# **College of Computer, Science &** Information Technology - Junagadh

AFFILIATED TO BHAKTA KAVI NARSINH MEHTA UNIVERSITY



# + Syllabus + Master of Science

## in CHEMISTRY

[Semester – I & II]

Academic Year : 2024-25

(Effective from June - 2023)



## ▲ <u>ADDRESS : C.C.S.I.T. - JUNAGADH</u> ►

Green City, Bypass Road, Nr. Chobari Railway Crossing, Junagadh. Website : http://ccsit.co.in, Email : ccsit\_junagadh@yahoo.co.in Phone : 92280 06940, 79906 61530

### **Credit Structure**

(SEMESTER-I)						
Paper No.	Paper Name	Credit	Int. Marks	Ext. Marks	Total Marks	
CC-101	Inorganic Chemistry	4	30	70	100	
CC-102	Organic Chemistry	4	30	70	100	
CC-103	Physical Chemistry	4	30	70	100	
CC-104	Analytical Chemistry	4	30	70	100	
CC-105	Practical	6	-	100	100	
CC-106	Practical Viva Voce	1	-	50	50	
CC-107	<b>Chemoinformatic Tools</b>	1	50	-	50	
Total Credits		24	Total Marks		600	

(SEMESTER-II)						
Paper No.	Paper Name	Credit	Int. Marks	Ext. Marks	Total Marks	
CC-201	Inorganic Chemistry	4	30	70	100	
CC-202	Organic Chemistry	4	30	70	100	
CC-203	Physical Chemistry	4	30	70	100	
CC-204	Analytical Chemistry	4	30	70	100	
CP-205	Practical	6	-	100	100	
CP-206	Practical Viva Voce	1	-	50	50	
CP-207	<b>Research Writing</b>	1	50	-	50	
Total Credits		24	Total Marks		600	

### <u>M.Sc. SEMESTER-I</u> <u>C-101 : INORGANIC CHEMISTRY</u>

### 1. Atomic Model & Bonding

Atomic Model, Structure & Bonding, Bond Parameters, Molecular orbital theory, Homonuclear diatomic molecules, Heteronuclear diatomic molecules, Valance bond theory, Types of overlapping, Shapes of covalent compounds, VSEPR, Shapes of molecules having regular & irregular geometry, bent's rule.

### 2. Main Group (S-Block)

Chemistry of Main group Elements of S-Block, General Trends, Physical and Chemical Properties and selected Applications.

### 3. Coordination Compounds

Classification of Coordination compounds, Werner's theory, Nomenclature, Isomerism, Coordination number, structures, shapes and Hybridisation, electronic spectra, spectroscopic terms, term symbols, calculation of spectroscopic terms.

### 4. Reactions Mechanism of Coordination Compounds

Synthesis and reactions of coordination compounds, Labile and inert complexes, Types of reactions in metal complexes, Substitution in square planar complexes, Substitution reactions & mechanism in octahedral complexes, Trans effect.

### 5. Nanomaterial

Definition and Introduction of nanomaterial, Size effects, Importance of nanomaterials, Classification of nanomaterials, Properties of nanomaterial, Synthesis techniques of nanomaterials, Inorganic Nanoparticles and Nano porous Materials: Oxide, catalysis. Techniques for characterisation of nanoscale materials: SEM, TEM, XRD, AFM.

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#### [12 Hrs.] Iclear diatomi

[10 Hrs.]

[14 Hrs.]

**4 CREDITS** 

### [12 Hrs.]

### [12 Hrs.]

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#### Reference Books:

- 1. Miessler, G. L; Fischer, P. J.; Tarr, D. A.; (2014, sixth edition) Inorganic Chemistry, (ISBN: 978-0-321-81105-9).
- 2. Agarwala S. K.; Lal K.; (2009), Advanced Inorganic Chemistry, (ISBN: 978-81-8398-773-8).
- 3. Singh, A.; Singh, R.; (2005) Textbook of Inorganic Chemistry Vol. I & II. New Delhi: Campus Books International, (ISBN: 8180300714).
- 4. Housecroft C. E; Sharpe A. G.; (2005, 2nd edition) Inorganic Chemistry, (ISBN: 0130-39913-2).
- 5. House J. E; House K. A.; (2016, 3rd edition) Descriptive Inorganic Chemistry, (ISBN: 978-0-12-804697-5).
- 6. Rao C. N. R; Muller A.; Cheetam A. K.; (2004) The Chemistry of Nanomaterials, Vol.1, and 2, Wiley VCH.
- 7. Poole C. P.; Owens Jr. F. J.; (2003) Introduction to Nanotechnology Wiley Interscience.
- 8. Kenneth J. K. (2001) Nanoscale materials in Chemistry, Wiley Interscience.
- 9. Pradeep T.; (2007) Nano: The Essentials in understanding nanoscience and nanotechnology, Tata McGraw Hill.
- Ajaikumar; (2016 2nd edition) Organometallic & Bloinorganic Chemistry, Aaryush Education, (ISBN:978-81-930437-1) Strohfeldt K. A., (2015) Essentials of inorganic chemistry: for students of pharmacy, pharmaceutical sciences and medicinal chemistry, (ISBN: 9780470665589)

