विद्या सर्वार्थ साधिका

ANANDALAYA
ANNUAL EXAMINATION
Class: IX

Subject: Science (086) MM : 80
Date : 18-02-2025 Time: 3 hours

General Instructions:

1. This question paper consists of 39 questions in 5 sections.
2. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.
3. Section A consists of 20 Objective type questions carrying 1 mark each.
4. Section B consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should be in the range of 30 to 50 words.
5. Section C consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should be in the range of 50 to 80 words.
6. Section D consists of 3 Long Answer type questions carrying 05 marks each. Answers to these questions should be in the range of 80 to 120 words.
7. Section E consists of 3 Source-based/case-based units of assessment of 04 marks each with sub-parts.

SECTION A

1. The density of copper decreases as temperature increases (as does the density of most substances). What happens when the temperature of copper sample changes from room temperature to 95 °C? (1)
   (A) It will become lighter. (B) It will become heavier.
   (C) It will expand. (D) It will contract.

2. A student crushed a piece of chalk and mixed the chalk powder in 100 mL water. The water appeared white and cloudy. After some time, the particles settled at the bottom of the container. She claims that the mixture is a suspension. What justifies her claim? (1)
   (A) The particles mix completely with water.
   (B) The particles of chalk form a separate layer.
   (C) The particles of chalk are visible through the naked eye.
   (D) The particles of chalk are uniformly distributed in water.

3. The table lists some compounds and their mass ratio. (1)
   (Atomic masses: H = 1 u, O = 16 u, C = 12 u, N = 14 u, Mg = 24 u and S = 32 u)

Compound	Combining elements	Ratio by mass
Water (H_2O)	Hydrogen, Oxygen	1:8
Carbon dioxide (CO_2)	Carbon, Oxygen	3:4
Nitrogen dioxide (NO_2)	Nitrogen, Oxygen	7:16
Magnesium Sulphide (MgS)	Magnesium Sulphur	3:4

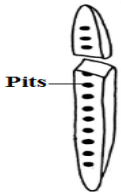
Which compound does NOT support the law of constant proportions?
(A) H_2O (B) CO_2 (C) NO_2 (D) MgS

4. Which of the following is a postulate of Bohr's model that explains why electrons do not lose energy as they revolve around the nucleus? (1)
   (A) Every atom has a discrete number of orbits in which electrons revolve with fixed energy.
   (B) Every atom has a large amount of empty space where the electrons move around the nucleus.
   (C) Every atom has as many electrons as there are protons which makes it electrically neutral.
   (D) Every atom has a positively charged nucleus where most of the mass of the atom is concentrated.

5. Ozone is labelled as triatomic because _____. (1)
   (A) ozone can exist freely in nature
   (B) ozone is a gas and gases are triatomic
   (C) three atoms of oxygen combine to form ozone
   (D) three molecules of oxygen combine to form ozone

6. During an experiment, a scientist discovers that a bacterial cell lacks ribosomes. Which cellular process would be affected? (1)
   (A) DNA synthesis (B) Protein synthesis
   (C) ATP synthesis (D) Nutrient absorption

7. Which of the following would most likely occur, if the structure 'A' is damaged in plants? (1)
   (A) The plant will not transport food properly.
   (B) The plant roots will not grow properly anymore.
   (C) The plant will not transport water and minerals vertically.
   (D) The plant will not grow new leaves anymore.



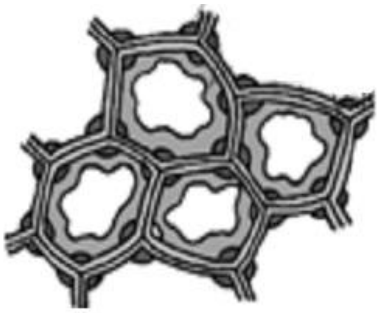
A

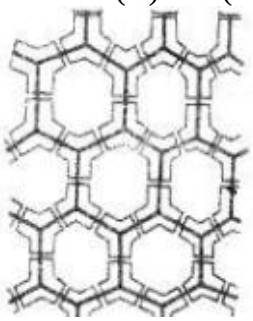
8. Which cell organelle plays a crucial role in detoxifying many poisons and drugs in a cell? (1)
   (A) Golgi apparatus (B) Lysosomes
   (C) Smooth endoplasmic reticulum (D) Vacuoles

