PRACTICE PAPER 2*

Time allowed : 2 hours ***Maximum marks : 40***

General Instructions :

(i) The question paper comprises four sections A, B, C and D. There are 17 questions in the question paper. All questions are compulsory.

(ii) Section-A – question no. 1 to 9 - all questions and parts thereof are of one mark each. These questions contain multiple choice questions (MCQs), very short answer questions, assertion - reason type questions, case based questions. Answers to these should be given in one word or one sentence.

(iii) Section-B – question no. 10 to 12 are short answer type questions, carrying 2 marks each. Answers to these questions should in the range of 30 to 50 words.

(iv) Section-C – question no. 13 to 15 are short answer type questions, carrying 3 marks each. Answers to these questions should in the range of 50 to 80 words.

(v) Section-D – question no. 16 and 17 are long answer type questions carrying 5 marks each. Answer to these questions should be in the range of 80 to 120 words.

(vi) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.

(vii) Wherever necessary, neat and properly labeled diagrams should be drawn.

SECTION - A

1. Define the atomicity of a molecule of an element?

2. Name the microorganisms which can cause acne and cholera.

OR

Give one local and one general effect of inflammation process.

3. Which of the following has the smallest mass?

(a) 4 g of He (b) 6.022×10^{23} atoms of He

(c) 1 atom of He (d) 1 mole atoms of He

OR

Which of the following correctly represents 360 g of water?

I. 2 moles of H_2O II. 20 moles of water

III. 6.022×10^{23} molecules of water IV. 1.2044×10^{25} molecules of water

(a) I (b) I and IV (c) II and III (d) II and IV

4. Fill in the blanks and select the correct option.

__(i)__ is the protozoan organism that causes kala-azar. These are __(ii)__ shaped and each has one long whip like structure. This disease is usually spread by the bite of certain types of __(iii)__ .

	(i)	**(ii)**	**(iii)**
(a)	SARS	Saucer	Mosquito
(b)	*Leishmania*	Oval	Sandfly
(c)	*Trypanosoma*	Rod	Mite
(d)	*Ascaris*	Oval	Ant

5. Which of the following statements is correct?

(a) Common cold is not contagious.
(b) The common cold virus does not have its own RNA.
(c) Common cold usually takes two months to clear up.
(d) The common cold virus can leave the body through the mucus of infected people.

For question numbers 6 and 7, two statements are given- one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below :

(a) Both A and R are true, and R is correct explanation of the assertion.
(b) Both A and R are true, but R is not the correct explanation of the assertion.
(c) A is true, but R is false.
(d) A is false, but R is true.

6. **Assertion :** When 10 g of $CaCO_3$ is decomposed, 5.6 g of residue is left and 4.4 g of CO_2 escapes.
Reason : Law of conservation of mass is followed.

7. **Assertion :** Poliomyelitis is a highly infectious viral disease of infants and children.
Reason : Pathogen of Poliomyelitis is a very small RNA containing virus.

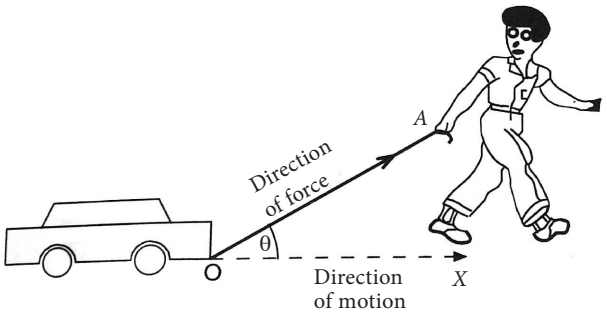
OR

Assertion : Filarial worm is transmitted to humans by *Culex* mosquito.
Reason : *Culex* prefers to breed in fresh water.

Answer Q. No. 8 and 9 contain five sub-parts each. You are expected to answer any four sub-parts in these questions.

