

**(DCHE 01)**

M.Sc. DEGREE EXAMINATION,  
DECEMBER 2019.

First Year  
Chemistry

GENERAL CHEMISTRY

Time : Three hours

Maximum : 70 marks

SECTION A — ( $4 \times 7 \frac{1}{2} = 30$  marks)

Answer any FOUR questions from the following.

1. By taking examples, explain the spectra of linear molecules in micro wave spectroscopy.
2. Explain the classification of molecular spectroscopy.
3. Write about simple harmonic oscillation in IR spectroscopy.
4. Discuss the vibrational structure of an electronic transition in UV-visible spectroscopy.
5. Explain the terms mean, standard deviation accuracy and precision.
6. Write the rules for significant figures with examples.
7. Explain the basic components and their functions of a computer.
8. Write about assignments and replacement in MS fortran.

SECTION B — ( $4 \times 10 = 40$  marks)

Answer ALL questions, choosing one from each unit.

9. (a) Discuss the energy of molecules and types of molecular spectroscopy with suitable examples.

Or

- (b) Describe the working principle and applications of ESR spectroscopy.
10. (a) Explain the important components, principle and application of infrared (IR) spectroscopy.

Or

- (b) Discuss the rotational fine structure of electronic vibrational transition of UV-visible spectroscopy giving examples.

11. (a) Explain the theory of sampling techniques and principles involved in the collection of solid samples for analysis.

Or

- (b) Explain Regression analysis.
12. (a) Write a fortran program for Beer's law by least squares method.

Or

- (b) Write a Fortran program for summoring of powers.
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**(DCHE 02)**

M.Sc. DEGREE EXAMINATION,  
DECEMBER 2019.

First Year  
Chemistry

INORGANIC CHEMISTRY

Time : Three hours

Maximum : 70 marks

SECTION A — ( $4 \times 7\frac{1}{2} = 30$  marks)

Answer any FOUR questions from the following.

1. Write the postulates of Planck's Quantum Theory.
2. Explain Spin and Orbit angular momentum.
3. Write the Postulates of VSEPR Theory.
4. Write about ionic crystals and molecular crystals.
5. Write about Spectrochemical series.
6. Explain the splitting of 'd' orbitals in octahedral complexes by taking an example.
7. Explain  $SN^1$  ligand substitution reaction by taking an example.
8. Write the synthesis and properties of Silicates.

SECTION B — ( $4 \times 10 = 40$  marks)

Answer ALL questions choosing one from each unit.

9. (a) What is de Broglie hypothesis? Explain the wave function and its significance.  
Or  
(b) Explain Term symbols by taking examples.
10. (a) Discuss different types of hybridization and shapes of polyatomic molecules.  
Or  
(b) Write the postulates of Molecular orbital Theory (M.O.) Draw and explain the M.O. diagram of Hydrogen molecule.
11. (a) How do you determine the stability of complexes by pH method?  
Or

- (b) What is Crystal Field Stabilization Energy (CFSE)? Discuss Orgel diagram with an example.
12. (a) Write the synthesis, structure and properties of silicones.  
Or
- (b) Write about the classification of labile and inert complexes with examples on the basis of valence bond and crystal field theories.
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**(DCHE 03)**

M.Sc.DEGREE EXAMINATION,  
DECEMBER 2019.  
First Year  
Chemistry

ORGANIC CHEMISTRY

Time : Three hours

Maximum : 70 marks

SECTION — A

Answer any FOUR Questions ( $4 \times 7\frac{1}{2} = 30$  marks)

1. Write a note on Antiaromaticity and Homoaromaticity.
2. Explain Asymmetric synthesis with stereo chemistry.
3. Discuss the stability and reactivity of carbenes and nitrenes.
4. Write a note on S<sub>N</sub>i mechanism.
5. Explain aromatic electrophilic substitution reactions with examples.
6. Explain sandmeyer reaction.
7. Explain Stobbe and Mannich reaction.
8. Write the mechanism of E<sub>1</sub> and E<sub>2</sub> reactions.

SECTION — B

Answer ALL Question ( $4 \times 10 = 40$  marks)

9. (a) Explain
    - (i) Cross conjugation
    - (ii) Resonance
    - (iii) Hyper conjugation
- Or
- (b) Discuss the conformations of cyclohexane and disubstituted cyclohexane derivatives.
10. (a) Explain methods of determining mechanisms isotopic effects.

Or

- (b) Discuss the nucleophilic substitution of allylic allylic and aliphatic trigonal carbon compounds.
11. (a) Write about allylic halogenation, auto oxidation and coupling of alkynes.

Or

- (b) Explain Michael reaction and Hydroboration with examples.
12. (a) Explain
- (i) Aldol reaction
  - (ii) Claisen reaction

Or

- (b) Discuss the mechanism and orientation in pyrolytic elimination with examples.
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**(DCHE 04)**

M.Sc. DEGREE EXAMINATION, DECEMBER 2019.

First Year

Chemistry

PHYSICAL CHEMISTRY

Time : Three hours

Maximum : 70 marks

SECTION A – (4 × 7½ = 30 marks)

Answer any FOUR questions.

1. Write a note on Raoult's law.
2. Explain Clausius Clapeyron equation.
3. Explain  $\beta$ -decay with examples.
4. Write a note on Bragg's equation.
5. Explain Nernst equation.
6. Discuss the Langmuir adsorption isotherm.
7. Write a note on Collision theory.
8. Explain about Acid base catalysis.

SECTION B – (4 × 10 = 40 marks)

Answer ALL questions.

9. (a) Discuss the Maxwell's partial relations and Gibbs Helmholtz equation.  
Or  
(b) Explain first and second law of thermodynamics and their applications.
10. (a) Explain Radio active decay and explain determination of Half – life – Nuclear stability.  
Or  
(b) Discuss the crystal defects and Schottky Frenkel defects.
11. (a) Define cell EMF and its measurement.  
Or  
(b) Define liquid junction potential and explain concentration cells with transference.
12. (a) Explain Jablonski diagram and discuss the fluorescence emissions.  
Or  
(b) Explain about Lindmann's theory and explain laws of photochemistry.
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