

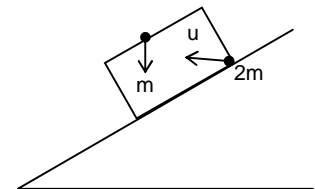
Instructions :

1. This Question Paper contains total **80 questions**. i.e. (Physics-20, Chemistry-20, Mathematics-20 and Biology-20) All questions are compulsory.
2. Each question has 4 choices out of which only **ONE** is correct.
3. For each question in **Section A** will be awarded **1 Marks** if you have darkened only the bubble corresponding to the correct answer and **zero mark** if no bubble is darkened. In all other cases, **(-0.25) mark** will be awarded.
4. For each question in **Section B** will be awarded **2 Marks** if you have darkened only the bubble corresponding to the correct answer and **zero mark** if no bubble is darkened. In all other cases, **(-0.50) mark** will be awarded.

PHYSICS (SECTION-A)

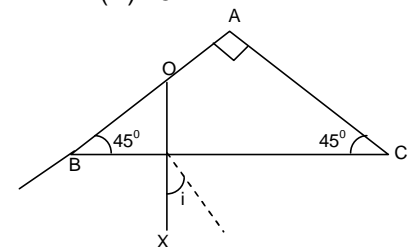
1. Two cars are moving in the same direction with the same speed 30 km/hr. They are separated by a distance of 5 km. The speed of a car moving in the opposite direction if it meets these two cars at an interval of 4 minutes is :
 (A) 30 km/hr (B) 45 km/hr (C) 20 km/hr (D) 10 km/hr

2. A box is sliding on a smooth frictionless surface as shown in the figure. A particle is projected at any unknown angle w.r.t. box. At the same time another particle of mass m is released from the ceiling of the block. The relative acceleration of the two particles is :
 (A) 2 m/s^2 (B) 5 m/s^2
 (C) 0 (D) 10 m/s^2

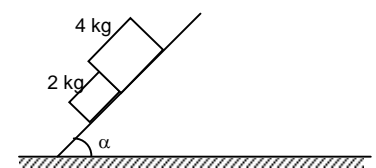


3. A parallel beam of light incident on a concave lens of focal length 10cm emerges as a parallel beam from a convex lens placed coaxially, the separation between the lenses being 10 cm. The focal length of the convex lens in cm is :
 (A) 20 (B) 10 (C) 5 (D) 15

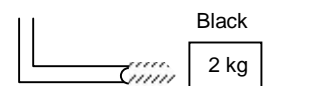
4. ABC is an right angled prism having refractive index $\sqrt{2}$. A ray is incident on face BC (hypotenuse) as shown in the figure. If emergent ray grazes the face AB then calculate angle of incidence i is :
 (A) 30° (B) 45°
 (C) 60° (D) 0°



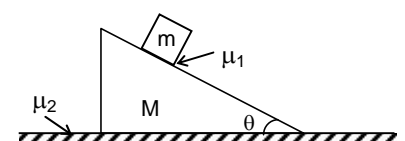
5. The acceleration of 2 kg and 4 kg blocks in m/s^2 is :
 (A) $g \cos \alpha$ (B) $g \tan \alpha$
 (C) $g \sin \alpha$ (D) g



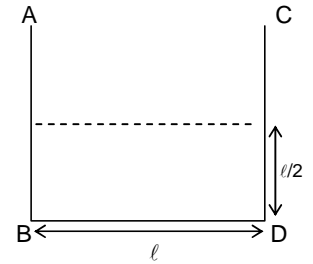
6. A block of metal weighing 2 kg is resting on a frictionless plane. It is struck by a jet releasing water at a rate of 1 kg /s and at a speed of 5 m/s. The initial acceleration of the block is :
 (A) 2.5 m/s^2 (B) 3.5 m/s^2
 (C) 4.5 m/s^2 (D) 5.5 m/s^2