8. **Read the following and answer any four questions from 8(i) to 8(v).**

A child pulls a toy car with a string attached to it, the car moves horizontally on the ground, but the force applied by the child is along the string held in his hand making some angle with the ground. In figure, the toy car moves along the horizontal ground surface but the force is being applied along the string, the direction of force making an angle θ with the direction of motion.



The whole of force is not being used in pulling the toy car, only its horizontal component along the ground is the effective force pulling the toy car. The work done in pulling the body will be equal to the product of horizontal component of the force and distance moved by the body, *i.e.*,

$W = F \cos \theta \times s$

(i) A child pulls a toy car through a distance of 10 m on a smooth, horizontal floor. The string hold in child's hand makes an angle of 60° with the horizontal surface. If the force applied by the child be 5 N, the work done by the child in pulling the toy car is

(a) 2.5 J (b) 20 J (c) 25 J (d) 22 J

(ii) The work done on an object does not depend on the

(a) displacement (b) angle between force and displacement
(c) force applied (d) initial velocity of the object.

(iii) In case of negative work, the angle between the force and displacement is

(a) 0° (b) 45° (c) 90° (d) 180°

(iv) Each of the following statement describes a force acting. Which force is causing work to be done?

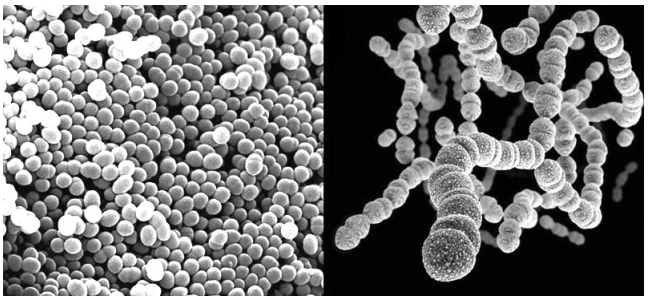
(a) The weight of a book at rest on a table.
(b) The pull of a moving railway engine on its coaches.
(c) The tension in an elastic band wrapped around a parcel.
(d) The push of a person's feet when standing on the floor.

(v) The work done is zero if

(a) the body shows displacement in the opposite direction of the force applied
(b) the body shows displacement in the same direction as that of the force applied
(c) the body shows a displacement in perpendicular direction to the force applied
(d) the body masses obliquely to the direction of the force applied.

9. Refer to the given figures and answer any four questions from 9(i) to 9(v).

Any physical or functional change from the normal state that causes discomfort of disability, or impairs the health of a living organism is called a disease. Some of the disease causing microorganisms are viruses, bacteria, fungi protozoans etc.



A B

(i) Figure A shows an organism called

(a) *Trypanosoma* (b) Staphylococci
(c) *Leishmania* (d) Streptococci.

(ii) Select the correct statements regarding the given figures.

(I) The organism shown in figure A is a type of bacteria.
(II) The organism shown in figure B causes sleeping sickness.
(III) Both the organisms A and B are agents of infectious diseases.
(IV) The organism in figure B is a type of fungi.

(a) (II) and (IV) (b) (I) and (II)
(c) (I) and (III) (d) (I), (III) and (IV)

(iii) Which organism(s) shown in the given figures can cause pneumonia?

(a) A (b) B
(c) Both (a) and (b) (d) None of these

(iv) Figure B shows a bacterium known as

(a) *E. Coli* (b) *Salmonella*
(c) Streptococci (d) *Clostridium*

(v) Organism shown in figure (A) does not causes

(a) Food poisoning (b) Pus-filled abscesses on skin
(c) Inflammation of salivary glands (d) Typhoid

SECTION - B

10. Electronic configuration of a neutral atom '*X*' is 2, 8, 6. What is the electronic configuration of X^{2-}?

11. Distinguish between mass and weight of a body.

OR

The Earth's gravitational force causes an acceleration of 10 m/s^2 in a 2 kg mass some where in space. How much will the acceleration of a 5 kg mass be at the same place?

