RAJA PEARY MOHAN COLLEGE

Department of Chemistry

B.Sc. Honours in Chemistry

Programe Specific Outcome, Course Outcome, Programe Outcome

(PSO, CO, PO)

Student Learning Outcomes (Chemistry)

Program outcomes, program specific outcomes and course outcomes

Program outcomes:

After completion of graduation degree in chemistry, students gained the theoretical as well as practical knowledge of handling chemicals. Also they expand the knowledge available opportunities related to chemistry in the government services through public service commission particularly in the field of food safety, health inspector, pharmacist etc. Afford a broad foundation in chemistry that stresses scientific reasoning and analytical problem solving with a molecular perspective. Achieve the skills required to succeed in graduate school, professional school and the chemical industry like cement industries, agro product, Paint industries, Rubber industries, Petrochemical industries, Food processing industries, Fertilizer industries etc. Got exposures of a breadth of experimental techniques using modern instrumentation. Understand the importance of the elements in the periodic table including their physical and chemical nature and role in the daily life. Understand the concept of chemistry to inter relate and interact to the other subject like mathematics, physics, biological chemistry etc. Learn the laboratory skills and safely to transfer and interpret knowledge entirely in the working environment.

Course outcomes:

Raja Peary Mohan College, Uttarpara, Hooghly,**SYLLABUS UNDER CBCS PATTERN**w.e.f. 2017-18 B.Sc. CHEMISTRY – PROGRAMME STRUCTURE

SEM	**CODE***	**PAPER**	**BRIEF DESCRIPTION**
1	CEMA-CC-1-1-TH	INORGANIC CHEMISTRY-1 ORGANIC CHEMISTRY -1A	Acid-base and redox reactions Basics of Organic Chemistry
	CEMA-CC-1-1-P	PRACTICALS	
	CEMA-CC-1-2-TH	PHYSICAL CHEMISTRY-1 ORGANIC CHEMISTRY -1B	Kinetic theory, Chemical kinetics, Stereochemistry
	CEMA-CC-1-2-P	PRACTICALS	
2	CEMA-CC-2-3-TH	ORGANIC CHEMISTRY -2	Reaction Mechanism
	CEMA-CC-2-3-P	PRACTICALS	
	CEMA-CC-2-4-TH	INORGANIC CHEMISTRY-2	Chemical Bonding
	CEMA-CC-2-4-P	PRACTICALS	
3	CEMA-CC-3-5-TH	PHYSICAL CHEMISTRY-2	Chemical Thermodynamics
	CEMA-CC-3-5-P	PRACTICALS	
	CEMA-CC-3-6-TH	INORGANIC CHEMISTRY-3	s and p Block Elements
	CEMA-CC-3-6-P	PRACTICALS	
	CEMA-CC-3-7-TH	ORGANIC CHEMISTRY -3	Alkenes, Alkynes, Carbonyls
	CEMA-CC-3-7-P	PRACTICALS	
4	CEMA-CC-4-8-TH	ORGANIC CHEMISTRY - 4	Organic Synthesis, Spectroscopy

	CEMA-CC-4-8-P	PRACTICALS	
	CEMA-CC-4-9-TH	PHYSICAL CHEMISTRY- 3	Applications of Thermodynamics, Quantum Mechanics
	CEMA-CC-4-9-P	PRACTICALS	
	CEMA-CC-4-10-TH	INORGANIC CHEMISTRY-4	Coordination Chemistry, d & f elements
	CEMA-CC-4-10-P	PRACTICALS	
5	CEMA-CC-5-11-TH	PHYSICAL CHEMISTRY -4	Quantum Chemistry, Statistical Thermodynamics
	CEMA-CC-5-11-P	PRACTICALS	
	CEMA-CC-5-12-TH	ORGANIC CHEMISTRY -5	Cyclic Compounds, Biomolecules
	CEMA-CC-5-12-P	PRACTICALS	
6	CEMA-CC-6-13-TH	INORGANIC CHEMISTRY-5	Bioinorganic and Organometallic Chemistry
	CEMA-CC-6-13-P	PRACTICALS	
	CEMA-CC-6-14-TH	PHYSICAL CHEMISTRY -5	Molecular Spectroscopy, Photochemistry
	CEMA-CC-6-14-P	PRACTICALS	

The Course code indicates subject-type of course-semester number-paper number-theory /practical [e.g. CEMA-CC-1-1-TH/P stands for Chemistry HonoursCore Course- First Semester- Paper 1- Theoretical /Practical]

** **Practicals are based on the corresponding theoretical papers.**

Discipline Specific Courses (DSE):

For Semester 5

Any One from the following

DSE-A1:MOLECULAR MODELLING & DRUG DESIGN

DSE-A2: APPLICATIONS OF COMPUTERS IN CHEMISTRY

Any One from the following

DSE-B1: INORGANIC MATERIALS OF INDUSTRIALIMPORTANCE

DSE-B2: NOVEL INORGANIC SOLIDS

For Semester 6

Any One from the following

DSE-A3: GREEN CHEMISTRY AND CHEMISTRY OF NATURAL PRODUCTS

DSE-A4: ANALYTICAL METHODS IN CHEMISTRY

Any One from the following

DSE-B3:POLYMER CHEMISTRY

DSE-B4: DISSERTATION

SKILL ENHANCEMENT COURSES (SEC)

SEC-A For Semester 3 [Any one]

SEC 1 – MATHEMATICS AND STATISTICS FOR CHEMISTS

SEC 2 – ANALYTICAL CLINICAL BIOCHEMISTRY

SEC-B For Semester 4 [Any one]

SEC 3 – PHARMACEUTICALS CHEMISTRY

SEC4 - PESTICIDE CHEMISTRY

The core courses would fortify the students with in-depth subject knowledge concurrently; the discipline specific electives will add additional knowledge about applied aspects of the program as well as its applicability in both academia and industry. Generic electives will introduce integration among various interdisciplinary courses. The skill enhancement courses would further add additional skills related to the subject as well as other than subject. In brief the student graduated with this type of curriculum would be able to disseminate subject knowledge along with necessary skills to suffice their capabilities for academia, entrepreneurship and Industry

Core course –1

Course Description:

This course covers fundamental principles and laws of chemistry. Topics include extra nuclear structure of atom, Acid-base and redox reactions, Basics of Organic Chemistry:Bonding and Physical Properties, General Treatment of Reaction Mechanism I, Stereochemistry I, General Treatment of Reaction Mechanism II, Kinetic Theory and Gaseous state, Transport processes, Chemical kinetics, Stereochemistry. Application of key concepts including electronegativity, bonding (ionic and covalent), hybridization of atomic orbitals, and molecular orbital theory to organic systems.Laboratory experiments and computer-based exercises augment and reinforce the basic principles of organic mixture separation, BP determination, discussed in lecture as well as provide practical examples.