### C-102 : ORGANIC CHEMISTRY

### 1. Reactive Organic Intermediates

Inductive effect, Resonance effect, Hyperconjugation effect and its applications (Stability, Acidity, Basicity, Nucleophilicity, Aromatic character), Homolytic and Heterolytic fission, Different types of arrow notation, concept and Examples of Electrophiles and Nucleophiles. Hybridization, Structure, Generation, Stability, Reactivity & Applications of Carbocation, Carbanion, Free radicals, Carbenes, Nitrenes, Ylides, Benzyne and Enamines. Applications and related reactions

### Aromaticity

Introduction, Criteria of aromaticity, Hückel's rule, Examples of aromatic, anti-aromatic and non-aromatic compounds. Aromatic character for Annulenes, Azulenes & Heterocycles.

### 2. Organic Reactions

Principal, mechanism and applications of:

Appel reaction, Benzoin condensation, Nef reaction, Prins reaction, Mitsunobu reaction, Vilsmeier-Haack reaction, Blanc Reaction, Riemer-Tiemann, Michael addition, Dieckmann condensation, Robinson annulations, Arndt-Eistert, Corey-Fuchs alkyne synthesis, Nazarov cyclization.

### 3. Rearrangements

Principal, mechanism and applications of:

Pinacol-pinacolone, Wagner-Meerwein, Demjanov, Benzil-Benzilic acid, Favorskii, Beckmann, Schmidt, Baeyer-Villiger, Lossen rearrangement, Neber rearrangement, Baker-Venkataraman rearrangement

### 4. Conjugate Addition & C-C Bond Forming Reaction

Enolate, Enamine and Imine chemistry, Grignard reagents, Cuprates and other conjugate reactions. Olefination reaction: Wittig, Horner–Wadsworth–Emmons, Mc-Murry reaction. Cyclopropanation reaction (Simons-smith), Bayliss Hillman reaction, Organocatalyzed C-C bond forming

Cyclopropanation reaction (Simons-smith), Bayliss Hillman reaction, Organocatalyzed C-C bond forming reactions: Aldol reaction, Mannich reaction and Stork enamine synthesis.

### 5. Organic Reagents

General mechanism, selectivity, and important applications of the following reagents:

- (a) Oxidative Reagents: K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>/H<sub>2</sub>SO<sub>4</sub> (Jones reagent), CrO<sub>3</sub>-pyridine (Collin's reagent), hypervalent iodine reagents (Dess-Martin), Swern reagent, SeO<sub>2</sub>, HIO<sub>4</sub>, NaIO<sub>4</sub>
- (b) Metal hydride reduction: Boron reagents (NaBH<sub>4</sub>, 9-BBN), aluminium reagents (LiAlH<sub>4</sub>, DIBAL-H), Li/Naliquid NH<sub>3</sub> mediated reduction (Birch reduction) of aromatic compounds and acetylenes.

### **Reference Books**

- 1. Ahluwalia, V. K. (2011, Fourth edition) Organic Reaction Mechanism. New Delhi: Narosa (ISBN: 978-81-8487-115-9).
- 2. J. Clayden, N. Greeves, S. Warren and P. Wothers, Organic Chemistry, 1st Ed., Oxford University Press, 2001.
- 3. László Kürtip; Barbara Czakó (2004, First edition) Strategic Applications of Named Reaction in Organic Synthesis. Philadelphia: Elsevier Publishing company (ISBN: 9780124297852).
- 4. M.B. Smith & J. March, March's Advanced Organic Chemistry, 6thEd., John Wiley & Sons, New York, 2007
- 5. F.A. Carey and R.A. Sundberg, Advanced Organic Chemistry, Part A and Part B, 5th Ed.,
- 6. McMurry, John E. (2011, Eight edition) Organic Chemistry. Boston: Cengage Learning (ISBN: 0840054440).
- 7. Smith, Michael B.; March, Jerry (2013, Seventh edition) March's Advanced Organic Chemistry: Reactions, Mechanisms and Structure. Hoboken: Wiley-Blackwell (ISBN: 978-0470-46259-1).
- 8. Bansal, Raj K. (2009, Fifth) A Textbook of Organic Chemistry. New Delhi: New Age International (ISBN: 978-81-224-2025-8).
- 9. T. W. Graham Solomons (2011, 10th edition) Organic Chemistry. Hoboken: John Willey & Sons (ISBN: 978-0-470-55659-7).