7. In the shown figure a triangular wedge of mass M and a small cube of mass m is placed. The coefficient of friction between wedge and cube is μ_1 and between wedge and ground is μ_2 . ($\mu_2 = \mu_1/2$). The force of friction on wedge due to grounds is (It is given that $\mu_1 > \tan \theta$) :
 (A) 5 m/s^2 (B) 0
 (C) 10 m/s^2 (D) 2.5 m/s^2



8. A liquid of density ' ρ ' taken in a cylindrical vessel of diameter ' ℓ ' upto a height of $\ell/2$ is kept on a horizontal surface. The acceleration with which the vessel should be moved in horizontal direction so that the level of the liquid at wall 'AB' raises to ℓ is
- (A) g (B) $2g$
(C) $3g$ (D) $g/2$

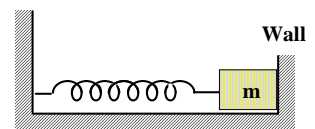


9. A vessel contains oil (density = 0.8 gm/cm^3) over mercury (density = 13.6 gm/cm^3). A homogeneous sphere floats with half its volume immersed in mercury and the other half in oil. The density of the material of sphere in gm/cm^3 is :
- (A) 9.2 (B) 8.2 (C) 6.2 (D) 7.2
10. A circular hole of radius 2 cm is made in an iron plate at 0°C . Its radius at 100°C is ? (α for iron = $11 \times 10^{-6} /^\circ\text{C}$.)
- (A) 2.0022 cm (B) 3.0022 cm (C) 4.0022 cm (D) 5.0022
11. A piece of ice of mass 100g and at temperature 0°C is put in 200 g of water at 25°C . Assuming that the heat is exchanged only between the ice and the water, the final temperature of the mixture is (latent heat of fusion of ice = 80 cal/g , specific heat capacity of water = $1 \text{ cal/g } ^\circ\text{C}$) :
- (A) 10°C (B) 20°C (C) 0°C (D) 5°C
12. The half life of ^{215}At is $100 \mu\text{s}$. The time taken for the radioactive of a sample of ^{215}At to decay to $1/16^{\text{th}}$ of its initial value is :
- (A) $300 \mu\text{s}$ (B) $600 \mu\text{s}$ (C) $200 \mu\text{s}$ (D) $400 \mu\text{s}$
13. A 2kg block initially at rest is dropped from a height of 0.4 m onto a spring whose force constant is 2000 N/m . The maximum distance the spring will be compressed is :
- (A) 1 m (B) 0.1 m (C) 10 m (D) 0.01 m
14. A solid cylinder of mass M and radius R rolls down an inclined plane with height h without slipping. The speed of its centre of mass when it reaches its bottom is :
- (A) $\sqrt{\frac{4gh}{3}}$ (B) $\sqrt{\frac{2gh}{3}}$ (C) $\sqrt{\frac{gh}{3}}$ (D) $\sqrt{\frac{6gh}{3}}$
15. If the radius of the earth were to contract to half its present value, the new period is (The angular velocity of earth about its own axis is $\frac{2\pi}{24} \text{ rad./hr.}$)
- (A) 3 hrs. (B) 6 hrs. (C) 4 hrs. (D) 5 hrs.

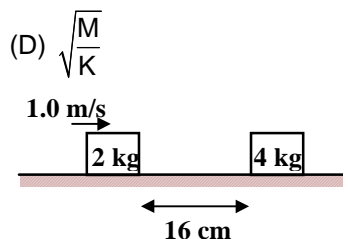
(SECTION-B)

16. An engine driver moving towards a wall with velocity of 50 m/s emits a note of frequency 1.2 kHz. The frequency of note after reflection from the wall as heard by the engine driver is (when speed of sound in air is 350 m/s.)
- (A) 1 kHz (B) 2 kHz (C) 1.6 kHz (D) 2.6 kHz

17. In the figure, the block of mass m , attached to the spring of stiffness k is in contact with the completely elastic wall, and the compression in the spring is ' e '. The spring is compressed further by ' e ' by displacing the block towards left and is then released. If the collision between the block and the wall is completely elastic then the time period of oscillations of the block is :

