

CCH-301-Organic and Physical Chemistry

RATIONALE: This course is designed to enable students to acquire basic understanding of organic as well as physical chemistry.

Its origin and structure helps the potential application of the unexplored and unidentified chemicals in the industry.

LEARNING OUTCOMES:

- Understand the concept of organic and physical chemistry
- Develop an understanding of the chemical systems around us
- Gain knowledge about the structure, function and applications of various chemicals

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CCH-301	Organic and Physical Chemistry	3	45	30	70	100

COURSE CONTENT:

Unit 1 Acid-Base Properties	Number of lectures: 15	Weightage:33.3%
1. Proton Acids-Bases theory , Lewis Acids-Bases theory		(4 hrs)
2. Scale of acidity-basicity		(2 hrs)
3. Factors effecting acidity and basicity of organic compounds		(9 hrs)
• Resonance effect (Drawing resonance structures and the conditions for resonance)		
• Inductive and electronic effects		
• Effect of hybridization		
• Steric effects		
• Effects by hydrogen bonding		
Unit 2 Electrophillic Aromatic Substitution	Number of lectures: 15	Weightage:33.3%
• Introduction		(5 hrs)
• Effect of substituent groups		
• Determination of orientation and relative reactivity		
• Classification of substituent groups		

<ul style="list-style-type: none"> • Orientation and Synthesis • Mechanism of nitration, sulfonation, Friedel-Craft alkylation and halogenations (4 hrs) • Orientation in mono and disubstituted benzenes (6 hrs) <ul style="list-style-type: none"> • Electrophilic aromatic substitution (Two steps) • Theory of reactivity. • Theory of orientation. • Electron release via resonance
Unit 3 Thermodynamics Number of lectures: 15 Weightage:33.3%
(A) Phase in Equilibrium. (8 hrs) <ul style="list-style-type: none"> • Clapeyron-clausius equation, Integrated form of clapeyron-clausius equation • Application of clapeyron-clausius equation from various phases in equilibrium • Trouton's law • Craft equation. • Elevation in Boiling point (Kb) • Depression of freezing point (Kf)
(B) Partial molar Properties (7 hrs) <ul style="list-style-type: none"> • Partial molar free energy. • Concept of Chemical Potential. • Gibbs-Duhem equation. • Variation of chemical potential with temperature and pressure. • Duhem-Margules equation. • Numericals

REFERENCES

Organic Chemistry

1. Organic Chemistry by Morrison and Boyd.4th ed. Pearson Education 2003
2. Advance Organic Chemistry by Jerry March.
3. Advance Organic Chemistry by Arun Bahal and B.S.Bahal.
4. Organic Chemistry Vol. I & II by S.M.Mukherji, S.P.Sing R.P.Kapoor.
5. Text book of Organic Chemistry by Arun Bahal, B.S.Bhal, S.Chand.
6. Organic Chemistry by I.L.Finar.

Physical Chemistry

1. Advance Physical Chemistry by Gurdeep Raj
2. Physical Chemistry (Question and Answers) by R.N.Madan G.D.Tully, S.Chand.
3. Principles of Physical Chemistry by Puri, Sharma, Pathania.

4. Essentials of Physical Chemistry by B.S.Bahal, Arun Bahal G.D.Tully.

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students
2. Explaining & Discussing the major terminologies related to Chemistry
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme % Weightage	Teaching Scheme No. of Lecture
Unit 1	33.3	15
Unit 2	33.3	15
Unit 3	33.3	15
Total	100	45

CCH-302-Inorganic and Biochemistry

RATIONALE: This course is designed to enable students to acquire basic understanding of inorganic chemistry and biomolecules

LEARNING OUTCOMES:

- Understand the concept of various biochemical entities in the body.
- Develop an understanding of the biochemical systems around us.
- Gain knowledge about the structure, function and applications of various inorganic compounds.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CCH-302	Inorganic and Biochemistry	3	45	30	70	100

COURSE CONTENT:

