

Integral University, Lucknow Department of Chemistry

Study and Evaluation Scheme

Program: B.Sc. (Hons.) Industrial Chemistry

| | | | Turns of | Per l | Period nr/week | /sem | | Eval | uation So | cheme | Sub | | | | | | Attri | butes | | |
|-------|----------------|---|------------------|-------|-------------------|------|-----|----------|-----------|-------|------|--------|------------------|-------------------|----------------------|--------------------------|--------------------|------------------------------------|----------------|------------------------|
| S. No | Course code | Course Title | Type of Paper | L | т | Р | UE | CA TA | Total | ESE | Tot. | Credit | Total Credits | Employa bility | Entrepre neurship | Skill Develop ment | Gender Equality | Environment & Sustainability | Human Value | Professional Ethics |
| THE | ORIES | | | | | | | | | | | | | | | | | | | |
| 1. | LN104 | Essential Professional Communication | Foundation | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | ~ | | | | ~ | ~ |
| 2. | MT108 | Elementary Mathematics | Foundation | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | | ~ | | | | |
| 3. | CH103 | Physical Chemistry-I | Core | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | | ~ | | ~ | | |
| 4. | CH104 | Inorganic Chemistry –I | Core | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | | ~ | | | | |
| 5. | CH105 | Organic Chemistry-I | Core | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | ~ | ~ | | ~ | | |
| PRA | CTICALS | | | | | | | | | | | | | | | | | | | |
| 6. | CH106 | Industrial Chemistry Lab-1 | Core | 0 | 0 | 8 | 40 | 20 | 60 | 40 | 100 | 0:0:4 | 4 | ~ | ~ | ~ | | ~ | | ~ |
| | | | Total | 15 | 5 | 8 | 240 | 120 | 360 | 240 | 600 | 15:5:4 | 24 | | | | | | | |

Program: B.Sc. (Hons.) Industrial Chemistry

Semester: Second

| | | | Turns of | Perl | Period hr/week | | | Eval | uation So | cheme | Sub | | | | | | Attri | butes | | |
|-------|----------------|----------------------------|------------------|------|-------------------|---|-----|----------|-----------|-------|------|--------|------------------|--------|----------|------------------|----------|---------------------|-------|------------------------|
| S. No | Course code | Course Title | Type of Paper | L | т | Р | UE | CA TA | Total | ESE | Tot. | Credit | Total Credits | | Entrepre | Skill Develop | Gender | Environment & | Human | Professional Ethics |
| | | | | | | | UE | IA | | | | | | Dility | neurship | ment | Equality | & Sustainability | Value | Ethics |
| THE | ORIES | 1 | . | | 1 | 1 | 1 | 1 | | | 1 | | F | 1 | | | r | r | | |
| 1. | CS110 | Basics of Computer | Foundation | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ✓ | ~ | ~ | | ✓ | | ~ |
| 2. | CH107 | Environmental Pollution | Foundation | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | ~ | ~ | | \checkmark | ~ | |
| 3. | CH108 | Physical Chemistry-II | Core | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | | ~ | | ✓ | | |
| 4. | CH109 | Inorganic Chemistry-II | Core | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | | | | | | |
| 5. | CH110 | Organic Chemistry-II | Core | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | ~ | ~ | | ✓ | | |
| PRA | CTICALS | • | | | | | | | | | | | | | | | | | | |
| 6. | CH111 | Industrial Chemistry Lab-2 | Core | 0 | 0 | 8 | 40 | 20 | 60 | 40 | 100 | 0:0:4 | 4 | ~ | ~ | ~ | | ~ | | |
| | | • | Total | 15 | 5 | 8 | 240 | 120 | 360 | 240 | 600 | 15:5:4 | 24 | | | | | | | |

Semester: First



Integral University, Lucknow Department of Chemistry

Study and Evaluation Scheme

Program: B.Sc. (Hons.) Industrial Chemistry

| | | | Turno of | Per | Period hr/week | | | Eval | uation So | heme | Sub | | | | | | Attri | butes | | |
|--------|----------------|--|------------------|-----|-------------------|---|-----|----------|-----------|------|------|--------|------------------|--------------|----------------------|--------------------------|--------------------|------------------------------------|----------------|------------------------|
| S. No. | Course code | Course Title | Type of Paper | L | т | Р | UE | CA TA | Total | ESE | Tot. | Credit | Total Credits | | Entrepre neurship | Skill Develop ment | Gender Equality | Environment & Sustainability | Human Value | Professional Ethics |
| THEC | ORIES | | | | | | | | | | | | | | | | | | | |
| 1. | (H201 | Industrial Aspects of Physical Chemistry | Core | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | | | ~ | | | | |
| 2. | | Industrial Aspects of Inorganic Chemistry | Core | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | ~ | | | | | |
| 3. | CH203 | Industrial Aspects of Organic Chemistry | Core | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | ~ | ~ | | | | |
| 4. | CH204 | Materials & Energy Balance | Core | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | | ~ | | | | ~ |
| 5. | CH205 | Industrial Aspects of Microbiology | Elective | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | ~ | ~ | | ~ | ~ | ✓ |
| 5. | CH206 | Biochemistry | Elective | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 5.1.0 | 4 | \checkmark | | ~ | | | ~ | |
| PRAG | TICALS | | | | | | | | | | | | | | | | | | | |
| 6. | CH207 | Industrial Chemistry Lab-3 | Core | 0 | 0 | 8 | 40 | 20 | 60 | 40 | 100 | 0:0:4 | 4 | ~ | ~ | ~ | | | ~ | ~ |
| | | | Total | 15 | 5 | 8 | 240 | 120 | 360 | 240 | 600 | 15:5:4 | 24 | | | | | | | |

Program: B.Sc. (Hons.) Industrial Chemistry

Semester: Fourth

| | | | Turne of | Perl | Period hr/week | | | Eval | uation So | heme | Sub | | | | | | Attri | butes | | |
|-------|---------|------------------------------|------------------|------|-------------------|---|-----|------|-----------|------|------|--------|---------|---------|----------|-----------------|----------|---------------------|-------|--------------|
| S. No | | Course Title | Type of Paper | | | | 0 | CA | | | | Credit | Total | Employa | Entrepre | Skill | Gender | Environment | Human | Professional |
| | code | | ruper | L | т | Р | UE | ТА | Total | ESE | Tot. | creat | Credits | | neurship | Develop ment | Equality | & Sustainability | Value | Ethics |
| THE | ORIES | | | | - | | | | | | | | | | | | | | | |
| 1. | CH208 | Polymer Science | Core | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ✓ | ~ | \checkmark | | | | |
| 2. | CH209 | Medicinal Drugs Chemistry | Core | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | ~ | ~ | | | ~ | ~ |
| 3. | CH210 | Petro-chemicals | Core | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | | ~ | | | | |
| 4. | CH211 | Agro-chemicals | Core | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | ~ | ~ | | \checkmark | | |
| 5. | CH212 | Industrial Waste Treatment | Elective | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | ~ | ~ | | \checkmark | ~ | |
| 5. | CH213 | Water treatment and analysis | Elective | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 5.1.0 | 4 | ~ | ~ | ~ | | \checkmark | ~ | |
| PR/ | CTICALS | | | | | | | | | | | | | | | | | | | |
| 6. | CH214 | Industrial Chemistry Lab-4 | Core | 0 | 0 | 8 | 40 | 20 | 60 | 40 | 100 | 0:0:4 | 4 | ~ | ~ | ~ | | \checkmark | ~ | |
| | | | Total | 15 | 5 | 8 | 240 | 120 | 360 | 240 | 600 | 15:5:4 | 24 | | | | | | | |

Semester: Third



Integral University, Lucknow Department of Chemistry

Study and Evaluation Scheme

Program: B.Sc. (Hons.) Industrial Chemistry

| | | | Turno of | Per | Period hr/week | | | Eval | uation So | heme | Sub | | | | | | Attri | butes | | |
|--------|----------------|--|------------------|-----|-------------------|---|-----|------|-----------|------|------|--------|------------------|--------------|----------------------|-----------------|----------|---------------------|-------|--------------|
| S. No. | Course code | Course Title | Type of Paper | | _ | | 0 | CA . | | | | Credit | Total Credits | Employa | Entrepre neurship | Skill | Gender | Environment | Human | Professional |
| | couc | | | L | | Р | UE | TA | Total | ESE | Tot. | | cicuits | bility | neurship | Develop ment | Equality | & Sustainability | Value | Ethics |
| THE | DRIES | - | | | | | | | | | - | | | - | | | | | | |
| 1. | CH301 | Chromatographic Techniques | Core | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | ~ | ~ | | ~ | | |
| 2. | CH302 | Process in Organic Chemicals Manufacture | Core | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | ~ | ~ | | | | |
| 3. | CH303 | Phytochemistry | Core | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | \checkmark | | | | \checkmark | ~ | \checkmark |
| 4. | CH304 | Unit Operations in Chemical Industry | Core | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | ~ | ~ | | | | ~ |
| 5. | CH305 | Pulp, Paper, Leather and Textile Industry | Elective | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | ~ | ~ | | ~ | | |
| 51 | CH306 | Dyes | Elective | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 0.110 | • | ~ | ~ | ~ | | ~ | | |
| PRA | TICALS | · | | | | | | | | | | | | | | | | | | |
| 6. | CH307 | Industrial Chemistry Lab-5 | Core | 0 | 0 | 8 | 40 | 20 | 60 | 40 | 100 | 0:0:4 | 4 | ~ | ~ | ~ | | | | |
| | • | • | Total | 15 | 5 | 8 | 240 | 120 | 360 | 240 | 600 | 15:5:4 | 24 | | | | | | | |

Program: B.Sc. (Hons.) Industrial Chemistry

Semester: Sixth

| | | | Turno of | Per | Period hr/week | | | Eval | uation So | heme | Sub | | | | | | Attri | ibutes | | |
|-------|--------------------|--------------------------------|------------------|-----|-------------------|----|--------|----------|-----------|----------|----------|-------------|------------------|---------|----------|------------------|----------|------------------------------------|----------------|------------------------|
| S. No | Course code | Course Title | Type of Paper | L | т | Р | UE | са ТА | Total | ESE | Tot. | Credit | Total Credits | Employa | Entrepre | Skill Develop | Gender | Environment & Sustainability | Human Value | Professional Ethics |
| | | | | | | | UE | ТА | | | | | | Dility | neursnip | ment | Equality | Sustainability | value | Ethics |
| THE | ORIES | | | | • | • | • | r | | | | | | | 1 | • | | | 1 | |
| 1. | CH308 | Spectroscopic Techniques | Core | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ✓ | ✓ | ~ | | | | |
| 2. | CH309 | Chemical Process Industry | Core | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | ~ | ~ | | | | ✓ |
| 2 | CH310 | Fundamentals of Food Chemistry | Elective | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 2:1:0 | 4 | ✓ | ~ | ~ | | | ✓ | |
| 3. | CH311 | Dairy Chemistry | Elective | 3 | 1 | 0 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | ~ | ~ | ~ | | | ✓ | |
| PRO | JECT/ PRESI | ENTATION | | | | | | | | | | | | | | | | | | |
| 4. | * CH312 | Project Training (3 months) | Core | 00 | 00 | 00 | 00 | 00 | 00 | 300 | 300 | 10 | 10 | ~ | ✓ | ~ | | | ~ | ✓ |
| 5. | CH313 | Oral Presentation | Core | 00 | 00 | 08 | 00 | 00 | 00 | 100 | 100 | 0:0:4 | 4 | | | ~ | | | ~ | |
| | • | • | Total | 9 | 3 | 8 | 120 | 60 | 180 | 520 | 700 | 9:3:14 | 26 | | | | | | | |
| | | | | | | * | The Ev | aluatio | n schem | e for th | e Projec | tl Training | g: | | | | | | | |
| | | | | | | | | | | | | | | | Tata | | | | | |

| | | The Evaluation serie | ine for the frojecti f | | |
|--------------------|-------------|----------------------|------------------------|-----------------|-------|
| | Course Code | Dissertation | Presentation | Viva/Discussion | Total |
| Project & Training | CH312 | 200 | 50 | 50 | 300 |
| | | | | | |

L= Lecture, T= Tutorial, P = Practical, CA= Continuous Assessment, UE= Unit Exam. TA= Teacher's Assessment, ESE= End Semester Examination; Sessional=CT+TA; Subject Total= Sessional+ESE

