

**(DCHE 01)**

**M.Sc. (Previous) DEGREE EXAMINATION, DECEMBER – 2015**

**(First Year)**

**CHEMISTRY**

**Paper – I : General Chemistry**

**Time : 3 Hours**

**Maximum Marks: 70**

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**PART-A**

**(4 × 7½ = 30)**

**Answer Any Four of the following**

- 1) What is the difference between atomic and molecular spectroscopy?
- 2) What is the principle of microwave spectroscopy?
- 3) Write briefly about the classification of bands in ultraviolet spectroscopy.
- 4) Discuss the diatomic rotator in IR spectroscopy with suitable example.
- 5) Write briefly about linear and non-linear regression?
- 6) How can you minimise the errors in analytical analysis?
- 7) Write a note on basic components of computers?
- 8) Explain Do statements with one inner loop?

**PART-B**

**(4 × 10 = 40)**

**Answer all questions**

- 9) a) i) Discuss the theory of microwave spectroscopy?  
ii) Write a note on Isotopic effect in rotation spectra?

OR

- b) i) Explain briefly the rotation spectra of rigid rotor and non-rigid rotor?  
ii) Describe the spectra of linear molecules by taking CO<sub>2</sub> and HCl as examples.

- 10)** a) i) Write a note on the electronic spectra of diatomic molecules?  
ii) Explain the rotational fine structure of electronic vibrational transition in visible spectroscopy?

OR

- b) i) Write a note on simple harmonic oscillation quantization of vibrational motion in IR?  
ii) Write a short notes on the diatomic vibrating rotator in IR spectroscopy?

- 11)** a) i) Explain the sampling techniques used in solid transmission and storage of samples?  
ii) What is confidence interval and determine the confidence interval when  $\sigma$  is known and the confidence interval when  $\sigma$  is unknown?

OR

- b) i) Explain the types and importance of minimization of errors?  
ii) Explain briefly about Gaussian distribution?

- 12)** a) Write a note on:  
i) Arithmetic statements  
ii) Arithmetic expressions

OR

- b) Write a programm on:  
i) Rate constant of a first order reaction.  
ii) Beer's Law by least squares method?

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**(DCHE 02)**

**M.Sc. (Previous) DEGREE EXAMINATION, DECEMBER – 2015**

**(First Year)**

**CHEMISTRY**

**Paper – II : Inorganic Chemistry**

**Time : 3 Hours**

**Maximum Marks: 70**

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**SECTION-A**

**(4 × 7½ = 30)**

**Answer Any Four questions**

- 1) Explain the Heisenberg's uncertainty principle.
- 2) Explain degeneracy and normalization of wave function.
- 3) Explain J-J and L-S coupling schemes.
- 4) Explain Fajan's rule and Born Heber cycle.
- 5) Describe the John – Tellor's effect on genetics of oh complexes.
- 6) Discuss the CFSE and colour of transition metal ions.
- 7) Explain the basic ideas for inner and outer sphere mechanism with examples.
- 8) Explain the structural properties of silicones.

**SECTION -B**

**(4 × 10 = 40)**

**Answer all questions**

- 9) a) Deduce the Schrodinger wave equation for an electron in a box.

OR

- b) Write a note on:
  - i) Wave function and its physical interpretation.
  - ii) Spin and orbital angular momentum.

10) a) Compare and contrast VB and MO methods.

OR

b) Explain different types of hybridization. Explain the dipole-dipole, and dipole-induced – dipole hydrogen bonding.

11) a) What is meant by CFSE? Write the differences between the crystals field splitting of 'd' orbitals in octahedral and tetrahedral geometrics.

OR

b) Describe the pH method for the determination of stability of metal complexes with examples.

12) a) Discuss the ligand substitution reactions of  $SN^1$  and  $SN^2$  in octahedral complexes.

OR

b) Write the preparation, properties and structures of carbides.