Course Objectives:

- To understand fundamental principles of extra nuclear structure of atom, Acid-base and redox reactions, Basics of Organic Chemistry.
- To understand Basics of Organic Chemistry related to bonding and physical properties, General Treatment of Reaction Mechanism, preliminary concept of stereochemistry and General Treatment of Reaction Mechanism.
- To understandKinetic Theory and Gaseous state, Transport processes, Chemical kinetics, Stereochemistry.

Recommended Books/References:

For Inorganic (TH &P)

1. Lee, J. D. *Concise Inorganic Chemistry,*5th Ed., Wiley India Pvt. Ltd., 2008.
2. Douglas, B.E. and McDaniel, D.H. *Concepts & Models of Inorganic Chemistry* Oxford, 1970.
3. Day, M.C. and Selbin, J. *Theoretical Inorganic Chemistry*, ACS Publications, 1962.

4. Atkin, P. *Shriver & Atkins' Inorganic Chemistry,* 5th Ed., Oxford University Press (2010).
5. Cotton, F.A., Wilkinson, G. and Gaus, P.L., *Basic Inorganic Chemistry 3rdEd.;*Wiley India.
6. Sharpe, A.G., *Inorganic Chemistry*, 4th Indian Reprint (Pearson Education) 2005.
7. Huheey, J. E.; Keiter, E.A. &Keiter, R.L. *Inorganic Chemistry, Principles ofStructure and Reactivity 4th Ed.*, Harper Collins 1993, Pearson,2006.
8. Atkins, P.W. & Paula, J. *Physical Chemistry*, Oxford Press, 2006.
9. Mingos, D.M.P., *Essential trends in inorganic chemistry*. Oxford University Press (1998).
10. Winter, M. J., The Orbitron, http://winter.group.shef.ac.uk/orbitron/ (2002). An illustrated gallery of atomic and molecular orbitals.
11. Burgess, J., *Ions in solution: basic principles of chemical interactions.* Ellis Horwood (1999).
12. Mendham, J., *A. I. Vogel's Quantitative Chemical Analysis* 6th Ed., Pearson, 2009.
13. *Practical Workbook Chemistry (Honours), UGBS, Chemistry*, University of Calcutta, 2015

For organic(TH &P)

1. Finar, I. L. *Organic Chemistry (Volume 1)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Morrison, R. N. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Sykes, P. *A guidebook to Mechanism in Organic Chemistry*, Pearson Education, 2003.
4. Carey, F. A., Guiliano, R. M.*Organic Chemistry*, Eighth edition, McGraw Hill Education, 2012.
5. Bhattacharyya, R. C, *A Manual of Practical Chemistry.*
6. Vogel, A. I. *Elementary Practical Organic Chemistry*, Part 2: *Qualitative Organic Analysis*, CBS Publishers and Distributors.
7. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry*, Pearson Education (2009).
8. Furniss, B.S., Hannaford, A.J., Smith, P.W.G., Tatchell, A.R. *Practical Organic Chemistry,5th Ed.*, Pearson (2012).
9. Dutta, S, *B. Sc. Honours Practical Chemistry*, Bharati Book Stall.
10. Carey, F. A., Guiliano, R. M. *Organic Chemistry*, Eighth edition, McGraw Hill Education, 2012.
11. Eliel, E. L. &Wilen, S. H. *Stereochemistry of Organic Compounds*, Wiley: London, 1994.
12. Nasipuri, D. *Stereochemistry of Organic Compounds,* Wiley Eastern Limited.
13. Clayden, J., Greeves, N. & Warren, S. *Organic Chemistry,* Second edition, Oxford University Press, 2012.
14. Keeler, J., Wothers, P. *Chemical Structure and Reactivity – An Integrated approach*, Oxford University Press.
15. Smith, J. G. *Organic Chemistry*, Tata McGraw-Hill Publishing Company Limited.
16.Fleming, I. *Molecular Orbitals and Organic Chemical Reactions*, Reference/Student Edition, Wiley, 2009.
17. James, J., Peach, J. M. *Stereochemistry at a Glance*, Blackwell Publishing, 2003.
18. Robinson, M. J. T., *Stereochemistry*, Oxford Chemistry Primer, OxfordUniversity Press, 2005.
19. Bhattacharyya, R. C, *A Manual of Practical Chemistry.*
20. Vogel, A. I. *Elementary Practical Organic Chemistry,* Part 2: *Qualitative OrganicAnalysis*, CBS Publishers and Distributors.
21. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry*, Pearson Education(2009).

22. Furniss, B.S., Hannaford, A.J., Smith, P.W.G., Tatchell, A.R. *Practical OrganicChemistry,5th Ed.*, Pearson (2012).
23. Dutta, S, *B. Sc. Honours Practical Chemistry*, Bharati Book Stall.

Physical Chemistry(TH &P)

1. Levine, I. N. *Physical Chemistry*, 6th Edition McGraw-Hill India
2. Castellan, G. W. *Physical Chemistry*, Narosa
3. McQuarrie, D. A. & Simons, J. D. *Physical Chemistry: A MolecularApproach*, Viva Press
4. Kapoor K.L, A Text Book Of Physical Chemistry , McGraw Hill India
5. Engel, T. & Reid, P. *Physical Chemistry*, 3rd Edition Pearson India
6. Atkins, P. W. & Paula, J. de *Atkins' Physical Chemistry*, 10th Edition Oxford University Press
7. Maron, S. &Prutton*Physical Chemistry*
8. Ball, D. W. *Physical Chemistry*, Thomson Press
9. Mortimer, R. G. *Physical Chemistry*, Elsevier
10. Laidler, K. J. *Chemical Kinetics*, Pearson
11. Glasstone, S. & Lewis, G.N. *Elements of Physical Chemistry*
12. Rakshit, P.C., *Physical Chemistry* Sarat Book House
13. Moore, W. J. *Physical Chemistry*, Orient Longman
14. Viswanathan, B., Raghavan, P.S. *Practical Physical Chemistry* Viva Books(2009)
15. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson
16. Harris, D. C. *Quantitative Chemical Analysis*. 9th Ed., Freeman (2016)
17. Palit, S.R., De, S. K. *Practical Physical Chemistry* Science Book Agency
18. Levitt, B. P. edited *Findlay's Practical Physical Chemistry* Longman Group Ltd.
19. Gurtu, J. N., Kapoor, R., *Advanced Experimental Chemistry* S. Chand & Co. Ltd.
20. *Practical Workbook Chemistry (Honours), UGBS, Chemistry*, University of Calcutta, 2015

Course Outcome (COs):

Upon successful completion students should be able to: Apply the fundamental principles of measurement, matter, atomic theory, chemical periodicity, the fundamentals of acid/base equilibria, including pH calculations, buffer behavior, acid/base titrations, and their relationship to electrophiles and nucleophiles, general chemical reactivity, the "gas laws" governing the physical/chemical behavior of gases, the basic (colligative) properties of solutions and solution chemistry to subsequent courses in science, the hybridization and geometry of atoms and the three-dimensional structure of organic molecules as well as stereochemistry.