Semester: Fifth

| | urse Code LN104 3 1 0 pe of Course (use tick mark) Core () DE () FC (V) e-requisite (if any) 10+2 with Chemistry 6. Frequency (use tick marks) Even () Odd (V) Either Sem () Every Sem () ial Number of Lectures, Tutorials, Practicals Even () Odd (V) Either Sem () Every Sem () Ial Number of Lectures, Tutorials, Practicals Even () Odd (V) Either Sem () Every Sem () Ial Number of Lectures, Tutorials, Practicals Even () Odd (V) Either Sem () Every Sem () Interview of the art of communication and learning language though literature Knowledge of Professional, Cultural and Cross-Cultural Communication Basic concept of structural and functional grammar; meaning and process of communication, verbal and nonverbal communication Knowledge of Reading and Comprehension of general and technical articles, precise writing, summarizing, abstracting Basic concepts of group discussion, organizing seminars and conferences Development of Listening , Speaking ,Reading & Writing skills (LSRW) Interview of the structural and functional grammar. Learning Language through literature. Example CO1 Basic Understanding of communication and Professional Communication Example Example Example CO2< | | | | | | | | | | |
|-------------------------------|--|------------|-----------------------------------|---------------------------------------|-------------------|----------|-----------|----------|----------|----------|----------|
| 1. Name of the Departme | | | | | | | | | - | | |
| 2. Course Name | ESSENTIAL PROFESSIONAL C | сомми | NICATION | | L | | 1 | Γ | | Р | |
| 3. Course Code | LN104 | | | | 3 | | 1 | L | | 0 | |
| 4. Type of Course (use tick | k mark) | | | | Core () | | DE | () | | FC (√ |) |
| 5. Pre-requisite (if any) | | 6. | Frequency (use tick marks) | Even () | Odd (√) | | Either | Sem (|) E | very Sei | m() |
| 7. Total Number of Lectur | es, Tutorials, Practicals | - | | | | | | | | | |
| Lect | ures = 30 | | Tutorials = 10 | | | | Practic | al = Nil | | | |
| 8. COURSE OBJECTIVES: | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | · · · · · · · · · · · · · · · · · · · | | | | | | | |
| • | • | - | • . | | | | unicatio | n | | | |
| - | | | - | viiting, suiiina | inzing, abstracti | iig | | | | | |
| | | | | | | | | | | | |
| 9. COURSE OUTCOMES (CC | | | | | | | | | | | |
| After the successful course | completion, learners will devel | lop follov | ving attributes: | | | | | | | | |
| COURSE OUTCOME (CO) | | | | TRIBUTES | | | | | | | |
| CO1 | Basic Understanding of comm | nunicatio | n and Professional Communic | ation | | | | | | | |
| CO2 | Basic knowledge of structural | l and fund | ctional grammar. Learning Lar | nguage throug | h literature. | | | | | | |
| CO3 | Basic tools of communication | and imp | rovement in communicative of | competence. | | | | | | | |
| CO4 | Understanding the basic gram | nmar and | basic structure of language | | | | | | | | |
| CO5 | Enhancement of writing skills | in Englis | h i.e. writing application, repo | ort and various | types of letters | • | | | | | |
| 10. Unit wise detailed con | | | | | | | | | | | |
| Unit-1 | Number of lectures = 08 | Title | of the unit: PROFESSIONAL C | OMMUNICAT | ION | | | | | | |
| | e , . | Essential | s of Effective Communication | n, Barriers to E | ffective Comm | unicati | on, The | Cross (| Cultural | Dimen | ions of |
| Professional Communication | | | | | | | | | | | |
| Unit-2 | | | | | | Dilai | | | | | |
| | ing Pool" by Ruskin Bond "The Po | | | | es by woody E. | Prior | | | | | |
| Unit-3 | Number of lectures = 08 | | of the unit: BASIC VOCABULA | | | | | | | | |
| | bstitution, Synonyms, Antonyn | | | | nistakes. Confus | able v | vords a | nd expr | essions | . Portm | anteau |
| words, Foreign words and e | | | | | | | | ia cripi | 200.0110 | , | |
| Unit-4 | Number of lectures = 08 | Title o | of the unit: BASIC GRAMMER | | | | | | | | |
| Articles, Prepositions, Tense | es, Concord (Subject-Verb agree | ement), N | /lodal Auxiliaries, Verbs: its Ki | nd & Uses, De | grees of Compa | rison, l | Punctua | tion. | | | |
| Unit-5 | Number of lectures = 08 | Title | of the unit: BASIC COMPOSIT | ION | | | | | | | |
| | eport? Kinds and objectives of | | | | Introduction to | busin | ess lette | ers. typ | es of b | usiness | letters. |
| | etter of Enquiry / Complaint Pro | | | | | | | | | | , |
| 11. CO-PO mapping | | | | | | | | | | | |
| COs | | Attribut | es | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | P07 |
| CO1 Basic Understandi | ng of communication and Profe | essional (| Communication | | 3 | 1 | 1 | | 2 | 1 | 1 |
| CO2 Basic knowledge o | f structural and functional gran | mmar. Le | arning Language through liter | rature. | 3 | 1 | 1 | | 2 | 1 | 1 |
| CO3 Basic tools of com | munication and improvement in | in comm | unicative competence. | | 3 | 1 | 2 | | 2 | 1 | 1 |
| CO4 Understanding the | e basic grammar and basic struc | cture of l | anguage | | 3 | 1 | 2 | | 2 | 1 | 1 |
| CO5 Enhancement of w | vriting skills in English i.e. writin | ng applica | ation, report and various type | s of letters. | 2 | 1 | 2 | | 2 | 1 | 1 |
| | 3 Strong | ng contrik | oution, 2 Average contributio | n , 1 Low cont | ribution | | | | | | |
| 12. Brief description of se | If-learning / E-learning compor | nent | | | | | | | | | |
| | | | | | | | | | | | |
| 13. Books recommended: | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| | (.) | | | | | | | | | | | | | |
|---------------------|--|---|---------|-----------------------|-----------------|------------------|-------------|---------------------|----------|----------------|----------|-----------|--------------------|---|
| | e of the Departmer | | · · | | | | | | - | _ | | - | _ | |
| - | se Name | ELEMENTARY MATHEMATIC | S | | | | L | | _ | 1 | | | P | |
| | se Code | MT108 | | | | | 3 | | _ | 1 | | _ | 0 | <u>, </u> |
| | of Course (use tick requisite (if any) | 10+2 with Mathematics | 6. | Frequency (use | tick marks) | Even () | Core | ≥ () (√) | | DE Either S | <u> </u> |) 5 | FC (V very Ser | |
| | | es, Tutorials, Practicals | 0. | Frequency (use | lick marks) | Even() | Out | (v) | | Either . | seni (|) [| very ser | II() |
| 7.100 | | ures = 30 | | Tuto | rials = 10 | | | | | Practic | al = Nil | | | |
| 8. COUR | | e course is aimed to develop t | the sk | | | ecessary for g | rooming th | nem in | | | | gradu | ate. The | topics |
| | | c tools for specialized studies in | | | , | | | | | | | 0 | | |
| | SE OUTCOMES (CO | | | | | | | | | | | | | |
| | | ompletion, learners will develo | op foll | owing attributes: | | | | | | | | | | |
| COUR | SE OUTCOME (CO) | | | | AT | TRIBUTES | | | | | | | | |
| | CO1 | Apply Numerical analysis whic | h has e | enormous applicat | tion in the fie | ld of Science a | nd some fi | elds o | f Engir | neering. | | | | |
| | CO2 | Familiar with numerical solution | ons of | nonlinear equatio | ons in a single | variable. | | | | | | | | |
| | CO3 | Familiar with finite difference | and di | fferent type interr | nolation tech | nique | | | | | | | | |
| | | | | <i>·</i> · · | | • | | | | | | | | |
| | CO4 | Familiar with calculation and in | nterpr | etation of errors in | n numerical n | nethod. | | | | | | | | |
| | CO5 | Familiar with statistical analysi | s. | | | | | | | | | | | |
| 10. Uni | t wise detailed con | tent | | | | | | | | | | | | |
| Unit-1 | | Number of lectures = 08 | - | e of the unit: | | | | | | | | | | |
| | | ns, definition of differential coe | fficien | t, differentiation of | of functions ir | ncluding functi | ion of a fu | nction | , differ | entiatio | on of pa | arametr | ic form, | simple |
| | essive differentiatio | | | | | | | | | | | | | |
| Unit-2 | | Number of lectures =08 | | of the unit: | 1 1 6 1 | | | | | | | | | |
| - | on: Integration as on of definite integra | inverse of differentiation, Ind | efinite | integrals of star | ndard form, I | integration by | parts, su | bstitut | ion m | ethod | and pa | rtial fra | iction n | iethod |
| Unit-3 | in or definite integra | Number of lectures = 08 | Title | of the unit: | | | | | | | | | | |
| | Basic concepts of | simple random sampling and | | | oling, measure | es of central to | endency (r | nean. | media | n and r | node). | measur | es of v | ariatio |
| | | rd deviation). Covariance, Karl F | | | | | | | | | | | | |
| Unit-4 | | Number of lectures = 08 | Title | of the unit: | | | | | | | | | | |
| | | and Binomial Theorem: Fu | | | | | permuta | tions | under | certai | n cond | itions. | Combir | nations |
| | torial identities. Bin | omial theorem (without proof) | | | Binomial theo | rem. | | | | | | | | |
| Unit-5 Drobabili | itu Bandom ovnoriu | Number of lectures = 08 ment and associated sample s | | e of the unit: | of probability | algobra of o | vonte add | ition a | nd m | ultiplica | tion th | oromo | on pro | habilita |
| | | bisson and Normal distributions | | | | , algebra or e | vents, auu | | ina m | иприса | tion the | eorems | on pro | Dabiiit |
| | O mapping | | anary | 0.01 | | | | | | | | | | |
| COs | | | Attribu | utes | | | F | 201 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
| | Apply Numerical a | analysis which has enormous | appli | cation in the fiel | ld of Science | and some f | ields of | | | | | | | |
| CO1 | Engineering. | • | | | | | | 3 | 2 | 2 | 1 | 1 | 3 | 1 |
| CO2 | Familiar with nume | erical solutions of nonlinear equ | ation | s in a single variab | ole. | | | 2 | 2 | 2 | 1 | 1 | 2 | 2 |
| CO3 | Familiar with finite | difference and different type in | nterno | lation technique | | | | 3 | 2 | 3 | 1 | 1 | 2 | 1 |
| | | | | • | | | | - | | | | | | |
| CO4 | Familiar with calcu | lation and interpretation of err | ors in | numerical method | d. | | | 3 | 2 | 3 | 1 | 1 | 3 | 2 |
| CO5 | Familiar with statis | tical analysis. | | | | | | 3 | 2 | 1 | 1 | 1 | 2 | 1 |
| | | 3 Strong | g conti | ribution, 2 Averag | ge contributio | n , 1 Low cont | ribution | | | | | | | |
| 12. Brie | ef description of sel | f-learning / E-learning compon | ent | | | | | | | | | | | |
| 1. | | n/content/storage2/nptel_data | | | | c6.pdf | | | | | | | | |
| 2. | | n/content/storage2/courses/12 | 221040 | 018/node114.htm | I | | | | | | | | | |
| 3. 4. | | n/courses/111107062/ 1pu.com/en/document/view/80 | 56277 | 8/derivation of m | ingo-kutto m | athod_natal | | | | | | | | |
| 4. 5. | | tube.com/watch?v=ntWKMkX4 | | o, aei wation-oi-fu | inge-kulld-fff | - indu-inplei | | | | | | | | |
| | ks recommended: | | | | | | | | | | | | | |
| 1. | | l, 1980, Probability and Statistic | s, Sch | aum's (Outline Se | ries) McGraw | -Hill Book Co. | | | | | | | | |
| 2. | Q. S. Ahmad, V. Is | mail and S. A. Khan: Biostatistic | cs, Lax | mi Publications Pv | vt. Ltd. | | | | | | | | | |
| 3. | | anced Engineering Mathematics | s", 5th | Edition, Wiley Eas | stern, 1985. | | | | | | | | | |
| 4. F | Mathematics, NC | | Tat- • | AcCrow Lill Dut !! | hore | | | | | | | | | |
| 5. | Higner Engineerir | ng Mathematics, B. V. Ramana. | i ata N | licgraw Hill Publis | ners | | | | | | | | | |