Unit 1: Chemistry of Noble gases	Number of lectures: 15	Weightage:33.3%
<ul style="list-style-type: none">• Introduction (6 hrs)• Discovery of Noble gases: Occurrence, Isolation of Non-radioactive of Noble gases Electronic configuration of Noble gases• Compound of Noble gases (9 hrs)<ol style="list-style-type: none">1. Non real compounds prepared by different methods2. True compounds: XeF₂, XeF₄, XeF₆, XeOF₂, XeO₃, XeO₂F₂, XeO₄, XeOF₄.		
Unit 2: Wave Mechanics	Number of lectures: 15	Weightage:33.3%
<ul style="list-style-type: none">• Black Body Radiation & Quantum Theory (5 hrs)• Photo electric effect: Wave particle duality of radiation• Compton Effect• Basic postulates of quantum Mechanics (4 hrs)• Operator: Definition, Algebra of operators, Addition, Multiplication, Commutative		

<ul style="list-style-type: none"> properties, linear operator, Commutator operators, Laplassian operator Free particle system (6 hrs) Particle in one dimension box 		
Unit 3	Number of lectures: 15	Weightage:33.3%
<p>(A) Amino acids (6 hrs)</p> <ul style="list-style-type: none"> Introduction. Classification and nomenclature Dipolar ion structure and Isoelectric point Synthesis of amino acids (Gabriel Phthalimide, Strecker, Fisher-Malonic ester) Reactions of amino acid <p>(B) Peptides (4 hrs)</p> <ul style="list-style-type: none"> Geometry of peptide linkage. Synthesis of peptides (Bergmann Method, Shehan Method). Determination of structure of peptide by terminal residue analysis <ul style="list-style-type: none"> N-terminal residue analysis by DNFB sanger method and iso-thiocynate method C- terminal residue analysis by enzymes <p>(C) Carbohydrates (5 hrs)</p> <ul style="list-style-type: none"> Introduction Definition & classification of Mono Sacharides. Nomenclature. Reactions of Glucose and Fructose (Methylation, Acetylation, Oxidation with Br₂ water ,Conc.HNO₃ , Fehling solution and Tollens reagent. Reaction with HCN, NH₂OH, Osazone formation and Epimerization.) Lengthening & shortening of carbon chain of aldoses 		

REFERENCES

Inorganic Chemistry

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| 1. Quantum Chemistry by R.K.Prasad, Revised IIIrd Edition,Page- 3,5,7,34-37,41,65-68. |
| 2. Quantum Chemistry by Ira Levine |
| 3. Quantum chemistry by A. K. Chandra |
| 4. Concise Inorganic Chemistry J.D.Lee, 4th edition |
| 5. Principles of inorganic chemistry, Puri, Sharma & Kalia |
| 6. Inorganic chemistry by James Huheey, Keiter & Keiter |

Organic Chemistry

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| 1. Fundamentals of Biochemistry by J L Jain |
| 2. Text book of Organic Chemistry by Arun Bahal, B.S.Bhal, S.Chand. |

3. Organic Chemistry by I.L.Finar.
4. Organic Chemistry by Morrison and Boyd.4th ed. Pearson Education 2003
5. Organic chemistry by Mehta & Mehta

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students
2. Explaining & Discussing the major terminologies related to Chemistry
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	33.3	15
Unit 2	33.3	15
Unit 3	33.3	15
Total	100	45

PCH 301-Chemistry Practical III

RATIONALE: This course is designed to enable students to acquire on hand basic understanding of the chemical world, its origin and structure to help the potential application of the unexplored and unidentified compounds in the industry. These practical make the students capable and competent to work in chemistry related industries.

LEARNING OUTCOMES:

- Understand the concept of origin of chemistry.
- Develop an understanding of the chemical properties of compounds.
- Gain knowledge about the structure, function and applications of the chemicals compounds.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. General viva-voce will be conducted to analyze the knowledge of the student.

Subject Code	Subject Title	Credits	Practical		Total Marks
			Hrs.	Max Marks	
PCH- 301	Chemistry Practical – III	3	7 (7 hrs & 1 Day)	100	100

LIST OF EXPERIMENTS

Laboratory Course –I

Organic Chemistry

(Any 7)

(4 hours per practical)

1. Separation and qualitative determination of binary organic mixture (Only Water Insoluble Solid Compounds taken) & preparation of derivative of any one compound

Laboratory Course -II

Physical Chemistry

(Any 7 out of 10)

(4 hours per practical)