Core course –2

Course Description: This course covers organic Stereochemistry, General Treatment of Reaction Mechanism, Substitution and Elimination Reactions, Chemical bonding, Radioactivity.

Course Objectives:

- To understand the concept of organic reactions mechanism and stereochemistry.

- To recognize the type of organic reactions
- To understand the bonding models, structures, radio activities,

Recommended Books/References:

For Organic (TH &P)

1. Finar, I. L. *Organic Chemistry (Volume 1),* Dorling Kindersley (India) Pvt. Ltd.(Pearson Education).
2. Morrison, R. N. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt.Ltd. (Pearson Education).
3. Sykes, P. *A guidebook to Mechanism in Organic Chemistry*, Pearson Education, 2003.4. Carey, F. A., Guiliano, R. M.*Organic Chemistry*, Eighth edition, McGraw HillEducation, 2012.
5. Eliel, E. L. &Wilen, S. H. *Stereochemistry of Organic Compounds*, Wiley: London,1994.
6. Nasipuri, D.*Stereochemistry of Organic Compounds*, Wiley Eastern Limited.
7. Clayden, J., Greeves, N. &Warren, S. *Organic Chemistry*, Second edition, OxfordUniversityPress, 2012.
8. Keeler, J., Wothers, P.*Chemical Structure and Reactivity – An Integrated approach*,Oxford University Press.
9. Smith, J. G. *Organic Chemistry*, Tata McGraw-Hill Publishing Company Limited.10.Fleming, I. *Molecular Orbitals and Organic Chemical Reactions*,Reference/StudentEdition,Wiley, 2009.
11. James, J., Peach, J. M. *Stereochemistry at a Glance*, Blackwell Publishing, 2003.
12. Robinson, M. J. T., *Stereochemistry*, Oxford Chemistry Primer, OxfordUniversityPress, 2005.
13. Maskill, H., *Mechanisms of Organic Reactions*, Oxford Chemistry Primer,OxfordUniversity Press.
1.Vogel, A. I. *Elementary Practical Organic Chemistry*, Part 1: *Small scalePreparations*, CBS Publishers and Distributors.
2. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry*, PearsonEducation(2009).
3. Furniss, B.S., Hannaford, A.J., Smith, P.W.G. &Tatchell, A.R. *PracticalOrganic Chemistry, 5th Ed.* Pearson (2012).
4. Ahluwalia, V.K. &Aggarwal, R. *Comprehensive Practical Organic Chemistry:Preparation and Quantitative Analysis*, University Press (2000).
5. *Practical Workbook Chemistry (Honours), UGBS, Chemistry*, University ofCalcutta, 2015.

For Inorganic (TH &P)

1. Lee, J. D. *Concise Inorganic Chemistry, 5thEd.*,Wiley India Pvt. Ltd., 2008.
2. Huheey, J. E.; Keiter, E.A. &Keiter, R.L. *Inorganic Chemistry, PrinciplesOfStructure and Reactivity 4th Ed.*, Harper Collins 1993, Pearson, 2006.
3. Douglas, B.E. and McDaniel, D.H. *Concepts & Models of Inorganic Chemistry*Oxford, 1970.
4. Porterfield, H. W., *Inorganic Chemistry*, Second Edition, Academic Press, 2005.
5. Purecell, K.F. and Kotz, J.C., *An Introduction toInorganic Chemistry*, Saunders:Philadelphia, 1980.
6. Cotton, F.A., Wilkinson, G., &Gaus, P.L. *Basic Inorganic Chemistry 3rdEd.;*Wiley India.

7. Gillespie, R. J. and Hargittai, I., The VSEPR Model of Molecular Geometry,Prentice Hall (1992).
8. Albright, T., *Orbital interactions in chemistry,* John Wiley and Sons (2005).
9. Mingos, D.M.P., *Essential trends in inorganic chemistry*. Oxford UniversityPress (1998).
10. Miessler, G. L., Fischer, P. J., Tarr, D. A., *Inorganic Chemistry,* Pearson, 5thEdition.
11. Kaplan, I., *Nuclear Physics,* Addison-Wesley Publishing Company Inc. London,1964.
12. Friedlander, G., Kennedy, J. W., Macias, E. S. And Miller, J. M., *Nuclear andRadiochemistry,* Wiley, 1981.
1. Mendham, J., *A. I. Vogel's Quantitative Chemical Analysis* 6th Ed., Pearson,2009.
2. *Practical Workbook Chemistry (Honours), UGBS, Chemistry*, University ofCalcutta, 2015.

Course Outcome (COs): Students will gain an understanding of the reactivity and stability of an organic molecule based on structure, including conformation and stereochemistry, Chemical bonding of inorganic compounds, the fundamentals of nuclear decay, the properties of an atomic nucleus that make it unstable and undergo nuclear decay, how various radiation detection instruments are constructed and become familiar with the electronic circuitry that is necessary for their operation, how alpha spectrometry can be used to detect and identify alpha particles, how gamma spectrometry can be used to detect and to identify gamma photons, how the neutron capture cross-section varies among atomic isotopes and how nuclear activation analysis can be used to identify small quantities of various isotopes, how radiopharmaceuticals are produced for the treatment of disease and understand why different radioisotopes are chosen to treat different diseases.

Core course –3

Course Description: This course covers Chemical Thermodynamics and Electrochemistry, Chemical periodicity, Chemistry ofs and p Block Elements,Noble Gases, Inorganic Polymers, Coordination Chemistry, Alkenes, Alkynes, Carbonyls, Addition to C≡C, Aromatic Substitution, Organometallics.