9. Identify the correct statement about manure. (1)
   (i) Manure contains large quantities of organic matter.
   (ii) It increases the water-holding capacity of sandy soil.
   (iii) It helps in draining out excess water from clayey soil.
   (iv) It consists of only nitrogenous waste of animals.
   (A) (i) and (iii) (B) (i) and (ii) (C) (ii) and (iii) (D) (iii) and (iv)

10. Which fish among the following is a surface feeder? (1)
    (A) Rohu (B) Mrigal (C) Common carp (D) Catla

11. Which is the correct statement based on the functions of plant tissues (X) and (Y)? (1)


X


Y

   (A) X and Y are living cells involved in photosynthesis.
   (B) X is a living cell, while Y is dead; both provide mechanical support to plants.
   (C) X and Y are living cells primarily involved in water transport.
   (D) X and Y are living cells that contribute to the plant's flexibility.

12. What is the phenomenon called when a plant cell membrane shrinks away from the cell wall due to water loss through osmosis? (1)
(A) Cytolysis (B) Plasmolysis (C) Endocytosis (D) Exocytosis

13. If the density of the liquid is increased, the upthrust would _____. (1)
(A) increase (B) decrease (C) remain same (D) increase and then decrease

14. An object of mass 5 kg is travelling with a uniform velocity of 8 m/s. What is the force acting on it? (1)
(A) zero (B) 1.6 m/s^2 (C) 0.62 m/s^2 (D) 40 m/s^2

15. The sound waves whose frequencies are greater than 20 kHz are known as _____. (1)
(A) infrasonic sound (B) ultrasonic sound (C) sonic boom (D) noise

16. A mass 'm' has a kinetic energy 'K'. If its velocity is doubled, what will be its kinetic energy? (1)
(A) K (B) 2K (C) 4K (D) $\frac{K}{2}$

For question numbers 17 to 20, two statements are given-one labelled Assertion and the other labelled Reason. Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.
(A) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(B) Both Assertion and Reason are true but Reason is NOT the correct explanation of Assertion.
(C) Assertion is true but Reason is false.
(D) Assertion is false and Reason is also false.

17. A: An object may acquire acceleration even if it is moving at a constant speed. (1)
R: With change in the direction of motion, an object can acquire acceleration.

18. A: The solids do not diffuse in air. (1)
R: The particles are loosely packed in solids.

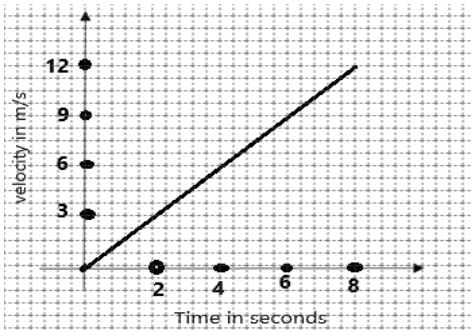
19. A: Apis mellifera, an exotic bee species, is commercially employed in apiaries. (1)
R: Apis mellifera produces a high yield of honey.

20. A: Chromosomes are composed of DNA and proteins. (1)
R: Chromatin material is visible as thread-like structures in non-dividing cells.

SECTION B

21. Explain the characteristics of sound that determine (i) loudness and (ii) pitch. (2)

22. The following graph shows variation of velocity with time of a 2 kg mass. Find the force acting on the mass. (2)



OR

A mass of 4 kg is initially at rest. An acceleration of 1.5 m/s^2 is acting on it for 10 seconds. What will be its momentum after 6 seconds?

23. Write the cations and anions present (if any) in the following compounds: (2)
(a) CH_3COONa (b) NaCl (c) H_2 (d) NH_4NO_3

24. Gallium exists naturally as a mixture of two nonradioactive isotopes, gallium-69 and gallium-71. The proton number of gallium is 31. (2)
(a) How many neutrons are there in gallium-69?
(b) What is the atomic number of gallium-71?

