

M. SC. (ANALYTICAL CHEMISTRY) / M. SC. (ORGANIC CHEMISTRY) / M. SC. (INORGANIC CHEMISTRY) SEM-I
(CHOICE BASED CREDIT & GRADE SYSTEM) : SUMMER -
2018

SUBJECT: INORGANIC CHEMISTRY-I

Day: Thursday
Date: 12/04/2018

Time: 03.00 PM TO 06.00 PM
Max. Marks: 60

S-2018-0868

N.B:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable **CALCULATOR** is allowed.
- 4) Chemical equations and neat diagrams must be drawn **WHEREVER** necessary.
- 5) Answers to both the sections should be written in the **SEPARATE** answer books.

SECTION-I

Q.1 Answer **ANY THREE** of the following: (15)

- a) Define an atomic orbital and give the four quantum numbers for its designation.
- b) Explain Heisenberg principle of uncertainty.
- c) Define bond energy. How it is related to bond strength?
- d) Derive an expression for the particle moving in a three dimensional box.
- e) Illustrate the geometry of the following molecules.
i) C.Cl_4 ii) PF_5 iii) XeOF_4

Q.2 A) Answer **ANY TWO** of the following: (10)

- i) Give one important application of Born-Haber cycle with the help of a suitable example.
- ii) Summarize VSEPR rules. How are they useful in the study of stereo chemistry?
- iii) Explain the use of any **ONE** of the following techniques in the study of molecular structure.
a) Infrared spectroscopy b) Magnetic susceptibility measurement
c) X-ray diffractometric

B) Solve **ANY ONE** of the following: (05)

- i) Calculate the wave length associated with an electron whose kinetic energy is given as 3.75×10^{-27} ergs:

(Given: Mass of electron: 9.1×10^{-28} g)

- ii) Find the number of 'Bond Pairs' and 'Lone Pairs' of electrons in any **TWO** of the following molecules.
a) CO b) NH_3 c) SF_6

P.T.O.

SECTION-II

Q.3 Answer **ANY THREE** of the following: **(15)**

- a) What do you mean by zero group elements? Why these elements called as Noble gases?
- b) Discuss the bonding in following compounds.
 XeF_2 , XeF_4 and XeF_6 using V.B. Theory.
- c) Define n-type and p-type semiconductors. Explain them with suitable examples.
- d) What is band theory? Explain the band theory with respect to sodium metal.
- e) Write a note on “Frankel defects”.

Q.4 Answer **ANY THREE** of the following: **(15)**

- a) Define ‘PON’ polymers. Write any three methods of preparation of ‘PON’ polymers. Write important uses of ‘PON’ polymers.
- b) “Iodine shows metallic character while fluorine shows non-metallic character”. Explain the statement.
- c) Define and explain in brief the following terms:
 - i) Insulator
 - ii) Semiconductor
 - iii) Conductor
 - iv) Valence band
 - v) Conduction band
- d) What do you mean silicones? How silicones are prepared “Give any two methods of preparation of silicones. Write their properties”.
- e) Write a note on- “Pseudohalogens”.

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