Roll No. .....

3006

B. Tech. 1st Semester (Common for All Branches) Examination – March, 2021

CHEMISTRY – I

Paper : BSC-CH-101-G

Time : Three Hours] *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt ***five*** questions in all, selecting ***one*** question from each Section. Question No. 1 is ***compulsory***. All questions carry equal marks.

1. (a) Why electron affinity of fluorine is less than chlorine ?

(b) Define rearrangement reactions. Give at least *two* examples.

(c) Calculate the effective nuclear charge experienced by 4s orbital of zinc atom.

(d) What is the effect of solvent polarity on various transitions in UV spectroscopy ?

(e) Give significance of Vander Waal's constants a and b.

(f) Write a short note on hardness of water.

$2.5 \times 6 = 15$

SECTION – I

2. (a) Define electron affinity. Why successive electron affinities have negative values ? 3

(b) Define Vander Waal's radii. Why they are larger than covalent radii ? 3

(c) What is ionization energy ? What are the factors on which it depends ? 3

(d) Write short notes on (i) role of doping on band structures and (ii) crystal field theory. 6

3. (a) Write brief notes on polarisability and electro-negativity. 4

(b) Draw energy level diagram for *NO* molecule. Predict its bond order. 4

(c) Explain why the size of a cation is always smaller while that of an anion is always larger than the size of corresponding atom ? 3

(d) What are normal and orthogonal wave functions ? Give an expression for Schrodinger wave equation. 4

SECTION – II

4. (a) Define distereoisomerism, meso compounds and tautomers with examples. 6

(b) Can optical isomerism be possible in a compound having no chiral carbon. Explain giving *two* suitable examples. 2

(c) What are elimination reactions ? What are its types ? Give *one* example of each. 4

(d) Give the method of synthesis of Aspirin. 3

5. (a) Explain the following with examples :

(i) Electrophilic substitution reactions 4

(ii) Chiral carbon atom 2

(iii) Metamerism 2

(iv) Enantiomers 2

(v) Difference between an intermediate and transition state 2

(b) Give the method of synthesis of Paracetamol. 3

SECTION – III

6. (a) What are critical constants ? Explain the methods for the measurement of critical constants. 5

(b) Derive the following : (i) Vander Waal's equation and (ii) Relation in between Boyle's temperature and Vander Waal's constants. 6

(c) Explain Zeolite process for water softening. 4

7. Write Short notes on : $3 \times 5 = 15$

(i) Ion Exchange Process

(ii) Measurement of Hardness of water by EDTA method

(iii) Soil Corrosion

(iv) Stress Corrosion

(v) Mechanism of Dry corrosion

SECTION – IV

8. (a) Explain the principle & applications of IR Spectroscopy. What is the importance of finger print region in this technique ? 7

(b) Describe principle and applications of NMR and MRI. 8

9. (a) What is flame photometry ? Describe its applications and drawbacks. 7

(b) Explain the following : $2 \times 4 = 8$

(i) Lambert-Beer's law

(ii) Hypochromic and Hypsochromic shift

(iii) Auxochrome

(iv) Principle of UV - Visible Spectroscopy

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