Sample Question Paper SCIENCE (THEORY)-IX

SECTION -A

1. State the relation between commercial unit of energy and joules.

2. How much work is done on a body of mass 1kg whirling on a circular path of radius 5m?

3. Name the man made component which is responsible for the depletion of ozone layer.

4. Mention one method by which living organisms influence the formation of soil.

5. Differentiate between transverse and longitudinal waves and give one example of each.

6. A body is floating on the surface of a liquid. With the help of a diagram show the two forces acting on it that are responsible for its floatation. State the relationship between these two forces in this case.

7. What is relative density?

    If an object is immersed wholly in a liquid causing upthrust equal to the weight of the body then what will be the relation between the relative densities of liquid and the object ?

8. List two ways in which water is useful to living organisms.

9. a) Mention any two human activities which would be responsible for air pollution.

    b) How is Earth's atmosphere different from that of Venus and mars?

10. The following data represents the distribution of electrons, protons and neutrons in atoms of four elements A,B,C,D.

Element	Protons	Neutrons	Electrons
A	19	21	19
B	17	18	17
C	17	20	17
D	18	22	18

Answer the following questions:-

(i) Describe the electronic distribution in atom of element B.

(ii) Is elements B a metal or a non-metal? Why?

(iii) Which two elements form a pair of ISOTOPES ?

(iv) Which two elements form a pair of ISOBARS?

11. a) Write chemical formula of Aluminium Sulphate.

b) Give example each of a diatomic & tetratomic element molecule.

12. What is symbiosis ? Name a symbiotic life form. Mention the specific organisms which display the symbiotic relationship in this life form.

13. a) Identify two features possessed by all Chordates.

b) In which class would you place any organism which has:-

(i) a scaly exoskeleton and a bony endoskeleton

(ii) a scaly exoskeleton and lay eggs outside water.

14. A source of sound produces 20 compressions and 20 rarefactions in 0.2 seconds. The distance between a compression and the next (consecutive) rarefaction is 50cm. Find the wavelength, frequency and time period of the wave.

15. (i) Define 1 joule of work.

(ii) In a tug of war team A wins and team B loses. Which of these teams does

(a) Positive work   (b) Negative work

Give reasons for your answer.

16. What is an Echo? State two conditions for echo to be heard. Bats cannot see still they catch their prey. Explain.

17. a) State the law of constant Proportion.

b) Taking the example of water explain the law of Constant Proportion.

c) Which postulate of Dalton's Atomic Theory explains this law ?

18. A flask contains 4.4g of CO_2 gas. Calculate

a) How many moles of CO_2 gas does it contain?

b) How many molecules of CO_2 gas are present in the sample.

c) How many atoms of oxygen are present in the given sample.

[Atomic mass of C=12u, O=16u]

19. a) It was diagnosed that Preeti suffers from Japanese encephalitis, which organ of Preeti's body is effected ?

b) How are antibiotics effective in the treatment of some diseases ?

c) Will they help in curing Preeti's disease ? Why ?

20. a) Discuss briefly the principle of immunization.

b) Mention any two diseases that can be prevented by immunization.

21. Discuss with the help of suitable examples three ways in which microorganisms can find entry into human body.

22. Pick the odd one out and justify your choice by giving reasons.

    i) Riceia, Marsilea, Marchantia & Funaria

    ii) Crocodile, Salamander, Sparrow and bat.

23. Explain 'potential energy' in your own words and give an example of it. State the S.I. unit of potential energy. Derive an expression for potential energy of an object of mass 'm' that has been raised to a height 'h' from the ground

    A body of mass 20kg is lifted up by 10 meters. Calculate its potential energy. If this body is allowed to fall, find its kinetic energy just before it touches the ground. (take g = 10m/s^2)

OR

Define 'Power' of a body.

State and define the S.I. unit of Power. Two children A and B both weighing 32kg start climbing up a rope separately reach a height of 8m, 'A' takes 15s and 'B' takes 20s to reach that level. Calculate the amount of work done by A and B. Which of the two has more power. Show by calculation. [g = 10m/s^2]

24. a) Illustrate Rutherford's experiment to explain the model of an atom.

    b) Atomic number of an element is 17. Identify the element, write its electronic configuration & mention its valency.
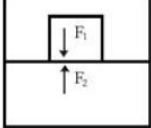
OR

Illustrate postulates of Neils Bohr to explain model of an atom. Identify the element, write

electronic configuration and number of neutrons present in the atom represented by $^{27}_{13}$ X

25. With the help of a labelled diagram, show

    a) Nitrogen cycle in nature

    b) Describe briefly any two processes involved in the cycling of N_2 in the environment.

OR

With the help of a labelled diagram show the cycling of carbon in nature. What are the two ways in which carbon-di-oxide is fixed in the environment.

