

## (ENGLISH VERSION)

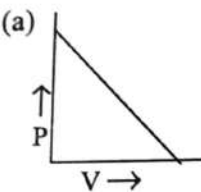
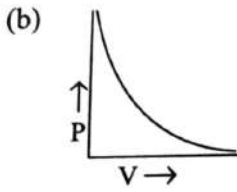
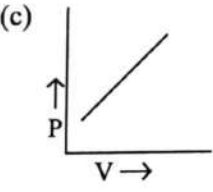
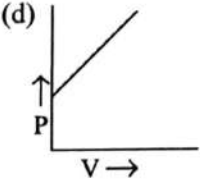
(For Regular &amp; External Candidates)

Time : Three Hours Fifteen Minutes

(First *fifteen* minutes for reading the question paper)
 Full Marks  $\left\{ \begin{array}{l} 90 - \text{For Regular Candidates} \\ 100 - \text{For External Candidates} \end{array} \right.$ 

Only the External Candidates will answer Group 'E'.  
 Figures in the margin indicate full marks for each question.

Group 'A'

1. Multiple choice questions. Four alternative answers are given for each of the following questions. Write the correct one. 1 × 15 = 15
- 1.1 Which layer of atmosphere has the greatest density ?
- (a) Troposphere (b) Stratosphere  
 (c) Mesosphere (d) Thermosphere
- 1.2 The P - V graph of Boyle's Law related to gas is
- (a)  (b)  (c)  (d) 
- 1.3 The relation between molecular mass (M) and vapour density (D) of gaseous substance is -
- (a)  $2M = D$  (b)  $M = D^2$   
 (c)  $M = 2.8D$  (d)  $M = 2D$
- 1.4 If the radius of curvature of a concave mirror is 20cm, then focal length of the mirror will be
- (a) 20 cm (b) 15 cm  
 (c) 10 cm (d) 40 cm
- 1.5 The wavelength of which of the following is greater than that of visible light ?
- (a) x - ray (b) infrared ray  
 (c)  $\gamma$  - ray (d) ultraviolet ray

- 1.6 Dentists use  
(a) convex mirror  
(c) concave mirror  
(b) convex lens  
(d) concave lens
- 1.7 Charge of an electron is  
(a)  $-3.2 \times 10^{-19}\text{C}$   
(c)  $1.6 \times 10^{-19}\text{C}$   
(b)  $-1.6 \times 10^{-19}\text{C}$   
(d)  $3.2 \times 10^{-19}\text{C}$
- 1.8 If the resistance (R) of the conductor and time of flow of current in the conductor (t) remain unchanged, the relation between the heat produced (H) in the conductor and flow of current (I) is  
(a)  $H \propto I$   
(c)  $H \propto I^2$   
(b)  $H \propto \frac{1}{I^2}$   
(d)  $H \propto \frac{1}{I}$
- 1.9 If 12C of charge flows through a conductor for 2 minutes, the electric current is  
(a) 6 amperes  
(c) 24 amperes  
(b) 0.1 amperes  
(d) 10 amperes
- 1.10 Number of groups in the long periodic table is  
(a) 9  
(c) 18  
(b) 13  
(d) 19
- 1.11 The order of oxidising property of Cl (17), I (53), F (9), Br (35) belonging to group 17 of long periodic table is  
(a)  $F < Cl < Br < I$   
(c)  $Cl > F > Br > I$   
(b)  $Cl > I > F > Br$   
(d)  $F > Cl > Br > I$
- 1.12 For which of the following ionic compounds no ion has octet?  
(a) LiH  
(c) NaCl  
(b) CaO  
(d)  $MgCl_2$
- 1.13 The solid state of which of the following compounds is not composed of molecules?  
(a) Sugar  
(c) Sodium fluoride  
(b) Glucose  
(d) Hydrogen chloride

- 1.14 Acetic acid is a weak electrolyte because in aqueous solution acetic acid is  
(a) non-conductor of electricity (b) completely dissociated  
(c) partially dissociated (d) not dissociated
- 1.15 During electrolysis  
(a) oxidation occurs at cathode and reduction occurs at anode  
(b) oxidation occurs at both the electrodes  
(c) reduction occurs at both the electrodes  
(d) reduction occurs at cathode and oxidation occurs at anode.