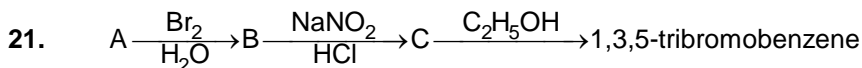


- (A) $\frac{2\pi}{5} \sqrt{\frac{M}{K}}$ (B) $\pi \sqrt{\frac{M}{K}}$ (C) $\frac{2\pi}{3} \sqrt{\frac{M}{K}}$ (D) $\sqrt{\frac{M}{K}}$
18. The friction coefficient between the horizontal surface and each of the block shown in the figure is 0.2. The collision between the blocks is perfectly elastic. The separation between them when they come to rest is (Take $g = 10\text{m/s}^2$)
- (A) 10 cm (B) 2 cm (C) 9 cm (D) 5 cm

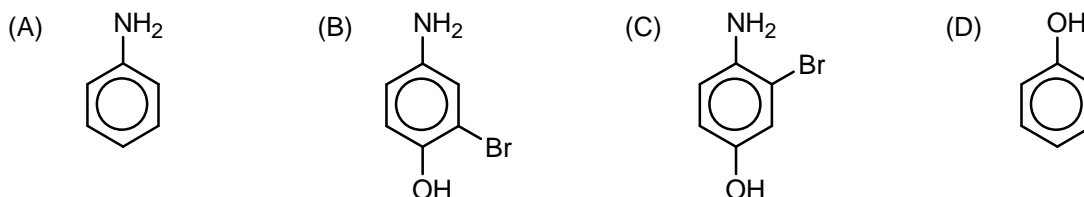


19. Potential in the x-y plane is given as $V = 5(x^2 + xy)$ volts. The electric field at the point (1, -2) is :
 (A) $5\hat{j}$ V/H (B) $-5\hat{j}$ V/H (C) $5\hat{i}$ V/M (D) $5\hat{k}$ V/M
20. Two satellites A and B revolve around a planet in coplanar circular orbit in the same direction with period of revolutions 1 hour and 8 hours respectively. The radius of satellite A is 10^4 km then the angular speed of 'B' with respect to A is :
 (A) $\pi/3$ rad/hr (B) π rad/hr (C) $\pi/2$ rad/hr (D) $\pi/4$ rad/hr

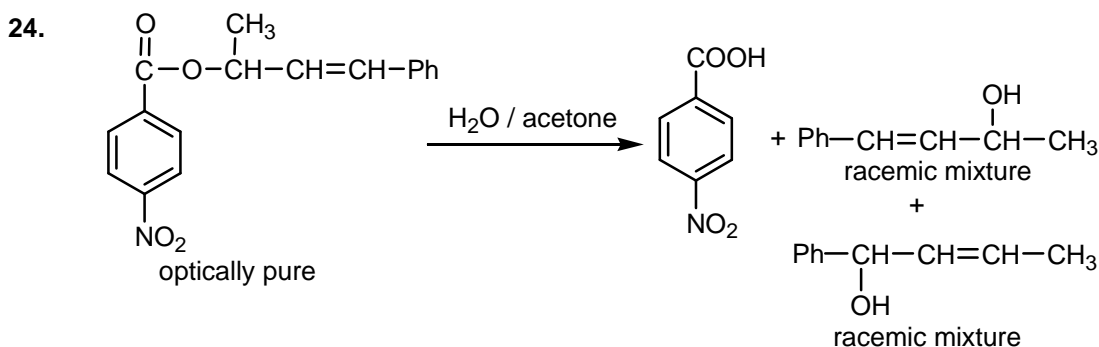
CHEMISTRY (SECTION- A)



A can be :

