactyla
(c) Marsupials
(d) Edentata

178. A poisonous lizard is:
(a) *Heloderma*
(b) *Ancistrodon*
(c) *Chamaeleon*
(d) *Varanus*

179. Match the phylum given in column-I with their example given in column-II and choose the correct option.

Column-I (Phylum)		Column-II (Examples)
A.	Echinodermata	I.	*Ascidia, Doliolum*
B.	Hemichordata	II.	*Asterias, Ophiura*
C.	Urochordata	III.	*Branchiostoma*
D.	Cephalochordata	IV.	*Balanoglossus, Saccoglossus*

(a) A – IV; B – II; C – I; D – III
(b) A – II; B – IV; C – I; D – III
(c) A – II; B – IV; C – III; D – I
(d) A – II; B – I; C – IV; D – III

180. Which is not a characteristic of *Taenia*?
(a) Apolysis
(b) Proglottids
(c) Metamerism
(d) Strobila

***************End of The Paper***************