

M. SC. (ANALYTICAL CHEMISTRY) / M. SC. (ORGANIC CHEMISTRY) / M. SC. (INORGANIC CHEMISTRY) SEM-I
(CHOICE BASED CREDIT & GRADE SYSTEM) : WINTER -
2017

SUBJECT: INORGANIC CHEMISTRY-I

Day: Thursday
Date: 26/10/2017

W-2017-0768

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

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) Write the Schrodinger's wave equation and explain the significance of each term in it.
- b) Explain the Pauli's Exclusion principle.
- c) Write a short note on bond multiplicity.
- d) Write the assumptions of Valence Bond Theory.
- e) Compare atomic orbitals with molecular orbitals giving similarities and differences.

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

- i) Define lattice energy and describe any one method for its determination.
- ii) What is hybridization? Explain sp^3 hybridization.
- iii) Explain the use of any **ONE** of the following:
 - a) Near IR and Far IR spectroscopy
 - b) Dipole moment
 - c) Electronic spectroscopy

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

- i) Write four quantum numbers of the 'last electron' going into the fluorine atom ($Z=9$).
- ii) A particle of mass 20g is confined to a three dimensional box having the dimensions $a = 2.5 \text{ \AA}$, $b = 1 \text{ \AA}$ and $c = 2.5 \text{ \AA}$, Calculate the energy associated with the particle provided that its quantum numbers are $n_x = 2$, $n_y = 1$ and $n_z = 2$
(Given: $h = 6.26 \times 10^{-27} \text{ erg sec}$).

P.T.O.

SECTION-II

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

- a) Explain the band theory of metal with respect to sodium metal.
- b) What are pseudohalogens? Compare the properties of pseudohalogens and halogens.
- c) Write the merits and demerits of organic and inorganic polymers.
- d) Define and explain polyhalides. Explain the structures of following polyhalides.
i) ICl_2 ii) I_3^{-1} iii) IBr^{-1}
- e) Write a note on – “Applications of silicones”.

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

- a) What is an insulator and a conductor? Explain why diamond is an insulator while graphite a good conductor of electricity?
- b) What are clathrate compounds? Discuss the clathrate compounds of Noble gases.
- c) Discuss why HF is weak acid while HI is stronger acid.
- d) What are n-type and p-type semiconductors? Explain each type with suitable examples.
- e) Write a note on- “phosphonitrilic- compounds”.

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