

Madhyamik 2013  
Bifurcated & Combined Syllabus  
Physical Science

(ENGLISH VERSION)

(Bifurcated Syllabus)

(For Regular and External Candidates)

Time : 3 Hours 15 Minutes

: Full Marks : 90 (for Regular Candidates)

100 (for External Candidates)

(First fifteen minutes for reading the question paper)

Group 'A' is compulsory. Answer ten questions from Groups 'B', 'C' and 'D' taking at least two from Group 'B' and at least three from each of the Groups 'C' and 'D'. Besides this only the External Candidates will answer Group 'E'.

Figures in the margin indicate full marks for each question.

Group 'A'

1. Give very short answers to any ten questions. 1x10

1.1 What is the term used to express the sum of the number of neutron and proton present in an atom of an element ?

1.2 What is the value of freezing point of water in absolute scale of temperature at standard pressure ?

1.3 What is the mass in gram of 2.24 litre of CO<sub>2</sub> at STP ? (C = 12, O = 16)

1.4 The number of which particle is different between  ${}^6_{12}\text{C}$  and  ${}^6_{13}\text{C}$  ?

1.5 What is the SI unit of thermal capacity ?

1.6 What will be the position of the object with respect to a convex lens when it is used as a magnifying glass ?

1.7 Mention the use of an ammeter.

1.8 The stream of which particle is β-ray ?

1.9 How many more elements are there in the second period of the Mendeleef's periodic table than those of the First period ?

1.10 Which acid is used in the laboratory preparation of nitric acid from sodium nitrate ?

1.11 By which type of chemical bond does carbon combine with hydrogen to form methane ?

1.12 Which metal is present in both the alloys—brass and bronze ?

1.13 Write the molecular formula of the alkyne which contains three carbon atoms.

Group 'B'

2.1 Write three postulates of Dalton's atomic theory. 3

2.2 What is nucleus of an atom ? What is nuclear force ? 3

2.3 State Boyle's law related to gas. 2

3.1 The number of which two particles does remain equal in the ions, K<sup>+</sup> and Cl<sup>-</sup>, formed by  ${}^{39}_{19}\text{K}$  and respectively ? 2

3.2 Write the equation formed by combining Boyle's law and Charles' law. What do the symbols used in this equation indicate ? 4

3.3 Both the pressure and the volume are doubled when a definite mass of a gas at 0°C is heated. What will be final temperature of the gas ? 2

4.1.1 What is standard pressure ?

4.1.2 What is Kelvin scale ? 2+2

- 4.2 What are the effects of increase and decrease of temperature on the motion of gas molecules ? 2
- 4.3 Why are pressure and temperature to be indicated when the volume of a definite mass of gas is mentioned ?  
2
- 5.1 Define mole. 2
- 5.2 What is called Avogadro's number ? What is its value ? 2+1
- 5.3 How many gram of hydrogen will be produced by the reaction of 32.7 gram of zinc with excess of dilute sulfuric acid ? (Zn=65.4, H = 1) 3

Group 'C'

- 6.1 Write three differences between heat and temperature. 3
- 6.2 What are the factors on which quantity of heat gained or lost by a body depend ? 3
- 6.3 What is water equivalent of a body ? 2
- 7.1 What is fundamental interval of a thermometer ? 2
- 7.2 Why is a convex lens called converging lens ? How can a real and magnified image be formed by a convex lens ? 2+2
- 7.3 What is focal length of a convex lens ? 2
- 8.1 Mention two differences between a convex lens and a concave lens. 2
- 8.2.1 What is dispersion of light ?
- 8.2.2 Mention two differences between pure spectrum and impure spectrum. 2+2
- 8.3 Write two differences between electromotive force and potential difference. 2
- 9.1 Write the SI unit of each of electric current, potential difference and resistance. 3
- 9.2 Several resistances are connected in a circuit either in series or in parallel combination. How would you ascertain by simple observation the type of combination by which they are connected ? 2
- 9.3 State Joule's laws relating to the heating effect of current. 3
- 10.1 Write the names of two instruments used in our daily life where heat is produced due to flow of current. 2
- 10.2 What is an electromagnet ? Write its two uses. 2+2
- 10.3 What is kilowatt hour ? 2
- 11.1 What effects on the rotation of Barlow's wheel are observed when (a) the current is increased, (b) positions of the polos of the magnet are reversed ? 2
- 11.2.1 Write two uses of X-ray.
- 11.2.2 Write the name of a natural radioactive element. 2+1
- 11.3.1 Mention one use of diode.
- 11.3.2 What is called nuclear fusion ? 1+2

Group 'D'

- 12.1 If the electronic arrangement of two elements A and B are K (2) L (7) and K (2) L (8) M (2) respectively, then complete the following table:

Element	Position in the Mendeleef's periodic table		Valency	Metal / non-metal
	Period	Group		
A				
B				

- 12.2 What will be the formula of the compound if A and B mentioned above combined to form it ? By what type of chemical bond the compound will be formed ? 2

12.3 Give definition of oxidation and reduction on the basis of electronic theory. 2

13.1 How is  $\text{SO}_3$  prepared from  $\text{SO}_2$  in the contact process for the manufacture of sulfuric acid ? Give the balanced equation of the reaction along with conditions. How is sulfuric acid prepared from the  $\text{SO}_3$  produced ? 4

13.2 How will you prove that concentrated  $\text{H}_2\text{SO}_4$  is a strong dehydrating agent ? Give equation. 1+1

3.3 What are used as electrolyte and as cathode in the electroplating of copper on iron ? 1+1

14.1 Give definition of electronegativity. 2

14.2 Give definition of an ore. Choose one ore of each of iron and magnesium from the following list :

bauxite, red haematite, cryolite, carnalite, calamine, chalcopyrites. 2+2

14.3 Write the name of one inorganic and one organic fertilizer. 2

15.1 Match Column 'B' with Column 'A' (Two extras are given in Column 'B') :

Column 'A'	Column 'B'
(i) Functional group present in acetic acid	(a) $\text{CH}_2 = \text{CH}_2$
(ii) The compound used in the ring test of nitric acid	(b) $\text{BaCl}_2$
(iii) The compound used in the identification of sulfuric acid	(c) $\text{AgNO}_3$
(iv) One greenhouse gas	(d) $\text{FeSO}_4$
(v) The compound formed by partial hydrogenation of acetylene	(e) $\text{NO}_2$
(vi) The air polluting gas produced by the reaction of Cu with concentrated $\text{HNO}_3$	(f) $-\text{COOH}$
	(g) $\text{CH}_4$
	(h) $-\text{CHO}$

15.2 Write the names of two mineral acids present in acid rain. Mention one harmful effect of acid rain. 2+1

15.3 Mention one use of each of methylated spirit and bleaching powder. 2

16.1 Give examples :

(i) substitution reaction of methane

(ii) oxidation reaction of nitric acid. 2+2

16.2 Arrange Br, F, I, Cl in the (i) descending order of non-metallic property and (ii) ascending order of atomic size. 2

16.3 What is the monomer of PVC ? Mention one use of PVC. 2

17.1 Give examples of two organic compounds whose molecular formula is same but properties are different. What is the relation between them ? 3

17.2 Write with equation what happens when bromine reacts with ethylene. Mention one use of ethylene. 2+1

17.3 write the balanced equation what happens in the reaction of iron with dilute hydrochloric acid. 2