BOARD QUESTION PAPER: DECEMBER 2020

Science and Technology Part - 1

Time: 2 Hours **Total Marks: 40**

Note: i. *All* questions are compulsory.
ii. Use of a calculator is not allowed.
iii. The numbers to the right of the questions indicate full marks.
iv. In case of MCQs (Q. No. 1(A)) only the first attempt will be evaluated and will be given credit.
v. For each MCQ, the correct alternative (A), (B), (C) or (D) with sub-question number is to be written as an answer.
For Eg: (i) (A), (ii) (B), (iii) (C)
vi. Scientifically correct, labelled diagrams should be drawn wherever necessary.

Q.1. (A) Choose the *correct* option: **[5]**

i. The minimum velocity of the spacecraft to escape from earth's gravitational force must be _____.
(A) 112 km/s (B) 11.2 km/s (C) 1.12 km/s (D) 0.112 km/s

ii. The melting point of pure ethanoic acid is _____.
(A) 17°C (B) 19°C (C) 15°C (D) 27°C

iii. The process of separation of light into its component colour while it is passing through a medium is called _____.
(A) Reflection (B) Refraction
(C) Dispersion (D) Internal reflection

iv. The conversion of ferrous sulphate into ferric sulphate is _____ reaction.
(A) Oxidation (B) Displacement
(C) Electrolysis (D) Reduction

v. Lithium (Li), _____ and Potassium (K) is Dobereiner's triad.
(A) Magnesium (Mg) (B) Aluminium (Al)
(C) Sodium (Na) (D) Calcium (Ca)

(B) Solve the following sub-questions: **[5]**

i. State true *or* false:
The refractive index depends upon the velocity of light in medium.

ii. Write the correlated answer:
Torch : Concave lens :: Camera : _____.

iii. Find odd man out:
Zinc, Iron, Phosphorus, Sodium.

iv. Draw the structural formula of C_3H_8.

v. Which satellite is used in educational field among INSAT and GSAT series?

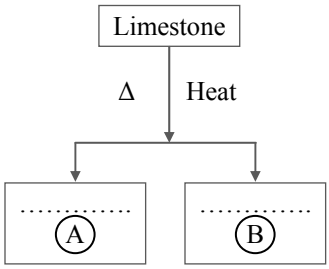
Q.2. (A) Give scientific reasons (any *two*): **[4]**

i. Star appears to be twinkling at night.
ii. Simple microscope is used for watch repairs.
iii. The copper vessels turn greenish and silver articles turn blackish when kept open in air for long time.

(B) Answer the following questions (any *three*): **[6]**

i. An object takes 5 seconds to reach the ground from a height of 5 m on a planet. What is the value of '*g*' on that planet?

ii. Identify 'A' and 'B' from the following table and complete the table. Write the chemical equation:



iii. Write the modern periodic law and also give the names of 'blocks' in modern periodic table.

iv. Distinguish between 'alternating current' and 'direct current'.

v. Define specific heat capacity. Write its S.I. unit.

Q.3. Answer the following (any *five*): **[15]**

i. An iron ball of mass 3 kg is released from a height of 125 m and falls freely to the ground. Assuming that the value of 'g' is 10 m/s^2, calculate:
   a. Time taken by the ball to reach the ground.
   b. Velocity of the ball on reaching the ground.

ii. An element has its electron configuration as (2, 8, 2). Answer the following:
   a. What is the 'atomic number' of this element?
   b. What is the 'Group' of this element?
   c. To which period does this element belong?