Course Objectives:

- To understand the concept of Chemical Thermodynamics.
- To recognize s and p Block Elements
- To understand Alkenes, Alkynes, Carbonyls,

Recommended Books/References:

For Physical (TH &P)

1. Levine, I. N. *Physical Chemistry*, 6th Edition , McGraw-Hill India
2. Castellan, G. W. *Physical Chemistry*, Narosa
3. McQuarrie, D. A. & Simons, J. D. *Physical Chemistry: A MolecularApproach,* Viva Press
4. Kapoor K.L, A Text Book Of Physical Chemistry , McGraw Hill India

5. Engel, T. & Reid, P. *Physical Chemistry*, 3rd Edition ,Pearson India
6. Atkins, P. W. & Paula, J. de *Atkins' Physical Chemistry*, 10th Edition, OxfordUniversity Press
7. Maron, S. &Prutton ,*Physical Chemistry*
8. Ball, D. W. *Physical Chemistry*, Thomson Press
9. Mortimer, R. G. *Physical Chemistry*, 2nd Edition, Elsevier
10. Glasstone, S. & Lewis, G.N. *Elements of Physical Chemistry*
11. Rakshit, P.C., *Physical Chemistry*,Sarat Book House
12. Moore, W. J. *Physical Chemistry*, Orient Longman
14. Denbigh, K. *The Principles of Chemical Equilibrium*,Cambridge
15. Zemansky, M. W. &Dittman, R.H. *Heat and Thermodynamics*, Tata-McGraw-Hil
16. Glasstone, S. An Introduction to Electrochemistry, East-West Press.
17. Klotz, I.M., Rosenberg, R. M.*ChemicalThermodynamics:Basic Concepts andMethods* , 7th Edition, Wiley
1. Viswanathan, B., Raghavan, P.S. *Practical Physical Chemistry* Viva Books(2009)
2. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson
3. Harris, D. C. *Quantitative Chemical Analysis*. 9th Ed., Freeman (2016)4.Palit, S.R., De, S. K. *Practical Physical Chemistry* Science Book Agency
5. Levitt, B. P. edited *Findlay's Practical Physical Chemistry* Longman Group Ltd.
6. Gurtu, J. N., Kapoor, R., *Advanced Experimental Chemistry* S. Chand & Co. Ltd.
7. *Practical Workbook Chemistry (Honours), UGBS, Chemistry*, University of Calcutta, 2015

For Inorganic (TH &P)

1. Lee, J. D. *Concise Inorganic Chemistry, 5th Ed.,* Wiley India Pvt. Ltd., 2008.
2. Huheey, J. E.; Keiter, E.A. &Keiter, R.L. *Inorganic Chemistry, PrinciplesofStructure and Reactivity 4th Ed.*, Harper Collins 1993, Pearson, 2006.
3. Douglas, B.E. and McDaniel, D.H. *Concepts & Models of Inorganic Chemistry*Oxford, 1970.
4. Porterfield, H. W., *Inorganic Chemistry*, Second Edition, Academic Press, 2005.
5. Purecell, K.F. and Kotz, J.C., *An Introduction toInorganic Chemistry*, Saunders:Philadelphia, 1980.
6. Cotton, F.A., Wilkinson, G., &Gaus, P.L. *Basic Inorganic Chemistry 3rd Ed.;*Wiley India.
7. Gillespie, R. J. and Hargittai, I., The VSEPR Model of Molecular Geometry,Prentice Hall (1992).
8. Albright, T., *Orbital interactions in chemistry*, John Wiley and Sons (2005).
9. Mingos, D.M.P., *Essential trends in inorganic chemistry*. Oxford UniversityPress (1998).
10. Miessler, G. L., Fischer, P. J., Tarr, D. A., *Inorganic Chemistry*, Pearson, 5thEdition.
11. Kaplan, I., *Nuclear Physics*, Addison-Wesley Publishing Company Inc. London,1964.
12. Friedlander, G., Kennedy, J. W., Macias, E. S. And Miller, J. M., *Nuclear andRadiochemistry*,Wiley, 1981.
3. Mendham, J., *A. I. Vogel's Quantitative Chemical Analysis* 6th Ed., Pearson, 2009.
4. *Practical Workbook Chemistry (Honours), UGBS, Chemistry*, University of Calcutta, 2015

For Organic Chemistry (TH &P)

1. Finar, I. L. *Organic Chemistry (Volume 1)*, Dorling Kindersley (India) Pvt. Ltd.

(Pearson Education).2. Morrison, R. N. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt.
Ltd. (Pearson Education).
3. Sykes, P. *A guidebook to Mechanism in Organic Chemistry*, Pearson Education, 2003.
4. Carey, F. A., Guiliano, R. M.*Organic Chemistry*, Eighth edition, McGraw Hill Education, 2012.
5. Loudon, G. M. *Organic Chemistry*, Fourth edition, Oxford University Press, 2008.
6. Norman, R.O. C., Coxon, J. M. *Principles of Organic Synthesis*, Third Edition, Nelson Thornes, 2003.
7. Clayden, J., Greeves, N. &Warren, S. *Organic Chemistry*, Second edition, Oxford UniversityPress, 2012.
8. Graham Solomons, T.W., Fryhle, C. B. *Organic Chemistry*, John Wiley & Sons, Inc.
9. Smith, J. G. *Organic Chemistry*, Tata McGraw-Hill Publishing Company Limited.
10. March, J. *Advanced Organic Chemistry*, Fourth edition, Wiley.
11. Jenkins, P. R., *Organometallic Reagents in Synthesis*, Oxford Chemistry Primer, Oxford University Press.
12. Ward, R. S., *Bifunctional Compounds*, Oxford Chemistry Primer, Oxford University Press.