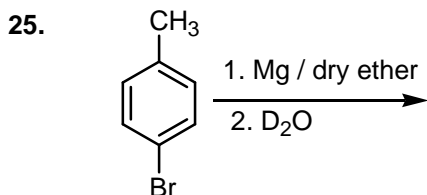


22. Which of the following reactions **does not** form a gaseous product ?
 (A) $\text{PbO}_2 + \text{H}_2\text{O}_2 \longrightarrow$ (B) $\text{KMnO}_4 + \text{H}_2\text{O}_2 + \text{H}^+ \longrightarrow$
 (C) $\text{PbS} + \text{H}_2\text{O}_2 \longrightarrow$ (D) $\text{Cl}_2 + \text{H}_2\text{O}_2 \longrightarrow$
23. When KMnO_4 is heated with fused KOH , the product formed is
 (A) MnO_2 , purple (B) K_2MnO_4 , green (C) MnO_2 , black (D) K_2MnO_4 , brown



The order of the above reaction is

- (A) 1 (B) 2 (C) 3 (D) 0

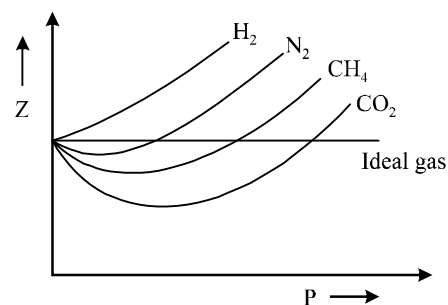


Number of deuterium labeled products produced in the above reaction is

- (A) 1 (B) 2 (C) 3 (D) 4
26. The reaction of an element A with water produces combustible gas B and an aqueous solution of C. When another substance D reacts with this solution C the same gas B is produced. D also produces the same gas even on reaction with dilute H_2SO_4 at room temperature. Element A imparts golden yellow colour to Bunsen flame. Then A, B, C and D may be identified as :
 (A) Na, H_2 , NaOH and Zn (B) Na, H_2 , NaOH and Zn(OH)_2
 (C) Na, H_2 , NaOH and Al(OH)_3 (D) Ca, H_2 , Ca(OH)_2 and Zn

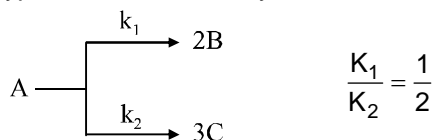
27. There are three samples of H_2O_2 labelled as 10 vol, 15 vol, 20 vol. Half litre of each sample are mixed and then diluted with equal volume of water. The volume strength of resultant solution is
 (A) 45 (B) 1.78 (C) 7.5 (D) 15

28. Compressibility factor $\left(Z = \frac{PV}{nRT}\right)$ is plotted against pressure. What is the correct order of ease of liquefaction of the gases shown in the above graph
 (A) $\text{H}_2 < \text{N}_2 < \text{CH}_4 < \text{CO}_2$
 (B) $\text{CO}_2 < \text{CH}_4 < \text{N}_2 < \text{H}_2$
 (C) $\text{H}_2 < \text{CH}_4 < \text{N}_2 < \text{CO}_2$
 (D) $\text{CH}_4 < \text{H}_2 < \text{N}_2 < \text{CO}_2$



29. In the radioactive decay: ${}^A_Z X \longrightarrow {}^A_{Z+1} Y \longrightarrow {}^{A-4}_{Z-1} W^* \longrightarrow {}^{A-4}_{Z-1} W$
 the sequence of radiations emitted is :
 (A) α, β, γ (B) γ, α, β (C) β, γ, α (D) β, α, γ

30. For a hypothetical elementary reaction

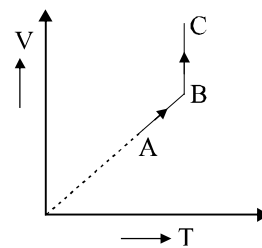


Reaction is started with 2 moles of A. The total number of moles of A, B and C after 75% completion of the reaction is :

