

(ENGLISH VERSION)

(New Syllabus)

(For Regular & External Candidates)

Time : Three Hours Fifteen Minutes

(First fifteen minutes for reading the question paper)

Full Marks { 90 - For Regular Candidates
100 - For External Candidates

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 of the following is not a greenhouse gas?
(a) methane (b) water vapour
(c) carbon dioxide (d) oxygen
- 1.2 Which of the following is the SI unit of pressure?
(a) Nm^2 (b) Nm^{-2}
(c) Nm (d) N

Turn Over

- 1.3 Vapour density of a gas is 32. Which of the following is its molecular weight?
(a) 8 (b) 16
(c) 32 (d) 64
- 1.4 On which of the following does the thermal conductivity of a metal depend?
(a) temperature (b) length
(c) nature of the material (d) area of cross section
- 1.5 What is the relation between the radius of curvature and the focal length of a mirror?
(a) $f=2r$ (b) $f=\frac{r}{2}$
(c) $f=\frac{r}{3}$ (d) $f=\frac{3}{2}r$
- 1.6 Which of the following colours deviates most when white light is refracted by a prism?
(a) red (b) yellow
(c) violet (d) green
- 1.7 Which of the following physical quantities represents ampere?
(a) coulomb-second (b) $\text{volt}\cdot\text{ohm}^{-1}$
(c) $\text{volt}\cdot\text{ohm}$ (d) $\text{volt}^{-1}\cdot\text{ohm}$
- 1.8 Resistivity of which of the following decreases with increase in temperature?
(a) conductor (b) semiconductor
(c) superconductor (d) insulator

1.9 Which of the following is the correct order of ionising power for α , β and γ rays?

- (a) $\alpha > \beta > \gamma$ (b) $\alpha > \gamma > \beta$
(c) $\gamma > \beta > \alpha$ (d) $\beta > \alpha > \gamma$

1.10 Which of the following has the highest atomic radius?

- (a) K (b) H
(c) Li (d) Na

1.11 In which of the following a covalent bond is present?

- (a) hydrogen chloride (b) sodium chloride
(c) lithium hydride (d) calcium oxide

1.12 Which of the following is a weak electrolyte in aqueous solution?

- (a) CH_3COOH (b) NaOH
(c) H_2SO_4 (d) NaCl

1.13 Which of the following is used to dry moist ammonia?

- (a) conc. H_2SO_4 (b) P_2O_5
(c) CaO (d) CaCl_2

1.14 Which of the following is an ore of aluminium?

- (a) bauxite (b) hematite
(c) malachite (d) chalcopyrites

1.15 Which of the following is the functional group of aldehydes?

- (a) $-\text{OH}$ (b) $-\text{CHO}$
(c) $>\text{C}=\text{O}$ (d) $-\text{COOH}$

Group 'B'

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

2.1 Fill in the blank :

In troposphere temperature _____ with increase in altitude. or

Mention one harmful effect of global warming.

2.2 Which atom, released from a chlorofluoro-carbon under the influence of UV rays, decomposes ozone into oxygen?

2.3 Write whether the following statement is true or false :

Under the same condition of temperature and pressure equal volumes of CO_2 and N_2 gas contain different number of molecules.

2.4 Write down the relation between the pressure and volume of a given mass of a gas according to Boyle's law when temperature remains constant.

- 2.5 Between apparent and real expansion coefficients of a liquid which one is its own characteristic? 1
or
What is the SI unit of thermal conductivity? 1
- 2.6 Give a natural example of dispersion of light. 1
- 2.7 Which type of lens can rectify myopic vision? 1
- 2.8 What will be the change in the motion of a Barlow's wheel if the direction of the current is reversed? 1
- 2.9 How much work has to be done when 1 coulomb of charge is taken against a potential difference of 1 volt? 1
- 2.10 From which part of a radioactive atom is β -particle emitted? 1
or
What is the atomic number of the daughter element produced if an α particle is emitted from ${}_{92}^{238}\text{U}$? 1
- 2.11 Match the right column with the left column : 1×4

2.11.1 A transition element	(a) Aluminium
2.11.2 A transuranium element	(b) Nickel
2.11.3 Reduces Fe_2O_3 at high temperature in the thermit process	(c) Tin
2.11.4 Present in the alloy bell metal	(d) Plutonium

Turn Over

- 2.12 Draw Lewis dot diagram of F_2 molecule. (F = 9) 1
- 2.13 Why the electrical conductivity of the solution produced by adding little sulphuric acid into pure water is more than the electrical conductivity of pure water? 1
or
What are the carriers of electricity in the solution during the electrolysis of an aqueous solution of an electrolyte? 1
- 2.14 Which ion migrates towards the cathode during the electrolysis of aqueous solution of CuSO_4 using Cu-electrodes. 1
- 2.15 Write down the formula of the black precipitate formed when H_2S gas is passed through an aqueous solution of lead nitrate? 1
or
What change of colour is observed when H_2S gas is passed through an acidified aqueous solution of potassium dichromate? 1
- 2.16 Two substances are used in the production of urea. One is ammonia, what is the other? 1
- 2.17 Mention one use of poly (vinyl chloride). 1
- 2.18 Write down the IUPAC name of $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$. 1
or
Write down the constitutional formula of an isomer of $\text{CH}_3\text{CH}_2\text{OH}$. 1