1. Bhattacharyya, R. C, *A Manual of Practical Chemistry.*
2. Vogel, A. I. *Elementary Practical Organic Chemistry*, Part 2: *Qualitative Organic Analysis*, CBS Publishers and Distributors.
3. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry*, Pearson Education (2009).4.Furniss, B.S., Hannaford, A.J., Smith, P.W.G., Tatchell, A.R. *Practical Organic Chemistry,5th Ed.*, Pearson (2012).
5. Dutta, S, *B. Sc. Honours Practical Chemistry*, Bharati Book Stall.
6. Arthur, I. Vogel, *Quantitative Organic Analysis*, Pearson
7. *Practical Workbook Chemistry (Honours), UGBS, Chemistry*, University of Calcutta, 2015

Course Outcome (COs): how to handle their understanding of the application of mathematical tools to calculate thermodynamic and kinetic properties, the relationship between microscopic properties of molecules with macroscopic thermodynamic observables, the derivation of rate equations from mechanistic data, the use of simple models for predictive understanding of physical phenomena associated to chemical thermodynamics and kinetics, the limitations and uses of models for the solution of applied problems involving chemical thermodynamic and kinetics. To gather verse knowledge regarding s and p Block Elements and are introduced to the concepts of functional groups, nomenclature, stereochemistry, and reaction mechanisms. The systematic chemistry of alkanes, alkenes, alkynes, alkyl halides, alcohols,carboxylic acid, amines, ethers and dyes and pigments are discussed

Core course –4

Course Description: This course covers Organic Nitrogen compounds, Rearrangements, Synthesis, Organic Spectroscopy, Applications of Thermodynamics, Phase Equilibrium,

Foundation ofQuantum Mechanics, Crystal Structure and Coordination Chemistry of d & f elements, Lanthanoids and Actinoids, Reaction Kinetics and Mechanism

Course Objectives:

- To understand the concept of Organic Nitrogen compounds,Synthesis, Organic spectroscopy.
- To understandApplications of Thermodynamics, Quantum Mechanics, Phase Equilibrium
- To understand Coordination Chemistry, Lanthanoids and Actinoids, Reaction Kinetics and Mechanism and chemistry of d & f elements.

Recommended Books/References:

For Organic (TH &P)

1. Finar, I. L. *Organic Chemistry (Volume 1),* Dorling Kindersley (India) Pvt. Ltd.(Pearson Education).
2. Finar, I. L. *Organic Chemistry* (*Volume 2: Stereochemistry and the Chemistryof Natural Products*), Dorling Kindersley (India) Pvt. Ltd.(Pearson Education).
3. Norman, R.O. C., Coxon, J. M. *Principles of Organic Synthesis,* Third Edition,Nelson Thornes, 2003.
4. Clayden, J., Greeves, N., Warren, S., *Organic Chemistry*, Second edition, OxfordUniversity Press 2012.
5. Silverstein, R. M., Bassler, G. C., Morrill, T. C. *Spectrometric Identificationof Organic Compounds*, John Wiley and Sons, INC, Fifth edition.
6. Kemp, W. *Organic Spectroscopy*, Palgrave.
7. Pavia, D. L. *et al. Introduction to Spectroscopy,* 5th Ed. Cengage Learning India Ed.(2015). 8. Dyer, J. *Application of Absorption Spectroscopy of Organic Compounds*, PHIPrivate Limited
9. March, J. *Advanced Organic Chemistry*, Fourth edition, Wiley.
10. Harwood, L. M., *Polar Rearrangements*, Oxford Chemistry Primer, OxfordUniversity Press.
11. Bailey, Morgan, Organonitrogen Chemistry, Oxford Chemistry Primer, OxfordUniversity Press.
12. Warren, S. *Organic Synthesis the Disconnection Approach*, John Wiley and Sons.
13. Warren, S., *Designing Organic Synthesis*, Wiley India, 2009.
14. Carruthers, W. *Modern methods of Organic Synthesis,* Cambridge University Press.
15. Willis, C. A., Wills, M., *Organic Synthesis*, Oxford Chemistry Primer, OxfordUniversity Press
1. Vogel, A. I. *Elementary Practical Organic Chemistry,* Part 2: *QualitativeOrganic Analysis,* CBS Publishers and Distributors.
2. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry,* Pearson Education(2009).
3. Furniss, B.S., Hannaford, A.J., Smith, P.W.G., Tatchell, A.R. *Practical OrganicChemistry,* 5th Ed., Pearson (2012).
4. Clarke, H. T., *A Handbook of Organic Analysis (Qualitative and Quantitative)*,Fourth Edition, CBS Publishers and Distributors (2007). 5. *Practical WorkbookChemistry (Honours), UGBS, Chemistry*, University of Calcutta, 2015.

For Physical (TH &P)

1. Levine, I. N. *Physical Chemistry*, 6th Edition , McGraw-Hill India
2. Castellan, G. W. *Physical Chemistry*, Narosa
3. McQuarrie, D. A. & Simons, J. D. *Physical Chemistry: A MolecularApproach,* Viva Press
4. Kapoor K.L, A Text Book Of Physical Chemistry , McGraw Hill India
5. Engel, T. & Reid, P. *Physical Chemistry*, 3rd Edition ,Pearson India
6. Atkins, P. W. & Paula, J. de *Atkins' Physical Chemistry*, 10th Edition, OxfordUniversity Press
7. Maron, S. &Prutton ,*Physical Chemistry*
8. Ball, D. W. *Physical Chemistry*, Thomson Press
9. Mortimer, R. G. *Physical Chemistry*, 2nd Edition, Elsevier
10. Atkins, P. W. *Molecular Quantum Mechanics*, 5th edition ,Oxford
11. Levine, I. N. *Quantum Chemistry*, 7th Edition, Pearson India
12. Sannigrahi A.B, Quantum Chemistry,2nd Edition, Books and Allied Pvt Ltd.
13. Denbigh, K. *The Principles of Chemical Equilibrium* Cambridge UniversityPress
14. Zemansky, M. W. &Dittman, R.H. *Heat and Thermodynamics*, Tata-McGraw-Hil.
1. Viswanathan, B., Raghavan, P.S. *Practical Physical Chemistry* Viva Books(2009)
2. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson
3. Harris, D. C. *Quantitative Chemical Analysis*. 9th Ed., Freeman (2016)
4. Palit, S.R., De, S. K. *Practical Physical Chemistry* Science Book Agency
5. Levitt, B. P. edited *Findlay's Practical Physical Chemistry* Longman Group Ltd.
6. Gurtu, J. N., Kapoor, R., *Advanced Experimental Chemistry* S. Chand & Co. Ltd.
7. *Practical Workbook Chemistry (Honours), UGBS, Chemistry*, University ofCalcutta, 2015.

For Inorganic (TH &P)

1. Huheey, J. E.; Keiter, E.A. &Keiter, R.L. *Inorganic Chemistry, Principles OfStructure and Reactivity 4th Ed.*, Harper Collins 1993, Pearson,2006.