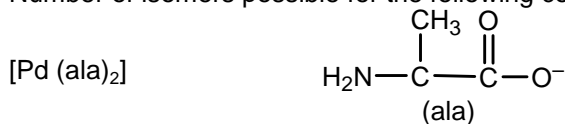
- (A) 2 (B) 3 (C) 4 (D) 4.5
31. Calculate ΔE when one mole of liquid is vapourised at its boiling point (80°C) and 1 atm pressure.
 ($H_{\text{vap}} = 30.7 \text{ kJ/mol}$)
 (A) 33.6 kJ (B) 31.4 kJ (C) 30 kJ (D) 27.8 kJ
32. A sample of sparingly soluble $\text{PbI}_2(\text{s})$ containing radioactive I-133 is added to 0.1M KI and stirred. Which of the following is observed ?
 (I) the radioactivity of the liquid phase increases
 (II) the concentration of I^- ions in the solution increases
 (A) I only (B) II only (C) both I and II (D) neither I or II
33. The amount of gas adsorbed on adsorbent increases always with
 (A) increase in temperature (B) increase in pressure
 (C) decrease in temperature (D) decrease in pressure
34. Which of the following reactions gives nitrogen as one of the products ?
 (A) $\text{NH}_4\text{NO}_3 \longrightarrow$ (B) $\text{ex.NH}_3 + \text{Cl}_2 \longrightarrow$ (C) $\text{Pb}(\text{NO}_3)_2 \longrightarrow$ (D) $\text{NH}_3 + \text{ex.Cl}_2 \longrightarrow$
35. What is the $[\text{Mg}^{+2}]$ in 0.1M NaF that is saturated with MgF_2 at 25°C ? $K_{\text{sp}} \text{MgF}_2 = 6.4 \times 10^{-9}$
 (A) 0.05M (B) $1.9 \times 10^{-3}\text{M}$ (C) $6.4 \times 10^{-7}\text{M}$ (D) $1.2 \times 10^{-3}\text{M}$

(SECTION-B)

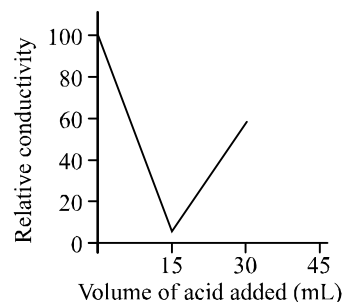
36. An ideal gas ($n = 2$ moles, $C_v = 3R$) is taken through a reversible process starting from A. If $\frac{V_B}{V_A} = 4$ and $T_A = -73^\circ\text{C}$ work done in the process $A \rightarrow B$ is :
- (A) 6.16 KJ (B) 29.9 KJ
(C) 9.97 KJ (D) 61.6 KJ



37. Number of isomers possible for the following complex is



- (A) 4 (B) 5 (C) 6 (D) 7
38. 20 mL of KOH solution was titrated with $0.20 \text{ mol L}^{-1} \text{ H}_2\text{SO}_4$ solution in a conductivity cell. The data obtained were plotted to give the graph shown below:
The concentration of the KOH solution was
(A) 0.30 mol L^{-1} (B) 0.15 mol L^{-1}
(C) 0.12 mol L^{-1} (D) 0.075 mol L^{-1}



39. What must be the concentration of aq. HCl so that equal concentration of H^+ comes from HCl and water ?
(A) 10^{-7} M (B) $\sqrt{50} \times 10^{-8} \text{ M}$ (C) $\sqrt{40} \times 10^{-14} \text{ M}$ (D) 10^{-8} M
40. Which value for the formation enthalpy (ΔH_f°) in kJ/mol of $\text{Br}_{2(\text{g})}$ follows from the following data ?
(Boiling point of $\text{Br}_{2(\text{g})} = 58.8^\circ\text{C}$)
- | S ⁰ | J/mol/K |
|---------------------------|---------|
| $\text{Br}_{2(\text{g})}$ | 245 |
| $\text{Br}_{2(\text{l})}$ | 152 |
- (A) 7 (B) 12 (C) 31 (D) 93

MATHEMATICS
(SECTION- A)