Group 'C'

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

3.1 What is meant by calorific value of a fuel ?
Between coal and diesel which has greater calorific value ?

3.2 If the volume of a given mass of a gas at STP is 52 m^3 what will be its volume at the pressure of 104 cmHg temperature remaining constant ?

or

What will be the volume of 8g of H_2 gas ($H=1$) at the pressure of 4 atmosphere and temperature of 300K ? ($R = 0.082 \text{ litre-atmosphere mol}^{-1} \text{ K}^{-1}$)

3.3 How does the refractive index of a medium depend on the velocity of light ?

or

What kind of mirror is used in the headlight of a car and why ?

3.4 Mention two advantages of using a CFL lamp over an incandescent lamp.

3.5 An aqueous solution of sugar cannot conduct electricity, but an aqueous solution of sodium chloride can. Why ?

or

Why is it appropriate to use the term formula weight instead of molecular weight in case of sodium chloride ?

3.6 Compare the following two properties of naphthalene and sodium chloride :
melting point and solubility in water.

3.7 Name a gas which can be prepared in Kipp's apparatus. Write the balanced chemical equation of the reaction for the preparation of the gas.

3.8 How is metallic zinc obtained from zinc oxide? Write the reaction with balanced chemical equation.

or

What happens when a piece of zinc is added to an aqueous solution of CuSO_4 ? Show with the help of electronic theory that this is an oxidation-reduction reaction.

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3.9 Show with the help of structural formula of ethylene that it is an unsaturated hydrocarbon.

or

What is denatured spirit?

Group 'D'

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

4.1 ✓ State Charles' law related to gases and represent it graphically (V vs t).

- 4.2 How many gram of ammonium sulphate will be required to prepare 6.8 g of ammonia by heating ammonium sulphate with caustic soda solution ? (H=1, N=14, O=16, S=32) 3

or

CaCl_2 , CO_2 and H_2O are produced by the reaction of dilute HCl with CaCO_3 . How many gram of HCl will be required to prepare 55.5 g of CaCl_2 , 22.0 g of CO_2 and 9.0 g of H_2O from 50.0 g of CaCO_3 ? What is the number of mole of HCl required ? (H=1, Cl=35.5) 2+1

- 4.3 What is the volume expansion coefficient of a gas at fixed pressure ? What is its value? 2+1

or

Mention two similarities between heat conduction and electrical conduction. Mention a non-metal having high thermal conductivity. 2+1

- 4.4 State the two laws of refraction of light. Write also the mathematical form of the second law. 2+1

- 4.5 In case of a concave mirror find the relationship between focal length and radius of curvature. 3

or

A ray of light passes through a prism. Show that the angle of deviation $\delta = i_1 + i_2 - A$. (Symbols have usual meaning) 3

Turn Over

- 4.6 Write Faraday's laws of electromagnetic induction. What is meant by alternating current? 2+1

- 4.7 An electric bulb of resistance 440 ohm is connected to 220 volt mains for 10 hours. Find the amount of electrical energy consumed in BOT unit. 3

or

A metal wire of resistance 6 ohm is stretched so that its length becomes double of its original length. What would be the final resistance ? 3

- 4.8 What is meant by mass defect ? What is the source of energy released in nuclear fusion ? 2+1

- 4.9 Write with an example what is meant by periodic property of elements ? Mention a property which is not periodic. 2+1

or

What is meant by electronegativity of an element? How does electronegativity of Group 1 elements of the long periodic table change from top to bottom ? 2+1

- 4.10 Which energy is responsible for the chemical reaction to occur during electrolysis? What reactions do occur at the cathode and the anode during electrolysis of acidulated water ? 1+2

4.11 Write balanced chemical equation with conditions for the industrial manufacture of SO_3 from SO_2 by the contact process. How is H_2SO_4 prepared from the SO_3 produced ? 2+1

4.12 Write balanced chemical equation of addition reaction of hydrogen with acetylene mentioning the conditions of reaction. Mention one use of LPG. 2+1

or

How would you convert ?



How is biopolymer protein biodegraded in nature ? 2+1

Group 'E'

[For External Candidates Only]

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

5.1 What is the main component of biogas ?

5.2 What is the SI unit of electric charge ?

5.3 How many elements are there in the third period of the long periodic table ?

Turn Over

5.4 What is the radioactive ray that is not made up of particles ?

5.5 What is the industrial source of CNG ?

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

6.1 What is the absolute scale of temperature ?

6.2 Mention two advantages of A.C. over D.C. ?

6.3 Write with balanced chemical equation what happens when an aqueous solution of ammonia is added to an aqueous solution of ferric chloride.

6.4 Write with balanced chemical equation what happens when methane undergoes combustion in oxygen ?