Solution

1. kilowatt hour   ½
    1 kilowatt hour = 3.6 X 10⁶ joules   ½

2. Zero   1

3. CFC (chloro fluoro carbon)   1

4. Roots of big trees go into cracks, widen them and finaly break the rocks/Lichens release
    some substances causing powdering of rock surface.   1

5. Transverse waves are the waves in which particles of the medium vibrate at right angles to
    the direction of propagation of wave.   ½

    example : water waves/waves set up in a rope whose one end is fixed and the other is jerked
    or any other appropriate example.   ½

    whereas,

    Longitudinal waves are those waves in which particles of the medium vibrate in the same
    direction as that of the wave.   ½

    example :- Compressed spring or any other appropriate example   ½

6.

    F_1 - weight of the body   1
    F_2 - buoyant force of the liquid

    $F_1 < F_2$ 1

7. Relative density of a substance is the ratio of density of the substance to that of water/

    Relative density = density of substance
    _____
                 Density of water   1

    Relative densities will be the same   1

8. i)   All cellular processes take place in water medium. The reactions that take place within
         our body in cells occur between substances that are dissolved in water.   1

    ii) Water is a very good solvent. Substances are also transported from one part of the
         body to the other in dissolved form.   1

9.(a) i) Increased use of vehicles run by fossil fuels increases the gaseous air pollutants ½

	ii)	Factory outlets, low efficiency engines throw exhaust gases in the air.	½
	(b)	In Earth's atmosphere CO_2 is 0.03% and in Mars and Venus it is 95-97%	1

10.

                K   L   M

i) $_{17}B$ –   2   8   7

ii)   Non metal, it is short of one electron to complete the octet.

iii)   B and C

iv)   A and D   ½ x 4

11.   a)   Aluminium sulphate   1

$Al^{3} \times SO_4^{2} \Rightarrow Al_2(SO_4)_3$ 1

    b)   Diatomic element molecule – $O_2 / H_2 / N_2$ ½

           Tetratomic element molecule – P_4 ½

12.   Symbiosis refers to association between two organisms which benefit mutually   1
      from each other / Lichens / Algae and fungi   ½ ½

13.   a)   Presence of notochord / dorsal nerve chord / paired gill pouches / have

          a bilaterally symmetrical body / are triploblastic / are coelomate. (any two) $\frac{1}{2}, \frac{1}{2}$

    b)   i)   Class pisces   ½

           ii)   Class Reptilia   ½

14.   No. of waves = 20

Distance between a compression and the next rarefaction is half a wavelength

$$\frac{\lambda}{2} = 50 \text{ cm}$$

$\lambda = 100$ cm

Time period, $T = \dfrac{\text{time taken}}{\text{no. of waves}}$ 1

$$= \frac{0.2s}{20}$$

$T = 0.01s$ 1

Frequency, $\vartheta = \dfrac{1}{\text{time period}}$

$$= \frac{1}{0.01} = 100 \text{ H}_z$$ 1

15.   i)   1 joule is the amount of work done when a force of 1 newton displaces
           a body by 1 meter along the line of action of force   1

ii) Team A does positive work. Displacement is in the direct of force ½ , ½

Team B does negative work. Displacement is in direction, opposite to the

line of action of force ½ , ½

16. * Echo - sound heard after reflection from an obstacle. 1

* Conditions –

a) time interval between the original sound and reflected sound must be ½

at least o.1 s

b) minimum distance of the obstacle from the source of sound must be ½

17.2m at 22°C. ≈ 17-18m at room temperature.

* Bats produce ultrasonic waves. These signals are received by them after reflection from the prey and interpreted by their brain accordingly. 1

17. * In a pure chemical compound, the mass ratio of constituent elements remains constant irrespective of the source it is obtained 1

* Example – H_2O

mass ratio of H : O is 2 : 16 or 1 : 8 ½

i.e. whatever may be the source of water 9g of H_2O when decomposed gives 1g of hydrogen and 8g of oxygen ½

* Law of conservation of atoms 1

18. 1 mole of CO_2 = 12 + 16 x 2 = 44g

a) Number of moles of CO_2 $= \dfrac{4.4 \text{ g}}{44 \text{ g mol}^{-1}} = 0.1$ mol. 1

b) Number of molecules of CO_2 = 0.1 x 6.022 x 10^{23}

$= 6.022 \times 10^{22}$ molecules 1

c) Number of atoms of oxygen = 2 x 0.1 x 6.022 x 10^{23}

$= 2 \times 6.022 \times 10^{22}$

$= 1.204 \times 10^{23}$ atoms 1

19. a) Brain ½

b) They block biochemical path ways. As a result of this the bacteria are unable to make cell walls and so they die. 1,1

c) No, Japanese eneephalitis is a viral disease ½

20. Our immune system responds against any microbe when it enters the body for the first time and remembers it specifically.
The next time the same microbe tries to enter the body, the immune system recognizes and responds vigorously eliminating the infection. 2

b)   Diphtheria/pertussis/mumps/tetanus/measles/polio (any two) $\frac{1}{2}, \frac{1}{2}$