41. The remainder when $x = 5^{5^{\dots^5}}$ (24 times 5) is divided by 24 is :
(A) 2 (B) 3 (C) 4 (D) 5
42. If $P = 21(21^2 - 1^2)(21^2 - 2^2)(21^2 - 3^2) \dots (21^2 - 10^2)$, then P is divisible by :
(A) 21! (B) 22! (C) 23! (D) 24!
43. A regular polygon of 10 sides is contracted. In how many ways can 3 vertices be selected so that no two vertices are consecutive ?
(A) 51 (B) 50 (C) 49 (D) 48
44. Let $x^2 - 3x + P = 0$ has two positive roots 'a' and 'b' then minimum value of $\left(\frac{4}{a} + \frac{1}{b}\right)$ is :
(A) 2 (B) 3 (C) 4 (D) 5
45. If $1^2 + 2^2 + 3^2 + \dots + (2003)^2 = (2003)(4007)(334)$ and $(1)(2003)(2)2002 + (3)(2001) + \dots + (2003)(1) = (2003)(334)x$, then x equals
(A) 2005 (B) 2004 (C) 2003 (D) 2001

46. If $ax^3 + bx^2 + cx + d$ is divisible by $ax^2 + c$ then a, b, c, d are in :
 (A) A.P. (B) G.P. (C) H.P. (D) None of these
47. Number of +ve integers n for which $n^2 + 96$ is a perfect square is :
 (A) 8 (B) 12 (C) 4 (D) None of these
48. The curve $y = (\lambda + 1)x^2 + 2$ intersect the curve $y = \lambda + 3$ in exactly one point, If λ equals :
 (A) $\{-2, -2\}$ (B) $\{1\}$ (C) $\{\}$ (D) $\{2\}$
49. If $\sqrt{\sqrt{x}} = \sqrt[4]{\sqrt[4]{3x^4 + 4}}$ then the value of x^4 is :
 (A) 4 (B) 5 (C) 6 (D) 2
50. An equilateral triangle is inscribed in the circle $x^2 + y^2 = a^2$ with the vertex at $(a, 0)$. The equation of the side opposite to this vertex is :
 (A) $2x - a = 0$ (B) $x + a = 0$ (C) $2x + a = 0$ (D) $3x - 2a = 0$
51. The last digit of $17^{50} + 7^{50}$ is :
 (A) 7 (B) 8 (C) 9 (D) 10
52. The no. of integral point (integer point mean both the coordinate integer) that lie exactly in the interior of the triangle with vertices :
 (A) 33 (B) 233 (C) 333 (D) None of these
53. The sum of all integral roots of $(\log_5 x)^2 + \log_{5x} |5/x| = 1$ is :
 (A) 4 (B) 5 (C) 6 (D) 7
54. The no. of times the digit 3 will be written when listing the integers from 1 to 1000 is :
 (A) 269 (B) 300 (C) 221 (D) 302
55. Value of $\sum_{r=2}^n \sin r\alpha$, where $(n+2)\alpha = 2\pi$.
 (A) 1 (B) 2 (C) 0 (D) 3

(SECTION- B)