**4 CREDITS** 

[14 Hrs.]

### [14 Hrs.]

[12 Hrs.]

[10 Hrs.]

## [10 Hrs.]

### C-103 : PHYSICAL CHEMISTRY

### 1. Statistical Thermodynamics

The concepts of Ensemble, Thermodynamic probability and entropy, Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics. Partition function, Molar partition function, Thermodynamic properties in term of molecular partition function for diatomic molecules, Monoatomic gases, Rotational, Translational, Vibrational and Electronic partition functions for diatomic molecules. Problems.

### 2. Electrochemical Cells

Introduction, Ostwald dilution law, Debye-Huckel theory of mean ionic activity co-efficients, Decomposition potential and its determination, over voltage, hydrogen over voltage, factors affecting over voltage, importance of hydrogen over voltage, Tafel equation. numerical problems. Commercial cells: Fuel cell, lead accumulator, nickel iron accumulator, zinc silver accumulator.

#### 3. The Properties of Solutions

Ideal solutions: Properties, the Duhem-Margules equation, vapour pressure curves. Composition of liquid and vapour in equilibrium influence of temperature on gas solubility and solid-liquid equillibria.

Non ideal solutions: Deviation from ideal behavior, vapour pressure curves, liquid and vapour compositions. General equations for liquid mixtures,

**Dilute solutions:** Henry's law. Determination of molecular weights from freezing and boiling points. Problems.

### 4. Free Energy and Chemical Reactions

Chemical equilibrium and the equilibrium constant: Equilibrium in homogeneous gaseous systems. Homogeneous reactions in liquid solutions. Homogeneous reactions in dilute solutions. Chemical equilibria in heterogeneous systems.

Free energy change in chemical reactions: The reaction isotherm, standard free energy of reaction, the direction of chemical variation of equilibrium constant with pressure and temperature. Influence of temperature on heterogeneous reactions. Integration of the Van't Hoff equation. Variation of standard free energy with temperature, problems. [10 Hrs.]

### 5. Catalysis

- Introduction, Types of catalysis (Homogeneous & heterogeneous), comparison between them, general characteristics of catalytic reaction.
- Heterogeneous catalysis: kinetics of unimolecular and bimolecular surface reaction.
- Homogeneous catalysis: types of acid base catalysis, Mechanism and kinetics of acid-base catalysis
- Enzyme catalysis- Mechanism and kinetics of enzyme catalysed reaction.
- Nanocatalysis, types, applications.

### **Reference Books**

- 1. Glasstone, Samuel. (2007) Textbook of Physical Chemistry: MCMILAN India Press (SBN: 033391-876-2).
- 2. Peter Atkins, Julio de Paula (2015) Physical chemistry: Thomson Press (ISBN: 019872872-7).
- 3. Gurdeep Raj (2014, Third edition) *Thermodynamics*. Meerut: GOEL publishing House (ISBN: 8187224886).
- 4. Gurtu, J. N. Gurtu, A. (2014, Twelfth edition) Advanced Physical Chemistry. Meerut: Pragati Prakashan (ISBN: 9350060191).
- 5. Barrow, Gordon M. (1996, Sixth edition) *Physical Chemistry*. New York: McGraw-Hill International. (ISBN: 0070051119).
- 6. V R Gowariker, (2012) Polymer Chemistry. New age International P limited. (ISBN: 978-0-85226-307-5).
- 7. Puri, Sharma, Pathamia, (2018, 47th edition) Principles of Physical Chemistry. Vishal Publishing Co. (ISBN: 978-93-82956-78-5).
- 8. B. S. Bahl, Arun Bhahl, G. D. Tuli, (2005) Essetials of Physical Chemistry. S. Chand & Company LTP. (ISBN: 81-219-0546-X).
- 9. Physical Chemistry, Ira N Levine (Tata McGraw-Hill Publishing Company, New Delhi, Fifth Edition).
- 10. Physical Chemistry, Alberty and Stilby, (John Wiley & Sons, New York).
- 11. D.K. Chakrabarty and B. Viswanathan, Heterogeneous Catalysis, New Age, 2008.
- 12. Introduction to the principles of heterogeneous catalysis. J.M.Thomas and W.J.Thomas, Acad.press, London, 1967.
- 13. Chemical kinetics and catalysis G.M.Panchenkov and V.P.Lebedev., Mir publication, 1976.

