

(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 for the candidates appearing in 2019 for the first time and for unsuccessful candidates (Continuing, Compartmental, EW and External Compartmental) who appeared in 2017 & 2018 for the first time.

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 alternatives are given as answer for each of the following questions. Write the correct ones. 1x15

- 1.1 Which among the following gases absorb long wavelength infrared radiation emitted from the earth's surface? <http://www.wbbseonline.com>

~~(a)~~ N₂ (b) O₂
(c) CH₄ (d) He

- 1.2 At STP, 2.24 L is occupied by

(a) 4.4 g CO₂ (b) 0.64 g SO₂
~~(c)~~ 28 g CO (d) 16 g O₂

[C=12, O=16, S=32]

- 1.3 How many molecules of CO₂ will be produced when 1 mole C reacts completely with 1 mole O₂?

~~(a)~~ 6.022 × 10²³ (b) 1.806 × 10²⁴
(c) 6.022 × 10²² (d) 6.022 × 10²⁴

- 1.4 For a solid, how many types of thermal expansion coefficients are there?

(a) one (b) two
~~(c)~~ three (d) four

- 1.5 Which one of the following has the highest wavelength?

(a) x-ray (b) γ-ray
(c) infrared ray ~~(d)~~ ultraviolet ray

- 1.6 In case of refraction, if the angle of incidence and the angle of refraction are 45° and 30° respectively, then the angle of deviation is

(a) 75° ~~(b)~~ 15°
(c) 7.5° (d) 37.5°

- 1.7 Temperature remaining unchanged if the potential difference between the two ends of a conductor is V and the current through the conductor is I , which of the following is true?
- (a) $V \propto I$ (b) $V \propto I^2$
(c) $V \propto I^{-1}$ (d) $V \propto I^{-2}$
- 1.8 The relation among electromotive force (V), work (W) and charge (Q) is
- (a) $Q = WV$ (b) $Q = \frac{V}{W}$
(c) $Q = \frac{V}{W^2}$ (d) $Q = \frac{W}{V}$
- 1.9 For the atom produced by β -particle emission from a radioactive atom
- (a) mass number increases
(b) atomic number increases
(c) mass number decreases
(d) atomic number decreases
- 1.10 To which group of the long periodic table do the halogen elements belong?
- (a) group 1 (b) group 16
(c) group 17 (d) group 2
- 1.11 Solid state of which of the following compounds is composed of ions?
- (a) sodium chloride (b) hydrogen chloride
(c) naphthalene (d) glucose

- 1.12 Which of the following has the highest ability to conduct electricity?
- (a) pure water
(b) aqueous solution of sugar
(c) liquid hydrogen chloride
(d) aqueous solution of acetic acid
- 1.13 In the first step of fixation of nitrogen which of the following compounds is formed as a result of lightning
- (a) NO (b) NO_2
(c) N_2O_5 (d) HNO_3
- 1.14 Which of the following is the formula of bauxite, ore of aluminium?
- (a) Al_2O_3 (b) $\text{Al}_2\text{O}_3 \cdot \text{H}_2\text{O}$
(c) $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$ (d) $\text{AlF}_3 \cdot 3\text{NaF}$
- 1.15 Which of the following is the alkyl group containing two carbon atoms?
- (a) methyl (b) ethyl
(c) propyl (d) isopropyl

Group 'B'

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

- 2.1 Write down the unit of calorific value of fuel ? 1

OR

Does the temperature increase or decrease with increase in altitude in the stratosphere? 1

2.2 Which radiation, coming from the sun, is prevented by the ozone layer from falling on the earth's surface? 1

2.3 State whether the following statement is true or false :

The volume of gas molecules is taken into consideration in Avogadro's law. 1

2.4 The product of volume and pressure of how many gram of N_2 gas is 224 litre atmosphere at STP ? [N = 14] 1

2.5 State whether the following statement is true or false:

The constituent particles of a material change position during conduction of heat through it. 1

OR

The width and the cross-section of a conductor remaining unchanged, what is the relation between the thermal resistance and thermal conductivity of that conductor ? 1

2.6 What will be the angle of incidence when a ray of light passes through the centre of curvature of a concave mirror? 1

2.7 How many rectangular surfaces are there in a prism ? 1

2.8 Give an example of semiconductor. 1
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2.9 A thin wire and a thick wire of the same conducting material have the same length. Which one of them will carry more current when connected to the same potential difference? 1

2.10 Mention one misuse of nuclear fission reaction. 1

OR

Which law explains the release of huge amount of energy in nuclear fusion? 1

2.11 Match the right column with the left column : 1×4

Left column	Right column
2.11.1 Oxide layer protects from attack by water vapour	(a) Cu
2.11.2 Group 1 element of the long periodic table having the least reducing property	(b) Be
2.11.3 When the metal remains exposed to air, the metal slowly develops green patches on its surface	(c) Al
2.11.4 Group 2 element of the long periodic table having the least atomic radius	(d) Li

2.12 Draw the Lewis dot structure of N_2 molecule. (atomic number of N is 7) 1

2.13 Which kind of electricity is used in electrolysis? 1

OR

Write down the cathode reaction in the electrolysis of acidulated water using platinum electrodes. 1

2.14 In electroplating gold on brass, what is the electrolyte used? 1

2.15 What colour is formed in the reaction of ammonia with Nessler's reagent? 1

2.16 Write down the formula of the precipitate formed when H_2S gas is passed through an aqueous solution of silver nitrate. 1

OR

Write the name of the compound which is formed by the reaction of nitrogen with magnesium metal at a high temperature. 1