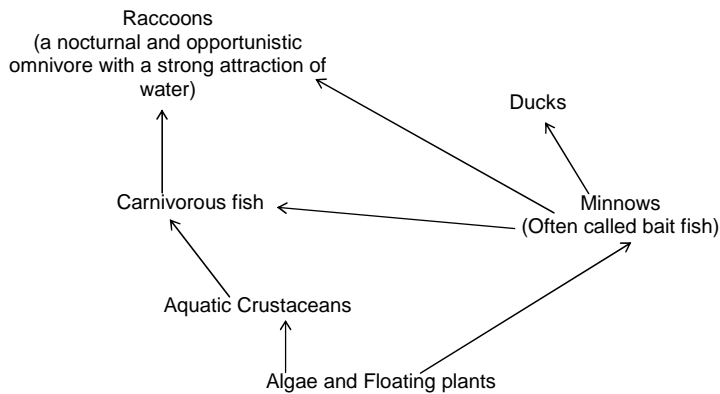
56. Let $a \neq 0$ and $P(x)$ be a polynomial of degree greater than 2. If $P(x)$ leaves remainder a and $-a$ When divided respectively by $x + a$ and $x - a$. The remainder when $P(x)$ is divided by $x^2 - a^2$ is :
 (A) $2x$ (B) $-2x$ (C) x (D) $-x$
57. Let x, y, z, t be equal no's $x^2 + y^2 = 9, z^2 + t^2 = 4$ and $xt - yz = 6$. Then the greatest value of $P = xz$ is :
 (A) 2 (B) 3 (C) 4 (D) 6
58. If $a = \log_{12} 18, v = \log_{24} 54$ then the value of $ab + 5(a - b)$ is :
 (A) 0 (B) 4 (C) 1 (D) 6
59. If x, y, z are real and unequal then the expression $x^2 + 4y^2 + 9z^2 - 6yz - 3zx - 2xy$ is always :
 (A) Non negative (B) Non positive (C) Zero (D) None of these
60. $U = \sqrt{a^2 \cos^2 \theta + b^2 \sin^2 \theta} + \sqrt{a^2 \sin^2 \theta + b^2 \cos^2 \theta}$ difference between maximum and minimum values of U^2 is:
 (A) $(a - b)^2$ (B) $(a + b)^2$ (C) $a^2 + b^2$ (D) $a^2 - b^2$

BIOLOGY
(SECTION- A)

61. Pacemaker of heart is situated in :
(A) Right ventricle (B) Right auricle (C) Left ventricle (D) Left auricle
62. Choose correctly matched option :
(A) Mollusca - Cilia (B) Echinodermata – Tube feet
(C) Annelids – Muscular foot (D) Porifera - Pseudopodia
63. Apical dominancy in plant is provided by :
(A) Auxin (B) Abscisic acid (C) Cytokinin (D) Ethylene
64. One of the cell organelle is said to function as “trigger of cell division”.
(A) Sphaerosome (B) Lysosome (C) Lomasome (D) Glyoxysome
65. The main function of lacteals in the human small intestine is absorption of
(A) Glucose (B) Amino acids (C) Water or vitamins (D) Fatty acids and glycerol
66. Open circulatory system is present in
(a) Arthropods (b) Annelids
(c) Chordates (d) Amphibians
(A) c only (B) c and b (C) a and b (D) d only
67. Which of the following diseases would not normally be spread by a common source?
(A) Measles (B) Typhoid fever (C) Dysentery (D) Cholera
68. The fact that all seven of the garden pea traits studied by Mendel obeyed the principle of independent assortment means that _____
(A) Seven pairs of alleles determining these traits are on the same pair of homologous chromosomes
(B) Seven pairs of alleles determining these traits behave as if they are on different chromosomes.
(C) Diploid number of garden pea is 7
(D) Formation of gametes in plants is by mitosis only
69. The allele for red flower colour (R) in a certain plant is co-dominant with the allele for white flowers (R'). Thus a plant with the genotype RR' has pink flowers. Tall (D) is dominant to dwarf (d). What would be the expected phenotypic ratio from a cross of RR'dd plants with R'R' Dd plants?
(A) 9:3:3:1
(B) 50 % pink 50 % white, and all tall
(C) 1: 1: 1: 1, in which 50 % are tall, 50 %dwarf, 50 % pink and 50% white
(D) 3:1
70. Which of these is not stored in the leucoplast ?
(A) Carbohydrates (B) Coloured pigments (C) Proteins (D) Fats
71. Which of the following statements is wrong ?
(A) Phloem possess mainly living cells
(B) Prokaryotic cells contain single chromosome
(C) Ribosomes are found both in eukaryotic and prokaryotic cells
(D) Robert Hooke gave the phrase “Omnis cellula - e - cellula”.
72. In the given food chain suppose the amount of energy at fourth trophic level is 5KJ, what will be the energy available at the producer level?
Grass → Grasshopper → Frog → Snake → Hawk
(A) 5 KJ (B) 50 KJ (C) 500 KJ (D) 5000 KJ
73. In the leaves of C₃ plants, the cells that normally contain chlorophyll are:
(A) palisade mesophyll cells (B) bundle sheath cells
(C) lower epidermal cells (D) endodermal cells
74. Living organisms produce nitrogenous wastes. The most toxic of these which is also maximally water soluble is:
(A) Urea (B) Uric acid (C) Creatine (D) Ammonia
75. The major component of bacterial cell wall is polymer called
(A) Xylem (B) Cellulose (C) Peptidoglycan (D) None of these