| 5. Pre-requisite (if any) 1042 with Chemistry 6. Frequency (use tick marks) Even () Odd (V) Either Sem () Even 7. Total Number of Lectures = 30 Tutorials = 10 Practical = NII 8. COURSE OBJECTIVES: The purpose of this undergraduate course is to impart basic and key knowledge of physical chemistry. By using the principal of number of tool course, the student will able exite the respective dimensions. 9. COURSE OUTCOMES (CO): After the successful course completion, learners will develop following attributes: COURSE OUTCOMES (CO): COURSE OUTCOME (CO) Students would get inside the sound knowledge of gas and their properties and examine the relationships between gas to pressure, amount, and volume. CO2 Students would able to understand the interfacial phenomena and behaviour of colloidal systems. CO3 Students would able to understand the interfacial phenomena and behaviour of colloidal systems. CO4 Students would able to understand the titer (CO): Attributes Number of lectures = 08 Title of the unit: GASEOUS TATE Postulates of kinetic theory of gases, and environ of quastion for their collocial systems. Importance of phase diagram in field in didustry. 10. Unit wise detailed content Unit-1 Number of lectures = 08 Title of the unit: GASEOUS TATE Postulates of kinetic theory of gases, deviation of colloidal solutions, Aptoci | unic o | | | | | | | | | | | |
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| Definition of thermodynamic terms : system, surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their Thermodynamic process. Concept of heat and work. First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat Constant volume and pressure and their relationship, Joule-Thomson effect and inversion temperature. Calculation of W, q, dU and H for the expansion or Unit-4 Number of lectures = 08 Unit-4 Number of lectures = 08 Title of the unit: THERMODYNAMICS – II Standard state, standard enthalpy of formation - Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant volume. Unit-5 Number of lectures = 08 Title of the unit: THERMODYNAMICS – II Standard state, standard enthalpy of formation - Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant volume. Unit-5 Number of lectures = 08 Title of the unit: PHASE EQUILIBRIUM Gibbs phase rule, Statement and meaning of the terms - phase, component and degree of freedom, phase equilibria of one component system - water, system. 11. CO-PO mapping CO1 Students would get inside the sound knowledge of gas and their properties and examine the relationships as temperature, pressure, amount, and volume. 3 1 2 2 CO2 <td< td=""><td>ds, Emi</td><td>ulsions.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<> | ds, Emi | ulsions. | | | | | | | | | | |
| Thermodynamic process. Concept of heat and work. First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat constant volume and pressure and their relationship, Joule-Thomson effect and inversion temperature. Calculation of W, q, dU and dH for the expansion or under isothermal and alabatic conditions for reversible process. Unit-4 Number of lectures = 08 Title of the unit: THERMODYNAMICS – II Standard state, standard enthalpy of formation - Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant pressure and dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy. Unit-5 Number of lectures = 08 Title of the unit: THERMODYNAMICS – II Unit-5 Number of lectures = 08 Title of the unit: THERMODYNAMICS – II Unit-5 Number of lectures = 08 Title of the unit: THERMODYNAMICS – II Unit-5 Number of lectures = 08 Title of the unit: THERMODYNAMICS – II Gos PO1 PO2 PO3 PO4 PO5 Cos Attributes PO1 PO2 PO3 PO4 PO2 <th col<="" td=""><td>t-3</td><td></td><td>Number of lectures = 08</td><td>Title of the unit: THERMODYNAMICS – I</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th> | <td>t-3</td> <td></td> <td>Number of lectures = 08</td> <td>Title of the unit: THERMODYNAMICS – I</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> | t-3 | | Number of lectures = 08 | Title of the unit: THERMODYNAMICS – I | | | | | | | |
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| Unit-4Number of lectures = 08Title of the unit: THERMODYNAMICS – IIStandard state, standard enthalpy of formation - Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at const Enthalpy of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy.Unit-5Number of lectures = 08Title of the unit: PHASE EQUILIBRIUMGibbs phase rule, Statement and meaning of the terms - phase, component and degree of freedom, phase equilibria of one component system - water, system.11. CO-PO mappingCOsAttributesPO1PO2PO3PO4PO5ICO1Students would get inside the sound knowledge of gas and their properties and examine the relationships between gas temperature, pressure, amount, and volume.31122CO2Students would able to understand the interfacial phenomena and behaviour of colloidal systems.31222CO3Students would able to apply First law of thermodynamics and Hess law of heat summation and perceive the concept of Enthalpy.3113313CO4Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field of chemistry and industry.31133 | | | | | ion of W, q | dU an | d dH foi | the ex | pansion | of idea | al gase | |
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| Unit-5Number of lectures = 08Title of the unit: PHASE EQUILIBRIUMGibbs phase rule, Statement and meaning of the terms - phase, component and degree of freedom, phase equilibria of one component system - water, system.11. CO-PO mappingCOsAttributesPO1PO2PO3PO4PO5ICO1Students would get inside the sound knowledge of gas and their properties and examine the relationships between gas temperature, pressure, amount, and volume.31122CO2Students would able to understand the interfacial phenomena and behaviour of colloidal systems.31222CO3Students would able to apply First law of thermodynamics and Hess law of heat summation and perceive the concept of Enthalpy.3113313CO5Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field of chemistry and industry.311333133 | | | • • | | | | • | | | | olume | |
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| between gas temperature, pressure, amount, and volume.Image: Constant of the stant o | , Stu | udents would get | inside the sound knowledge | of gas and their properties and examine the relations | ships 🦕 | 1 | 1 | | · · | 4 | | |
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| Intensive properties.Image: Constraint of the concept of Enthalpy.Image: Constraint of the concept of the concept of Entha | Stu | udents would th | e restate definition of syster | n, surrounding, closed and open system, extensive | and , | 4 | 2 | | 2 | 4 | | |
| CO4the concept of Enthalpy.3113CO5Students would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field of chemistry and industry.3113 | 3 int | tensive properties | 5. | | 3 | 1 | 2 | | 2 | 1 | | |
| the concept of Enthalpy.Image: Concept of Enthalpy.Image: Concept of Enthalpy.Image: Concept of Enthalpy.COSStudents would able to understand the basic definitions and terms in a phase diagram and importance of phase diagram in field of chemistry and industry.Image: Concept of Enthalpy.Image: Concept of Enthalpy. | 4 | | | odynamics and Hess law of heat summation and per | ceive a | 1 | 1 | | 2 | 2 | | |
| phase diagram in field of chemistry and industry. | the | | 17 | | | - | - | | , | - | | |
| | 5 | | | finitions and terms in a phase diagram and important | ce of 3 | 1 | 1 | | 3 | 2 | | |
| | ph | hase diagram in fie | , , | | | | | | | | | |
| 3 Strong contribution, 2 Average contribution, 1 Low contribution | Duit (| la annination a far th | - | | ution | | | | | | | |
| 12. Brief description of self-learning / E-learning component | | | | | | | | | | | | |
| https://www.fullonstudy.com/bsc-1st-year-chemistry-notes-pdf https://www.docsity.com/en/bsc-1st-year-notes-chemistry/4194474/ | | | | <i>, , , , , , , , , ,</i> | | | | | | | | |
| https://www.oocsity.com/en/bsc-1sc-year-lotes-chemistry-notes-pdf-sem-i-ii-download-here-db8ebb3b5340 https://medium.com/@itsharishjoshi/bsc-1st-year-chemistry-notes-pdf-sem-i-ii-download-here-db8ebb3b5340 | | • • • • | | | b3b5340 | | | | | | | |
| https://www.youtube.com/watch?v=UVaHSegCPzE | | • • • • | | , , | | | | | | | | |
| 13. Books recommended: | | | , | | | | | | | | | |
| 1. Chemical Thermodynamics by R.P.Rastogi et al | | | lynamics by R.P.Rastogi et al | | | | | | | | | |
| 2. Principles of physical chemistry by Puri Sharma and Pathan | 2. P | Principles of physi | cal chemistry by Puri Sharma a | | | | | | | | | |
| 2 Eccentials of Deviced Chamistry, Dabl & Tuli S. Chand P. Ca. 1td | 3. E | Essentials of Physi | cal Chemistry, Bahl & Tuli, S. C | hand & Co. Ltd. | | | | | | | | |
| 3. Essentials of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd. | | | al Chamistry Duri Charma 8 | Pathania Vichal Publishing Co | | | | | | | | |
| Essentials of Physical Chemistry, Bahl & Tull, S. Chand & Co. Ltd. Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co. Simplified course in Physical Chemistry, Madan & Tuli, S. Chand & Co. Ltd. | 4. P | | - | - | | | | | | | | |

| 1. Name of the Department: CHEMISTRY 2. Course Name INORGANIC CHEMISTRY – I | T | 1 | | |
|--|------------|----------|--------------------|----------|
| | T | | P | |
| | 1 | | 0 | <u> </u> |
| 4. Type of Course (use tick mark) Core (√) DE 5. Pre-requisite (if any) 10+2 with Chemistry 6. Frequency (use tick marks) Even () Odd (√) Either | • • | \ | FC () very Ser | |
| 7. Total Number of Lectures, Tutorials, Practicals | Selli (|) [| very ser | II() |
| | al = Nil | | | |
| 8. COURSE OBJECTIVES: To introduce and explain various properties of atomic structure, periodic table and nuclear chemistry: de Brog | | or way | os Hois | onhore |
| uncertainty, atomic orbitals, quantum numbers, Aufbau's, Pauli's and Hund's multiplicity rules along with VSEPR (Valence Shell Electron I | | | | |
| Orbital theory. | un nep | aisiony | | |
| 9. COURSE OUTCOMES (CO): | | | | |
| After the successful course completion, learners will develop following attributes: | | | | |
| COURSE OUTCOME (CO) ATTRIBUTES | | | | |
| CO1 Students are able to evaluate the atomic structure and their properties along with principles, shapes and electr | onic con | figurati | ons. | |
| CO2 Understanding of various periodic properties and their variations gives an idea of elemental nature. | | | | |
| CO3 Students are taught principles, types and strengths of various chemical combinations for effective application o | f bondin | ıg. | | |
| CO4 Analysis and evaluation of hybridization and geometry of molecular system helpful to identify the structure and | their re | activity | <i>'</i> . | |
| CO5 The study of nuclear chemistry and its application create knowledge about the dating and radiotracer techniq nuclear fission and nuclear fusion. | ues alon | ng with | nuclear | decay |
| 10. Unit wise detailed content | | | | |
| Unit-1 Number of lectures = 08 Title of the unit: ATOMIC STRUCTURE | | | | |
| Idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, quantum numbers, shapes of s, p, and d orbitals. Aufbau | and Pau | li exclu | sion pri | nciples |
| Hund's multiplicity rules. Electronic configurations of the elements. | | | | |
| Unit-2 Number of lectures =08 Title of the unit: PERIODIC PROPERTIES | | | | |
| An introduction to modern periodic table, periodicity in properties of elements: Atomic and ionic radii, ionization energy, electron Affini | ty, electi | ronega | tivity, el | ffective |
| nuclear charge, shielding effect. | | | | |
| Unit-3 Number of lectures = 08 Title of the unit: CHEMICAL BONDING – I Introduction, causes of chemical combination, electronic theory of valency, general characteristics of: electrovalent bond, covalent bond covalent bond | ad coor | dinato | hand r | notalli |
| bonding and hydrogen bonding. | iu, coor | unate | bonu, i | netaiiit |
| Unit-4 Number of lectures = 08 Title of the unit: CHEMICAL BONDING – II | | | | |
| Hybridization and shapes of simple molecules and ions. Valence Shell Electron Pair Repulsion (VSEPR) theory to NH3, SF4, CIF3, ICI4- and I | 120. Mo | lecular | Orbital | theory |
| for homonuclear and heteronuclear diatomic molecules, bond length, bond angle and bond energy, resonance. | | | | |
| Unit-5 Number of lectures = 08 Title of the unit: NUCLEAR CHEMISTRY | | | | |
| Natural and artificial radioactivity, binding energy, rate equation for nuclear decay, nuclear fission and nuclear fusion and their applicati | ons, gro | up disp | laceme | nt law |
| isotopes and isobars, applications of radioactivity: radiocarbon dating and radio tracer techniques. | | | | |
| 11. CO-PO mapping | 1 1 | | | |
| COs Attributes PO1 PO2 PO3 | PO4 | PO5 | PO6 | P07 |
| CO1 Students are able to evaluate the atomic structure and their properties along with principles, shapes and 2 1 - | 2 | - | - | 2 |
| | 2 | | 4 | 2 |
| CO2 Understanding of various periodic properties and their variations gives an idea of elemental nature. 1 1 - | 3 | - | 1 | 2 |
| CO3 Students are taught principles, types and strengths of various chemical combinations for effective 2 1 - | 2 | - | - | 3 |
| CO4 Analysis and evaluation of hybridization and geometry of molecular system helpful to identify the structure 1 1 - | 1 | - | - | 1 |
| CO5 The study of nuclear chemistry and its application create knowledge about the dating and radiotracer 2 1 - | 1 | - | 1 | 2 |
| 3 Strong contribution, 2 Average contribution, 1 Low contribution | <u> </u> | | | |
| 12. Brief description of self-learning / E-learning component | | | | |
| 1. https://www.youtube.com/watch?v=0ofu2inFF0k | | | | |
| https://www.youtube.com/watch?v=MCYRhCA7j1s | | | | |
| 3. https://www.wiley.com/en-in/Basic+Inorganic+Chemistry,+3rd+Edition-p-9780471505327 | | | | |
| 13. Books recommended: | | | | |
| 1 Advanced Inergenia Chemistry Vol I R II Cetus Drokech C D. Tuli C K. Devy, D D. Mader, C. Chend O. Ce, U.J. | | | | |
| 1. Advanced Inorganic Chemistry Vol-I & II, Satya Prakash, G.D. Tuli, S.K. Basu, R.D. Madan, S. Chand & Co. Ltd. | | | | |
| 2. Test book of Inorganic Chemistry, P.L. Soni, Sultan Chand & Sons | | | | |
| | | | | |

| 1. Nam | e of the Departmer | nt: CHEMISTRY | | | | | | | | | | |
|------------|--------------------------------------|--|-----------|--|------------------|------------------|------------|-----------|-----------|---------|------------|----------|
| 2. Cou | rse Name | ORGANIC CHEMISTRY – I | | | | L | | | т | | Р | |
| 3. Cou | rse Code | CH105 | | | | 3 | | | 1 | | 0 | |
| 4. Type | e of Course (use tick | mark) | | | | Core (√ |) | DE | () | | FC (|) |
| 5. Pre- | requisite (if any) | 10+2 with Chemistry | 6 | . Frequency (use tick marks) | Even () | Odd (v | ') | Either | Sem (|) E | ery Se | m () |
| 7. Tota | l Number of Lecture | es, Tutorials, Practicals | | | | | | | | | | |
| | | ures = 30 | | Tutorials = 10 | | | | | al = Nil | | | |
| | | | | o study the nomenclature of org | | | | | organic | molecu | les con | sidering |
| | | | droge | n bonding etc., and mechanism | of various type | es of organic re | actions. | | | | | |
| | RSE OUTCOMES (CO | • | | | | | | | | | | |
| | SE OUTCOME (CO) | ompletion, learners will devel | eiop je | | TRIBUTES | | | | | | | |
| | CO1 | | - | organic molecules considering va | | effects such as | inducti | ve effec | t, hyper | conjuga | ation, | |
| | | mesomeric effects, hydrogen | | - | | | | | | | | |
| | CO2 | Evaluate the different types of | of org | anic reactions and their mechan | sm. | | | | | | | |
| | CO3 | Understand IUPAC nomenclat | ature | of Alkane, Alkenes, Alkynes, fund | ctional groups, | , bifunctional a | nd poly | function | al organ | nic com | pounds. | |
| | CO4 | Analyze Isomerism and its type | pes. | | | | | | | | | |
| | CO5 | Understand and evaluate the | e mec | hanism of Hoffmann elimination | Markownikof | f's rule, Saytze | ff rule, o | ozonolys | sis and e | poxida | tion. | |
| 10. Un | it wise detailed con | tent | | | | | | | | | | |
| Unit-1 | | Number of lectures = 08 | | itle of the unit: STRUCTURE ANI | | | | - | | | | |
| | | sp hybridization of carbon; B | Bond | lengths, bond angles, bond ene | rgy, resonanc | e, hyperconjug | ation, i | nductive | e, electo | meric | and me | somerio |
| Unit-2 | nydrogen bonding. | Number of lectures =08 | т | tle of the unit: ORGANIC REACT | | | | | ATEC | | | |
| | | | | itution and Elimination reaction | | | | | | ediates | - carbo | cations |
| | | benes, nitrenes and benzynes. | | | . Licetropinie | | inics, i | cuctive | interni | culates | carbo | cations |
| Unit-3 | · · · | Number of lectures = 08 | Ti | tle of the unit: IUPAC NOMENCI | ATURE | | | | | | | |
| Classifica | ation of organic con | npounds, Functional group, He | lomo | logous series, IUPAC nomenclat | ure of organio | c compounds (| alkanes | , alkene | s, alkyn | es, cyc | loalkan | es, alky |
| | alcohols, aldehydes, | | | ters, anhydrides), bifunctional a | | nal organic cor | npound | s. | | | | |
| Unit-4 | <u> </u> | Number of lectures = 08 | | tle of the unit: STEREOCHEMIST | | | | | | | - <i>(</i> | |
| | | | | ereoisomerism, E and Z nomer oonds, Newman, Saw horse and I | | | rism in | alicyclic | compo | unds. | Conform | nationa |
| Unit-5 | | Number of lectures = 08 | | tle of the unit: ALKANES AND A | · · · | 10113. | | | | | | |
| | ion of alkanes by hy | | | eduction of alkyl halides, Grignar | | irtz reaction. C | nemical | propert | ies of al | kanes. | Mechar | nisms of |
| | | | | ides, Saytzeff rule, Hoffmann eli | | | | | | | | |
| | | ozonolysis, hydration, hydroxyl | ylatio | n and oxidation with KMnO4. | | | | | | | | |
| 11. CO-P | O mapping | | | | | | | | | | | |
| COs | | | | ibutes | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | P07 |
| CO1 | | and bonding of organic molecul gation, mesomeric effects, hyd | | onsidering various types of effec n bonding etc. | ts such as indu | uctive 3 | 2 | 1 | | 1 | | 3 |
| CO2 | | ent types of organic reactions a | | | | 3 | 2 | 1 | | 1 | | 3 |
| CO3 | Understand IUPAC polyfunctional orga | | enes, | Alkynes, functional groups, bifu | nctional and | 3 | 3 | 1 | | 1 | | 3 |
| CO4 | Analyze Isomerism | | | | | 3 | 2 | 1 | | 1 | | 3 |
| CO5 | Understand and ev | aluate the mechanism of Hoffr | fmanı | n elimination, Markownikoff's ru | le, Saytzeff rul | e, 2 | 2 | 1 | | 1 | | 3 |
| | ozonolysis and epo | | | | | | 2 | - | | - | | |
| 12. Bri | ef description of sel | f-learning / E-learning compor | - | ntribution, 2 Average contribution | JII, I LOW COI | | | | | | | |
| 1. | | nacademy.org/science/organic | | | | | | | | | | |
| 2. | | | | hemistry/Map%3A_Organic_Che | mistry_(Smith |)/Chapter_06% | 3A_Un | derstand | ding_Org | ganic_F | Reaction | s |
| 3. | | | | ogy/the-basics-of-organic-chemi | stry/ | | | | | | | |
| 4. | | pr.com/guides/chemistry/orga | anic-o | chemistry/ | | | | | | | | |
| | ks recommended: | Chamistry, Babl 0, Babl 0, Cl | الم مر ما | 9 Co. 14d | | | | | | | | |
| 1. 2. | - | c Chemistry, Bahl & Bahl, S. Ch y Vol.I & II, I.L. Finar | nand | & CO. LTO. | | | | | | | | |
| 3. | - | Organic Chemistry, Nafis Haide | ler, S. | Chand & Co. Ltd. | | | | | | | | |
| 4. | A text book of Or | ganic Chemistry, Bahl & Bahl, S | S. Ch | and & Co. Ltd. | | | | | | | | |
| 5 | Organic Chamistr | Vol I II & III Dr. Iagdamha Si | ingh | I D S Vaday Pragati Prakashan | | | | | | | | |