21.   Through cuts and wounds (Tetanus)

Through contaminated food and water (cholera)

Through sexual contact (AIDS, Syphillis)

Through air (TB, Pneumonia)

Through direct skin contact (Ring worm) (any three) $3\left(\frac{1}{2} + \frac{1}{2}\right)$

22.   i)   Marsilea is the odd one out as it is a pteridophyte while the rest are $\frac{1}{2}, \frac{1}{2}, \frac{1}{2}$
bryophytes

ii)   Salamander is the odd one out as it has three chambered heart while
all the rest have four chambered heart $\frac{1}{2}, \frac{1}{2}, \frac{1}{2}$

23.   'Energy possessed by an object by virtue of its position or configuration' – to be explained in candidate's own words   1

Example :- stretched string of bow/a stone lifted to a certain hight or any other appropriate example   ½

S.I. unit – joule   ½

Derivation of the relation P.E. = mgh   1

(Correct steps to be written)

As the object falls, $m = 20kg$ $g = 10m/s^2$ $h = 10m$

$\therefore$ P.E = mgh = 20kg $\times$ 10m/s^2 $\times$ 10m

P.E = 2000J   1

its P.E. gets converted to K.E.

kinetic energy just before it touches = 2000J   1

OR

* Power is rate of doing work/rate of transfer of energy   1

* S.I. unit of power is watt   ½

* I watt is the power of an agent which does work at the rate of 1joule per second/ power of an agent when the rate of consumption of energy is 1 joule per second   ½

For A :

W   = mgh

     = 32 kg $\times$ 10 m/s^2 $\times$ 8m

W   = 2560 J   1

Both have same mass and climb the same height

∴   Work done by B = 2560 J   ½

A has more power   ½

$$P_A = \frac{2560\ J}{15s} = 170.7\ W$$ ½

$$P_B = \frac{2560\ J}{20s} = 128\ W$$ ½

24.   a)   **Rutherford's scattering experiment**

He selected very thin gold foil to be bombarded with fast moving

$\propto$ - particles - which were doubly positively charged 'He' ions.

The fast moving $\propto$ - particles have a considerable amount of

K.E. to hit gold atoms

Observations

i)   Most of the $\propto$ - particles passed straight through the foil.

ii)   One out of 12,000 particles appeared to rebound.

Inference

i)   There is a positive centre inside the atom called nucleus.

ii)   The electrons revolve around the nucleus in well defined orbits.

iii)   The size of the nucleus is very small as compared to the size of the atom.   3

b)   Atomic number is 17

Element is chlorine   1
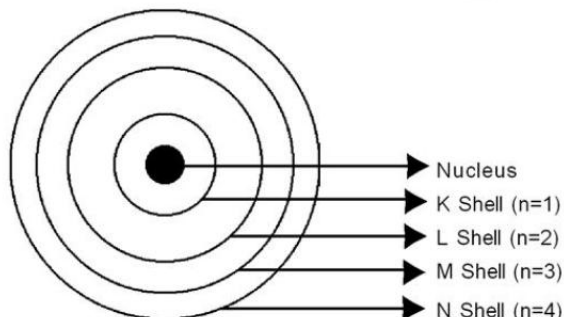
Electronic configuration - 2,8,7; valency - 1   ½ , ½

OR

a)   Bohr model of an atom

i)   Only certain special orbits known as discrete orbits of electrons are allowed inside the atom.

ii)   While revolving in discrete orbits the electrons do not radiate energy

iii)   These orbits or shells are called energy levels

These orbits or shells are represented by the letters K,L,M,N.......or the number n=1,2,3,4.................   3

25.   a)   Fig. 14.6 page 198 NCERT   1

         Any four labelling   ½ x 4

   b)   Fixing of nitrogen by N_2 fixing bacteria which are found in root nodules of legumes or which are free living, ammonification by bacteria in the soil, conversion of ammonia to nitrites or nitrites to nitrates by different type of bacteria, Nitrates to nitrogen in air by different bacteria. (any two)   1,1

OR

   a)   fig 14.7 page, 199, NCERT book   1

         Any four labellings   ½ x 4

   b)   i) Conversion of CO_2 into glucose by green plants in the presence of sunlight during photosynthesis

         ii) Usage of carbonates dissolved in sea water by marine animals to make their shells   1,1