2. Greenwood, N.N. &Earnshaw A. *Chemistry of the Elements*, Butterworth-Heinemann, 1997.
3. Cotton, F.A., Wilkinson, G., Murrillo, C. A., Bochmann, M., *AdvancedInorganic Chemistry 6th Ed. 1999.*,Wiley.
4. Miessler, G. L. & Donald, A. Tarr. *Inorganic Chemistry* 4th Ed., Pearson, 2010.
5. Purecell, K.F. and Kotz, J.C., *An Introduction toInorganic Chemistry*,Saunders: Philadelphia, 1980.
6. Mingos, D.M.P., *Essential trends in inorganic chemistry*. Oxford UniversityPress (1998).
1. Mendham, J., *A. I. Vogel's Quantitative Chemical Analysis* 6th Ed., Pearson,2009.
2. *Inorganic Synthesis*, Vol. 1-10.

Course Outcome (COs): How to design syntheses of organic molecules, how to determine the structure of organic molecules using IR and NMR spectroscopic techniques,the use of nuclear magnetic resonance spectroscopy, mass spectrometry and infrared spectroscopy for organic structure elucidation and concept of organic nitrogen compounds.The application of mathematical tools to calculate thermodynamic and kinetic properties, the relationship between microscopic properties of molecules with macroscopic thermodynamic observables, the derivation of rate equations from mechanistic data, the use of simple models for predictive understanding of physical phenomena associated to chemical thermodynamics and kinetics, the limitations and uses of

models for the solution of applied problems involving chemical thermodynamic and kinetics.the limitations of classical mechanics at molecular length scales, the differences between classical and quantum mechanics, the connection of quantum mechanical operators to observables, probabilities, amplitudes, averages, expectation values, and observables, how molecular phenomena can be related to model problemshow to interpret spectra, the connection between common approximation methods and standard chemical frameworks (Born-Oppenheimer approximation, molecular orbitals, for example), molecular-level critical thinking skills, and the bonding models, structures, reactivates, and applications of coordination complexes.Also aim of this course is to teach the student the chemistry of complexes. So, learning the coordinate bond theory is one of the aims. The student must learn geometrical, optical, linkage, coordinate isomer and Jahn-teller distortion with electronic spectra of TM complexes.

Core course –5

Course Description: This course covers Quantum Chemistry, Statistical Thermodynamics,Numerical Analysis, Carbocyles and Heterocycles and Cyclic Stereochemistry, Pericyclic reactions, Carbohydrates, Biomolecules.

Course Objectives:

- To understand the concept Quantum Chemistry, Statistical Thermodynamics,
- To understand the Cyclic Compounds, Pericyclic reactions, Carbohydrates andBiomolecules.

Recommended Books/References:

For Physical (TH &P)

1. Levine, I. N. *Physical Chemistry*, 6th Edition McGraw-Hill India
2. Castellan, G. W. *Physical Chemistry*, Narosa
3. McQuarrie, D. A. & Simons, J. D. *Physical Chemistry: A Molecular Approach*, Viva Press
4. Kapoor K.L, A Text Book Of Physical Chemistry , McGraw Hill India
5. Engel, T. & Reid, P. *Physical Chemistry*, 3rd Edition Pearson India
6. Atkins, P. W. & Paula, J. de *Atkins' Physical Chemistry*, 10th Edition Oxford University Press
7. Levine, I. N. *Quantum Chemistry*, 7th Edition,Pearson India
8. Maron, S. &Prutton*Physical Chemistry*
9. Ball, D. W. *Physical Chemistry*, Thomson Press
10. Mortimer, R. G. *Physical Chemistry*, Elsevier
*11.*Glasstone, S. & Lewis, G.N. *Elements of Physical Chemistry*
12. Rakshit, P.C., *Physical Chemistry* Sarat Book House
14. Klotz, I.M., Rosenberg, R. M. *Chemical Thermodynamics:Basic Concepts and Methods*,Wiley
15. Sannigrahi A.B, Quantum Chemistry,2nd Edition, Books and Allied Pvt Ltd.
16. Atkins, P. W. *Molecular Quantum Mechanics*, 5th edition ,Oxford
17. Moore, W. J. *Physical Chemistry*, Orient Longman

18. Nash, L. K. *Elements of Statistical Thermodynamics*, Dover
19. V. Rajaraman, Computer Oriented Numerical Methods, PHI Learning, 2013
20. V. Rajaraman, Computer Programming in FORTRAN 77, Prentice Hall, 1997
21. Martin Cwiakala, Schaum's Outline of Programming with FORTRAN 77, 1995
1. McQuarrie, D. A. *Mathematics for PhysicalChemistry.* University Science Books (2008)
2. Mortimer, R. *Mathematics for Physical Chemistry*. 3rd Ed. Elsevier (2005)
3. Yates, P. *Chemical Calculations*. 2nd Ed. CRC Press (2007)
4. Harris, D. C. *Quantitative Chemical Analysis*. 6th Ed., Freeman (2007) Chapters 3-5
5. Let us C, YashvantKanetkar, BPB Publication, 15th Edition, 2016

For Organic (TH &P)

1. Clayden, J., Greeves, N., Warren, S. *Organic Chemistry,* Second edition, Oxford University Press 2012.
2. Eliel, E. L. &Wilen, S. H. *Stereochemistry of Organic Compounds*, Wiley: London.
3. Nasipuri, D. *Stereochemistry of Organic Compounds,* Wiley Eastern Limited.
4. Fleming, I. *Molecular Orbitals and Organic Chemical reactions*, Reference/Student Edition, Wiley, 2009.
5. Fleming, I. *Pericyclic Reactions*, Oxford Chemistry Primer, Oxford University Press. 6. Gilchrist, T. L. &Storr, R. C. *Organic Reactions and Orbital symmetry*, Cambridge University Press.
7. Finar, I. L. *Organic Chemistry (Volume 1),* Dorling Kindersley (India) Pvt. Ltd.(Pearson Education).
8. Finar, I. L. *Organic Chemistry* (*Volume 2: Stereochemistry and the Chemistry of Natural Products*), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
9. Morrison, R. T. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
10. Loudon, G. M. *Organic Chemistry*, Fourth edition, Oxford University Press.
11. James, J., Peach, J. M. *Stereochemistry at a Glance*, Blackwell Publishing, 2003.
12. Robinson, M. J. T., *Stereochemistry*, Oxford Chemistry Primer, Oxford University Press, 2005.
13. Davis, B. G., Fairbanks, A. J., *Carbohydrate Chemistry*, Oxford Chemistry Primer, Oxford University Press.
14. Joule, J. A. Mills, K. *Heterocyclic Chemistry*, Blackwell Science.
15. Acheson, R.M. *Introduction to the Chemistry of Heterocyclic compounds,* John Wiely& Sons (1976).
16. Gilchrist, T. L. *Heterocyclic Chemistry*, 3rd edition, Pearson.
17. Davies, D. T., *Heterocyclic Chemistry*, Oxford Chemistry Primer, Oxford University Press
1. *Practical Workbook Chemistry (Honours), UGBS, Chemistry*, University of Calcutta, 2015
2. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. *Practical Organic Chemistry, 5th Ed.*, Pearson (2012).
3. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry,* Pearson Education.