A text book of Organic Chemistry, Bahl & Bahl, S. Chand & Co. Ltd.
 Organic Chemistry Vol.1, II & III, Dr. Jagdamba Singh, L.D.S. Yadav, Pragati Prakashan.

| 1. Nam | e of the Departmen | : CHEMISTRY | | | | | | | | |
|----------------|--|---|---------------|-------------------|-----------|-----------|------------|----------|----------|----------|
| | se Name | INDUSTRIAL CHEMISTRY LAB – I | | L | | 1 | - | | Р | |
| 3. Cour | se Code | CH106 | | 0 | | (| | | 8 | |
| 4. Type | of Course (use tick | nark) | | Core (√) | | DE | | | FC (|) |
| 5. Pre- | requisite (if any) | 10+2 with Chemistry 6. Frequency (use tick marks) | Even () | Odd (V) | | Either | Sem () |) Ev | very Ser | m () |
| 7. Tota | Number of Lecture | s, Tutorials, Practicals | | | | | | | | |
| | Lectu | res = 00 Tutorials = 00 | | | | Practic | al = 08 | | | |
| | | e purpose of the undergraduate chemistry Lab program at the Integ | | | de the | key kno | owledge | base a | and lab | oratory |
| | | s for careers as professionals in the field of chemistry, and various othe | er industrie: | s. | | | | | | |
| | SE OUTCOMES (CO) | mpletion, learners will develop following attributes: | | | | | | | | |
| | SE OUTCOME (CO) | | BUTES | | | | | | | |
| | CO1 | Inderstand the basic analytical and technical skills and technical skills | | ectively in the v | arious | fields of | chemis | try | | |
| | CO2 | Jnderstand the basic titration methods and technical skills to work in t | the differen | t fields of chem | istry. | | | | | |
| | CO3 | Able to detect presence of elements and functional group in organic co | ompounds. | | | | | | | |
| | CO4 | Remember to keep records of all performed experiments in the manne | er which is r | equired in labo | ratory | | | | | |
| | CO5 | Analyze the importance of personal safety and care of equipment's and | d chemicals | | | | | | | |
| 10. Syll | | | | - | | | | | | |
| Exp - 0 | | Preparation of standard solution related to normality & molarity. | | | | | | | | |
| Exp – 0 | 2 | Preparation of buffer solution, pH measurement. | | | | | | | | |
| Exp – 0 | 3 | Acid - base titration. | | | | | | | | |
| Exp – 0 | 4 | Oxidation-reduction (redox) titrations. a) To determine the strength sulphate (Mohr's salt) solution by using external indicator. | n of oxalic a | acid. b) To det | ermine | the str | ength o | of ferro | us amn | าonium |
| Exp – 0 | 5 | To determine the strength of potassium permanganate solution by us | ing sodium | thiosulphate so | lution. | lodome | etrically. | | | |
| Exp – 0 | 6 | To determine the strength of given copper sulphate solution by using | sodium thic | osulphate soluti | on. Iod | ometric | ally. | | | |
| Exp – 0 | 7 | Complexometric titrations. a) To estimate the concentration of calciur with EDTA. | n ions with | EDTA. b) To est | timate | the con | centratio | on of m | agnesiu | ım ions |
| Exp – 0 | 8 | Detection of element present in the given organic compounds. | | | | | | | | |
| Exp – 0 | | Detection of functional group present in the given organic compound g) Amine h) Amide | ls. a) Carbo> | vylic b) Phenolio | c c) Alco | oholic d |) Aldehy | dic e) k | Ketonic | f) Ester |
| | O mapping | | | | | | | | | |
| COs | | Attributes | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | P07 |
| CO1 | Understand the ba fields of chemistry | sic analytical and technical skills and technical skills to work effective | vely in the | various 3 | 2 | 1 | | 1 | | 3 |
| CO2 | Understand the bas | ic titration methods and technical skills to work in the different fields o | of chemistry | /. 3 | 2 | 1 | | 1 | | 3 |
| CO3 | Able to detect pres | nce of elements and functional group in organic compounds. | | 3 | 3 | 1 | | 1 | | 3 |
| CO4 | Remember to keep | records of all performed experiments in the manner which is required | in laborato | ry 3 | 2 | 1 | | 1 | | 3 |
| CO5 | Analyze the import | nce of personal safety and care of equipment's and chemicals. | | 2 | 2 | 1 | | 1 | | 3 |
| 12 Brid | f description of self | 3 Strong contribution, 2 Average contribution, learning / E-learning component | 1 Low cont | ribution | | | | | | |
| 12. Brie 1. | | m.edu/uploads/files/79645701812579729-genchem-reference-for-we | b.pdf | | | | | | | |
| 2. | | hadhika.ac.id/E-BOOK/12-1213-akfarmahad-16-1-vogelqu-d.pdf | | | | | | | | |
| 3. | | u.edu.sa/filedownload/doc-6-pdf-f06110ef2e1e1ae119cbacf71dd1773 | 32-original. | pdf | | | | | | |
| 4. | https://www.sten s recommended: | .org.uk/resources/collection/3959/practical-chemistry | | | | | | | | |
| 15. BOOR 1. | | Chemistry: Jagdamba Singh, L.D.S Yadav, Jaya Singh, I.R. Siddiqui, Prag | atiEdition | | | | | | | |
| 2. | | hemistry, A.I.Vogel. | | | | | | | | |
| 3. | Practical Physical | Chemistry: B. Viswanathan and P.S.Raghavan. | | | | | | | | |
| 4. | Experimental Inor | zanic Chemistry –W.G.Palmer. | | | | | | | | |

| 1 Nam | e of the Departmer | nt: CHEMISTRY | | | | | | | | | | |
|-----------|-----------------------|--|---------|-------------------------------------|--------------------|-----------------|---------|--------------|-----------|----------|----------|----------|
| | se Name | BASICS OF COMPUTER | | | | L | | | T | | P | |
| | se Code | CS110 | | | | 3 | | | 1 | | 0 | |
| | | | | | | | | | | | - | <u> </u> |
| | of Course (use tick | | 6 | F | F (() () | Core () | , | DE | • • | \ | FC (√ | |
| | requisite (if any) | 10+2 with Chemistry | 6. | Frequency (use tick marks) | Even (V) | Odd (|) | Either | Sem (|) E | very Se | m() |
| 7. Tota | | es, Tutorials, Practicals | | | | | | | | | | |
| | | ures = 30 | | Tutorials = 10 | | | | | al = Nil | | | |
| | | | | ents of computer system, unders | | | | | | vices, b | asics of | OS and |
| | - | | ernet | working devices and fundamental | concepts of | Internet and v | veb tec | nnologi | es. | | | |
| | SE OUTCOMES (CO |): completion, learners will develo | n fall | owing attributory | | | | | | | | |
| | SE OUTCOME (CO) | inpletion, learners will develo | p jon | | IBUTES | | | | | | | |
| coon | | | | | | | | | | | | |
| | CO1 | Have a strong foundation of kr | owled | lge about the structure of compu | ter system. | | | | | | | |
| | CO2 | Utilize and configure compute | r perip | heral devices, install and operate | system and | application so | ftware. | | | | | |
| | CO3 | Work on MS office(word, pow | er poir | nt and excel) and OS. | | | | | | | | |
| | CO4 | Establish a small computer net | work | and utilize resource sharing. | | | | | | | | |
| | | | | | | | | | | | | |
| | CO5 | Design and develop a website | with li | mited features. | | | | | | | | |
| | t wise detailed con | | | | | | | | | | | |
| Unit-1 | | Number of lectures = 08 | Title | e of the unit: INTRODUCTION TO | COMPUTER | | | | | | | |
| | - | istics features of Computer, Ha | rdware | e and Software of Computer, lang | uages of Co | mputers, Appl | cations | , Block | Diagran | n of Cor | nputer | System, |
| | puter Generations. | | | | | | | | | | | |
| Unit-2 | - | Number of lectures =08 | | of the unit: COMPUTER ORGAN | | | | | | | | |
| | | | | rganization of Computer System i | | Devices and i | ts func | tions, N | lemory | manage | ement, | Booting |
| | BIOS), Memory Mai | Number of lectures = 08 | - | vices - Hard disc, Floppy disc, CD- | | | | . | | | | |
| Unit-3 | A duanta and D | | | of the unit: OPERATING DEVICES | | | | | C Office | in Date | | d. Euro |
| | | ys used in Word, Excel & Power | | ntroduction to Data Processing a | nd Flowchar | t, Operating er | wronn | ient, ivi | s Office | in Deta | all (wor | a, Exce |
| Unit-4 | Tomp, short cut ke | Number of lectures = 08 | | of the unit: COMPUTER NETWO | RKING | | | | | | | |
| Introduct | tion to networking, | Modem, Network topology co | ncepts | and types with advantages and o | drawbacks o | f each, compo | nents c | of LAN, V | WAN an | d MAN | , Mediu | m used |
| in Netwo | | | | | | | | - | | | - | |
| Unit-5 | | Number of lectures = 08 | Title | of the unit: INTERNET AND WEB | TECHNOLO | GIES | | | | | | |
| History a | ind concept, Archite | ecture, Application, Hypertext | Marku | ip Language, DHTML, WWW, Go | pher, FTP, 1 | elnet, Web B | rowsers | s, Net S | urfing, S | Search | Engines | , Email |
| | gnatures, Network, | Security, Firewall. | | | | | | | | | | |
| 11. CO-P | O mapping | | | | | | | | | | | |
| COs | | | Attribu | ites | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | P07 |
| CO1 | Have a strong foun | dation of knowledge about the | struct | ture of computer system. | | | | | | | | 3 |
| 602 | Litilize and configu | ra computer peripheral devices | incto | ll and anarata system and analisa | tion coftwor | | | | 1 | 2 | | 3 |
| CO2 | - | | | II and operate system and applica | LION SOILWAR | e. | | | 1 | 2 | | 3 |
| CO3 | Work on MS office | (word, power point and excel) a | and OS | 5. | | | | | | 3 | | 3 |
| CO4 | Establish a small co | omputer network and utilize res | ource | sharing. | | | | | | 3 | 1 | 2 |
| CO5 | Design and develop | o a website with limited feature | es. | | | | | | | 2 | | 1 |
| | | 3 Strong | ; contr | ibution, 2 Average contribution , | 1 Low cont | ribution | | | | | | |
| 12. Brie | ef description of sel | f-learning / E-learning compon | ent | | | | | | | | | |
| 1. | https://edu.gcfglo | obal.org/en/computerbasics/w | hat-is- | a-computer/1/ | | | | | | | | |
| 2. | 1 0 | e-Learning/Computer-Basicsc | | _ ! | | | | | | | | |
| 3. | | | | id-knowledge/basics-of-computer | s/basic-com | puter-termino | logy/ | | | | | |
| 4. | | ksforgeeks.org/basics-of-comp | uter-a | nd-its-operations/ | | | | | | | | |
| 13. Bool | ks recommended: | | | | | | | | | | | |
| 1. | | ion Technology: Breaking News | ", TMł | 4. | | | | | | | | |
| 2. | | ntroduction to Computers". | | | | | | | | | | |
| 3. | Nelson, "Data Co | 1 / | | 9 C Drogrommin -" Now Ass | | | | | | | | |
| 4. 5 | . | A Yadav, "Introduction To Con et 101" Addicion Wesley | iputer | a C Programming", New Age | | | | | | | | |
| 5. 6. | | et 101", Addision Wesley. Foundation of Information Tec | nolog | vy" Pragati | | | | | | | | |
| 6. 7. | | mentals- by Sinha. PK and Sinha | - | | | | | | | | | |
| 7. | compater i unual | incintais by sinna. I it and sinna | | | | | | | | | | |