Conductometric titrations

1. To determine the strength of the given mixture of acids by conductometric titrations (HCl / CH₃COOH Vs NaOH)
2. To determine the strength of the given strong acid/base by conductometric titrations (HCl Vs NH₄OH)

pH metric titrations

1. Calibration of pH meter using 4 pH buffer solution and determine the strength of the given acid/base using pH metric titrations (HCl Vs NaOH)
2. To determine the Dissociation constant of the acid of mixtures of CH₃COONa and CH₃COOH by pH meter

Refractometry

1. To determine the specific refraction and molar refraction of the given liquid A, B and mixture C (A+B) and calculate the percentage composition of A and B in the mixture C by Abbe's Refractrometer
2. To determine the molar refraction $\text{CH}_3\text{COOC}_2\text{H}_5$, $\text{CH}_3\text{COOC}_3\text{H}_7$ and $\text{CH}_3\text{COOC}_4\text{H}_9$ and show the constancy of reaction equivalent of $-\text{CH}_2-$ Group by Abbe's Refractrometer

Viscometry

1. To determine the viscosity of different mixtures of liquid A and B and determine the percentage composition of unknown mixture by graphical method

Stalagmometry

1. To determine the surface tension and compare cleaning-efficiency of two samples of a detergent or soap with stalagmometer

Chemical kinetics

1. To study the kinetics of the reaction of decomposition of H_2O_2 catalysis by iodine ion (Clock reaction)

Thermochemistry

1. Find the solubility and heat of solution of the given organic acid at two different temperatures

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment

Subjective Elective
ECH-301A Environmental Pollution

RATIONALE: This course is designed to enable students to acquire basic understanding of the Environment and pollution causing disturbance in it.

LEARNING OUTCOMES:

- Various types of pollutants.
- Preventions for the pollution free society

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of End Term Examination conducted by University examination for 50 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
ECH-301A	Environmental Pollution	2	24	00	50	50

Course Content

Unit 1:	Number of lectures: 12	Weightage:50%
• Introduction		
•Classification of pollutant		
•Types of pollution – Air, Water and Soil (Major causes, effects and control measurements)		
•Major environmental crisis		
•acid rain, green house effect and global warming.		
Unit 2	Number of lectures: 12	Weightage:50%
• Noise Pollution		
• Thermal Pollution		
• Radio Active Pollution		
•Prevention of pollution		

REFERENCES

1. Environmental Science by S.K.Dhameja
2. Environmental Microbiology by Maier

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students
2. Explaining & Discussing the major terminologies related to Environmental pollution
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	50	12
Unit 2	50	12
Total	100	24

ECH- 301B Ceramics

RATIONALE: This course is designed to enable students to acquire basic understanding of the ceramic and ceramic industries.

LEARNING OUTCOMES:

- Application of ceramics in today's world

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of End Term Examination conducted by University examination for 50 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
ECH-301B	Ceramics	2	24	00	50	50

Course Content

Unit 1:	Number of lectures: 12	Weightage:50%
<ul style="list-style-type: none">• Introduction of Ceramics, History-Definition- Domestic and Industrial uses of Ceramics - Modern Ceramics - Hi-tech ceramics - Sub-division in Ceramics.• Ceramic bodies,•Procedures of body preparation,•Quality testing of raw material,•Grinding,•Sieving and demagnetizing,•Filter pressing,•Dearing pug mill,•Slip casting,•Slip Parameters,• Finishing,• Glazing,• Firing,• Type of kiln		

Unit 2**Number of lectures: 12****Weightage:50%****1(A) Ceramic Properties Measurements**

- Common physical test in ceramics.
- Moisture measurement,
- Grit content,
- Specific density,
- Water of plasticity(WOP),
- Viscosity,
- Dry shrinkage,
- Porosity,
- Water absorption,
- Fired shrinkage,
- Loss of ignition (LOI),
- Module of rupture(MOR),
- Crazing test,

(B) Refractories :

- Classification of refractories,
- Properties and application of refractories,
- Manufacturing process of silica bricks.

REFERENCES

1. Industrial ceramics -Felix singer and Sonja s. singer
2. Ceramic technology and processing - Alan G. king
3. Source book of Ceramics,Part-1 - S.kumar
4. Source book of Ceramics,Part-2 - S.kumar

INSTRUCTION STRATEGIES

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TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	50	12
Unit 2	50	12
Total	100	24