### **C-104: ANALYTICAL CHEMISTRY**

### 1. Fundamentals of Analytical Chemistry & Chemical Calculations

[12 Hrs.] Analytical chemistry, its functions and applications, Analytical problems and procedures, Analytical techniques and methods, Concentration units (Molarities, Normality, Formality, ppb, ppm, mole calculation, Empirical Formulas, % composition, Determination of molecular weight, theoretical yield, Percent Yield, Problems

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**4 CREDITS** 

### 4 CREDITS [14 Hrs.]

### [10 Hrs.]

[12 Hrs.]

### [14 Hrs.]

### 2. Analytical Methods

Solution equilibria, Electrochemical reactions, Potentiometry, pH and its control, Titrimetry I: acid-base titrations, Complexation, solubility and redox equilibria, Titrimetry II: complexation, precipitation and redox, titrations, Gravimetry, Voltammetry and amperometry, Conductimetry

### 3. Green Chemistry

Introduction, importance and twelve principles of Green Chemistry. Designing a green synthesis using these principles. Green Chemistry in day to day life. Green solvents (alternatives of organic solvents). Ionic liquids, supercritical fluids, CO2 and H2O and aqueous phase organic synthesis. Non-traditional greener alternative approaches: Green reagents, catalysis, biocatalysis. Applications of non-conventional energy sources: Microwave, ultrasonic assisted synthesis, electro-synthesis and sunlight (UV), radiation assisted synthesis.

### 4. Optical Methods

**Refractive index:** Introduction, Principle, Instrumentation, Measurement of refractive index, abbe refractometer, immersion refractometer, application.

**Polarimetry:** Introduction, Principle, Instrumentation, optical purity, calculations.

### 5. Thermal Methods of Analysis

Principle, theory and instrumentation of TGA, DTA and DSC. Factors affecting thermal analysis. Applications of thermal methods in various field of science. Various theories of thermal analysis for evaluation of kinetic parameters and analysis of simple and polymeric compounds.

### **Reference Books**

- 1. Fundamentals of Analytical Chemistry by Skoog Douglas A.
- Analytical Chemistry by D. Kealey & P. J. Haines, BIOS Scientific Publishers Limited, 2002 First published 2002 (ISBN 1-85996-189-4)
- 3. Instrumental Methods of Analysis by B. Sivasankar,
- 4. B. K. Sharma. "Instrumental method of chemical analysis" **24th** edition, GOEL publishing house Meerut .2005
- 5. Gary D. Christian. "Analytical chemistry" **6th** edition John Wiley & sons, Inc. 2004
- 6. Skoog, Holler, Niemon, "principles of instrumental analysis" **5th** edition, Saunders college publisher.
- 7. Analytical Chemistry by Chatwal G. R.
- 8. Indian Pharmacopoeia Commission (IPC) Ghaziabad, www.ipc.gov.in
- 9. Green Chemistry by V. K. Ahluwalia, Ane Books Pvt. Ltd.
- 10. Green Chemistry by K. R. Desai, Himalia Publishing House.Instrumental Methods of Analysis by B. Sivasankar,
- 11. B. K. Sharma. "Instrumental method of chemical analysis" **24th** edition, GOEL publishing house Meerut .2005
- 12. Gary D. Christian. " Analytical chemistry" 6th edition John Wiley & sons, Inc. 2004
- 13. Skoog, Holler, Niemon, "principles of instrumental analysis" **5th** edition, Saunders college publisher.
- 14. Analytical Chemistry by Chatwal G. R.
- 15. Analytical Chemistry: Theory and Practice by Verma R. M.