| 1 Name of the Department | | | | | | | | | | | |
|--|--|---------|--|-----------------|------------------|----------|-----------|----------|-----------|---------------|----------|
| 1. Name of the Departmer 2. Course Name | ENVIRONMENTAL POLLUTIO | N | | | • | | - | r | | D | |
| 3. Course Code | CH107 | | | | L 3 | | | L | + | <u>Р</u> 0 | |
| 4. Type of Course (use tick | | | | | Core() | | DE | | - | 0 FC(√ |) |
| 5. Pre-requisite (if any) | 10+2 with Mathematics | 6. | Frequency (use tick marks) | Even (V) | Odd (| | Either | |) F | very Sei | |
| 7. Total Number of Lecture | | 5. | requercy (use tick marks) | | | | LIUICI | | , L | | |
| | ures = 30 | | Tutorials = 10 | | | | Practic | al = Nil | | | |
| | e main objective of this course | e is to | | nts, their sour | ces, control an | d their | | | on livi | ng spec | ies and |
| environment. | , | | | | , | | | | | 0 -1 | |
| 9. COURSE OUTCOMES (CO |): | | | | | | | | | | |
| | ompletion, learners will develo | op foll | owing attributes: | | | | | | | | |
| COURSE OUTCOME (CO) | | | | TRIBUTES | | | | | | | |
| CO1 | Evaluate different types of air and Ozone Layer Depletion. Ox | | ants, their harmful effects on liv nitrogen and carbon cycle. | ving and non-li | ving species; Si | udy of | Global \ | Warmin | g, Gree | n House | e Effect |
| CO2 | Analyze the various factors of v | water | quality assessment parameters | , water polluta | ants and Waste | water | reatme | nt proc | esses. | | |
| СО3 | Understand the soil composition | on, soi | l pollutants, their control, Natic | onal and Interr | national Standa | rds. | | | | | |
| CO4 | Evaluate the various types was | te and | d their toxicity aspects and man | agement. | | | | | | | |
| CO5 | Understand the sources of hea | vy me | tals and their related toxicity. | | | | | | | | |
| 10. Unit wise detailed cont | | - | , | | | | | | | | |
| Unit-1 | Number of lectures = 08 | Titl | e of the unit: AIR POLLUTANTS | | | | | | | | |
| CO, CO2, ozone, CFC; ozone | depletion; global warming & N | IOx; H | armful effects of pollutants on | living and nor | -living species; | Oxyge | n, nitro | gen and | CO2 cy | cle, Air | quality |
| standard, Bhopal gas tragedy | | - | | Ū. | 5. | | | | | | |
| Unit-2 | Number of lectures =08 | Title | of the unit: WATER QUALITY F | PARAMETERS | AND WATER P | OLLUTIO | ON | | | | |
| Water quality parameters; in techniques, Preservation. | nternational and national stand | dards; | Water quality assessment. Wa | ater pollution | and its contro | ; water | polluta | ints; to | kicity. V | Vater sa | ampling |
| Unit-3 | Number of lectures = 08 | Title | of the unit: AGRICULTURAL PO | OLLUTANTS | | | | | | | |
| Fertilizers, insecticides, pesti | cides, plastics, toxic metals, dye | es, sur | factants and their toxicity; inter | rnational and r | national standa | rds; cor | ntrol. | | | | |
| Unit-4 | Number of lectures = 08 | Title | of the unit: INDUSTRIAL WAS | TE | | | | | | | |
| Industrial waste: toxic aspect | ts, management and disposal. R | Radioa | ctive, municipal, and biomedica | al waste – toxi | city hazards, m | anagem | ient and | l dispos | al. | | |
| Unit-5 | Number of lectures = 08 | Title | of the unit: CHEMICAL TOXICO | DLOGY | | | | | | | |
| Toxic chemicals in the Enviro | onment, biochemical effects of I | Mercu | ry and Lead, Carcinogens, Vecto | or-borne disea | se, water-born | e disea | se, Pollu | ition an | d Public | : Health | issues. |
| 11. CO-PO mapping | | | | | | | | | | | |
| COs | ŀ | Attribu | ıtes | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
| Evaluate different t | types of air pollutants, their har | | | species; Study | of | | | _ | | | |
| | reen House Effect and Ozone L | | | | 3 | 2 | 3 | 3 | 3 | 3 | 2 |
| co2 Analyze the various treatment processe | s factors of water quality assess es. | ment | parameters, water pollutants a | nd Waste wat | er 3 | 2 | 3 | 3 | 3 | 3 | 2 |
| CO3 Understand the soi | il composition, soil pollutants, t | heir c | ontrol, National and Internation | al Standards. | 3 | 2 | 3 | 3 | 3 | 3 | 2 |
| CO4 Evaluate the variou | us types waste and their toxicity | aspe | cts and management. | | 3 | 2 | 3 | 3 | 3 | 3 | 2 |
| CO5 Understand the so | urces of heavy metals and their | relate | ed toxicity. | | 3 | 2 | 3 | 3 | 2 | 3 | 2 |
| | 3 Strong | conti | ibution, 2 Average contributio | n , 1 Low cont | ribution | 1 | 1 | 1 | | 1 | |
| 12. Brief description of sel | f-learning / E-learning compon | · | , | | | | | | | | |
| | annica.com/science/pollution-e | | nment | | | | | | | | |
| | science.com/22728-pollution-fa | | | | | | | | | | |
| | dawi.com/journals/jeph/2012/3 | | | | | | | | | | |
| 4. https://www.com 13. Books recommended: | serve-energy-future.com/cause | es-and | -errects-of-environmental-pollu | ition.php | | | | | | | |
| | nemistry Manahan, Stanley E, 20 | 004 T | avlor & Francis Ltd | | | | | | | | |
| | Environmental Chemistry, Des | | - | | | | | | | | |
| | nemistry: A Global Perspective, | | | ford Univ Pr (| Sd) | | | | | | |
| | nvironmental Chemistry, Reid, I | | 1 11 | . (. | | | | | | | |
| - | Environment, Thomas G. Spiro, | | - | • | ication. | | | | | | |
| 6. Environmental Ch | nemistry, Vanloon, Gary W Duff | y, Step | ohen J., Oxford Higher Educatio | n publication | | | | | | | |

