

Class: 9
Subject: Science
Topic: OASK1509SA201
No. of Questions: 41

Time: 3 hours

M.M.: 80

General Instructions:

1. The question paper comprises of two sections, A and B, you are to attempt both the sections.
2. All questions are compulsory.
3. There is no overall choice. However, internal choice has been provided in all the three questions of five marks category. Only one option in such questions is to be attempted.
4. All questions of section A and all question of section B are to be attempted separately.
5. Question numbers 1 to 4 in section A are one mark question. These are to be answered in one word or one sentence.
6. Question numbers 5 to 13 are two marks questions, to be answered in about 30 words.
7. Question numbers 14 to 22 are three marks questions, to be answered in about 50 words.
8. Question numbers 23 to 25 are five marks questions, to be answered in about 70 marks.
9. Question numbers 26 to 41 in section B are multiple choice question are based on practical skills. Each question is a one mark question. You are to choose one most appropriate response out of the four provided to you.

SECTION – A

- Q1. Give one example where kinetic energy is transferred from one object to other.
- Sol. In the game of billiards, the player provides the kinetic energy to the cue ball by striking it with the cue stick. If the cue ball collides with another ball, it will slow down dramatically and the ball it collided with gain speed as the kinetic energy is transferred on to it.
- Q2. A battery lights a bulb. Suggest the possible energy changes involved in the lighting process.
- Sol. Chemical energy of battery → Electrical energy → Light energy + Heat energy
- Q3. What are the different states in which water is found during the water cycle?
- Sol. The different states in which water is found during the water cycle are liquid (water), gas (water vapour) and solid (snow).

Q4. List any two human activities that lead to an increase in the carbon dioxide content of air.

Sol.

- (a) Combustion of wood.
- (b) Deforestation.
- (c) Respiration

Q5. Flash and thunder are produced simultaneously. But thunder is heard a few seconds after the flash is seen, why? How does the speed of sound in air vary with rise in density of the medium?

Sol. In lightning process, flash and thunder are produced simultaneously. Flash is seen almost immediately seconds later because speed of sound \ll speed of light. Speed of light increases with the increases in density of the medium.

Q6. The volume of 50 g of a substance is 20 cm. If the density of water is 1g/cm, will the substance float or sink?

Sol. Density of water $\rho_w = 1 \text{ g cm}^{-3}$
Mass of substance $m = 50 \text{ g}$
Volume of substance $V = 20 \text{ cm}^3$
 \therefore Density of substance $\rho_s = m/V = 50\text{g}/20 \text{ cm}^3 = 2.5 \text{ g cm}^{-3}$
At the density of the substance is greater than that of water, the given substance will sink in water

Q7. What are polyatomic ions? Give any two examples.

Sol. A group of atoms carrying a positive or a negative charge are called polyatomic ions.
Examples: (NH_4^+) , (CO_3^{2-})

Q8. Archimedes could find the purity of a king's crown using buoyancy, How?

Sol. The crown made of impure gold would displace more water than it would actually have, had it been made out of pure gold for the same volume.
The increase in the volume of the water displaced indicates the presence of impurities in the gold crown.

Q9.

- (a) If an element M has mass number 27 and atomic number 13, how many neutrons does its atom contain?
- (b) Define Avogadro's constant. Give its value.

Sol.

- (a) Atomic number = number of protons = 13
Mass number = number of protons + number of neutrons
 \therefore Number of neutrons = mass number – number of protons
 $= 27 - 13 = 14$
- (b) Avogadro constant is the actual number of particles (atoms, molecules or ions) present in 1 mole of any substance.
Its value is 6.022×10^{23} .

Q10.

- (a) Name any two green house gases.
(b) What causes global warming?

Sol.

- (a) Carbon dioxide (CO_2), methane (CH_4), ozone (O_3) and water vapour (H_2O) green house gases.
(b) The greenhouse gases do not allow heat rays to escape from the earth resulting in an increase of temperature of earth. Hence, green house gases cause global warming.

Q11. Give two examples each of biodegradable and non-biodegradable pollutants.