12. If one mole of carbon atom weighs 12 gram, what is the mass (in gram) of 1 atom of carbon?

SECTION - C

13. Explain with reason whether the potential energy in the following cases increases or decreases:

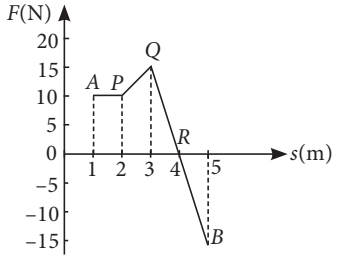
(a) a spring is compressed,

(b) a spring is stretched,

(c) a body is taken away against the gravitational force.

OR

A body moves from point *A* to *B* under the action of a force, varying in magnitude as shown in figure. Obtain the work done.



14. How will you find the valency of nitrogen, oxygen and fluorine?

15. Write the formula and names of compounds formed by

(a) Na^+ and HCO_3^- (b) K^+ and CO_3^{2-} (c) Cu^{2+} and SO_4^{2-} (d) Cu^{2+} and O^{2-}

(e) Na^+ and SO_4^{2-} (f) NH_4^+ and CO_3^{2-}

SECTION - D

16. The acceleration of a freely falling body does not depend on the mass of the body. Show this by deriving an expression for the same.

OR

(a) State and explain universal law of gravitation given by Newton.

(b) The mass of the earth is 6×10^{24} g and that of the planet is 7×10^{22} kg. If the distance between the Earth and the planet be 4×10^5 m, calculate the force exerted by the Earth on the Moon.
($G = 6.7 \times 10^{-11}$ Nm^2 kg^{-2})

17. *Y* is the ion of an element *X*. *Y* contains 13 protons,14 neutrons and 10 electrons.

(a) What is the nucleon number of *Y*?

(b) Draw a 'dot and cross' diagram to show how the electrons are arranged in an atom of *X*.

(c) Predict the formula of the compound that contains *Y* and the oxide ion.

OR

The valency of hydrogen is 1, magnesium is 2, aluminium is 3 and carbon is 4. Can you see any connection between the valency of an element and the number of electrons it has in its outermost electron shell? What would you predict the valencies of helium (He), phosphorus (P), sulphur (S) and neon (Ne) to be?

ANSWERS

1. The number of atoms present in one molecule of an element is called its atomicity.

2. Acne – *Staphylococci* and cholera – *Vibrio cholerae*

OR

Local effect : Swelling or pain

General effect: Fever or headache

3. **(c) :** 4 g of He = 6.022×10^{23} atoms of He

= 1 mole atoms of He

$\therefore$ Mass of 1 He atom $= \frac{4}{6.022\times10^{23}} = 0.664\times10^{-23}$ g

$= 6.64 \times 10^{-24}$ g

$\therefore$ 1 atom of He has the smallest mass.

OR

(d) : I. 2 moles of $H_2O = 2 \times 18$ g = 36 g

II. 20 moles of $H_2O = 20 \times 18$ g = 360 g

III. 6.022×10^{23} molecules of H_2O = 18 g

IV. 1.2044×10^{25} molecules of H_2O

$= \frac{18}{6.022\times10^{23}} \times 1.2044\times10^{25} = 360$ g

4. **(b)**

5. **(d):** Common cold spreads through the mucus of the infected people during sneezing and coughing.

6. **(a)**

7. **(b):** Poliomyelitis is a highly infectious viral disease of infants and children that may attack adults also. It is caused by small RNA containing virus, polio virus and is transmitted through faeces, urine and nasal secretions contaminating food or drinks either directly or through flies. This virus causes inflammation of grey matter of the spinal cord, inability of head to bend forward and stiffness of the neck. It also destroys motor nerve cells in the spinal cord. Muscles fail to work and shrink due to lack of nerve impulses. This causes paralysis of limbs.

