



M 6558



Reg. No. : .....

Name : .....

**II Semester B.Sc. Degree (CCSS – Reg./Supple./Improv.)**  
**Examination, May 2014**  
**CORE COURSE IN CHEMISTRY**  
**2B03 CHE : Theoretical and Inorganic Chemistry**

Time: 3 Hours

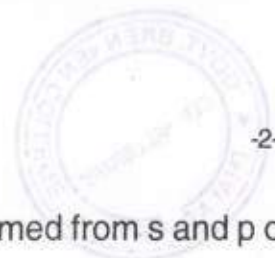
Max. Weightage: 25

**SECTION – A**

Answer **all** questions. **Each** bunch of **four** questions carries a weightage of **1**.  
Choose the correct answer :

1. i) In Bohr's theory each orbit is associated with a definite energy called
    - a) Photon
    - b) Kinetic energy
    - c) Quanta
    - d) Velocity
  - ii) The conclusion that every additional electron enters the orbital with lowest possible energy has been drawn from
    - a) Pauli's exclusion principle
    - b) Hund's rule
    - c) Aufbau principle
    - d) de Broglie equation
  - iii) In Schrodinger wave equation ' $\psi$ ' represents
    - a) Orbit
    - b) Wave function
    - c) Wave
    - d) Radial probability
  - iv) The orbital configuration of  ${}_{24}\text{Cr}$  is  $3d^54s^1$  the number of unpaired electron in  $\text{Cr}^{3+}(\text{g})$  is
    - a) 3
    - b) 2
    - c) 1
    - d) 4
2. i) Which of the following is an ionic compound ?
    - a)  $\text{SO}_3$
    - b)  $\text{ICI}$
    - c)  $\text{KI}$
    - d)  $\text{LiH}$
  - ii) Which of the bonds will have directional character ?
    - a) ionic bond
    - b) metallic bond
    - c) covalent bond
    - d) both c) and b)

P.T.O.



- iii) A hybrid orbital formed from s and p orbital can contribute to
- a  $\sigma$  bond only
  - $\pi$  bond only
  - either  $\sigma$  or  $\pi$  bond
  - none of the above
- iv) Which of the following molecule has the highest dipole moment ?
- $\text{BF}_3$
  - $\text{NH}_3$
  - $\text{NF}_3$
  - $\text{B}_2\text{H}_6$
3. i) Which of the following molecule has the shortest C-H bond ?
- Ethene
  - Ethane
  - Ethyne
  - Methane
- ii) Which of the following species have intra molecular hydrogen bond ?
- phenol
  - o-nitro phenol
  - p-nitro phenol
  - nitro ethane
- iii) In which of the following molecule the van der Waals' force is likely to be the most important in determining the m.pt and b.pt ?
- $\text{CO}_2$
  - $\text{H}_2\text{S}$
  - $\text{Br}_2$
  - $\text{HCl}$
- iv) Iodine is a
- Molecular solid
  - Ionic solid
  - Metallic solid
  - Covalent solid
4. i) The nuclear radius as compared to the atomic radius is of the order
- $10^{-2}$
  - $10^{-4}$
  - $10^{-6}$
  - $10^{-8}$
- ii) An isotope of  $^{231}\text{Th}$  can be converted into  $^{227}\text{Th}$  by the emission of
- one  $\alpha$ -particle
  - one  $\beta$ -particle
  - two  $\alpha$  and one  $\beta$  particle
  - one  $\alpha$  and two  $\beta$  particle
- iii) The isotopic mass of  $^{238}_{92}\text{U}$  is 238.15 amu. its packing fraction is
- 5.25
  - 0.125
  - 12.5
  - 1.25
- iv) In a neutron induced reaction of  $^{235}_{92}\text{U}$ , the product obtained is  $^{95}_{37}\text{Rb}$ , three neutrons and an element. The other new element is
- $^{138}_{55}\text{Cs}$
  - $^{140}_{56}\text{Ba}$
  - $^{144}_{54}\text{Xe}$
  - $^{90}_{38}\text{Sr}$
- (Weightage :  $4 \times 1 = 4$ )



## SECTION - B

Answer **any 5** questions. **Each** carries a weightage of **1** :

- What is de Broglie concept ?
- What is Hund's rule ?
- Write down the configuration of penultimate shell of Francium ( $Z = 87$ ).
- Write the diagrammatic representation (Lewis diagram) showing the outer electron dots of NaCl formation.
- What is the shape and hybridization of  $\text{SF}_6$  ?
- Draw the formation of  $\text{NH}_4^+$  ion.
- Calculate the bond order of carbon molecule.
- Define mass defect.

(Weightage :  $5 \times 1 = 5$ )

## SECTION - C

Answer **any 4** questions. **Each** carries a weightage of **2** :

- Explain Zeeman effect.
- Write down the structure and hybridisation of  $\text{CH}_4$ .
- Draw the M.O. diagram of  $\text{N}_2$ .
- Explain Born-Lande equation.
- Explain stellar energy.
- The half-life period of radioactive Actinium is 19.5 days. In how much time will a gram of pure element lose 1 centigram ?

(Weightage :  $4 \times 2 = 8$ )

## SECTION - D

Answer **any 2** questions. **Each** carries a weightage of **4** :

- Describe stern Gerlac experiment.
- State and explain Fajan's rule.
- Explain nuclear liquid drop model.

(Weightage :  $2 \times 4 = 8$ )