

PHYSICAL SCIENCE
NEW SYLLABUS

Time : 3 Hours 15 Minutes
(First 15 minutes for reading the question paper only)

Full Marks : 90 for Regular Candidates
100 for External Candidates

Group - A

1. MCQ type question (All questions are compulsory): 1 × 15 = 15

Each of the following questions has four alternatives. Write the correct one.

1.1 Which one of the following does not deplete ozone layer?

- (a) NO (b) N₂O (c) CO₂ (d) CFC

MCQ Model Answer :

1.1.(c) CO₂

1.2 Which of the following is equal to 290K?

- (a) 30°C (b) 17°C (c) 0°C (d) 27°C

1.3 The molecular weight of methane is 16, which of the following is its vapour density?

- (a) 22.4 (b) 8 (c) 16 (d) 32

1.4 Which of the following has the highest thermal conductivity (in cal.cm⁻¹ s⁻¹ K⁻¹ unit)?

- (a) Copper (b) Gold (c) Iron (d) Diamond

1.5 For which angle of incidence deviation is minimum during refraction of light from lighter to denser medium?

- (a) 60° (b) 0° (c) 90° (d) 45°

1.6 Which pair of the following is the two terminal colours in pure spectrum of white light?

- (a) Red and violet (b) Red and green (c) Violet and orange (d) Blue and indigo

1.7 Which one of the following is the unit of electric charge?

- (a) volt (b) coulomb (c) ohm (d) watt

MCQ Model Answer :

1.7.(b) coulomb

- 1.8 What will be the equivalent resistance where two resistances of 3 ohm and 6 ohm are connected in parallel combination?
(a) 3 ohm (b) 4 ohm (c) 2 ohm (d) 1 ohm
- 1.9 Which of the following is the correct order of decreasing power of ionising of gas? (α , β , γ are radioactive rays)
(a) $\alpha > \beta > \gamma$ (b) $\gamma > \beta > \alpha$ (c) $\alpha > \gamma > \beta$ (d) $\gamma > \alpha > \beta$
- 1.10 Which one of the following is not a transition element ?
(a) Fe (b) Co (c) Ca (d) Cr
- 1.11 Which one of the following is an ionic compound ?
(a) HCl (b) CH₄ (c) MgCl₂ (d) NH₃
- 1.12 Which of the following is a weak electrolyte ?
(a) CuSO₄ (b) KOH (c) H₂SO₄ (d) CH₃COOH
- 1.13 Which of the following gases can be prepared by Kipp's apparatus ?
(a) N₂ (b) H₂S (c) HCl (d) NH₃
- 1.14 Hematite is the one of which of the following metals ?
(a) Copper (b) Aluminium (c) Iron (d) Zinc.
- 1.15 Which of the following functional groups is present in ethyl alcohol ?
(a) — CHO (b) >C=O (c) — COOH (d) — OH

Group- B

2. Answer the following questions (Alternatives are to be noted): 1 × 21 = 21

2.1 In which layer of atmosphere do storm and rain occur?

or

What are the bacteria called which decompose biomass to methane in biogas plant?

2.2 Fill up the blank:

In stratosphere temperature _____ with increase in altitude.

2.3 What is the temperature in $^{\circ}\text{C}$ at which volume of a gas will be zero at constant pressure according to Charles' law?

2.4 A gas at fixed temperature is kept in a closed vessel . Some more amount of the same gas is added to the vessel without altering the temperature. What will be the change in pressure?

2.5 What is the SI unit of coefficient of linear expansion of a solid ?

or

Write down the relation among the linear, surface and volume expansion coefficients of a solid.

2.6 What type of spherical mirror is used in the headlight of cars?

2.7 Where will the image be formed when an object is placed at the focus of a convex lens?

2.8 Define the resistance of a conductor according to Ohm's law.

2.9 What is the SI unit of resistivity?

2.10 From which part of an atom the radioactive rays emanate?

or

Name a positively charged radioactive particle.

2.11 Match the right column with the left:

Left Column	Right Column
2.11.1 The most electronegative element of group 17	i) Zn
2.11.2 An alkaline earth metal	ii) Sn
2.11.3 A metal which can be prepared by the carbon reduction of its oxide.	iii) F
2.11.4 Present in bronze	iv) Mg

- 2.12 Which type of electricity is used in electrolysis?
2.13 What is used as electrolyte in the electroplating of gold over silver?

or

Write whether the following statement is true or false:

During electrolysis electrolytes conduct electricity through electrons.

- 2.14 Write the formula of the precipitate when an aqueous solution of ammonia is added to the aqueous solution of ferric chloride?

or

What is liquor ammonia?

- 2.15 What change of colour is observed when a few drops of aqueous solution of sodium nitroprusside is added to an aqueous solution of hydrogen sulphide made alkaline with NaOH solution?
2.16 Write whether the following statement is true or false:
aqueous solution of glucose can conduct electricity.
2.17 Write the IUPAC name of the following compound:



- 2.18 Which gas is liberated when NaHCO_3 is added to acetic acid?

or

Write down the formula of the organic compound produced in the first step in the substitution reaction of methane with chlorine.