Course Outcome (COs): The student should have the following learning outcomes through knowledge on different classical and quantum mechanical distribution functions, statistical mechanics and the approximations making a statistical description possible apply the theory to understand gases and crystals and in addition be able to construct microscopic models and from

these derive thermodynamic observablesdescribe the importance and consequences of quantum mechanics for macroscopic particle systems.This course able to predict the stereochemistry & products of the Pericyclic reactions and how to apply various disconnection approaches & the retrosynthesis of organic compounds in designing of new compounds,students should be able to identify the main types of pericyclic reactions, to understand and to apply the Woodward-Hoffmann rules, to determine if a pericyclic reaction is thermally or photochemically allowed and to predict its regioselectivity and its stereoselectivity.

Core course –6

Course Description: This course covers Theoretical Principles in Qualitative Analysis, Bioinorganic Chemistry, Organometallic Chemistry, Catalysis by Organometallic Compounds, Molecular Spectroscopy, Photochemistry and Theory of reaction rate, Surface phenomenon, Dipole moment and polarizability**.**

Course Objectives:

- To understand the concept of Theoretical Principles in Qualitative Analysis, Bioinorganic Chemistry.
- To understand the Organometallic Chemistry, Catalysis by Organometallic Compounds
- To understand theMolecular Spectroscopy, Photochemistry and Theory of reaction rate, Surface phenomenon, Dipole moment and polarizability**.**

Recommended Books/References:

For Inorganic (TH &P)

1. Lippard, S.J. & Berg, J.M. *Principles of Bioinorganic Chemistry* PanimaPublishing Company 1994.
2. Huheey, J. E.; Keiter, E.A. &Keiter, R.L. *Inorganic Chemistry, PrinciplesofStructure and Reactivity 4th Ed.*, Harper Collins 1993, Pearson,2006.
3. Greenwood, N.N. &Earnshaw A. *Chemistry of the Elements*, Butterworth-Heinemann, 1997.
4. Cotton, F.A., Wilkinson, G., Murrillo, C. A., Bochmann, M., *AdvancedInorganic Chemistry 6th Ed. 1999.*,Wiley.
5. Bertini, I., Gray, H. B., Lippard, S.J., Valentine, J. S., Viva, 2007.
6. Basolo, F, and Pearson, R.C. *Mechanisms of Inorganic Chemistry*, John Wiley& Sons, NY, 1967.
7. Purecell, K.F. and Kotz, J.C., *An Introduction toInorganic Chemistry*,Saunders: Philadelphia, 1980.
8. Powell, P. *Principles of Organometallic Chemistry*, Chapman and Hall, 1988.

9. Collman, J. P. *et al. Principles and Applications of OrganotransitionMetalChemistry*. Mill Valley, CA: University Science Books, 1987.
10. Crabtree, R. H. *The Organometallic Chemistry of the Transition Metals*. NewYork, NY: John Wiley, 2000.

For Physical (TH &P)

1. Levine, I. N. *Physical Chemistry*, 6th Edition , McGraw-Hill India2. Castellan, G. W. *Physical Chemistry*, Narosa
3. McQuarrie, D. A. & Simons, J. D. *Physical Chemistry: A MolecularApproach*, Viva Press
4. Kapoor K.L, A Text Book Of Physical Chemistry , McGraw Hill India
5. Engel, T. & Reid, P. *Physical Chemistry*, 3rd Edition ,Pearson India
6. Atkins, P. W. & Paula, J. de *Atkins' Physical Chemistry*, 10th Edition, OxfordUniversity Press
7. Maron, S. &Prutton ,*Physical Chemistry*
8. Ball, D. W. *Physical Chemistry*, Thomson Press
9. Mortimer, R. G. *Physical Chemistry*, 2nd Edition, Elsevier
10. Banwell, C. N. Fundamentals of Molecular Spectroscopy, Tata-McGraw-Hill
11. Barrow, G. M. Molecular Spectroscopy, McGraw-Hill
12. Hollas, J.M. Modern Spectroscopy, Wiley India
13. McHale, J. L. Molecular Spectroscopy, Pearson Education
14. Wayne, C. E. & Wayne, R. P. Photochemistry, OUP
15. Brown, J. M. Molecular Spectroscopy, OUP

Course Outcome (COs): The learning objective is that students acquire foundation knowledge of the biochemistry of selected and predominantly trace, elements.Understand typical roles and chemistry of the elements, in particular the metal ions, essential for living systems, e.g. structural, recognition, sensor roles and redox and non-redox catalytic roles. Rationalize the role of specific metal ions in metalloenzymes for catalyzing energetically and stereo- and enantio-selectively difficult reactions, Assess the viability of the reaction mechanisms proposed for the biological activation of the small molecules through and comparisons to known chemistry of the elements. Describe basic principles in the use of optical, vibrational and magnetic resonance, Mössbauer spectroscopies, X-ray diffraction and fluorescence, electrochemical and other selected methods for the characterization of biomolecular compounds containing any element of the periodic system. Propose spectroscopic and other techniques appropriate for investigation of specific metalloenzymes.

Students acquireknowledge 1. the selection rule for infrared-active transitions. 2. Determine the vibrations for a triatomic molecule and identify whether they are infrared-active. 3. Determine whether the molecular vibrations of a triatomic molecule are Raman active. 4. Explain the difference between Stokes and anti-Stokes lines in a Raman spectrum. 3. Justify the difference in intensity between Stokes and anti-Stokes lines. 5. Draw the Stokes and anti-Stokes lines in a Raman spectrum of a compound when given the energies of the different transitions. 6. Students will be able to analyse the hybridization of given compounds. 7. Students will be able to Draw character table and point groups.