(SECTION- B)

76. The diagram illustrates the relationships between the organisms in a certain pond. In this pond community, which organisms are secondary consumers?



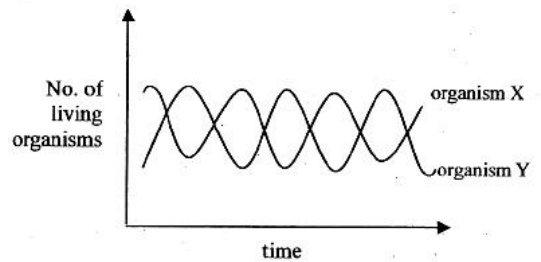
- (A) Aquatic crustaceans and raccoons (B) Carnivorous fish and aquatic crustaceans
 (C) Ducks and minnows (D) Ducks and carnivorous fish

77. Match the following

Column – I	Column – II
(a) Montreal protocol	(1) Green House Gases
(b) Kyoto protocol	(2) Ozone depletion
(c) World Earth Day	(3) 22 March
(d) World Water Day	(4) 22 April

- (A) a-2, b-1, c-4, d-3 (B) a-1, b-2, c-3, d-4 (C) a-3, b-2, c-4, d-1 (D) a-4, b-1, c-2, d-3

78. When the number of two species of aquatic organisms was monitored over time, the following graph was obtained. Which of the following statements is most likely to be true?



- (A) One organism is the food of the other.
 (B) Each organism needs the other type for its survival.
 (C) Organism X needs Y for multiplication but Y does not need X.
 (D) One organism is a parasite on the other species

79. Characteristics given in the following table represent which of the following pair of families?

	Character	Family 1	Family 2
1.	Skin	Smooth and moist	Keratinised & Hairy
2.	Heart	Three chambered	Four chambered
3.	Fertilization	External	Internal

- (A) Mammalia, Amphibia (B) Amphibia, Mammalia
 (C) Reptilia, Aves (D) Aves, Reptilia

80. Match the following:

Column I	Column II
(a) Basophils	(i) Phagocytosis
(b) Neutrophils	(ii) Inflammation
(c) Plasma cells	(iii) Blood clotting
(d) Thrombocytes	(iv) Antibodies

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

ANSWER KEY

KVPY MOCK TEST-2

CLASS XI

1. (B)	2. (C)	3. (A)	4. (D)	5. (C)	6. (A)	7. (B)	8. (A)	9. (D)	10. (A)
11. (C)	12. (D)	13. (B)	14. (A)	15. (B)	16. (C)	17. (C)	18. (D)	19. (B)	20. (A)
21. (A)	22. (C)	23. (B)	24. (A)	25. (A)	26. (A)	27. (D)	28. (A)	29. (D)	30. (D)
31. (C)	32. (A)	33. (B)	34. (B)	35. (C)	36. (C)	37. (C)	38. (A)	39. (B)	40. (C)
41. (D)	42. (A)	43. (B)	44. (B)	45. (A)	46. (B)	47. (C)	48. (C)	49. (A)	50. (C)
51. (B)	52. (D)	53. (C)	54. (B)	55. (C)	56. (D)	57. (B)	58. (C)	59. (A)	60. (A)
61. (B)	62. (B)	63. (A)	64. (B)	65. (D)	66. (C)	67. (A)	68. (B)	69. (C)	70. (B)
71. (D)	72. (D)	73. (A)	74. (D)	75. (C)	76. (D)	77. (A)	78. (A)	79. (B)	80. (A)