Group - C

3. Answer the following questions (Alternatives are to be noted): $2 \times 9 = 18$
3.1 Write two harmful effects of depletion of ozone layer on human health and environment.

- 3.2 The volume of a gas at 300K temperature and 760mmHg of pressure is 300cm³.
What is the volume of the gas at STP ?

or

Find out the volume of 2.2g of CO₂ at a temperature of 300K and 570 mmHg of pressure. (C=12, O = 16) (R= 0.082L atm K⁻¹ mol⁻¹)

- 3.3 Write the laws of refraction of light
- 3.4 How does resistance depend on length and cross-section of a conductor?

or

Write down Fleming's left hand rule.

- 3.5 Draw Lewis - dot diagram of carbon dioxide.

or

Show with an example that an ionic compound can be formed even when its ions have no filled octet.

- 3.6 Compare two properties of ionic and covalent compounds.
- 3.7 Write the condition and balanced chemical equation of the reaction for preparation of ammonia gas in the laboratory.

or

Show that H₂S is a reducing agent with the help of a chemical reaction.

- 3.8 Write with example the difference between mineral and ore.
- 3.9 Write the names of monomers of PVC and teflon.

or

Write constitutional formulas of two organic compounds having the same molecular formula C₂H₆O.

Group -D

4. Answer the following questions (Alternatives are to be noted): $3 \times 12 = 36$

4.1 Establish the combined form of Charles' and Boyle's law. 3

4.2 How many gram of ferrous sulphide will be required to prepare 1.7 g of hydrogen sulphide gas by the reaction of ferrous sulphide with dilute sulfuric acid?
(Fe = 56, S= 32, H=1) 3

or

Metallic zinc and carbon monoxide are produced when zinc oxide is heated with carbon. How many gram of carbon will be required to produce 31.785g of zinc and 14.000g of carbon monoxide from 40.685g of zinc oxide? How many mole of carbon monoxide is produced in the reaction? (C=12, O=16) $2 + 1=3$

4.3 What is meant by coefficient of thermal conductivity of a substance ?
Establish the relation between CGS and SI units of it. $1 + 2=3$

4.4 What is meant by focus of a lens?
What is hypermetropia? Which lens is used for its remedy? $1 + 2=3$

4.5 Prove that $\delta = i_1 + i_2 - A$ in case of refraction light through a prism. 3
(The symbols has usual meaning)

or

If the refractive index of a medium for red and violet light are μ_r & μ_v respectively prove that $\mu_r < \mu_v$

4.6 State Joule's law of heating effect of current. 3

4.7 When an electric lamp is connected to 220 V mains 1 ampere of current flows.
What will be the current when the lamp is connected to 110V mains?

or

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

- 4.8 What is radioactivity?
Write down two uses of radioactivity. 1 + 2=3
or
When a radioactive atom emits an α - particle how are atomic number and mass number changed in the daughter atom?
By the emission of which radioactive ray from a radioactive atom, the atomic number remains unchanged ? 2 + 1=3
- 4.9 What is meant by ionization energy of an element?
Arrange Li, Na, and K in increasing order of their ionization energy. 2 + 1=3
- 4.10 Mention the following points in case of electrorefining of copper:
i) electrodes used and the electrolyte
ii) the chemical reaction occurring at the electrodes 3
- 4.11 In the laboratory preparation of nitrogen, why instead of heating directly a concentrated aqueous solution of ammonium nitrite, a mixed aqueous concentrated solution of ammonium chloride and sodium nitrite mixed in equimolar proportion is heated ? Answer with balanced chemical equations. 3
or
Write with condition and balanced chemical equation how urea is industrially prepared. 3
- 4.12 C_2H_6 is called a saturated hydrocarbon, but why is C_2H_4 called an unsaturated hydrocarbon ? 3
or
How will you convert $HC \equiv CH \rightarrow Br_2CHCHBr_2$? 2 + 1=3
Mention one use of CNG.

Group -E

(For external candidates only)

5. **Answer any four of the following questions:** 1 × 4=4
- 5.1 Equal number of helium and hydrogen atoms are kept in two similar jars at same temperature. What will be the ratio of their pressure ?

- 5.2 What property of light is utilized to form an image by a lens ?
- 5.3 What type of energy transfer takes place in a dynamo ?
- 5.4 What is the non-metallic component present in stainless steel ?
- 5.5 Write the name of the compound which is formed by the reaction of nitrogen with red-hot magnesium.

6. Answer any three of the following questions: 2 × 3=6

- 6.1 What is meant by renewable energy source ?
Give an example.
- 6.2 Three resistors R_1 , R_2 , R_3 are connected in parallel combination with a cell. Find the relation between the currents I_1 , I_2 , I_3 flowing through them.
- 6.3 Give an explanation of diffusion of gases.
- 6.4 What is bio-degradable polymer? Give an example.