Sol. Biodegradable pollutants-cow dung and paper Non-biodegradable pollutants-polythene, plastic and DDT

Q12. Write two points of difference between gymnosperms and angiosperms.

Sol.

Gymnosperms		Angiosperms	
(i)	The seeds are naked.	(i)	The seeds are enclosed by fruit wall.
(ii)	The microspores and megaspores are produced by male and female cones.	(ii)	The microspores are produced in anthers while the megaspore are produced in ovules of the ovary in

Q13. List any two characteristics of division Pteridophyta that shows they are the most advanced cryptogams.

Sol.

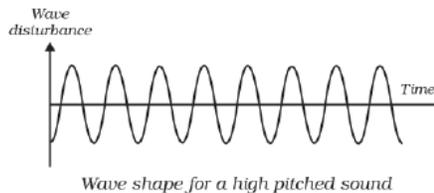
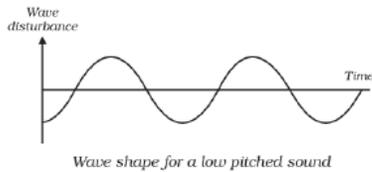
- (i) Plant body is thallus like. It is not differentiated into root, stem and leaves.
(ii) No vascular tissue is found.
(iii) Water is essential for reproduction.

- (iv) It includes algae, fungi and lichens.

Q14.

- (a) Draw a diagram depicting low pitched sound and high pitched sound.
(b) When a person uses deodorant spray, the other person standing at a distance would hear the sound of spraying first and the fragrance of spray would reach him later. Why so?

Sol.



The sound of spraying deodorant travels through the vibration of air layers so it reaches first. But the fragrance of deodorant reaches the other person through actual movement of air particles, therefore, takes more time.

Q15.

- (a) How do you define mechanical work?
(b) Name and define SI unit of work?
(c) What do you mean by positive and negative work? Give example.

Sol.

- (a) Work done on an object is defined as the magnitude of the force acting on the object multiplied by the distance moved by the object in the direction of the applied force.
 \therefore Work (W) = constant force applied (F) x displacement along the direction of force (S).
(b) SI unit of work is 1 joule (1J or 1Nm). Work is said to be 1 joule if under the influence of a force of 1N the object moves through a distance of 1m along the direction of applied force.
(c) Work is considered positive if the displacement of the object is along the direction of force applied. On the other hand, work is taken as negative if the displacement of the object is in the direction of force applied.

As an example, work done by a man is taken positive when he moves from ground floor to second floor of his house. But work done by the same man is negative when he is descending from second floor of house to ground floor.

Q16. Explain the working and application of a SONAR.

Sol. SONAR system consists of a transmitter and a detector and is installed on a ship or motorboat. The transmitter produced and transmits ultrasonic waves. These waves travel through water and strike the object under water on the sea bed. The object reflects these waves and are sensed by the detector. The detector converts the ultrasonic waves into electrical signals. If d be the depth of the said object and v be the velocity of the ultrasonic waves in water, then the time interval between transmission and reception of ultrasonic waves will be

$$t = 2d/v$$

By knowing the time t we can find the value of d .

SONAR technique is used to determine the depth of the sea and to locate underwater hills, valleys etc.

Q17. State any three postulates of Dalton's atomic theory.

Sol.

- (i) The postulates of Dalton's atomic theory are:
- (ii) Atoms are indivisible particles which can neither be created nor destroyed.
- (iii) Atoms of an element are identical in mass and chemical properties.
- (iv) Atoms of different elements differ in masses and chemical properties.
- (v) Atoms combine in simple whole number ratio to form compounds.

Q18. Calculate the number of molecules of sulphur present in 16 g of solid sulphur.

Sol.

(a) Molecular mass of $S_8 = 8 \times$ Atomic mass of sulphur $= 8 \times 32 = 256$ g
256 g of sulphur (S_8) = 1 mole
 \therefore 16 g of solid sulphur $= \frac{1 \times 16}{256} = \frac{1}{16}$ mole.