iii. a. Write the 'endothermic' or 'exothermic' nature of the reaction:

$$2KClO_{3(s)} \xrightarrow{\Delta} 2KCl_{(s)} + 3O_2 \uparrow$$

   b. Balance the given chemical equation:

$$NaOH_{(aq)} + H_2SO_{4(aq)} \rightarrow Na_2SO_{4(aq)} + H_2O_{(l)}$$

   c. From given reaction, identify 'oxidant' and 'reductant':

$$CuO + H_2 \rightarrow Cu + H_2O$$

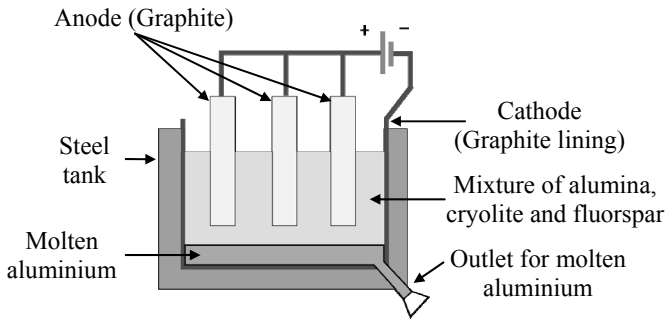
iv. A copper sphere of 100 g mass is heated to raise its temperature to 100°C and is released in water of mass 195 g and temperature 20°C in a copper calorimeter. If the mass of the calorimeter is 50 g, what will be the maximum temperature of water?
(Specific heat of copper = 0.1 cal/g°C)

v. a. Draw a neat labelled diagram of 'dispersion of white light through glass prism'.
   b. Which coloured ray is the least deviated?
   c. Which coloured ray is the most deviated?

vi. Complete the following table for convex lens:

	Position of object	Position of image	Size of image	Nature of image
(a)	_____	At focus F_2	Point image	Real and inverted
(b)	At $2F_1$	At $2F_2$	_____	Real and inverted
(c)	Between F_1 and O (within focal length)	On the same side (object side)	Very large	_____

vii. Observe the following diagram and answer the questions:

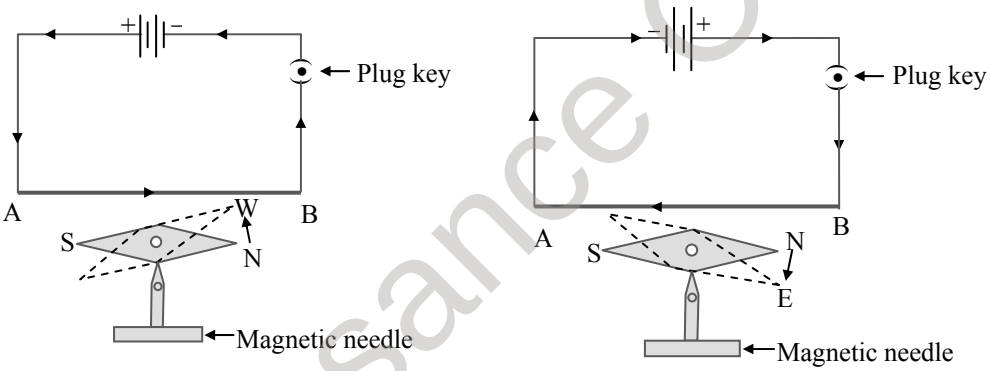


a. Write the 'anode reaction'.
b. Write the 'cathode reaction'.
c. What is the purpose of mixing 'cryolite' and 'fluorspar' with 'alumina' in the electrolytic reduction of alumina?

viii. a. What is the principle behind the working of satellite launch vehicle?
b. Write the formula for the escape velocity.
c. Write the long form of 'ISRO'.

Q.4. Solve the following questions (any *one*): **[5]**

i. Observe the diagrams and answer the questions:



a. Which effect of electric current is shown in the above figure?
b. What will happen if the number of electric cells is increased on the magnetic needle?
c. If the distance between the conductor and magnetic needle is increased, what will be the effect on intensity of magnetic field?
d. If the ends of electric cell are interchanged, what will be the effect of the magnetic needle?
e. Write the names of any *two* instruments which work on magnetic effect of electric current.

ii. Answer the following:
a. Draw the electron-dot structure of Methane.
b. Define Homologous series.
c. Write the IUPAC names of the following:
(i) $CH_3 - CH_2 - COOH$
(ii) $CH_3 - CHOH - CH_3$
(iii) $CH_3 - CO - CH_2 - CH_3$