### M.Sc. SEMESTER-I C-105: PRACTICALS

### 6 CREDITS & 12 Hrs./Wk

### INORGANIC CHEMISTRY

### (25 Marks)

Analysis of a mixture containing six radicals including one less common metal ion: W, Tl, Ti, Mo, Se, Zr, Th, Ce, V and Li. (Minimum 10 Mixtures)

### Group B : Preparation and Characterisation of Metal Complexes (25 Marks)

- 1. Preparation and Characterisation of [VO(AcAc)<sub>2</sub>].
- 2. Preparation of cis & trans  $[Cr(Ox)_2(H_2O)]$ .
- 3. Preparation and Characterisation of  $[Co(Py)_2Cl_2]$ .
- 4. Preparation of [Cu(gly)<sub>2</sub>] & [Cu(acac)<sub>2</sub>].

Group A : Inorganic Qualitative Analysis

- 5. Preparation and Characterisation of [Cu(NH<sub>3</sub>)<sub>4</sub>]SO<sub>4</sub>.H<sub>2</sub>O
- 6. Preparation and Characterisation of [Ni(NH<sub>3</sub>)<sub>6</sub>]Cl<sub>2</sub> compare with [Ni(H<sub>2</sub>O)<sub>6</sub>]Cl<sub>2</sub>.
- 7. Preparation and Titrimetric Estimation of [Fe(HCO<sub>2</sub>)<sub>2</sub>].2H<sub>2</sub>O.
- 8. Preparation and Characterisation of [Ni(en)<sub>3</sub>]Cl<sub>2</sub>.2H<sub>2</sub>O
- 9. Synthesis of bis(salicylidene)ethylene diamine cobalt (II) complex.
- 10. Synthesis of bis(8-quinolinol) bis(benzylidene)ethane-1,2-diamine Ni(II) complex.

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### [14 Hrs.]

[10 Hrs.]

[12 Hrs.]

[12 Hrs.]

### PHYSICAL CHEMISTRY

### (50 Marks)

### (25 Marks)

#### Group-A Conductometry:

- 1. To determine concentration of mixture HCl+CH<sub>3</sub>COOH + CuSO<sub>4</sub> / HCl + Oxalic acidvs. NH<sub>4</sub>Cl/ NaOH by conductometricaly.
- 2. To determine the equivalent conductance of a strong electrolyte and to verify the Onsager's equation.
- 3. To determine the degree of hydrolysis and hydrolysis constant.
- 4. Determine the CMC of a surfactant by conductivity measurements.
- 5. To determine the Equivalence conductance and dissociation constant of strong electrolytes and weak electrolytes and hence to verify Ostwald's distribution law.

### pH metry:

- 1. To determine normality and dissociation constant of tribasic acids using 0.1N NaOH by P<sup>H</sup> Metricaly
- 2. To determine the Hammett constant for p-amino/ nitro benzoic acid using 0.1N NaOH by P<sup>H</sup>-Metry.
- 3. To determine the standard oxidation potential of the Quinhydrone electrode.
- 4. To determine the acidic and basic dissociation constants of amino acid and its isoelectric point by pH-metry.
- 5. Determine the dissociation constant and strength of borax solution pH-metrically.

### **Potentiometry:**

- 1. Determination of dissociation constant of dibasic acids.
- 2. Determination of activity and activity coefficient of ions.
- 3. Redox titration- Fe2+ vs Ce4+, I- vs KMnO4.
- 4. Determine the amount of ferrous sulphate / ferrous ammonium sulphate in given flask potentiometrically using cerric salt solution.
- 5. Determine the pseudo first order rate constant for bromination of N, N –dimethyl aniline/phenol.

### **Refractometry:**

- 1. To study the variation of refractive index with composition of given liquid and to determine the % composition of unknown mixture.
- 2. Determine parachor/density/refractive index of binary solutions.
- 3. To determine the molar refractive index of a given salt.
- 4. To determine the electron polarization and electron polarizability of a given salt.
- 5. To determine refraction equivalents of carbon, hydrogen and chlorine atoms.

### **Group-B**

### Partition Co-efficient:

- 1. To study the distribution of benzoic acid between toluene & water at room temperature and hence to prove the dimerization of benzoic acid in benzene / toluene.
- 2. To determine equilibrium constant for the reaction between potassium iodide& iodine by the method of distribution.
- 3. Determine the formula of a complex between Cu+2 and NH3 by distribution method.
- 4. Determine the equilibrium constant of the reaction I + I2 = I3- by the distribution method.
- 5. To study the distribution co-efficient of succinic acid between ether and water.

### **Reaction Kinetics:**

- 1. To determine the order of the reaction by a fractional change method.
- 2. To determine the temperature coefficient and the energy of activation of the reaction between KBrO3 and KI.
- 3. Autocatalytic reaction between KMnO4 and oxalic acid
- 4. To determine the reaction velocity constant for the reaction between acetone & iodine
- 5. To determine the temperature coefficient and energy of activation of hydrolysis of methyl acetate catalyzed by HCl. + KI by fractional change method.

