

SCIENCE AND TECHNOLOGY–I

S.S.C. BOARD SEPTEMBER, 2009

TIME: 2 HOURS

MARKS: 40

QUESTIONS

- NOTE :**
- i) All questions are compulsory**
 - ii) All questions carry equal marks**
 - iii) Draw diagrams wherever necessary.**

1.A) Four incomplete statements are given below. Complete them by choosing the proper alternatives from those given below and rewrite the complete statement in your answer book :

- a) In CGS system, the unit of specific heat capacity is
- i) kcal/kg° C
 - ii) cal/kg° C
 - iii) cal/g° C
 - iv) kcal/g° C
- b) The modern periodic table is based on

- i) The principles of octaves.
 - ii) The atomic numbers of elements.
 - iii) The atomic mass of the elements.
 - iv) The presences of triads of elements.
- c) The apparent depth of an object placed in a denser medium and seen through a rare medium is
- i) Greater than the real depth.
 - ii) Less than the real depth.
 - iii) Equal to the real depth.
 - iv) Double its real depth.
- d) The stored ability to do work is called as
- i) Energy
 - ii) Force.
 - iii) Power.
 - iv) Momentum.

B) Match the items in column A with their appropriate items in column B and write correct pairs in your answer book :

Column A	Column B
Heating effects of electric current	Natural geyser
Wind energy	Electric bell
Magnetic effect of electric current	Electric iron
Geothermal energy	Winnowing

C) Read the following sentences carefully and answer in the true or false form :

- i) In modern periodic table, halogens are placed in group 17.
- ii) Carbon dating technique is used to find the percentage of carbon in atmosphere.
- iii) The velocity of sound is the lowest in liquids.
- iv) In cold countries the crumbling of the rock is due to an anomalous behaviour of the water.

D) Identify the odd one of the following group :

- i) Stretched bow, Bullet fired from a gun, Flowing water, Flying aeroplane.
- ii) Sitar, Harmonium, Trumpet, Flute.
- iii) Short-sightedness, Long-sightedness, Presbyopia, Colour blindness.
- iv) Uranium, Thorium, Radium, Sodium.

2.A) Give specific reasons : (any two)

- i) Glucose is non-electrolyte.
- ii) Ice floats on water.
- iii) The filament of incandescent lamp is made of tungsten.
- iv) γ -radiations are not deflected by electric or magnetic field.

(B) Distinguish between following pairs : (any two)

(Write only two points of distinction for a pair)

- i) Potential energy and Kinetic energy.
- ii) Gaseous fuels and Solid fuels.
- iii) Energy and Power.
- iv) s-block elements and p-block elements.

3.A) Solve the following examples : (any two)

- i) What is the power used by a microwave oven if 0.15 kw.hr of energy is used in 20 minutes.
- ii) Find the resistance of a 60 W, 240 V bulb?
- iii) An energy of 2J is used to lift a block of 0.5 kg. How high will it rise?
- iv) 0.4 g of NaOH is dissolved in one litre of solution. 15 ml of this solution requires 10 ml of HCl for complete neutralisation. Calculate the normality of the HCl solution.

(Equivalent weight of NaOH = 40)

B) Answer any of the following questions :

- i) What is noise pollution? State any three adverse effects of sound pollution.
- ii) What is refraction of light? State the laws of refraction of light.

4.A) Draw neat and labelled diagrams : (any two)

- i) Production of x-rays.
- ii) Motion of free electrons when current is set up in the metal.
- iii) Hope's apparatus.

- iv) Ray diagram when an object is placed between F_1 and $2F_1$ of a convex lens.

4.B) Answer the following : (any one)

- i) Deduce normality equation.
- ii) State Ohm's law. Define ohmic conductors and non ohmic conductors. Also give one example of each.

5.A) Answer the following questions in short : (any four)

- i) What is the least distance of distinct vision?
- ii) Concentration of which ions should be high for proper functioning of living cells?
- iii) State the number of groups and periods in the modern periodic table.
- iv) State two general precautions for safety while using an electrical appliance.
- v) State two uses of solar cells.
- vi) What is meant by blind-spot?

B) Answer the following : (any one)

- i) Which column is known as zero group in the modern periodic table? Write names of any four elements in this group. Why zero group elements do not take part in chemical reactions?

- ii) Define electrolysis. Write cathode and anode reactions in case of electrolysis of copper chloride. State two industrial applications of electrolysis.

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ANSWERS

1.A)

- i) Cal/g deg C
- ii) the atomic number of elements
- iii) less than the real depth
- iv) energy

B) Match :

A		B
1	Heating effect of electric current	Electric iron
2	Wind energy	Winnowing
3	Magnetic effect of electric current	Electric bell
4	Geothermal energy	Natural geysers

c)

- i) True
- ii) False
- iii) False
- iv) True

D)

- i) Stretched bow
- ii) Sitar
- iii) Colour blindness
- iv) Sodium

2.A.i)

Glucose is non-electrolyte because

- a) Its aqueous solution cannot conduct electric current.
- b) It is a covalent compound.

2.B.i) Kinetic Energy and Potential Energy :

Kinetic Energy		Potential Energy	
1.	The energy possessed by a body on account of its motion is called Kinetic energy	1.	The energy possessed by a body on account of its position or configuration is called Potential Energy.
2	It does not have to be converted into another form to do work.	2	It has to be converted into Kinetic energy to do work.
3	Formula for kinetic energy is $\frac{1}{2}mv^2$	3	Formula for potential energy is mgh .
4.	Running Water, A bullet fired from a gun are examples of Kinetic Energy.	4	A compressed spring, water stored in a dam are examples of Potential energy.