Group 'B'

2. Answer the following questions (alternatives are to be noted):

- 2.1 Mention one fuel which is alternative to fossil fuel. 1
- 2.2 Write the name of a gas which increases atmospheric temperature. 1

OR

Fill in the blank :-

\_\_\_\_\_ radiation, coming from the sun is prevented by the ozone layer from falling on the earth's surface. 1

- 2.3 What is SI unit of pressure of gas? 1
- 2.4 What are constants in Charles' law? 1

OR

Write whether the following statement is *True* or *False*:

Per degree interval in kelvin scale of temperature is equal to per degree interval in celcius scale. 1

- 2.5 Is it possible to form a virtual image of shorter length than the length of the object by any mirror? 1
- 2.6 Which type of mirror is used in the headlight of a motor car? 1
- 2.7 If the refractive indices of a medium for red and blue colours of light are  $\mu_r$  and  $\mu_b$  respectively, which one is greater in magnitude? 1

2.8 What is the SI unit of electric charge?

2.9 What is the unit of electrical conductance?

**OR**

What are the constituents of fuse wire?

2.10 'Kilowatt - hour' is the unit of which physical quantity?

2.11 Match the Right column with the Left column :

Left column	Right column
2.11.1 Acetic acid	(a) non conductor of electricity
2.11.2 Glass	(b) Weak electrolyte
2.11.3 Most electronegative element	(c) Krypton
2.11.4 One noble element	(d) Fluorine

2.12 Arrange F, I, Br, Cl in decreasing order of electronegativity :

2.13 In which group of long periodic table, elements of all three physical state - gaseous, liquid and solid are present?

**OR**

To which group of long periodic table do the alkali metals belong?

2.14 Show the conventional representation of H<sub>2</sub>O molecule by 'dash' sign.

2.15 The electronic configuration of hydride ion (H<sup>-</sup>) is like the electronic configuration of the atom of which element?

**OR**

Draw the Lewis dot diagram of H<sub>2</sub> molecule.

2.16 Give example of a covalent liquid.

2.17 Write whether the following statement is *True* or *False* :  
The electrical conductivity of solid NaCl is greater than the electrical conductivity of fused NaCl. 1

2.18 What reaction occurs at the cathode in the electrolyte method of extraction of aluminium? 1

**OR**

Write whether the following statement is *True* or *False*:-

Free electrons carry electricity through electrolytic substances. 1

**Group 'C'**

3. Answer the following questions (alternatives are to be noted) : 2 × 9

3.1 What is global warming? 2

3.2 At a pressure of 770 mmHg a fixed mass of hydrogen gas occupies a volume of 75cm<sup>3</sup> at 27°C. What volume will the mass of hydrogen gas occupy at that temperature and 750mmHg pressure? 2

**OR**

What will be the volume of 64g of O<sub>2</sub> gas (O=16) at a pressure of 2 atmosphere and temperature of 300K?

R = 0.082 litre - atmosphere mol<sup>-1</sup> K<sup>-1</sup> 2

3.3 Determine the angle of deviation for the refraction of light rays from rarer to denser medium.  
(angle of incidence = *i*, angle of refraction = *r*) 2

**OR**

Why do the green leaves of tree appear 'green' in sunlight? 2

3.4 Give the definition of electromotive force of an electric cell in open circuit. 2

3.5 Why are the elements of group 2 of long periodic table called alkaline earth metals? 2

**OR**

Give example of a transitional element and a transuranic element. 2



3.6 What type of chemical bond is present in  $\text{NH}_3$ ? Draw Lewis electron dot diagram of  $\text{NH}_3$ .  
(The atomic number of H and N are 1 and 7 respectively)

3.7 How is ionic bond formed in sodium fluoride?  
(The atomic number of F and Na are 9 and 11 respectively)

**OR**

C has 4 electrons in its outermost shell and O has 6 electrons in its outermost shell. Draw the Lewis dot diagram of  $\text{CO}_2$  molecule.