| 2. Course 3. Course | | + CUENICTOV | | | | | | | | | | |
|---|--|---|---|---|---|---|-----------|-------------------|------------|-------------|---------------|----------|
| 3. Course | e of the Departmen | PHYSICAL CHEMISTRY – II | | | | | | - | - | | | |
| | | CH108 | | | | L 3 | | | Г <u> </u> | | <u>Р</u> 0 | |
| /1 IVDO (| of Course (use tick | | | | | o Core (√ | , | DE | | | FC (| <u>۱</u> |
| | equisite (if any) | 10+2 with Chemistry | 6. | Frequency (use tick marks) | Even (√) | Odd (| / | Either | |) F | very Sei | |
| | | es, Tutorials, Practicals | 0. | requerey (use tier marks) | Liteli (1) | ouu (| 1 | Little | | / - | very ser | |
| | | ures = 30 | | Tutorials = 10 | | | | Practic | al = Nil | | | |
| 8. COURS | | | Jate co | urse is to impart basic and key k | nowledge of p | ohysical che | mistry. | | | incipal | of phys | ics and |
| | | | | oortant for higher studies. After s | | | | | | | | |
| | respective dimensi | | | | | | | | | | | |
| | SE OUTCOMES (CO) | | | | | | | | | | | |
| | | ompletion, learners will deve | op foll | | | | | | | | | |
| COOKS | E OUTCOME (CO) | Students get insight knowled | dae of | order of reaction and their dete | IBUTES | lundorstan | d tha fr | octors w | hich co | uld off | oct the | rato o |
| | CO1 | reaction. | ige of | order of reaction and then dete | | | | actors w | | | ett the | Tale 0 |
| | CO2 | | oncen | t of entropy; explore the relation | how entrony w | ould be var | ving wit | h resner | rt to P | Γ& V | | |
| | | | | | | | | | | | ontono | the of |
| | CO3 | process. | sound | knowledge of Gibbs free energy | and Heimnoitz | z functions; | now th | ey woul | a aeciae | e the sp | ontane | ity of a |
| | | | ence b | etween "completions" for irrever | sible chemical | reactions a | nd for re | eversible | chemi | cal reac | tions. T | hev go |
| | CO4 | | | elier's Principle, how the equilibri | | | | | | | | , 0 |
| | | Clapeyron Equation. | | | - | | | | | - | | |
| | CO5 | Students evaluate fundament | als of e | electrochemistry and understand | the concept of | pH, solubili | ty and it | ts applic | ation. | | | |
| 10. Unit | wise detailed cont | ent | | | | | | | | | | |
| Unit-1 | | Number of lectures = 08 | Tit | e of the unit: CHEMICAL KINETIC | S | | | | | | | |
| Chemical I | kinetics and its sco | pe, rate of a reaction, factor | s influe | ncing the rate of a reaction conc | entration, tem | perature, p | ressure | , solvent | , light, | catalyst | concer | tratio |
| | | | | mical reactions- zero, First, second | | | | | | | | |
| reaction d | differential method | , method of integration, meth | nod of | half-life period and isolation met | hod. Arrhenius | s equation, | concept | of activ | ation ei | nergy. S | imple o | ollisior |
| theory. | | | | | | | | | | | | |
| Unit-2 | <u> </u> | Number of lectures =08 | | e of the unit: THERMODYNAMICS | | | | | | | | |
| | | | | tatements of the law. Thermody physical change, entropy as a crit | | | | | | | | |
| Unit-3 | or vor, entropy as a | Number of lectures = 08 | | of the unit: FREE ENERGY | | leity and eq | unipriu | <u>II, EIIIIO</u> | py chan | geiniu | eal gase | :5. |
| | e energy (G) and He | | | namic quantities, A & G as criteria | a for thermody | namic equi | ihrium : | and snor | ntaneity | their a | dvanta | ge ove |
| | | G and A with P, V and T. | mouy | | a for the mouy | inanne equi | | | itaneity | , then e | avanta | |
| Unit-4 | | Number of lectures = 08 | Title | e of the unit: CHEMICAL EQUILIB | RIUM | | | | | | | |
| Equilibriur | m constant and fre | e energy. Thermodynamic d | erivati | on of law of mass action. Le Cha | ateliers princip | ole. Reaction | n isothe | rm and | reactio | n isoch | or - Cla | peyro |
| - | and Clausius -Clape | yron equation, applications. | | | - | | | | | | | |
| Unit-5 | | Number of lectures = 08 | | e of the unit: ELECTROCHEMISTR | - | | | | | | | |
| Jalvanic ce | cells, standard elect | rode potential, types of electr | odes, r | measurement of pH; Solubility and | d solubility pro | duct and its | applica | tions. | | | | |
| 11. CO-PO | D mapping | | | | | | | | | | | |
| COs | | | Attrib | utes | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | P07 |
| CO1 | | nt knowledge of order of rea | ation (| المتحد المتحد والمتحد فيتحد والمتحد والمتحد والمتحد | erstand the fa | actors | 1 | | | | | |
| 001 | | | | and their determination and und | | 3 | | 1 | | 2 | 1 | |
| | | the rate of reaction. | | | | 3 | - | 1 | | 2 | 1 | |
| (02 ^S | | velop the concept of entropy | | ore the relation how entropy wo | uld be varying | 3 | 1 | 1 2 | | 2 2 | 1 | |
| CO2 | respect to P, T & V. | velop the concept of entropy | ; explo | ore the relation how entropy wo | , , | with 3 | - | - | | | | |
| CO2 | respect to P, T & V. Students would pe | velop the concept of entropy erceive the sound knowledge | ; explo | | , , | with 3 | - | - | | | | |
| CO2 r CO3 | respect to P, T & V. Students would pe would decide the s | velop the concept of entropy erceive the sound knowledge pontaneity of a process. | y; explo | ore the relation how entropy wo | unctions; how | with 3 they 3 | 1 | 2 | | 2 | 1 | |
| CO2 r CO3 | respect to P, T & V. Students would pe would decide the s Students would al | velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " | ; explo of Gib | ore the relation how entropy wo obs free energy and Helmholtz f | unctions; how reactions and | with 3 they 3 d for | 1 | 2 | | 2 | 1 | |
| CO2 r CO3 v CO4 r | respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit | velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insightics is of reactants and products | ; explo of Gib comple nt sour are shi | ore the relation how entropy wo obs free energy and Helmholtz f etions" for irreversible chemical nd knowledge of LeChâtelier's fted by using Clausius-Clapeyron | unctions; how reactions an Principle, how Equation. | they 3 d for y the 3 | 1 | 2 2 | | 2 2 | 1 | |
| CO2 r CO3 CO4 r CO5 CO5 CO5 CO5 CO5 CO5 CO5 CO5 CO5 CO5 | respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit Students evaluate | velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insightics is of reactants and products | ; explo of Gib comple nt sour are shi | ore the relation how entropy wo obs free energy and Helmholtz f etions" for irreversible chemical nd knowledge of LeChâtelier's | unctions; how reactions an Principle, how Equation. | they 3 d for y the 3 | 1 | 2 2 | | 2 2 | 1 | |
| CO2 r CO3 CO4 r CO5 CO5 CO5 CO5 CO5 CO5 CO5 CO5 CO5 CO5 | respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit | evelop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- cies of reactants and products fundamentals of electrochem | r; explo of Gik (comple nt sour are shi nistry a | ore the relation how entropy wo obs free energy and Helmholtz f etions" for irreversible chemical nd knowledge of LeChâtelier's fted by using Clausius-Clapeyron ind understand the concept of p | unctions; how reactions and Principle, how Equation. H, solubility ar | with 3 they 3 d for v the 3 nd its 3 | 1 1 1 | 2 2 1 | | 2 2 3 | 1 1 2 | |
| CO2 CO3 CO4 CO5 | respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit Students evaluate application. | erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh cies of reactants and products fundamentals of electrochem 3 Stron | y; explo of Gib (comple nt sour are shi histry a | ore the relation how entropy wo obs free energy and Helmholtz f etions" for irreversible chemical nd knowledge of LeChâtelier's fted by using Clausius-Clapeyron | unctions; how reactions and Principle, how Equation. H, solubility ar | with 3 they 3 d for v the 3 nd its 3 | 1 1 1 | 2 2 1 | | 2 2 3 | 1 1 2 | |
| CO2 r CO3 c CO4 r CO5 c 12. Brief | respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit Students evaluate application. | velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- ties of reactants and products fundamentals of electrochem 3 Stron f-learning / E-learning compo | y; explo of Gib (comple nt sour are shi histry a ng cont nent | ore the relation how entropy wo obs free energy and Helmholtz f etions" for irreversible chemical nd knowledge of LeChâtelier's fted by using Clausius-Clapeyron ind understand the concept of p | unctions; how reactions and Principle, how Equation. H, solubility ar | with 3 they 3 d for v the 3 nd its 3 | 1 1 1 | 2 2 1 | | 2 2 3 | 1 1 2 | |
| CO2 5 CO3 5 CO4 7 CO5 5 CO5 5 CO5 12. Brief 1. | respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit Students evaluate application. f description of self https://www.your | velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- ties of reactants and products fundamentals of electrochem 3 Strom f-learning / E-learning compo tube.com/watch?v=UVaHSeg0 | y; explo of Gik comple nt sour are shi nistry a ng cont nent CPzE | ore the relation how entropy wo obs free energy and Helmholtz f etions" for irreversible chemical nd knowledge of LeChâtelier's fted by using Clausius-Clapeyron ind understand the concept of p ribution, 2 Average contribution | unctions; how reactions and Principle, how Equation. H, solubility ar | with 3 they 3 d for v the 3 nd its 3 | 1 1 1 | 2 2 1 | | 2 2 3 | 1 1 2 | |
| CO2 5 CO3 5 CO4 7 CO5 5 CO5 5 CO5 7 CO5 7 | respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit Students evaluate application. f description of self https://www.your https://stuvera.cc | velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- ties of reactants and products fundamentals of electrochem 3 Strom f-learning / E-learning compo tube.com/watch?v=UVaHSeg0 om/bsc-1st-year-chemistry-no | y; explo of Gib comple are shi histry a ng cont nent CPzE tes-pdf | by the relation how entropy wo but free energy and Helmholtz f etions" for irreversible chemical and knowledge of LeChâtelier's fted by using Clausius-Clapeyron and understand the concept of p ribution, 2 Average contribution | unctions; how reactions and Principle, how Equation. H, solubility ar | with 3 they 3 d for v the 3 nd its 3 | 1 1 1 | 2 2 1 | | 2 2 3 | 1 1 2 | |
| CO2 5 CO3 5 CO4 7 CO5 5 CO5 5 CO5 12. Brief 1. | respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit Students evaluate application. f description of self https://www.your https://stuvera.cc http://www.freeb | velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- ties of reactants and products fundamentals of electrochem 3 Strom f-learning / E-learning compo tube.com/watch?v=UVaHSeg0 | y; explo of Gib (comple nt sour are shi nistry a nistry a nent CPzE tes-pdf ysical-C | bre the relation how entropy wo bbs free energy and Helmholtz f etions" for irreversible chemical nd knowledge of LeChâtelier's fted by using Clausius-Clapeyron and understand the concept of p ribution, 2 Average contribution | unctions; how reactions and Principle, how Equation. H, solubility ar | with 3 they 3 d for v the 3 nd its 3 | 1 1 1 | 2 2 1 | | 2 2 3 | 1 1 2 | |
| CO2 r CO3 c CO4 r CO5 c CO5 c cO5 c cO5 c cO5 c c cO5 c c cO5 c c c c c c c c c c c c c c c c c c c | respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit Students evaluate application. f description of self https://www.you https://stuvera.cc http://www.freeb https://www.mot https://examupda | velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- ties of reactants and products fundamentals of electrochem 3 Strom f-learning / E-learning compo tube.com/watch?v=UVaHSeg0 pm/bsc-1st-year-chemistry-no pookcentre.net/Chemistry/Phy | y; explo of Gib (comple nt sour are shi nistry a nistry a nent CPzE tes-pdf ysical-C | bre the relation how entropy wo bbs free energy and Helmholtz f etions" for irreversible chemical nd knowledge of LeChâtelier's fted by using Clausius-Clapeyron and understand the concept of p ribution, 2 Average contribution | unctions; how reactions and Principle, how Equation. H, solubility ar | with 3 they 3 d for v the 3 nd its 3 | 1 1 1 | 2 2 1 | | 2 2 3 | 1 1 2 | |
| CO2 r CO3 c CO4 r CO5 c CO5 c cO5 c cO5 c cO5 c c cO5 c c cO5 c c c c c c c c c c c c c c c c c c c | respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit Students evaluate application. f description of self https://www.your https://stuvera.cc http://www.freeb https://www.mob https://examupda s recommended: | velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- ties of reactants and products fundamentals of electrochem 3 Strom f-learning / E-learning compo tube.com/watch?v=UVaHSegG om/bsc-1st-year-chemistry-no bookcentre.net/Chemistry/Phy ot3ath.com/uplode/book/boo ates.in/b-sc-books/ | y; explo of Gib (comple nt sour are shi nistry a nistry a nent CPzE tes-pdf ysical-C | bre the relation how entropy wo bbs free energy and Helmholtz f etions" for irreversible chemical nd knowledge of LeChâtelier's fted by using Clausius-Clapeyron and understand the concept of p ribution, 2 Average contribution | unctions; how reactions and Principle, how Equation. H, solubility ar | with 3 they 3 d for v the 3 nd its 3 | 1 1 1 | 2 2 1 | | 2 2 3 | 1 1 2 | |
| CO2 5 CO3 5 CO4 7 CO5 5 CO5 5 CO5 7 CO5 7 CO3 CO3 7 CO3 CO3 7 CO3 CO3 CO3 CO3 CO3 CO3 CO3 CO3 CO3 CO3 | respect to P, T & V. Students would pe would decide the sy Students would al reversible chemica equilibrium quantit Students evaluate application. f description of self https://www.your https://stuvera.cc http://www.freeb https://www.mob https://examupda s recommended: Physical Chemistr | velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- ties of reactants and products fundamentals of electrochem 3 Strom f-learning / E-learning compo tube.com/watch?v=UVaHSegG om/bsc-1st-year-chemistry-no bookcentre.net/Chemistry/Phy ot3ath.com/uplode/book/boo ates.in/b-sc-books/ | r; explo of Gib (comple nt sour are shi nistry a ng cont nent CPzE tes-pdf ysical-C k-6083 | by the relation how entropy wo bas free energy and Helmholtz f etions" for irreversible chemical and knowledge of LeChâtelier's fted by using Clausius-Clapeyron and understand the concept of p ribution, 2 Average contribution f/ Chemistry-Books.html 9.pdf | unctions; how reactions and Principle, how Equation. H, solubility ar | with 3 they 3 d for v the 3 nd its 3 | 1 1 1 | 2 2 1 | | 2 2 3 | 1 1 2 | |
| CO2 5 CO3 5 CO4 7 CO5 5 CO5 5 CO5 7 CO5 7 CO3 CO3 7 CO3 CO3 7 CO3 CO3 CO3 CO3 CO3 CO3 CO3 CO3 CO3 CO3 | respect to P, T & V. Students would pe would decide the s Students would al reversible chemica equilibrium quantit Students evaluate application. f description of self https://www.your https://www.freet https://www.freet https://www.mot https://examupda s recommended: Physical Chemistrr Thermodynamics | velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- ties of reactants and products fundamentals of electrochem 3 Strom f-learning / E-learning compo tube.com/watch?v=UVaHSegG om/bsc-1st-year-chemistry-no bookcentre.net/Chemistry/Phy ot3ath.com/uplode/book/boo ates.in/b-sc-books/ y, P.WE. Atkins, ELBS – J. Rajaram and J.C. Kuriacos | r; explo of Gib (comple nt sour are shi nistry a ng cont nent CPzE tes-pdf ysical-C k-6083 | by the relation how entropy wo bas free energy and Helmholtz f etions" for irreversible chemical and knowledge of LeChâtelier's fted by using Clausius-Clapeyron and understand the concept of p ribution, 2 Average contribution f/ Chemistry-Books.html 9.pdf | unctions; how reactions and Principle, how Equation. H, solubility ar | with 3 they 3 d for v the 3 nd its 3 | 1 1 1 | 2 2 1 | | 2 2 3 | 1 1 2 | |
| CO2 5 CO3 5 CO4 7 CO5 5 CO5 5 CO5 5 CO5 7 CO5 7 CO3 CO3 7 CO3 CO3 7 CO3 CO3 CO3 CO3 CO3 CO3 CO3 CO3 CO3 CO3 | respect to P, T & V. Students would pe would decide the sy Students would al reversible chemica equilibrium quantit Students evaluate application. f description of self https://www.you https://stuvera.cc http://www.freet https://www.mot https://examupda s recommended: Physical Chemistr Thermodynamics Chemical Thermo | velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- ties of reactants and products fundamentals of electrochem 3 Strom f-learning / E-learning compo tube.com/watch?v=UVaHSegG om/bsc-1st-year-chemistry-no bookcentre.net/Chemistry/Phy bt3ath.com/uplode/book/boo ates.in/b-sc-books/ y, P.WE. Atkins, ELBS – J. Rajaram and J.C. Kuriacos dynamics by R.P.Rastogi et al | r; explo of Gib (comple nt sour are shi nistry a ng cont nent CPzE tes-pdf ysical-C k-6083 e – Edu | ore the relation how entropy wo obs free energy and Helmholtz f etions" for irreversible chemical nd knowledge of LeChâtelier's fted by using Clausius-Clapeyron ind understand the concept of p ribution, 2 Average contribution f/ chemistry-Books.html 9.pdf | unctions; how reactions and Principle, how Equation. H, solubility ar | with 3 they 3 d for v the 3 nd its 3 | 1 1 1 | 2 2 1 | | 2 2 3 | 1 1 2 | |
| CO2 r CO3 r CO4 r CO5 r CO5 r CO5 r CO5 r CO5 r CO5 r CO5 r CO5 r CO3 r | respect to P, T & V. Students would pe would decide the sy Students would al reversible chemica equilibrium quantit Students evaluate application. f description of self https://www.youi https://www.freet https://www.freet https://www.mot https://examupda s recommended: Physical Chemistr Thermodynamics Chemical Thermo Principles of physi | velop the concept of entropy erceive the sound knowledge pontaneity of a process. ble to difference between " al reactions. They got insigh- ties of reactants and products fundamentals of electrochem 3 Strom f-learning / E-learning compo tube.com/watch?v=UVaHSego om/bsc-1st-year-chemistry-no bookcentre.net/Chemistry/Phy bt3ath.com/uplode/book/boo ates.in/b-sc-books/ y, P.WE. Atkins, ELBS – J. Rajaram and J.C. Kuriacos dynamics by R.P.Rastogi et al ical chemistry by Puri Sharma | r; explo of Gik (comple nt sour are shi nistry a nistry a ng conte nent CPzE tes-pdf ysical-C k-6083 e – Edu and Pa | ore the relation how entropy wo obs free energy and Helmholtz f etions" for irreversible chemical and knowledge of LeChâtelier's fted by using Clausius-Clapeyron and understand the concept of p ribution, 2 Average contribution f/ chemistry-Books.html 9.pdf | unctions; how reactions and Principle, how Equation. H, solubility ar | with 3 they 3 d for v the 3 nd its 3 | 1 1 1 | 2 2 1 | | 2 2 3 | 1 1 2 | |
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| 1. Nam | e of the Departmen | nt: CHEMISTRY | | | | | | | | | | |
|-----------|--|--|------------|----------------------------------|------------------|------------------|-----------|-----------|-----------|----------|---------------|----------|
| | se Name | INORGANIC CHEMISTRY – II | | | | L | | - | ٢ | | Р | |
| | se Code | CH109 | | | | 3 | | | | | <u>г</u> 0 | |
| | of Course (use tick | | | | | Core (√) | | DE | | | FC (|) |
| | requisite (if any) | 10+2 with Chemistry | 6. | Frequency (use tick marks) | Even (V) | Odd (| \ \ | Either | <u> </u> |) F | very Sei | • |
| | | es, Tutorials, Practicals | 0. | frequency (use tick marks) | Even (V) | Ouu (| / | Littlei | | / - | very ser | |
| 7110101 | | ures = 30 | | Tutorials = 10 | | | | Practic | al = Nil | | | |
| 8 COUR | | terest among students for gen | eral Ir | | Icated and int | roduction of | neriodi | | | s of cla | ssificat | ion and |
| | | ck elements will be made. Int | | | | | | | | | | |
| | moieties will be do SE OUTCOMES (CO | | | | | | | | | | | |
| | | ,. completion, learners will develo | op foll | owina attributes: | | | | | | | | |
| | SE OUTCOME (CO) | | <u>, ,</u> | _ | TRIBUTES | | | | | | | |
| | CO1 | An understanding is developed | l for th | | | elements in per | iodic ta | ble. | | | | |
| | CO2 | Evaluation of anomalous behave | viour | of elements can be with proper | reasoning. | | | | | | | |
| | CO3 | Introduction of coordination ch | nemis | try creates higher order thinkin | g ability to dea | I with comple | inorga | nic moie | eties. | | | |
| | CO4 | How the stability of coordination | on cor | nplexes can be predicted throu | igh the applica | tion and reme | nbranc | e of sim | ple rule | s. | | |
| | CO5 | A keen interest is created in stu | udent | s to pursue inorganic chemistry | in higher class | ses | | | | | | |
| 10. Unit | t wise detailed cont | tent | | | | | | | | | | |
| Unit-1 | | Number of lectures = 08 | Titl | e of the unit: S – BLOCK ELEM | ENTS (GROUP - | - 1 AND 2 ELEN | IENTS) | | | | | |
| | , | onic configuration, Anomalous | | | | | | ds in the | e variati | on of p | ropertie | es (such |
| | ion potential, atom | ic and ionic radii etc.) | | | | | | | | | | |
| Unit-2 | | Number of lectures =08 | | of the unit: P – BLOCK ELEME | | | | | | | | |
| | | onic configuration, Variation of | | | | s of first eleme | ents of e | each gro | oup. Stu | idy of s | ome im | portant |
| Unit-3 | | ydrides, fluorocarbons silicates Number of lectures = 08 | | of the unit: D – BLOCK ELEME | | | | | | | | |
| | ristic properties of c | d-block elements. Properties of | | | | ry compounds | such as | Carbid | as Ovid | os and | Sulphid | 05 |
| | | | | | | | Jucitus | | | cs ana . | Juipinu | |
| Unit-4 | R chamical proporti | Number of lectures = 08 | | of the unit: CHEMISTRY OF N | | Vo (Structuro | and hor | ading in | Vo com | nound | cuch a | |
| | | ies noble gases, special propert d Clausius -Clapeyron equation | | | , chemistry of | xe (structure) | | iung in | ve cou | ipound | s such a | is kerz, |
| Unit-5 | Ner of equation an | Number of lectures = 08 | | of the unit: COORDINATION (| COMPOUNDS | | | | | | | |
| Double sa | alts. Werner's coord | lination theory, IUPAC nomencl | | | | ner and outer o | orbital c | omplex | es. | | | |
| | 0 mapping | | | | | | | | | | | |
| | U mapping | | | 1 | | | | 000 | 204 | DOF | DOC | 007 |
| COs | | | \ttribu | | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
| | | s developed for the significance | | | ents in periodic | | | 1 | | | | 2 |
| CO2 | | nalous behaviour of elements ca | | | | 2 | | | | | | |
| CO3 | moieties. | ordination chemistry creates hi | gner o | brder thinking ability to deal w | ith complex in | organic 3 | | | 1 | | | |
| CO4 | How the stability o simple rules. | f coordination complexes can l | be pre | dicted through the application | and remembr | ance of 3 | | | | | | |
| CO5 | A keen interest is c | reated in students to pursue in | organi | c chemistry in higher classes | | 2 | | 1 | | | 1 | 2 |
| | | 3 Strong | ; conti | ibution, 2 Average contribution | on , 1 Low cont | ribution | | | | | | |
| 12. Brie | | f-learning / E-learning compon | | | | | | | | | | |
| 1. | | ey.com/en-in/Basic+Inorganic+C | | |)5327 | | | | | | | |
| 2. | | a.ac.jp/chem/iwanami/inorg/IN | _ | 01.PDF. | | | | | | | | |
| 3. | s recommended: | org/doi/pdf/10.1021/ed073pA1 | L4.Z | | | | | | | | | |
| 13. 800 | | nic Chemistry Vol-I & II, Satya Pi | rakach | GD Tuli SK Rasu RD Mad | an S Chand & | Colltd | | | | | | |
| 2. | | ganic Chemistry, P.L. Soni, Sulta | | | | CO. LIU. | | | | | | |
| 3. | - | in Inorganic Chemistry, Madan | | | | | | | | | | |
| 4. | | Chemistry, J.D. Lee, Black Well | | - | | | | | | | | |
| | | | | | | | | | | | | |