Course Description:DSE-A-3: GREEN CHEMISTRY AND CHEMISTRY OFNATURAL PRODUCTS

Knowledge and understanding:

Students learn the basic principles of green and sustainable chemistry. They must be able to do and understand stoichiometric calculations and relate them to green process metrics. They learn alternative solvent media and energy sources for chemical processes

Environmental science is the study of patterns and processes in the natural world and their modification by human activity. To understand current environmental problems, we need to consider physical, biological and chemical processes that are often the basis of those problems. This course will give you the skills necessary to address the environmental issues we are facing today by examining scientific principles and the application of those principles to natural systems. This course will survey some of the many environmental science topics at an introductory level, ultimately considering the sustainability of human activities on the planet.

Course Objectives:

- To consider how the natural and built environments shape and are shaped by multiple socio-cultural and political factors.
- To think across and beyond existing disciplinary boundaries, mindful of the diverse forms of knowledge and experience that arise from human interactions with the world around them.
- To live responsibly and appreciate the environmental and cultural histories of the places they inhabit.
- To cultivate compassion, curiosity, collaboration, and hope.
- To nurture knowledge, respect, and love for the natural and human communities of central Maine, the place where they spend four formative years of their lives.
- To develop skills of analysis and communication, bearing in mind disciplinary traditions and diverse publics.

Course Outcome (COs):

The Environmental Studies major prepares students for careers as leaders in understanding and addressing complex environmental issues from a problem-oriented, interdisciplinary perspective. Students:

- Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
- Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
- Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
- Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
- Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
- Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
- Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and/or practitioners.

Industrial Chemistry
Course Description: DSE-BINORGANIC MATERIALS OFINDUSTRIALIMPORTANCE:

The course is designed to teach you the essential skills and knowledge involved in industrial chemistry. The course content is wide ranging with limited detailed theory and includes some factual information that simply will need to be memorized. A key skill emphasized is problem solving, both quantitative and qualitative. The topic also cover the paints, pigments varnishes, ceramics, galss, cements, soaps, detergents, refractories, ferti;ozers, adhesives, enamels, explosives and different industries.

Course Objectives:

The specific objectives of Industrial Chemistry program are to:

- ❖ Make the students well-grounded in the principles and through knowledge of scientific techniques of industrial Chemistry.
- ❖ Educate and train Chemists to acquire a meaningful picture of Chemical industries.
- ❖ Prepare students for professional participation in Chemical industries so as to adapt themselves to jobs which are problem solving
- ❖ Train students to be result-oriented in the chemical, petrochemical, biochemical and allied technological fields.

Course Outcome (COs):

- ❖ Industrial Chemistry is designed to provide graduates with the skills, knowledge and learning tools required to carry out professional research, and development and production activities in the field of chemistry, including the following sectors: health, food, cosmetics, the environment and energy.

Polymer Chemistry
Course Description: DSE-B-3: POLYMER CHEMISTRY:

Polymer Chemistry is a course that introduces students to Polymer science, engineering and technology, where types of polymer, reactions to form polymer, polymerization mechanisms, structures, properties and applications.

Course Objectives:

The aim of the course is to familiarise students with electrochemical processes occurring in the solid state:

- ❖ The subject provides an introduction to polymer science with respect to synthesis, polymerization kinetics and network formation/gelation of macomolecules formed by step-growth and chain-growth polymerization.
- ❖ Polymer structure/conformation and transitions from liquid (melt, solutions) to solid (polymer crystals and –glass) states are discussed using equilibrium thermodynamics, kinetics and free volume considerations.
- ❖ Polymer solubility/miscibility and phase diagrams are determined using thermodynamic parameters. Molecular weight determination of polymers is shown using osmotic pressure, viscosimetry and size exclusion chromatography (SEC).
- ❖ An overview of mechanical and rheological properties of polymers is also given. Specialized synthesis for flow assurance industry.

Course Outcome (COs):

After studying this course, you should be able to:

- ❖ isolate the key design features of a product which relate directly to the material(s) used in its construction
- ❖ indicate how the properties of polymeric materials can be exploited by a product designer
- ❖ describe the role of rubber-toughening in improving the mechanical properties of polymers
- ❖ identify the repeat units of particular polymers and specify the isomeric structures which can exist for those repeat units
- ❖ Estimate the number- and weight-average molecular masses of polymer samples given the degree of polymerisation and mass fraction of chains present.
- ❖ Differentiate between natural and man-made polymers.
- ❖ Explain polymerization methods.
- ❖ understand polymerization kinetics
- ❖ Uses of polymers.

Course Description: SEC 3 – PHARMACEUTICALS CHEMISTRY

The course includes theoretical studies in the field of Medicinal Chemistry. It also includes physical chemical factors, diagnostic medical instruments such as ECG, EEG, CT, etc. Also, it includes disease and treatment.

Course Objectives:

The main objectives of this master in medicinal chemistry are:

- ❖ Understanding of the basic biological and pharmacological interactions by using both natural products and total synthesis of bioactive molecules.
- ❖ Use of corresponding knowledge for the development of biologically and clinically active drugs.
- ❖ It will include advanced courses in natural products, organic synthesis, medicinal chemistry; fundamentals of cell biology, molecular biology, drug design, and analytical methods.

Course Outcome (COs):

The main objectives of this master in medicinal chemistry are:

- ❖ Understanding of the basic biological and pharmacological interactions by using both natural products and total synthesis of bioactive molecules.
- ❖ Use of corresponding knowledge for the development of biologically and clinically active drugs.
- ❖ It will include advanced courses in natural products, organic synthesis, medicinal chemistry; fundamentals of cell biology, molecular biology, drug design, and analytical methods.

DEPARTMENT OF CHEMISTRY

The Outcomes of UG Course, B. Sc. in Chemistry

At the completion of B. Sc. in Chemistry the students are able to:

After completion of degree, students gained the theoretical as well as practical knowledge of handling chemicals. Also they expand the knowledge available opportunities related to chemistry in the government services through public service commission particularly in the field of food safety, health inspector, pharmacist etc**.** Afford a broad foundation in chemistry that stresses scientific reasoning and analytical problem solving with a molecular perspective. Achieve the skills required to succeed in graduate school, professional school and the chemical industry like cement industries, agro product, Paint industries, Rubber industries, Petrochemical industries, Food processing

industries, Fertilizer industries etc. Got exposures of a breadth of experimental techniques using modern instrumentation.Understand the importance of the elements in the periodic table including their physical and chemical nature and role in the daily life. Understand the concept of chemistry to inter relate and interact to the other subject like mathematics, physics, biological science etc. Learn the laboratory skills and safely to transfer and interpret knowledge entirely in the working environment.

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PRINCIPAL
RAJA PEARY MOHAN COLLEGE
UTTARPARA, HOOGHLY