3.8 Distinguish between naphthalene and sodium chloride by two physical properties

3.9 What is meant by strong electrolyte?

**OR**

What are meant by cathode and anode electrodes?

Group 'D'

4. Answer the following questions (alternatives are to be noted) :

4.1 Establish the combined form of Boyle's law and Charles' law.

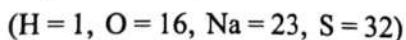
4.2 By the reaction of aluminium with 40 grams of metallic oxide and high temperature, 28 grams of the metal and 25.5 grams of aluminium oxide are produced. How many grams of aluminium are required for the reaction?

**OR**

The chemical equation for the reaction between sulphuric acid and sodium hydroxide is:



How many grams of sodium hydroxide will be required to react completely with 4.9 grams of sulphuric acid?



4.3 A light is incident from air medium on another medium. If the refractive index of this medium is 1.5 and the wavelength of light in this medium is  $4000\text{\AA}$ , what is the wavelength of light in the air medium? What is the velocity of the light in this medium?

**OR**

As a result of refraction of light through an equilateral prism the angle of deviation becomes  $40^\circ$ . If the path of the ray through the prism is parallel to the base of the prism, determine the angle of incidence at the first surface of prism.

3

- 4.4 Draw refracted rays for the incident rays which are parallel to the principal axis of a convex lens. Mark focus (F).

3

**OR**

Explain the converging action of a convex lens.

3

- 4.5 What is long-sightedness? What type of lens is used to remedy this defect?

2 + 1

- 4.6 If two electric bulbs of ratings '240V-60W' and '240V-100W' are connected in series, which one will shine brighter?

(Filaments of both the bulbs are of same material)

3

**OR**

An electric cell of internal resistance  $5\Omega$  and emf 2V is connected to a resistor of  $15\Omega$ . Determine the potential difference between the two ends of the cell.

3

- 4.7 Which energy is transformed to which energy in an electric motor? Why in domestic circuits, electric bulbs, electric fans, refrigerators etc., are connected in parallel combination?

3

- 4.8 State Ohm's law. If a potential difference of 10V is applied between the two ends of a conductor, electric current of 0.1A flows. Determine the resistance of the conductor.

2 + 1

- 9 The first three elements of group 16 of long periodic table are O, S, and Se. Arrange them in the order of decreasing atomic radius, increasing electro negativity and decreasing ionization energy.

3

- 10 What type of chemical bond is present in  $MgCl_2$ ? How are the chemical bonds formed in  $MgCl_2$ ?

(Atomic number of Mg and Cl are 12 and 17 respectively)

1 + 2

**OR**

Explain why an aqueous solution of sodium chloride is conductor of electricity but the aqueous solution of sugar or glucose is not? 3

4.11 What is electroplating ? What is the cathode in the electroplating of silver over a copper material? 2 + 1

4.12 Write the reaction occurring at the cathode in the electrolysis of acidulated water using platinum electrodes. Why is acidulated water instead of pure water used for electrolysis? 1 + 2

**OR**

Write the reactions occurring at cathode and anode in the electrolysis of the aqueous solution of  $\text{CuSO}_4$  using Cu – electrodes. What is used as anode in refining of impure copper metal by the process of electrolysis ? 2 + 1

**Group 'E'**

(For external candidates only)

5. Answer the following questions (any four) 1 × 4

5.1 What is the SI unit of calorific value of fuels?

5.2 Write down the ideal gas equation for 1 mol gas.

5.3 From which group to group 12 of long periodic table are the transitional elements located?

5.4 Which type of energy is transformed to electrical energy in a dynamo?

5.5 How many covalent bonds are present in  $\text{CHCl}_3$  molecule ?

6. Answer the following questions (any three) : 2 × 3

6.1 If two conductor wires of resistances 6 ohms and 4 ohms are connected in parallel combination, what will be the equivalent resistance of the combination?

6.2 What is meant by the principal axis of a concave lens?

6.3 Mention similarity of properties of hydrogen with two properties of group 17 elements of long periodic table.

6.4 Why fused sodium chloride can conduct electricity?