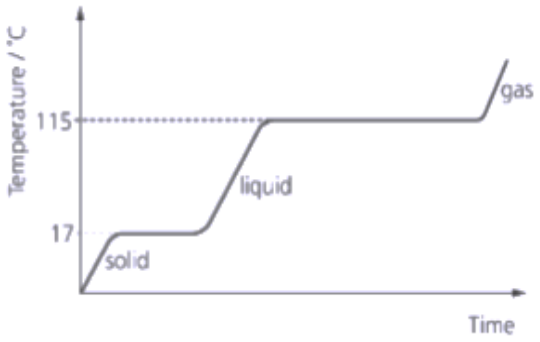
25. Draw a diagram of a plant cell and label the cell parts based on their following functions: (2)
(a) The organelle involved in synthesising complex sugars from inorganic substances.
(b) The fluid content enclosed within the plasma membrane.
(c) The part that provides structural strength to the plant cell.

26. (a) What are neurons? (2)
(b) What are the major locations of neurons in the body?

SECTION C

27. Write the molecular formulae for the following compounds (3)
(a) Copper (II) bromide (b) Aluminium (III) nitrate (c) Calcium (II) phosphate
(d) Iron (III) sulphide (e) Mercury (II) chloride (f) Magnesium (II) acetate

28. Below is a heating curve for a pure substance. It shows how the temperature rises over time, when the substance is heated until it melts, then boils. (3)



(a) What is the melting point of the substance?
(b) What happens to the temperature while the substance changes state?
(c) The graph shows that the substance takes longer to boil than to melt. Suggest a reason for this.
(d) How can you say that the substance is not water?

OR

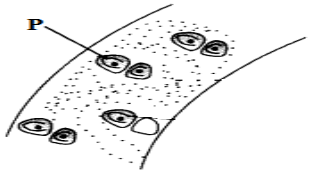
Use the idea of particles to explain why:
(a) solids have a definite shape.
(b) you can't store gases in open containers.
(c) you can't squeeze a sealed plastic syringe that is completely full of water.

29. (a) What is work? Give its SI unit. (3)
(b) A light and a heavy object have the same momentum. Which one has a larger kinetic energy? Show mathematically.

30. (a) State the Newton's law of gravitation. (3)
(b) Two masses A and B, 1000 kg each, are separated by a distance of 10 m. Find the gravitational force acting on B?
(c) What will be the gravitational force acting on A?

31. The area of a (v-t) graph is 25 units and its slope is 2 units where the units are corresponding SI units. (3)
(a) What do the area and the slope of the (v-t) graph represent?
(b) If the initial velocity is 0 m/s, find the final velocity.

32. Observe the figure of a connective tissue given below and answer the following questions based on it. (3)
(a) Identify the tissue and write its location.
(b) What is the composition of the part labelled as P?
(c) How does this tissue differ from the bone based on its flexibility?



33. Three farmers in a village face different challenges in their fields. Mahabir struggles to remove Parthenium from the vegetable farm, and Kalyan notices pests damaging his flowering plants. Meanwhile, Anirudh deals with a plant fungal infection on his fruit farm. Each farmer seeks effective management strategies to ensure healthy harvests. (3)

(a) How does the presence of Parthenium affect Mahabir's vegetable crops?
(b) Mention any two ways, the insects might attack Kalyan's flowering plants.
(c) What specific management strategies can farmers Kalyan and Anirudh implement to protect their crops and ensure a healthy harvest?

SECTION D

34. (a) What does a pure substance mean? (5)
(b) You mix instant coffee with water, to make a cup of coffee. Is the coffee an impurity? Explain.
(c) Explain why melting and boiling points can be used as a way to check purity.
(d) Could there be impurities in a gas? Explain.

OR

Compound	Mass (g) dissolving in 100 g of water at 25 ºC
Silver nitrate	241.3
Calcium nitrate	102.1
Sugar (glucose)	91.0
Potassium nitrate	37.9
Potassium sulphate	12.0
Calcium hydroxide	0.113
Calcium carbonate (chalk)	0.0013
Silver chloride	0.0002

Answer the following questions based on the table given above:
(a) Which substance in it is the most soluble?
(b) How many times more soluble is this substance than potassium sulphate, at 25°C?
(c) The substance in (a) gives a colourless solution. What will you see if you add 300 g of it to 100 g of water at 25°C?
(d) What will you see if you heat up the mixture in (c)? Why?