2.17 What is the value of $H-C-H$ bond angle in methane? 1

OR

Write the IUPAC name of CH_3CH_2COOH . 1

2.18 What is the industrial source of CNG? 1

Group 'C'

3. Answer the following questions (alternatives are to be noted): <http://www.wbbseonline.com> 2×9

3.1 What is the concept of sustainable development? 2

3.2 1g of a gas at $7^\circ C$ and 2 atmosphere pressure occupies a volume of 410 mL. Determine the molar mass of the gas. 2
($R = 0.082$ litre atmosphere $\text{mole}^{-1} K^{-1}$)

OR

A fixed mass of gas occupies a volume of 273 cm^3 at STP. At what pressure the above gas will occupy a volume of 300 cm^3 at $27^\circ C$? 2

3.3 What is the refractive index of a medium? 2

OR

Which type of defect of vision is rectified by a convex lens? 2

3.4 Two resistances r_1 and r_2 , when connected separately to the same potential difference, it was seen that the current flowing through r_1 was six times the current flowing through r_2 . Determine the ratio of r_1 and r_2 . 2

3.5 How did Kossel explain the formation of ionic bond? 2

OR

Liquid hydrogen chloride cannot conduct electricity, but molten sodium chloride can conduct electricity.—Explain. 2

3.6 Distinguish between sodium chloride and naphthalene by two physical properties. 2

- 3.7 Between two aqueous solutions, one is ferric chloride and the other is aluminium chloride. How would you identify the ferric chloride solution using aqueous solution of ammonia? Answer with balanced chemical equation. 2

- 3.8 Why zinc blende can be called both mineral and ore of zinc? 2

OR

Mention two ways of preventing rusting of iron. 2

- 3.9 Write with balanced chemical equation what happens when methane is burnt in oxygen. 2

OR

Mention one use of each of acetic acid and ethyl alcohol. 2

Group 'D'

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

- 4.1 What is meant by molar volume of a gas? Mention two reasons for deviation of real gases from the behaviour of ideal gases. 1+2

- 4.2 How many gram of Al is required to prepare 558 g of Fe by the reduction of Fe_2O_3 with Al at high temperature? How many mole of Fe_2O_3 will be required in the reaction? 2+1

[Fe = 55.8, Al = 27, O = 16]

OR

By heating 32.1 g ammonium chloride with calcium hydroxide 10.2 g NH_3 , 33.3 g CaCl_2 , and 10.8 g H_2O are obtained. How many gram of calcium hydroxide takes part in the reaction? How many mole of NH_3 , and how many litre of NH_3 at STP are formed in the reaction? (N=14, H=1) 1+2

- 4.3 Which quantities remain fixed in the definition of volume expansion coefficient of a gas? Name a non-metal which is a good conductor of heat. 2+1

OR

What is meant by 'linear expansion coefficient of copper is $17 \times 10^{-6}/^\circ\text{C}$ '? Why does the value remain the same even in kelvin scale? 2+1

- 4.4 What type of mirror is used by the dentists? Why a ray of light does not deviate as a result of refraction through a glass slab? 1+2

- 4.5 When an object is placed 20 cm away from a convex lens, no image is obtained on either side of the lens. What is the focal length of the lens? If the refractive index of glass with respect to air is 1.5, what is the refractive index of air with respect to glass? 2+1

OR

The length of an object is 5 cm. An image of length 10 cm is obtained when it is placed at a distance of 2 cm in front of a convex lens. What is the linear magnification and image distance? 1+2

4.6 Write in brief the basic principle of hydroelectric power generation. 3

4.7 A current of 1A flows when an electric bulb is connected to 220 V mains. What would be the current when the same bulb is connected to 110 V mains ? 3

OR

Find the ratio of resistances for two bulbs of 220V-60W and 110V-60W. 3

4.8 Explain why a new element is formed by α -particle emission but no new element is formed by γ -ray emission from a radioactive element. 2+1

4.9 Write down Dobereiner's law of triads. Arrange Cl, Br, I, F in increasing order of their oxidising power. 2+1

OR

What is the important conclusion of Moseley's experiment? What is the importance of this conclusion in regard to periodic table ? 2+1

4.10 Write two differences between the conduction of electricity through a metallic wire and an electrolyte during electrolysis. 5

In electrolytic refining of copper metal, impure copper rod is used as which electrode ? 2

4.11 Write the names of the chemicals used and balanced chemical equation in the industrial production of urea. 3

4.12 (A) and (B) are two unsaturated hydrocarbons, each containing 2 carbon atoms. On reaction with bromine, (A) adds one molecule of bromine per molecule and (B) adds two molecules of bromine per molecule. Write structural formula of (A) and (B). Write balanced chemical equation of reaction of (B) with bromine. 2+1

OR

Write balanced chemical equation of the reaction of sodium hydroxide with acetic acid.

Which one between jute and polyethene is environment friendly for packaging and why? 1+2

Group 'E'

[For External Candidates Only]

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

5.1 Give an example of a non-conventional energy with the help of which electricity can be generated.

5.2 Write the SI unit of electric power.

5.3 Which acid is manufactured utilising catalytic oxidation of ammonia ?

5.4 At STP an ideal gas occupies a volume of 273 cm^3 . What volume will the gas occupy at 76 cmHg pressure and at a temperature of 273°C ?

5.5 What is the functional group present in ethyl alcohol ?

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

6.1 What is a superconductor?

6.2 Mention one use of each of ultraviolet ray and gamma ray. <http://www.wbbseonline.com>

6.3 Write the name and formula of one ore of iron.

6.4 Write mentioning the product, how polymerisation reaction of ethylene is carried out.