| 1 Mare | o of the Department | +. CHEMISTRY | <u>SEMILOTEN II</u> | | | | | | | |
|-----------|---------------------------------|---|--|-------------------|----------|----------------|-----------|----------|-----------|----------|
| - | e of the Departmen | | | • | | | T | | - | |
| | se Name | ORGANIC CHEMISTRY – II | | L | | | <u>г</u> | _ | P | |
| | se Code | CH110 | | 3 | | | 1 | _ | 0 | |
| | of Course (use tick | - | | Core (√ |) | DE | • • | | FC (| |
| 5. Pre- | requisite (if any) | 10+2 with Chemistry | 6. Frequency (use tick marks) Even (√) | Odd (|) | Either | Sem (|) E | very Sei | n() |
| 7. Tota | Number of Lecture | s, Tutorials, Practicals | | | | | | | | |
| | Lectu | ires = 30 | Tutorials = 10 | | | Practic | al = Nil | | | |
| 8. COUR | SE OBJECTIVES: Stu | dents will be able to understa | nd the about arenes and Aromaticity, Huckel rule o | f aromaticity, | Aromat | ic electr | ophilic s | substitu | ution rea | actions |
| | | | stitution reaction of alkyl halides SN1 and SN2 | | | | | | | |
| alcohols, | trihydric alcoholsald | ehydes and ketones, chemical | reactions of aldehydes and ketones. | | | | | | | |
| 9. COUR | SE OUTCOMES (CO) | : | | | | | | | | |
| After the | successful course co | ompletion, learners will develo | op following attributes: | | | | | | | |
| COUR | SE OUTCOME (CO) | | ATTRIBUTES | | | | | | | |
| | CO1 | Understanding of Kekule struc mechanism of Aromatic electr | ture, Stability and carbon-carbon bond lengths, re | sonance, Huc | kel rule | of arom | aticity, | chemic | al reacti | on and |
| | | | cation, methods of formation and chemical reaction | ns of alkyl ha | lides. M | echanis | m of nu | cleophi | lic subs | titutior |
| | CO2 | • | nd SN2 reactions) with energy profile diagrams. | | nacs, m | cenams | | cicopin | 110 5005 | lication |
| | | | nomenclature, methods of formation, reduction of | aldehvdes, ke | etones. | carboxy | lic acids | and es | ters. Hv | droger |
| | (()) | _ | ons of alcohols, Dihydric alcohols, chemical reaction | | | - | | | - | - |
| | | | es Synthesis of aliphatic aldehydes and ketones, a | • / | | | | | | |
| | (()) | | -koch reaction and aromatic ketones by Friedel craf | | , | | | | | |
| | | | chanism of nucleophilic additions to carbonyl grou | | l conde | nsation. | Cannizz | zaro rea | action. I | Baever |
| | 0.05 | | ondorof Verlay reduction, Clemmensen reduction a | - | | | | | , | |
| 10. Uni | t wise detailed cont | - | | | | | | | | |
| Unit-1 | | Number of lectures = 08 | Title of the unit: ARENES AND AROMATICS | | | | | | | |
| | ature of benzene de | | enzene, Stability and carbon-carbon bond lengths of | of henzene re | sonance | Hucke | l rule of | aroma | ticity A | romati |
| | | | , Mechanism of nitration, halogenation. Sulphonati | | | | | aronna | ticity, A | Unatio |
| Unit-2 | inc substitution gen | Number of lectures =08 | Title of the unit: ALKYL AND ARYL HALIDES | on and thede | -crants | eaction | • | | | |
| | aturo classification | | emical reactions of alkyl halides. Mechanims of nuc | loophilic subs | titution | roaction | ofalley | balido | c (SN1 o | nd SN |
| |) with energy profile | | entical reactions of any handes. Mechanins of fuc | leopinite subs | itution | reaction | | manue | 5 (JIAT 9 | |
| Unit-3 | / with energy prome | Number of lectures = 08 | Title of the unit: ALCOHOLS | | | | | | | |
| | luie electrole un un un | | | | | . Is a sealing | a Asidi | | Deed | |
| | | | n, reduction of aldehydes, ketones, carboxylic acids | | | | | | | |
| | - | prmation and chemical reaction | ormation, chemical reactions of vicinal glycols an | | acolone | realiai | igemeni | L. THINY | | JIIUIS - |
| Unit-4 | ature, methous of to | Number of lectures = 08 | Title of the unit: ALDEHYDES AND KETONES | | | | | | | |
| | of alighetic aldebuy | | | side Crienerd | | | | 2 4:44: | C: | |
| | | | r reference to acid chlorides, alcohols, carboxylic a | | | | | | anes. Sy | ntnesi |
| | tic aldenydes by oxi | · | r-Tiemann reaction, gattermann-koch reaction and Title of the unit: CHEMICAL REACTION OF ALDEH | | | -neual c | rait acy | ation. | | |
| Unit-5 | 6 1 1 11 | Number of lectures = 08 | | | | | | | | |
| | | | ith particular reference: aldol condensation, Cann | | | in react | ion, Wit | tig rea | ction, N | lannic |
| | | ation, Meerwine Pondorof Ver | lay reduction, Clemmensen reduction and Wolff-Kis | shner reductio | n. | | | | | |
| | O mapping | | | | | | | | | |
| COs | | | Attributes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | P07 |
| CO1 | | | carbon-carbon bond lengths, resonance, Huckel | rule of 3 | 1 | 1 | | 2 | | 2 |
| | 11 | | Aromatic electrophilic substitution. | | - | - | | - | | - |
| CO2 | Mechanism of nucl | - | of formation and chemical reactions of alkyl of alkyl halides (SN1 and SN2 reactions) with energy | - | 1 | 1 | | 2 | | 2 |
| | diagrams. To create basic kr | nowledge of nomenclature r | nethods of formation, reduction of aldehydes, k | etones | + | | | | | |
| CO3 | | | Acidic nature, Reactions of alcohols, Dihydric a | - | 1 | 1 | | 2 | | 2 |
| 205 | - | of vicinal glycols and pinacol-p | - | iconois, 3 | 1 | 1 | | - | | <u> </u> |
| ļ | | | nacolone rearrangement. natic aldehydes and ketones, alcohols, carboxylic ac | side and | + | | | | | |
| 604 | | | | | | | | 2 | | - |
| CO4 | | s Reimer-Hemann reaction, g | attermann-koch reaction and aromatic ketones by | Friedel 3 | 1 | 1 | | 2 | | 2 |
| | craft acylation. | vo the mechanism of nuclear | nilic additions to carbonyl groups with aldol conder | acation | | | | | | |
| 605 | , , , | | , , , | · | | | | 2 | | - |
| CO5 | | | erwine Pondorof Verlay reduction, Clemmensen re | duction 3 | 1 | 1 | | 2 | | 2 |
| | and Wolff-Kishner r | | | | 1 | 1 | 1 | | 1 | <u> </u> |
| | | | contribution, 2 Average contribution , 1 Low cont | ribution | | | | | | |
| 12. Brie | | -learning / E-learning compon | | | | | | | | |
| 1. | | | c_Chemistry/Map%3A_Organic_Chemistry_(Smith) | /Chapter_06% | 3A_Un | derstand | ling_Org | ganic_R | eaction | 5 |
| 2. | https://www.dum | mies.com/education/science/ | biology/the-basics-of-organic-chemistry/ | | | | | | | |
| 3. | https://www.topp | or.com/guides/chemistry/orga | nic-chemistry/ | | | | | | | |
| 13. Bool | s recommended: | | | | | | | | | |
| 1. | | Chemistry, Bahl & Bahl, S. Cha | ind & Co. Ltd. | | | | | | | |
| 2. | - | / Vol.I & II, I.L. Finar | | | | | | | | |
| 3. | | Organic Chemistry, Nafis Haide | r, S. Chand & Co. Ltd. | | | | | | | |
| 4. | | | ngh, L.D.S. Yadav, Pragati Prakashan | | | | | | | |
| | | , , | | | | | | | | |

| 4 | · · (ultire Delle | | | | | | | | |
|----------|--------------------------------|--|---------------------------------------|---------|--------------|---------|-----------|------------------|----------|
| | e of the Departmen | | | - | _ | - | | | |
| - | se Name | INDUSTRIAL CHEMISTRY LAB – II | L | | 1 | | | P | |
| | se Code of Course (use tick | CH111 | 0 | | |) | | 8 | ` |
| | requisite (if any) | 10+2 with Chemistry 6. Frequency (use tick marks) Even (v) | Core(√) Odd() | | DE Either | |) 5 | FC (very Ser | |
| | | s, Tutorials, Practicals | Ouu () | | LIUIEI | Seni (|) [| very Sei | II () |
| | | res = 00 Tutorials = 00 | | | Practic | al = 08 | | | |
| 8. COUF | | Ident will be able to work effectively and safely in a laboratory environment, practic | al/technic | al/ con | | | ills, cor | ncepts t | o solve |
| - | | problems, transferable skills like ability to work in teams as well as independently. | | | | | | | |
| | SE OUTCOMES (CO) | | | | | | | | |
| - | SE OUTCOME (CO) | ompletion, learners will develop following attributes: ATTRIBUTES | | | | | | | |
| COOK | CO1 | Remember to keep records of all performed experiments in themanner which is require | ed in labor | atory. | | | | | |
| | CO2 | Able to Evaluate water quality parameters like chloride content and alkalinity. | | , | | | | | |
| | CO3 | Understand the basic titration methods and technical skills to work in the different field | s of chem | istry. | | | | | |
| | CO4 | Know about the principles of qualitative and quantitative analysis of inorganic mixtures | | | | | | | |
| | CO5 | Analyze the importance of personal safety and care of equipment's and chemicals. | | | | | | | |
| 10. Syll | abus | | | | | | | | |
| Exp – 0 | 1 | To determine chloride content in the given water sample. | | | | | | | |
| Exp – 0 | 2 | To determine the percentage of available chlorine in the given bleaching powder samp | le. | | | | | | |
| Exp – 0 | 3 | To determine Alkalinity in the given water sample. | | | | | | | |
| Exp – 0 | 4 | Qualitative analysis of inorganic mixture Cations: NH4 ⁺ Pb ²⁺ , Ag+, Bi ³⁺ , Cu ²⁺ , Cd ²⁺ , Sn ²⁺ , Fe ³⁺ , Al ³⁺ , Co ²⁺ , Cr ³⁺ , Ni ²⁺ , Mn ²⁺ , Zn ²⁺ , Ba ²⁺ , | Sr ²⁺ , Ca ²⁺ , | K⁺ | | | | | |
| Exp – 0 | | Qualitative analysis of inorganic mixture Anions: CO^{32-} , S^{2-} , SO_3^{2-} , SO_4^{2-} , NO_3^{-} , NO_2^{-} , CH_3COO^- , F^- , CI^- , Br^- , I^- , PO_4^{3-} , BO_3^{3-} , $C_2O_4^{2-}$ | | | | | | | |
| | O mapping | | | | | | | | |
| COs | | Attributes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
| CO1 | Remember to keep | records of all performed experiments in themanner which is required in laboratory. | 3 | 1 | 1 | | 2 | 1 | 2 |
| CO2 | Able to Evaluate wa | ater quality parameters like chloride content and alkalinity. | 3 | 1 | 1 | | 1 | 2 | 2 |
| CO3 | Understand the bas | ic titration methods and technical skills to work in the different fields of chemistry. | 3 | 1 | 1 | | 1 | | 2 |
| CO4 | Know about the pri | nciples of qualitative and quantitative analysis of inorganic mixtures. | 3 | 1 | 1 | | 1 | | 2 |
| CO5 | Analyze the import | ance of personal safety and care of equipment's and chemicals. | 3 | 1 | 1 | | 1 | 2 | 2 |
| | | 3 Strong contribution, 2 Average contribution, 1 Low contributi | on | | | | | | |
| 12. Brie | | -learning / E-learning component | | | | | | | |
| 1. | | Im.edu/uploads/files/79645701812579729-genchem-reference-for-web.pdf | | | | | | | |
| 2. | | ahadhika.ac.id/E-BOOK/12-1213-akfarmahad-16-1-vogelqu-d.pdf au.edu.sa/filedownload/doc-6-pdf-f06110ef2e1e1ae119cbacf71dd17732-original.pdf | | | | | | | |
| 3. 4. | | n.org.uk/resources/collection/3959/practical-chemistry | | | | | | | |
| 5. | | tserv.chula.ac.th/~sanongn1/processing.pdf | | | | | | | |
| 13. Bool | ks recommended: | | | | | | | | |
| 1. | Advanced Organic | : Chemistry, Bahl & Bahl, S. Chand & Co. Ltd. | | | | | | | |
| 2. | | / Vol.I & II, I.L. Finar | | | | | | | |
| 3. | | Chemistry: B. Viswanathan and P.S.Raghavan. | | | | | | | |
| 4. | | ganic Chemistry – W.G.Palmer. | | | | | | | |
| 5. | Organic Chemistry | ı Vol.I, II & III, Dr. Jagdamba Singh, L.D.S. Yadav, Pragati Prakashan. | | | | | | | |

