Subject: Science   M.M: 80
Date   : 02/01/2020   Time: 3 Hours

General Instructions:
1. The question paper comprises three sections – A, B and C. Attempt all the sections.
2. All questions are compulsory.
3. Internal choice is given in each section.
4. All questions in Section A are one-mark questions comprising MCQ, VSA type and assertion-reason type questions. They are to be answered in one word or in one sentence.
5. All questions in Section B are three-mark, short-answer type questions. These are to be answered in about 50 - 60 words each.
6. All questions in Section C are five-mark, long-answer type questions. These are to be answered in about 80 – 90 words each.
7. This question paper consists of a total of 30 questions.

SECTION A

1. Why does the temperature of a substance remain constant during its melting or boiling?   (1)

2. What are polyatomic ions? Give one example.   (1)

3. Answer question numbers 3(a) - 3(d) on the basis of your understanding of the following paragraph and the related concepts studied.

    A truck at rest does not require any attention when parked along a roadside. But a moving truck, even at speeds as low as $5ms^{-1}$, may kill a person standing in its path. A small mass, such as a bullet may kill a person when fired from a gun.These observations suggest that the impact produced by the objects depends on a quantity called momentum.This quantity was introduced by Newton.

    Let us consider a situation in which a car with a dead battery is to be pushed along a straight road to give it a speed of $1ms^{-1}$, which is sufficient to start its engine. If one or two persons give a sudden push to it, it hardly starts. But a continuous push over some time results in a gradual acceleration of the car to this speed. It means that the change of momentum of the car is not only determined by the magnitude of the force but also by the time during which the force is exerted. If the force is zero, v = u for whatever time t is taken. This means that the object will be moving with uniform velocity.

    (a) Define momentum.   (1)
    (b) How do you relate force and momentum?   (1)
    (c) Express Newton's first law of motion using second law of motion.   (1)
    (d) Draw velocity-time graph and displacement-time graph for uniform motion.   (1)

4. The solubility of salts P, Q, R and S (in grams per 100 g of of solvent) at certain temperature as determined are shown below:

Salt	Temperature in K				
	283	293	313	333	353
P	23	32	62	106	167
Q	36	36	36	37	37
R	35	35	40	46	54
S	24	37	41	55	66

    (a) What mass of P would be needed to produce a saturation solution of P in 50g of water at   (1)
    313 K?
    (b) What would be observed as the solution cools?   (1)

(c) Which of the Following salts has the highest solubility in water at 293 K?   (1)
     i) P   ii) Q
     iii) R   iv) S

(d) What is the effect of change of temperature on the solubility of a salt.   (1)
     i) decreases   ii) remains constant
     iii) increases   iv) first increases and then decreases

5. A train passes over a 400m long bridge. If the speed of the train is $30 ms^{-1}$ and train takes 20s to cross the bridge, find the lengthof the train.   (1)
     i) 400m   ii) 200m
     iii) 800m   iv) 600m

OR

An object moves with a constant velocity of $9.8 ms^{-1}$, its acceleration, in ms^{-2} is,
     i) 0   ii) 4.9
     iii) 9.8   iv) 32

6. The wave in which the particles of the medium vibrate in the same direction as the wave propagate is   (1)
     i) Matter wave   ii) Longitudinal wave
     iii) Transverse wave   iv) Electromagnetic wave

7. The weight of a body in tap water and salted water are W_A and W_B respectively, then,   (1)
     i) $W_A = W_B$ ii) $W_A < W_B$
     iii) $W_A > W_B$ iv) $W_B = 2W_A$

8. The locomotory organs of Echinodermata are: (1)
     i) Tube feet   ii) Muscular feet
     iii) Jointed legs   iv) Parapodia

OR

In Taxonomic hierarchy Family comes between
     i) Class and Order   ii) Order and Genus
     iii) Genus and Species   iv) Division and Class

9. Identify a member of Porifera.   (1)
     i) Spongilla   ii) Euglena
     iii) Penicillium   iv) Hydra

10. Which of the following is not a viral disease?   (1)
     i) Dengue   ii) AIDS
     iii) Typhoid   iv) Influenza

11. Which of the following can make you ill if you come in contact with an infected person?   (1)
     i) Deficiency disorder   ii) Chicken pox
     iii) Genetic disorder   iv) Blood cancer

12. Which of the following has maximum number of atoms?   (1)
[Atomic mass of C=12u, O=16u, H=1u]
i) 18 g of H_2O ii) 18 g of O_2 iii)18 g of CO_2 iv)18 g of CH_4

OR

Which of the following correctly represents 360 g of water?
i) 2 moles of water   ii) 20 moles of water
iii) 6.022×10^{23} molecules of water   iv) 1.2044×10^{25} molecules of water

For question numbers 13 and 14, two statements are given- one labeled Assertion (A) and the other labeled Reason (R). Select the correct answer to these questions from the codes (i), (ii), (iii) and (iv) as given below
i) Both A and R are true and R is correct explanation of the assertion.
ii) Both A and R are true but R is not the correct explanation of the assertion.
iii) A is true but R is false.
iv) A is false but R is true.

13. Assertion: The concept of formula mass is used for ionic compounds.   (1)
    Reason: For ionic compounds there is no discrete individual molecule.