By Avogadro number, we know that

1 mole of sulphur (S_8) contains $= 6.022 \times 10^{23}$

$\therefore \frac{1}{16}$ mole of sulphur (S_8) contains $= 6.022 \times 10^{23} \times \frac{1}{16}$ molecules.

Hence, 16 g of solid sulphur has $0.376 \times 10^{23} = 3.76 \times 10^{22}$ molecules.

Q19. Give two examples of each of the following:

- (a) Diseases which spread through air.
- (b) Diseases which spread through water.
- (c) Diseases which spread through insect.

Sol.

- (i) Common cold and tuberculosis.
- (ii) Jaundice and typhoid.
- (iii) Malaria and dengue fever.

Q20. What precautions can you take in your school to reduce the incidence of infectious diseases? Mention any three points.

Sol.

- (i) Prevent water logging to avoid mosquito breeding.
- (ii) Provision of safe drinking water.
- (iii) Periodic cleaning of toilets.

Q21. List any two benefits of classification. Why bryophytes and pteridophytes grow in moist and shady places?

Sol.

- (a)
 - (i) It makes study of organisms easy.
 - (ii) It gives inter-relationship amongst different groups of animal.
 - (iii) It gives us an idea about existing life forms.
 - (iv) Classification is the base for development of other branches of biological science.
- (b) Bryophytes and pteridophytes grow in moist and shady places because they required water for fertilization.

Q22. Explain, how HIV-AIDS virus affects and damages our body? What is an antibiotic?

Sol.

- (i) In HIV infection, the virus goes to the immune system and damages its function by attacking cells of immune system (T-cells). Gradual decreases in their number weakens our immune system. Our body can then no longer fight off the many minor infections that we face every day. Instead, every small cold can become pneumonia; minor gut infection can produce major diarrhea with blood loss. Ultimately, these other infections kill the people suffering from HIV-AIDS.
- (ii) Antibiotic are chemical substances obtained from some microbes such as bacteria and fungi, which stop the growth of specific kinds of microbes.

Q23.

- (a) State the law of conservation of energy.
- (b) Name the type of energy possessed by the following:
 - (i) Stretched slinky
 - (ii) A speeding car
 - (iii) Flowing water

- (iv) Stretched rubber band.
- (c) An object of mass 50 kg is raised to a height of 600 cm above the ground. What is its potential energy? ($g = 10 \text{ m/s}$)

Sol.

- (a) According to the law of conservation of energy, we can neither create nor destroy energy. Energy may only be transformed from one form to another such that total energy before and after the transformation remains exactly the same.
- (b)
- (i) A stretched slinky possesses potential energy on account of change in its configuration.
 - (ii) A speeding car possesses kinetic energy due to its state of motion.
 - (iii) Flowing water possesses kinetic energy.
 - (iv) A stretched rubber band possesses potential energy due to change in its configuration.
- (c) Here mass of object $m = 50 \text{ kg}$
Acceleration due to gravity $g = 10 \text{ m s}^{-2}$
Height to which object is raised $h = 600 \text{ cm} = 6 \text{ m}$
 \therefore Potential energy of the object $E_p = mgh$
 $= 50 \times 10 \times 6$
 $= 3000 \text{ J}$

OR

- (a) Define kinetic energy. Give examples.
- (b) Obtain an expression for the kinetic energy of an object of mass 'm' and possessing a velocity 'V'.

Sol.

- (a) Kinetic energy of an object is the energy possessed by it by virtue of its state of motion. A speeding vehicle, a rolling stone, a flying aircraft, flowing water, blowing wind, a running athlete possess kinetic energy,
- (b) Consider an object of mass m in a state of motion with an initial velocity u. Let now a constant force F acts on it and displaces the body through a distance S in the direction of force applied.

$$\therefore \text{Work done on the object } W = Fs$$

Due to the work done on the body a change in velocity takes place. Let velocity of the object changes from u to v. Let a be the acceleration produced.