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**(DCHE 03)**

**M.Sc. (Previous) DEGREE EXAMINATION, DECEMBER – 2015**

**(First Year)**

**CHEMISTRY**

**Paper – III : Organic Chemistry**

**Time : 3 Hours**

**Maximum Marks: 70**

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**SECTION-A**

**(4 × 7½ = 30)**

**Answer Any Four questions**

- 1) Write a short note on conjugation and cross-conjugation.
- 2) Explain about stereospecific synthesis and stereoselective synthesis with suitable examples.
- 3) Write briefly on kinetic and thermodynamic control.
- 4) a) Explain about Non-classical carbocations with suitable examples?  
b) Explain the SN<sup>1</sup> reaction at a vinylic carbon.
- 5) Explain briefly about Ipso-substitution.
- 6) Explain the sandmeyer reaction and its mechanism.
- 7) Write the mechanism of Wittig reaction.
- 8) State and explain the Hofmann and the Saytzeff rules with suitable examples.

**SECTION -B**

**(4 × 10 = 40)**

**Answer All questions**

**UNIT - I**

- 9) a) i) Explain the concept of Hyper conjugation and Tautomerism.  
ii) What are Non-Benzenoid Aromatic compounds? Explain the aromaticity of any four Non-Benzenoid Aromatic compounds.

OR

- b) i) Describe the methods of resolution.  
ii) Explain the conformational isomerism in cyclohexane.

**UNIT - II**

- 10) a) i) Discuss the role of kinetics in formulating reaction mechanisms.  
ii) What are Carbenes and Nitrenes? How they are generated? Give structure.

OR

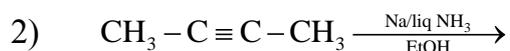
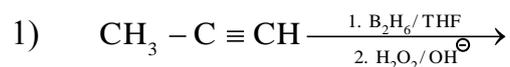
- b) i) Write the mechanism of  $SN^2$  and  $SN^i$  reactions.  
ii) What is Anchimeric assistance? Explain by involving phenyl group as Neighbouring group.

**UNIT - III**

- 11) a) i) Explain about Diazonium coupling and Gattermann – Koch reaction.  
ii) Write a short note on Allylic Halogenation.

OR

- b) i) Write a note on Hunsdiecker reaction and Auto-oxidation.  
ii) Predict the products of the following reactions



**UNIT - IV**

- 12) a) Explain the following reactions with mechanisms.  
i) Claisen reaction,  
ii) Benzoin condensation, and  
iii) Perkin reaction

OR

- b) i) Give evidence in favour of the  $E_2$  mechanism.  
ii) Explain the effect of leaving groups and solvents in the reactivity of elimination reactions.

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(DCHE04)

M.Sc. (Previous) DEGREE EXAMINATION, DECEMBER – 2015

First Year

CHEMISTRY

Paper - IV : Physical Chemistry

Time : 3 Hours

Maximum Marks: 70

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**SECTION -A**

(4 × 7½ = 30)

**Answer any four questions**

- 1) Explain the changes of entropy in the mixing of ideal gases.
- 2) Discuss the variation of chemical potential with temperature and pressure.
- 3) Give the differences between Alpha decay theory and Beta decay theory.
- 4) How to find out the Miller indices from Weis indices? Explain with suitable examples.
- 5) Define Liquid Junction potential and deduce the equation for Liquid Junction potential.
- 6) Give a short notes on Micelles and reverse Micelles.
- 7) What is reaction rate? Explain how temperature effect the reaction rates.
- 8) Define Quantum yield and explain why HCl shows high quantum yield and HBR shows low quantum yield.

**SECTION -B**

(4 × 10 = 40)

**Answer All questions**

- 9) a) Write the concept and significance of Helmholtz and Gibbs free energy functions.

OR

- b) Describe the free energy changes in ideal gases and chemical reaction.

**10)** a) Explain the Mechanism of nuclear reaction & with suitable examples.

OR

b) Give a short notes on:

- i) Isotopic dilution
- ii) Schottky and Frenkel defects

**11)** a) Derive an equation for EMF of cell without transfer of concentration.

OR

b) Deduce the BET equation.

**12)** a) Derive the rate laws of  $\text{H}_2\text{-Br}_2$ .

OR

b) Explain about:

- i) Photo sensitization.
- ii) Inter System Crossing.