35. (a) State Newton's second law of motion. Give the expression relating force and acceleration. (5)
(b) A force of 5 N produces an acceleration of 8 ms^{-2} on a mass m_1 and an acceleration of 24 ms^{-2} on a mass m_2. What acceleration would the same force provide if both the masses are tied together?

OR

(a) Define 1 N.
(b) Describe in brief an activity to illustrate the property of inertia of rest.
(c) A bullet of 10 g strikes a sand bag at a speed of 10^3 ms^{-1} and gets embedded after travelling 5 cm. Calculate the time taken by the bullet to come to rest.

36. Explain what happens when the following organelles are removed from a cell: (5)
(a) Nucleus (b) Mitochondria (c) Cell membrane (d) Vacuole (e) Golgi apparatus

OR

Write the scientific reason for the following statements:
(a) Meristematic cells possess a prominent nucleus and dense cytoplasm without vacuoles.
(b) Plants like cacti have thick epidermis.
(c) Parenchyma is called the "living" tissue.
(d) To remove the peel from a coconut is difficult.
(e) Bones are strong and non-flexible.

SECTION E

Questions 37 to 39 are Source-based/Case study-based questions of 4 marks with sub-parts.

37. A wave is a disturbance that moves through a medium when the particles of the medium set neighbouring particles into motion. They in turn produce similar motion in others. The particles of the medium do not move forward themselves, but the disturbance is carried forward. This is what happens during propagation of sound in a medium, hence sound can be visualised as a wave. Sound waves are characterised by the motion of particles in the medium and are called mechanical waves. Sound waves propagate through the medium as compressions and rarefactions. We can describe a sound wave by its frequency, amplitude and speed.

(i) Give the relation between frequency and wavelength of a sound wave. (1)

(ii) Write the speeds of sound in air (v_a), water (v_w) and steel (v_s), in increasing order of their magnitudes. (1)

(iii) A person has a hearing range from 20 Hz to 20 kHz. What are the typical wavelengths of sound waves in air corresponding to these two frequencies? Take the speed of sound in air as 344 m s^{-1}. (2)

OR

(iii) Draw a diagram to show production of compressions and rarefactions in air near a source of sound.

38. Study the table given below and answer the following questions.

Particle	Electrons	Protons	Neutrons
A	12	12	12
B	12	12	14
C	10	12	12
D	10	8	8
E	9	9	10

(i) Which particle is a positive ion? What is the charge on this ion? (1)

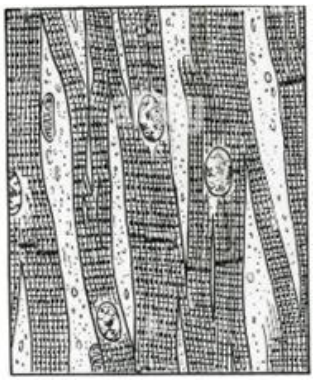
(ii) Which particle is a negative ion? What is the charge on this ion? (1)

(iii) Which three particles are neutral atoms and why? (2)

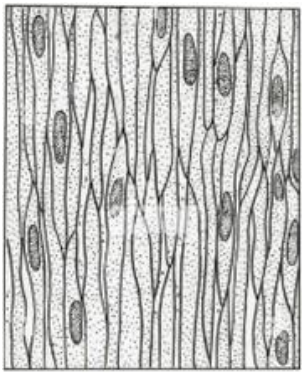
OR

(iii) Which two particles are isotopes and why?

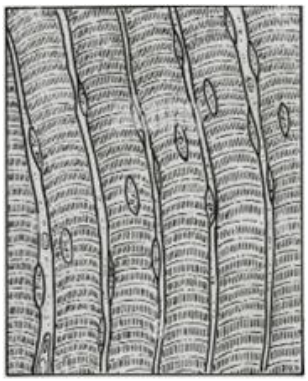
39. While preparing for a practical exam, a student reviewed slides A, B and C of muscle tissues under a microscope. Observe the slides given below and answer the following questions:



A



B



C

(i) Identify slides A, B and C and mention one of their common features. (1)

(ii) Which type of muscle is responsible for the functioning of the heart, and how does its structure support this function? (1)

(iii) Explain the significance of striations in muscles. (2)

OR

(iii) Name the muscle essential for the peristaltic movements in the stomach and intestine. Mention any one distinguishing feature of the cells of this type of muscle.