Then according to the equation of motion

$$v^2 - u^2 = 2as$$

$$\Rightarrow \frac{v^2 - u^2}{2a}$$

Again according to second law of motion, we have $F = ma$

$$\text{Work done on the object } W = Fs = (ma) \left(\frac{v^2 - u^2}{2a} \right) = \frac{1}{2} m (v^2 - u^2),$$

If the object started from rest, then $u = 0$ and hence

$$W = \frac{1}{2} mv^2$$

Obviously the work done on the object is equal to the kinetic energy imparted to the object. Thus, the kinetic energy possessed by an object of mass moving with a uniform velocity u is given by

$$E_k = \frac{1}{2} mv^2$$

Q24.

- (a) Chlorine occurs in nature in two isotopic forms with masses 35 u and 37 u in the ratio of 3: 1 Calculate the average atomic mass of chlorine atom on the basis of this data.
 (b) Give any three uses of three isotopes.

Sol.

- (a) The isotopes of chlorine are in the ration 3:1. It means that the two isotopes are 75% and 25% respectively.

$$\begin{aligned} \text{Average atomic mass of cholorine} &= \frac{35 \times 75}{100} + \frac{37 \times 25}{100} \\ &= \frac{105}{4} + \frac{37}{4} \\ &= \frac{142}{4} = 35.5 \text{ u} \end{aligned}$$

- (b) Three uses of isotopes:
 (i) An isotope of cobalt is used in the treatment of cancer.
 (ii) An isotope of iodine is used in the treatment of goiter.
 (iii) An isotope of uranium is used as a fuel in unclear reactors.
 (iv)

OR

- (a) Write three points of difference between isotopes and isobars.
 (b) Describe Bohr's model of the atom?

Sol.

(a)

Isotopes	Isobars
1. Atoms of the same element having same atomic number but different mass number.	1. Atoms of different elements having different atomic number but same mass number.
2. They have same chemical properties but different physical properties.	2. They possess different physical and chemical properties.
3. Example - ${}^1_1\text{H}$ and ${}^2_1\text{H}$	3. Example - ${}^{40}_{20}\text{Ca}$ and ${}^{40}_{18}\text{Ar}$

(b) Bohr's model of atom

- (i) Only certain special orbits known as discrete orbits of electrons, are allowed inside the atom. Electrons revolve around the nucleus in discrete orbits or stationary states.
 (ii) These orbits or shells are called energy levels. The energy levels are numbered as 1, 2, 3, 4, etc. The energy levels can also be represented by the letters K, L, M, N, etc.

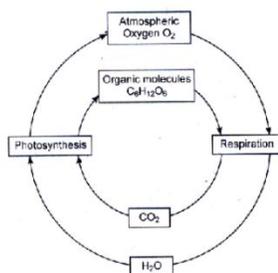
- (iii) While revolving in discrete orbits, the electrons do not radiate energy.
- (iv) So long as an electron revolves in a particular orbits, it neither emits nor absorbs energy.

Q25.

- (a) Describe with diagram the oxygen cycle operating in nature.
- (b) How depletion of ozone layer takes place?

Sol.

- (a) Oxygen-cycle: Oxygen from the atmosphere is used up in combustion, respiration and in the formation of oxides of nitrogen. It is returned to the atmosphere through photosynthesis.



- (b) Chlorofluorocarbons used as solvents, refrigerants, propellants and blowing agents for plastic foams are stable and persist in atmosphere for years. These enter the upper layers of atmosphere where UV radiation causes CFCs to dissociate the ozone into oxygen.

OR

- (a) Define the following terms:
 - (i) Ammonification
 - (ii) Nitrification
 - (iii) Denitrification
- (b) State any two applications of green house effect.

Sol.

- (a)
 - (i) Ammonification is defined as the conversion of organic material of plants and animals into ammonia and amino acids by microorganisms.
 - (ii) Nitrification is defined as the conversion of ammonia into nitrates by microorganisms.
 - (iii) Denitrification is defined as the conversion of nitrate into ammonia and free nitrogen by microorganism.

- (b) Application of green house effect:
- (i) In cold climatic conditions, vegetables and plants are grown in glass house to protect them from cold.
 - (ii) It is useful in increasing temperature in black box of solar cookers by covering it with plain glass sheet.

