Roll No. ..... Total Pages : 3

300105

Dec., 2018

B.Tech. Ist Semester

CHEMISTRY

(BSC-102)

Time : 3 Hours] [Max. Marks : 75

Instructions :

(i) It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.

(ii) Answer any four questions from Part-B in detail.

(iii) Different sub-parts of a question are to be attempted adjacent to each other.

PART–A

1. (a) What is the significance of Ψ and Ψ^2. (1.5)

(b) What are the intrinsic & extrinsic semiconductors? (1.5)

(c) What is hypsochromic shift? (1.5)

(d) What do you mean by IR active molecule? (1.5)

(e) What is dipole- induced dipole interactions? (1.5)

(f) Define critical temperature. (1.5)

(g) What does an Ellingham diagram signifies? (1.5)

(h) Differentiate between hard and soft acids? (1.5)

(i) Differentiate between enantiomers and diastereomers. (1.5)

(j) Define Walden Inversion. (1.5)

PART–B

(a) Derive the expression for E and Ψ for a particle in 1-D box. (5)

(b) Draw and explain molecular orbital diagram of O_2. Compare its bond order and magnetic properties with O_2^+, O_2^-, O_2^{-2}. (5)

(c) Briefly discuss crystal field splitting in tetrahedral complexes. (5)

5. (a) Explain the theory of UV-visible spectroscopy and various types of electronic transitions. (7)

(b) Write a short note on following:-

(i) Chemical Shift.
(ii) Beer-Lambart's Law.
(iii) Fundamental Vibrations and overtones.
(iv) Fluorescence. (2×4)

6. (a) Derive Van der Wall's equation for real gases and extend the derivation to critical phenomenon. (8)

(b) Write a short note on PES diagrams. Elaborate saddle point and mountain pass in a potential energy surface diagram. (7)

5. (a) Briefly explain polarization and polarizibility. Discuss the factors influencing polarizability and consequences of polarizability. (5)

(b) What do you understand by electronegativity? Explain its variation across the periodic table. How it effect other properties of elements / molecules? (5)

(c) Discuss the geometry of ClO_3^- and PCl_5. (5)

6. (a) What are optical active compounds? Discuss the essential conditions for optical isomerism, elaborate with example. (5)

(b) Discuss stereoisomerism in transitional metal compound with suitable examples. (5)

(c) Draw and discuss energy diagram for different conformational isomers of butane. (5)

7. (a) Explain elimination reaction with detailed mechanism by taking suitable example along with rules governing major product formation. Describe how elimination reaction competes with substitution reaction. (8)

(b) Give synthesis of an antihistamine and antipyretic drug. (7)