3.A.

i) **Given :** Energy used = 0.15 K.W. hr

Total time = 20 min = 20/60 hr.

Solution :

∴ Power used = work done = 0.15 KW.hr. = 0.45

KW time (20/60) hr.

∴ **Power used by a microwave oven = 450 W**

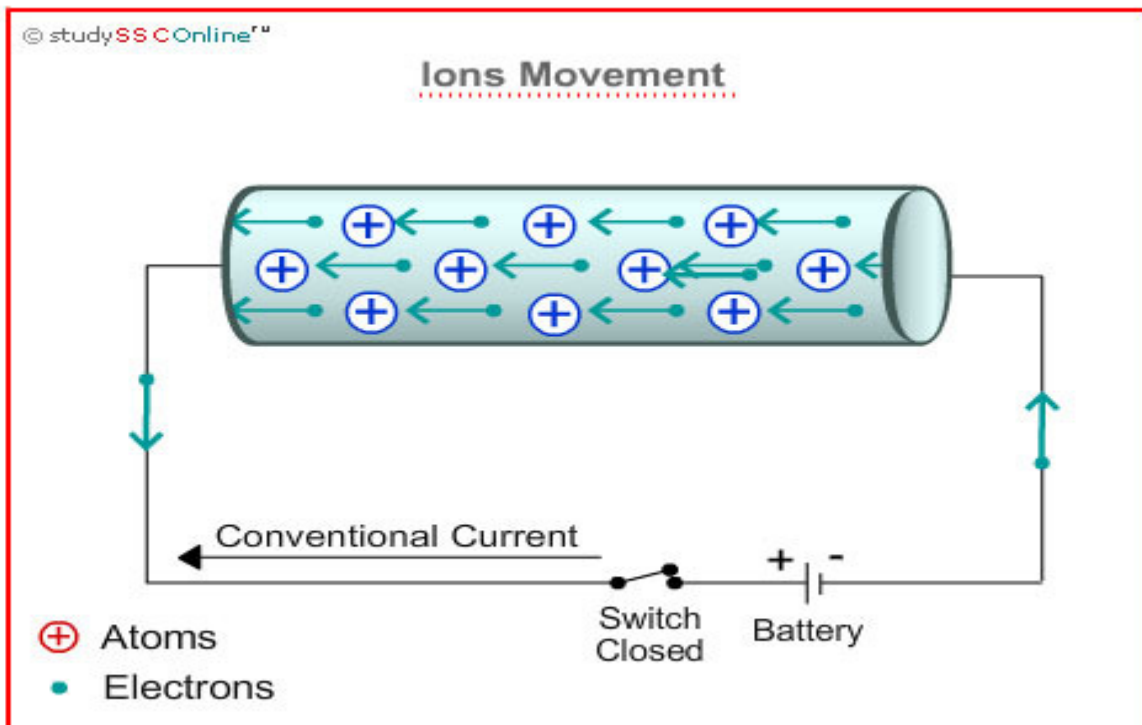
3.B.i)

Sound which is unnecessary, unpleasant or unwanted and intolerable in the work place and environment is called noise pollution. Measures to control noise pollution:

- a) Controlling of noise at the source and replacing the old plants or machines with new ones.
- b) Using sound absorbers to control transmission path.
- c) By using ear-plug and protective caps in factories.
- d) By controlling the exposure to sound, as far as possible.

4.A.ii) Motion of free electrons when current is set up in the metal :

{PLEASE VIEW THE ANIMATION FILE FOR THIS TOPIC}



4.B.i)

Derivation of Normality Equation :

In neutralization reaction volumes of acid and base are always inversely proportional to their normality. Let $N_1 V_1$ be normality and volume of acid and $N_2 V_2$ be normality and volume of base.

$$V_1 \propto \frac{1}{N_1}$$

$$V_1 = \frac{k}{N_1} \dots\dots\dots (k \text{ is a constant})$$

$$V_1 N_1 = k \dots\dots\dots (1)$$

$$V_2 \propto \frac{1}{N_2}$$

$$V_2 = \frac{k}{N_2} \dots\dots\dots (k \text{ is a constant})$$

$$V_2 N_2 = k \dots\dots\dots (2)$$

From eqⁿ (1) & (2)

$$V_1 N_1 = V_2 N_2$$

$$\therefore N_1 V_1 = N_2 V_2$$

$$\frac{\text{Normality} \times \text{Volume}}{\text{(For Acid)}} = \frac{\text{Normality} \times \text{Volume}}{\text{(For Base)}}$$

This equation is known as Normality Equation.

5.A.i)

For a normal eye, the minimum distance from the eye, at which the objects can be clearly and distinctly seen without any strain on the

eye, is about 25 cm and is known as the least distance of distinct vision.

5.B.1)

The last column on the right side of the modern periodic table is called zero group or group 18.

- a) It is the group or family of inert gases also known as noble gases or rare gases.
- b) They are helium, neon, argon, krypton, xenon and radon.
- c) The inert gases have stable electronic configuration with complete duplet, or complete octet. Because of this the valency of inert gases is zero and the atoms of inert gases form neither ionic nor covalent bonds with other atoms.
- d) The zero group and group 18 together constitute the p-block elements.