14. Assertion: Light is a transverse wave.   (1)
    Reason: For light, the oscillations are of the medium particles or their pressure or density. So, it
               is mechanical wave.

SECTION B

15. (a) List any two properties that liquids have in common with gases.   (3)
    (b) Give two reasons to justify that an Iron almirah is a solid at room temperature.
    (c) Explain why water droplets appear on the outer surface of a tumbler containing ice cold water.

16. (a) What is the molar mass of C_2H_5OH ?   (3)
    (b) Write the chemical formula of Sodium carbonate and Aluminium bromide.
    (c) Which postulate of Dalton,s atomic theory is the result of the law of constant proportion?
        [Atomic mass of C=12u, O=16u, H=1u]
                                        OR
    (a) Give one example each of diatomic and tetra atomic elements.
    (b) State the number of atoms present in each of the following chemical species:
        (i) CO_3^{2-} (ii) P_2O_5
    (c) If chemical formula of potassium sulphate is K_2SO_4. What is the valency of K and what will be
        the chemical formula of Zinc sulphate?

17. Wet cloths dry up. Similarly when we spill water on the floor it dries up after some time. In both   (3)
    cases change of state from liquid to gas takes place without reaching the boiling point.
    (a) What is this phenomenon called?
    (b) Explain how the change occurs at temperature lower than its boiling point.
    (c) Mention any two factors which determine the rate at which change of state from water to water
        vapour occurs at room temperature.

18. After monsoon, a blue green layer was developed on moist soil on road side. Deepak collected this   (3)
    upper slippery layer to his Biology teacher, who helped him to identify it under the microscope.
    (a) Which group of organisms is responsible for this?
    (b) How can a farmer use this in his field?
    (c) Name an organism belonging to this group.

19. Distinguish between the following: (3)
    (a) Monera and Protista in the basis of nuclei.
    (b) Fungi and Plantae on the basis of mode of nutrition.
    (c) Gymnosperms and Angiosperms on the basis of fruits.

20. (a) Why is immune system essential to maintain good health?   (3)
    (b) What is antivenom? How is it different from vaccine?
    (c) Why is AIDS considered as a "syndrome"?

21. (a) Name the viral disease which generally affects the children causing paralysis of limbs.   (3)
    (b) Name the program which was launched globally in 1995 with an aim to iradicate a viral
         disease from the world.
    (c) Name a disease thus iradicated from the world.

22. (a) Define kinetic energy.   (3)
    (b) Derive an expression for kinetic energy of an object.

23. Give reason: (3)
    (a) Ship sinks a little when it enters river from sea.
    (b) The dam of water reservoir is broader at the bottom.
    (c) It is easier to lift a rock under water.

24. On a 60 km track, a train travels the first 30 km at an uniform speed of 30 km/h. How fast must the train travel the next 30 km so as to average 50 km/h for the entire trip? (3)

OR

The distance S travelled by a particle at times t are as shown in the following table:

S (m)	0	1	4	9	15	21	27	33
t (s)	0	1	2	3	4	5	6	7

Draw the distance-time graph corresponding to these values and from this graph determine the speed of the particle in the time interval t = 3 s and t = 7 s.

SECTION C

25. (a) State the law of conservation of mass. In a chemical reaction 4.2 g of sodium hydrogen carbonate reacted with 3.0 g of ethanoic acid. The product formed were 4.1 g of sodium ethanoate, 0.9 g of water and 2.2g of CO_2. Show that data is in agreement with law of conservation of mass. (5)
    (b) Convert 150 g of $CaCO_3$ into mole.
    (c) How many molecules are present in 9 g of water?
    (d) What is the mass of one atom of hydrogen?
        (given that Ca= 40u, C= 12 u, O= 16 u, H = 1u)

OR

    (a) What is the unit of relative atomic mass?
    (b) Calculate the mass of O_2 molecule which contains same number of molecules as 1.4 g of nitrogen.(At. Mass of O=16u, N=14 u)
    (c) 1.16g sodium chloride should react with how much silver nitrate to form 1.7g to form sodium nitrate and 2.87g silver chloride?
    (c) Calculate the percentage of carbon in a carbon dioxide.

26. (a) Reeta's mother mixed oil and water in kitchen by mistake. Reeta told her that she can separate the mixture. Name the technique used by Reeta. Draw the labelled diagram and write the principle involved in this technique. (5)
    (b) Convert the following temperatures int to the celsius scale :
        i) 293 K   ii) 470 K

27. Define the terms and give one example for each. (5)
    (a) Bilateral symmetry   (b) Coelom   (c) Triploblastic   (d) Eukaryotic   (e) Nomenclature

28. Which are the two ways of prevention of infectious diseases? Explain both in detail. (5)

OR

Which are the two treatment approaches commonly undertaken? Explain both using examples.

29. (a) State the law of conservation of energy. (5)
    (b) Illustrate the law of conservation of energy by discussing the energy changes which occur when an object of mass, m is made to fall freely from a height, h.
    (c) Relate 1kWh = 3.6×10^6 J

30. (a) State Newton's law of gravitation. (5)
    (b) Write any two points of differences between 'G' and 'g'.
    (c) Write the importance of Universal law of gravitation. (any two)

OR

    (a) Prove that acceleration due to gravity does not depend on the mass of the object.
    (b) Explain the variation of 'g' with latitude and altitude.
    (c) Differentiate between mass and weight. (any two)