SECTION – B

- Q26. The least count of a spring balance is 1 g wt. When it is suspended freely without any weight attached to the hook, the pointer is just in front of second small division on the scale. The zero error is
- (a) – 2 g wt
 - (b) + 2 g wt
 - (c) Zero
 - (d) +1 g wt

Sol. (b)

- Q27. A student noted down the following observation in his note book:
- (i) Weight of the stone in air = 272 g wt
 - (ii) Weight of the stone in water = 192 g wt
 - (iii) Weight of the stone in salty water = 176 g wt

- (a) 11/12
- (b) 11/17
- (c) 13/17
- (d) 6/5

Sol. (d)

- Q28. A student lowers a body in a liquid filled in a container. He find that there is a maximum apparent in weight of the body when
- (a) It just touches the surface of the liquid.
 - (b) It is completely immersed in the liquid.
 - (c) It is partially immersed in the liquid.
 - (d) It is partially immersed and also touches the sides of the container.

Sol. (b)

- Q29. An object exerts a force F on a surface of surface area A. The pressure P acting on the surface is given by
- (a) $P = F/A$
 - (b) $P = A/F$
 - (c) $P = FA$
 - (d) $P = F/A^2$

Sol. (a)

- Q30. In the experiment of verification of reflection of sound, the incident sound is directed along
- (a) Axis of tube.
 - (b) Normal to the axis of the tube.
 - (c) At an angle of 30 from the axis of the tube.
 - (d) At an angle of 45 from the axis of the tube.

Sol. (a)

- Q31. A student while verifying laws of reflection of sound measure the angle between the incident sound wave and reflected sound wave as 110° . The angle of reflection is
- (a) 110
 - (b) 55
 - (c) 27
 - (d) 0

Sol. (b)

- Q32. On which of the following factors does the speed of propagation of a pulse in a slinky not depend upon?
- (a) Dimensions of slinky
 - (b) Material of slinky
 - (c) Room temperature
 - (d) Length of the slinky

Sol. (d)

- Q33. Reverberation produced in large auditoriums is due to:
- (a) Reflection of sound by windows.
 - (b) Absorption of sound by walls.
 - (c) Reflection of sound by walls and ceiling.
 - (d) Absorption of sound by floor.

Sol. (c)

- Q34. During the experiment on measurement of loss in weight of solid in tap water and salty solution, the maximum loss in the weight of the body is observed when
- (a) It touches the surface of the liquid
 - (b) It is completely immersed in the liquid
 - (c) It is partially immersed in the liquid
 - (d) No difference in loss in weight in above three cases.

Sol. (b)

- Q35. Skin is kept moist in earthworms. It helps in
- (a) Locomotion
 - (b) Respiration
 - (c) Protection
 - (d) Both (a) and (b)

Sol. (b)

- Q36. The feature that places them in the same phylum is:
- (a) Pointed head
 - (b) Bulky thorax
 - (c) Presence of scales
 - (d) Post anal tail



Sol. (d)

- Q37. In the figure of an earthworm given below, the horizontal lines, throughout the body represent:



- (a) Cells of the body.
- (b) Cells walls separating the cells of the body.
- (c) Vertically arranged muscles of the body.
- (d) Septa separating segments of the body.

Sol. (d)

- Q38. If we want to determine the volume of a solid by immersing it in water, the solid should be
- (a) Lighter than water
 - (b) Heavier than water
 - (c) Insoluble in water
 - (d) Heavier than water and insoluble in it

Sol. (d)

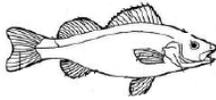
Q39. Rajive found out the role of spiracle in a cockroach as:

- (a) Excretion
- (b) Circulation
- (c) Respiration
- (d) Movement

Sol. (c)

Q40. Which animal belongs to phylum Arthropoda?

(a)



(b)



(c)



(d)



- (a) A
- (b) B
- (c) C
- (d) D

Sol. (d)

- Q40. A specimen of a fish was given to students to identify the external visible chordate feature in it.
The student would look for:
- (a) Operculum
 - (b) Notochord
 - (c) Dorsal tubular nerve cord
 - (d) Post anal tail

Sol. (d)

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