### Adsorption:

- 1. To study the adsorption of aqueous oxalic acid solution by activated charcoal and examine the validity of Freundlich and Langmuir's adsorption isotherms.
- 2. To study the adsorption of I2 from alcoholic solution by charcoal.

### **Polarimetry:**

- 1. To determine the specific & molecular rotation of glucose/ sucrose & hence intrinsic rotation and concentration of an unknown solution of optically active compound.
- 2. To determine the rate constant for the inversion of cane sugar.
- 3. To determine % composition of D-sucrose and tartaric acid in a given mixture.

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### (25 Marks)

### Thermodynamics

1. Heat of vaporization: To determine heat & entropy of vaporization of a given liquid by a kinetic approach.

#### Reference Book:

- 1. Svehla, G. (1996, Seventh edition) Vogel's Qualitative Inorganic Analysis. New Jersey: Pearson Education. (ISBN: 0582218667).
- Jeffery, G. H.; Bassett, J.; Mendham, J.; Denny, R. C. (1989) Vogel's Textbook of Quantitative Chemical Analysis. Hoboken: John Willey & Sons (ISBN: 0-582-44693-7).
- 3. Pass G., Sutcliffe H., (1974 2nd edition) Practical Inorganic Chemistry: Preparations, Reactions, and Instrumental Methods. (ISBN: 9789401727440)
- 4. Marusak R. A., Doan K., Cummings S. D., (2007) Integrated approach to coordination chemistry an inorganic laboratory guide, (ISBN: 9780471464839)
- 5. Woollins D. (2006, 2nd edition) Inorganic Experiments, (ISBN: 978352730510)
- 6. Parsania P. H (2005, 1st edition) Experiments in Physical Chemistry, Granth Nirman Board.
- 7. Experimental Physical Chemistry by G. Peter Matthews, (Clarendon Press, Oxford, London).
- 8. Experimental Physical Chemistry by V. D. Athawale and Parul Mathur, (New Age International Publishers, New Delhi).
- 9. Advanced Physical Chemistry Experiments by Gurtu and Gurtu, (Pragati Prakashan, Meerut).
- 10. Advanced Physico-Chemical Experiments by J. Rose, (Sir Isaac Pitman & Sons Ltd., London).
- 11. Experiments in Physical Chemistry by D. P. Shoemaker, C. W. Garland and J. W. Nibler, (McGraw Hill International Edition, London
- 12. A Laboratory Manual of Experiments in Physical Chemistry by D. Brennan and C. F. H. Tipper, (McGraw hill Publishing Company Ltd., London).
- 13. Systematic Experimental Physical Chemistry by S. W. Rajbhoj and T. K. Chondhekar, (Anjali Publication, Aurangabad)
- 14. Experimental Physical Chemistry by R. C. Das & B. Behera, (Tata McGraw hill Publishing Company Ltd., New Delhi).
- 15. W. J. Popiel, Laboratory Manual of Physical Chemistry, ELBS, London, 1970.

M.Sc.(Chemistry) Sem-1				
CP-106	Viva Voce		1 Credits	
Comprehensive Viva Voce based on Practical and core Courses				

M.Sc.(Chemistry) Sem-1				
CP-107	Cheminformatic Tools	2 Hrs/Week	1 Credits	

### 1. Chemical Drawing

- Drawing chemical reaction, Structure drawing using templates, Structure to name and name to structure.
- Drawing mechanism of reaction, Diagram of Assembly, Chiral Structure.
- Reproducing reaction scheme from given research paper, 3D Chemdraw ultra.
- Use of MS Excel for plotting and statistical analysis.

#### 2. Web & Tools for Literature Search

- Research Journals & publications.
- 3. Citation & Referencing

# **College of Computer, Science &** Information Technology - Junagadh

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Courses Offered

- B.Sc. Bachelor of Science
- ▶ B.Sc.(IT) Bachelor of Science in Information Tech.
- ► B.C.A. Bachelor of Computer Application
- D.M.L.T. Diploma in Medical Laboratory Technology
- M.Sc.(IT) Master of Science in Information Technology
- M.Sc.(Micro.) Master of Science in Microbiology
- M.Sc.(Chem.) Master of Science in Chemistry

## ▲ <u>ADDRESS : C.C.S.I.T. - JUNAGADH</u>

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