OR

(c) : The filarial worms cause a slowly developing chronic inflammation of the organs in which they live for many years, usually the lymphatic vessels of the lower limbs, and the disease is called filariasis. The pathogen spreads from one human being to another through mosquitoes like *Culex*. The parasite resides in lymph vessels, connective tissues and mesentery. In *Culex* and other mosquitoes, females are blood sucking while males suck juices of flowers and fruits. Female *Culex* carries filarial worm from one person to another. It prefers to breed in dirty water near human habitation.

8. **(i) (c) :** As, $W = F \cos\theta \times s$

F = 5 N, $\theta = 60°$, s = 10 m

$\therefore$ $W = 5 \times \cos 60° \times 10$

$= 5 \times 0.5 \times 10 = 25$ J

(ii) (d): Work done does not depend on the initial velocity of the object.

(iii) (d) : If the force acts opposite to the direction of motion of a body, then the angle θ between the direction of motion and the direction of force is 180°.

(iv) (b)

(v) (c) : Work done is zero when a force acts at right angles to the direction of motion of the body.

9. **(i) (b)**

(ii) (c) : The organism shown in figure B is of the bacterium that causes strep throat.

(iii) (b)

(iv) (c)

(v) (d): Typhoid is caused by a bacterium known as *Salmonella typhi*.

10. X = 2, 8, 6

No. of electrons in neutral atom = 2 + 8 + 6 = 16

$X + 2e^- \rightarrow X^{2-}$

No. of electrons in X^{2-} = 16 + 2 = 18

Electronic configuration of X^{2-} = 2, 8, 8

11.

	Mass	Weight
(i)	Mass is a scalar quantity.	Weight is a vector quantity.
(ii)	Mass of a body does not depend on the shape, size and the state of the body.	The weight of a body changes with the value of *g*. So when *g* decreases, the weight of the body also decreases.
(iii)	Mass of a body is proportional to the quantity of matter contained in it.	The weight of a body is directly proportional to its mass.
(iv)	The SI unit of mass is kilogram (kg).	The SI unit of weight is same as that of the force, *i.e.,* newton (N).

OR

The acceleration produced in any body due to the gravitational pull of the Earth does not depend on the mass of the body. So, the acceleration produced in the 5 kg mass due to gravitational pull will also be 10 m/s^2.

12. Molecular mass of carbon = 12 g

$\because$ 6.022×10^{23} atoms of carbon have mass = 12 g

$\therefore$ 1 atom of carbon has mass

$$= \frac{12}{6.022 \times 10^{23}} = 1.99 \times 10^{-23} \text{ g}$$

13. (a) When a spring is compressed, work is done on the spring in compressing it. Therefore, potential energy increase.

(b) When a spring is stretched, work is done on the spring in stretching it. Therefore, potential energy increases.

(c) Work is done by us in taking the body away against the gravitational force. Therefore, potential energy increases.

OR

Work done = Area under *F-s* curve

$W_{AB} = W_{12} + W_{23} + W_{34} + W_{45}$

= Area under *AP* + Area under *PQ*

+ Area under *QR* – Area above *RB*

$$= 10 \times 1 + \left[\frac{1}{2}(5\times1)+(10\times1) + \frac{1}{2} \times 15\times 1 - \left(\frac{1}{2}\times15\times1\right)\right.$$

= 10 + 12.5 = 22.5 J

14. (i) Nitrogen has 5 electrons in valence shell, hence its valency is 8 – 5 = 3.

(ii) Oxygen has 6 electrons in valence shell, hence its valency is 8 – 6 = 2.

(iii) Fluorine has 7 electrons in valence shell, hence its valency is 8 – 7 = 1.

15.	**Formula**	**Name of the compound**
(a)	$NaHCO_3$	Sodium bicarbonate
(b)	K_2CO_3	Potassium carbonate
(c)	$CuSO_4$	Copper(II) sulphate
(d)	CuO	Copper(II) oxide
(e)	Na_2SO_4	Sodium sulphate
(f)	$(NH_4)_2CO_3$	Ammonium carbonate

16. Newton's law of gravitation states that every two bodies in the universe attract each other with a force which is directly proportional to the product of their masses and inversely proportional to the square of distance between them.

$$F = G\frac{Mm}{d^2} \quad ...(i)$$

Newton's second law of motion shows that force is the product of mass and acceleration. Let *m* be the mass of the body, the gravitational force causes acceleration in it is denoted by '*g*'.

$\therefore$ $F = mg$ ...(ii)

From eqn. (i) and (ii), we get $mg = G\frac{Mm}{d^2}$

$\because$ *M* = mass of the Earth and

d = distance between the object and the Earth.

Let the object be on the surface of the Earth. The distance *d* = *R* (radius of the Earth).

$\therefore$ $mg = G\frac{M\times m}{R^2}$

$\therefore$ $g = \frac{GM}{R^2}$

Hence, from above relation it is clear that acceleration due to gravity of body does not depend on the mass of the body.

OR

(a) Newton's law of gravitation may be stated as follows: Every particle in the universe attracts every other particle with a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between them. The direction of the force is along the line joining the two particles.

Let us consider two particles *A* and *B* of masses m_1 and m_2, and separated by a distance *R*. Then, the force of gravitation (*F*) acting on the two particles is given by,

$F \propto m_1 \times m_2$

$F \propto \frac{1}{R^2}$ or $F \propto \frac{m_1\times m_2}{R^2}$

or $F = G\frac{m_1\times m_2}{R^2}$ ...(i)

where *G* is called the universal gravitational constant.

Force of gravitation $\propto \frac{1}{R^2}$ ...(ii)

Equation (i) is the mathematical form of Newton's law of gravitation. In eq. (i), the magnitude of the force varies inversely with the square of the distance between the two particles. So, the force law is given by eq. (ii) and it is also called inverse-square law.

(b) The force exerted by one body on another body is given by the Newton's formula

$$F = G \times \frac{m_1 \times m_2}{r^2}$$

Here, Gravitational constant, $G = 6.7 \times 10^{-11}\ \text{Nm}^2\ \text{kg}^{-2}$

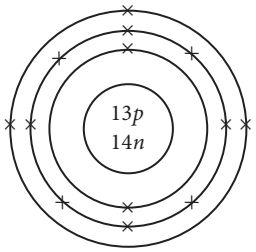
$$F = \frac{6.7 \times 10^{-11} \times 6 \times 10^{24} \times 7 \times 10^{22}}{(4 \times 10^5)^2} = 1.7 \times 10^{26}\ \text{N}$$

17. *Y* is the ion of an element *X*.

Y contains $p = 13$, $n = 14$ and $e = 10$.

(a) The nucleon number of *Y* is (13 + 14 =) 27.

(b) An atom of *X* contains $p = 13$, $n = 14$ and $e = 13$.



(c) Since *Y* contains 13 protons and 10 electrons, it carries + 3 charge.

So, the formula of the compound that contains *Y* and the oxide ion is Y_2O_3.

OR

The valency of an element depends upon the number of electrons in the outermost shell (valence shell) of an atom of the element. The valency of an element is either equal to the number of valence electrons in an atom of the element or to the number of electrons required to complete an octet in its valence shell.

Valency of a metal = Number of valence electrons

Valency of a non-metal = 8 – Number of valence electrons

Helium (He) : An atom of helium contains 2 electrons in its *K* shell. This shell is the outermost shell of helium which is completely filled with 2 electrons. Hence, valency of helium = 0.

Phosphorus (P) : The electronic configuration of the P atom is 2, 8, 5. Thus, it has 5 valence electrons and it is a non-metal. Hence, valency of P = 8 – 5 = 3.

Sulphur (S): The electronic configuration of an atom of S is 2, 8, 6.

Sulphur is a non-metal. Hence, valency of S = 8 – 6 = 2.

Neon (Ne) : The electronic configuration of neon is 2, 8. The outermost shell of neon is completely filled. Hence, valency of neon = 0.

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