| 1. Name of the Departmen | nt: CHEMISTRY | | | | | | | | |
|---|--|---|------------------|-----------|----------|----------|----------|----------|----------|
| 2. Course Name | INDUSTRIAL ASPECTS OF PH | YSICAL CHEMISTRY | L | | 1 | Г | | Р | |
| 3. Course Code | CH201 | | 3 | | 1 | L | | 0 | |
| 4. Type of Course (use tick | mark) | | Core (√) | | DE | () | | FC (|) |
| 5. Pre-requisite (if any) | 10+2 with Chemistry | 6. Frequency (use tick marks) Even () | Odd (√ |) | Either | Sem (|) E' | very Sei | m () |
| 7. Total Number of Lecture | es, Tutorials, Practicals | | | | | | | | |
| Lectu | ures = 30 | Tutorials = 10 | | | Practic | al = Nil | | | |
| | | study the use of simple models for predictive und | | | | | | | |
| - | | s and to develop deep understanding of theory | - | ion an | d corro | sion of | mater | ials in | various |
| | | for prevention of corrosion in different contexts wit | h kinetics. | | | | | | |
| 9. COURSE OUTCOMES (CO) |): completion, learners will develo | on following attributes: | | | | | | | |
| COURSE OUTCOME (CO) | | ATTRIBUTES | | | | | | | |
| | Students will gain an understa | nding of the thermodynamic and kinetic forces invo | lved in chemic | al react | ions wh | ich dete | ermine | how mi | uch and |
| C01 | how soon products are formed | | | | | | | | |
| | | ate the chemical kinetics, how reaction rates are m | neasured and r | eprese | nted in | rate law | s, and | applica | tions of |
| CO2 | chemical kinetics in studying e | | | | | | | | |
| CO3 | Students will gain an understa | nding of methods for determining molecular mass b | ased upon coll | igative | propert | ies. | | | |
| | Students will create the own | understanding approaches to the finding of unknow | vn compositior | n of ana | lvte fro | m critic | al solut | e temp | erature |
| CO4 | graph. | | | | | | | | |
| CO5 | Students will gain an understa | nding of approaches to the development of dry & w | et corrosion ar | nd its pr | eventio | n. | | | |
| 10. Unit wise detailed cont | | 0 - FF / / / / / / / / / / / / / / / / / | | | | | | | |
| Unit-1 | Number of lectures = 08 | Title of the unit: ADSORPTION | | | | | | | |
| | | ption, Adsorption of gases by solids, Freundlich ad | disorption isoth | erm l | angmui | r's theo | rv of a | dsornti | on BET |
| | ion, Determination of surface a | | | ierin, E | anginan | 5 1100 | iy or a | asorpen | , 521 |
| Unit-2 | Number of lectures =08 | Title of the unit: CATALYSIS | | | | | | | |
| General characteristics of ca | talytic reactions Acid-base cat | alysis, Enzyme catalysis, Mechanism and kinetics o | f enzyme catal | yzed re | actions | Michae | elis-Me | nten ec | uation, |
| | | catalysis, Surface reactions, Kinetics of surface react | | - | | | | | |
| Unit-3 | Number of lectures = 08 | Title of the unit: COLLIGATIVE PROPERTIES | | | | | | | |
| | | of molecular mass of solute from lowering of vap | | | | | | | |
| | | e, Determination of molecular mass of solute fror | | | | | | | |
| Relation between depression and osmotic pressure, van't l | | g of vapour pressure, Determination of molecular | mass of solute | from c | lepressi | on of fr | eezing | point, C | Jsmosis |
| Unit-4 | Number of lectures = 08 | Title of the unit: AZEOTROPIC MIXTURES | | | | | | | |
| | | ble liquids, Phenol water system, CST and effect of in | mpurities on C | ST. | | | | | |
| | | | | | | | | | |
| Unit-5 | Number of lectures = 08 | Title of the unit: CORROSION AND ITS CONTROL | | <u></u> | | 1.0 | | | |
| corrosion. | ects of corrosion, Dry or Chem | ical Corrosion, Wet or electrochemical corrosion, I | viecnanism of | Electro | cnemica | a Corros | sion, Pr | reventio | n trom |
| 11. CO-PO mapping | | | | | | | | | |
| COs | | Attributes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
| Students will gain a | | odynamic and kinetic forces involved in chemical re | actions | | 105 | 104 | | 100 | 107 |
| | ow much and how soon produc | | 3 | 1 | 1 | | 2 | 1 | 1 |
| Students will be ab | | etics, how reaction rates are measured and represe | ented in | | | | - | | |
| rate laws, and appl | ications of chemical kinetics in | studying enzyme mechanisms. | 3 | 1 | 2 | | 3 | 1 | |
| CO3 Students will gain | an understanding of method | s for determining molecular mass based upon col | lligative 3 | 1 | 2 | | 3 | 1 | |
| properties. | | | _ | - | - | | , | - | |
| CO4 | 0 11 | oaches to the finding of unknown composition of | analyte 3 | 1 | 1 | | 2 | 1 | 1 |
| from critical solute | temperature graph. | | | | | | | | |
| cos prevention. | an understanding of approac | hes to the development of dry & wet corrosion | and its 3 | 1 | 1 | | 2 | 1 | 1 |
| prevention. | 2 Strong | contribution, 2 Average contribution , 1 Low cont | ribution | | | | | | l |
| 12. Brief description of col | f-learning / E-learning compor | | | | | | | | |
| - | r.res.in/jspui/handle/12345678 | | | | | | | | |
| • • • | org/doi/full/10.1021/ie50157a | | | | | | | | |
| | csonline.org/industrial-chemis | | | | | | | | |
| 4. http://nsdl.niscair | r.res.in/jspui/handle/12345678 | 9/351?mode=full | | | | | | | |
| 13. Books recommended: | | | | | | | | | |
| | | th edition, Pubs: John Wiely & Sons, New York, 1982 | | | | | | | |
| | | s, Pubs: McGraw Hill Book Company, New York(198 | , | | | | | | |
| • | | rial Chemistry, Pubs: Van Nostrand inhold Company | | | | | | | |
| - | | Vol. I & II, Pubs: Vikas Publishing House, Pvt. Ltd., N Industrial Inorganic Chemistry, Pubs: V. Ch. Publish | | - | | | | | |
| 5. Buchner V., 30fille | | muusunai morganic chemistry, Pubs. v. ch. Publish | CIS, NEW TULK | (1202). | | | | | |

| 1. Name of the Depa | rtment: CHEMISTRY | | | | | | | | |
|--|--|--|------------------|----------|-----------|-----------|----------|----------|----------|
| 2. Course Name | INDUSTRIAL ASPECTS OF IN | ORGANIC CHEMISTRY | L | | | Г | | Р | |
| 3. Course Code | CH202 | | 3 | | - | 1 | | 0 | |
| 4. Type of Course (us | | | Core (√) | | DE | () | | FC (|) |
| 5. Pre-requisite (if a | | 6. Frequency (use tick marks) Even () | Odd (V |) | Either | Sem (|) E | very Se | m() |
| 7. Total Number of L | ectures, Tutorials, Practicals | | | | | 1 | | | |
| | Lectures = 30 | Tutorials = 10 basic metallurgical processes and their application | anc in inductri | ios alor | | al = Nil | niou | of allo | rc thoir |
| | ction of important metals from their | | | | ig with | | | | s, then |
| 9. COURSE OUTCOME | - | | | | | | | | |
| | ourse completion, learners will devel | ••••• | | | | | | | |
| COURSE OUTCOME | | ATTRIBUTES | | | | | | | |
| C01 | Basic understanding of import | ant aspects of inorganic chemistry application such a | as metallurgica | l proce | sses is c | reated | among | studen | ts. |
| CO2 | How inorganic materials are ir | nportant for industrial chemistry is evaluated throug | gh suitable exa | mples. | | | | | |
| CO3 | Evaluation of Commercial prep | parations of alloys, their merits and demerits and ho | w they can be | applied | l in indu | strial ch | emistry | y is don | e. |
| CO4 | Importance and application of | f metallurgical processes in industrial chemistry is lea | arnt. | | | | | | |
| CO5 | Important applications of inor | ganic materials like zeolites, alumina etc. are evaluat | ted by their rea | actions | and pro | perties. | | | |
| 10. Unit wise detaile | | <u> </u> | , | | | | | | |
| Unit-1 | Number of lectures = 08 | Title of the unit: METALLURGY | | | | | | | |
| Basic metallurgical op | erations- crushing and pulverization, | concentration, calcinations, roasting, types of roasti | ng, reduction a | and refi | ning. | | | | |
| Unit-2 | Number of lectures =08 | Title of the unit: PHYSICO CHEMICAL PRINCIPLES | OF EXTRACTIO | DN | | | | | |
| | and refining of Copper, lead, alumin | | | | | | | | |
| Unit-3 | Number of lectures = 08 | Title of the unit: INORGANIC MATERIALS OF INDU | ISTRIAL IMPO | RTANCI | F | | | | |
| | ucture and modification. Alumina, sili | | | | 6 | | | | |
| Unit-4 | Number of lectures = 08 | Title of the unit: METALS AND ALLOYS | | | | | | | |
| | | , nickel, titanium and their alloys, mechanical and ch | emical propert | ies and | their a | onlicatio | ns | | |
| - | | | | | | | | | |
| Unit-5 | Number of lectures = 08 | Title of the unit: ADHESIVE development of adhesive strength, chemical factors | influencing ad | nosivo a | oction f | rom cor | rosion | | |
| | | development of duriesive strength, enemical factors | innachenig au | | | | 1051011. | | |
| 11. CO-PO mapping | | | 201 | 202 | 000 | 204 | DOF | DOC | 0.07 |
| COs Basic underst | | Attributes ganic chemistry application such as metallurgical pro | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
| | nong students. | ganic chemistry application such as metallurgical pro | 2 | | 1 | | 1 | 1 | 2 |
| CO2 How inorgan | ic materials are important for indust | rial chemistry is evaluated through suitable examples | s. 2 | 1 | | | | 1 | 2 |
| 03 | f Commercial preparations of alloys, emistry is done. | their merits and demerits and how they can be app | plied in 1 | | | | | | 1 |
| | · · | esses in industrial chemistry is learnt. | 2 | 1 | 1 | | 1 | 1 | 2 |
| Important an | | e zeolites, alumina etc. are evaluated by their reaction | | - | - | | - | - | |
| cos properties. | | | 2 | | | | | 1 | 2 |
| 12 Brief description | of self-learning / E-learning compor | g contribution, 2 Average contribution , 1 Low contribution | Πουτιοη | | | | | | |
| - | w.degruyter.com/view/title/304228 | | | | | | | | |
| | | ial_inorganic_chemistry.html?id=y43xAAAAMAAJ | | | | | | | |
| | | 89/743/CHE%2012_EN%20Inorganic%20Chemistry.p | df?sequence= | 1&isAllo | owed=y | | | | |
| | | s.org/events-list/industrial-inorganic-chemistry | | | | | | | |
| 13. Books recommend 1. Austin H. T. | | es, Pubs: McGraw Hill Book Company, New York (198 | 24) | | | | | | |
| | - | trial Chemistry, Pubs: Van Nostrand Hold Company, L | | | | | | | |
| | | , Vol. I & II Pubs: Vikas Publishing House, Pvt. Ltd., Ne | · · · | | | | | | |
| | | , Industrial Inorganic Chemistry, Pubs: V. Ch. Publish | ers, New York | (1989). | | | | | |
| | | ngineering, Pubs: Mir Publishers, Moscow (1961). | | | | | | | |
| | - | nemical Engineering, Pubs: McGraw-Hill Co., U.S.A, 1 Chemical Engineering, Pubs: McGraw-Hill Book Con | | rk 100 | 100- | rn (I LI | Cham: | cal En~ | nooring |
| | Pubs: McGraw-Hill Book Company, N | | npany, New Yo | ик, 198 | н. о. ге | ııy J.⊓., | Chemi | cai Erig | meening |
| | | / | | | | | | | |

| 1. Name of | f the Departmen | t: CHEMISTRY | <u>SEMESTER III</u> | | | | | | | |
|----------------|--------------------------------------|--|--|----------------|----------|-----------|----------|----------|---|-----------|
| 2. Course N | Name | INDUSTRIAL ASPECTS OF OF | IGANIC CHEMISTRY | L | | | Т | | Р | |
| 3. Course C | Code | CH203 | | 3 | | | 1 | | 0 | |
| 4. Type of | Course (use tick | mark) | | Core (√) | | DE | () | | FC (|) |
| 5. Pre-requ | uisite (if any) | 10+2 with Chemistry | 6. Frequency (use tick marks) Even () | Odd (√ |) | Either | Sem (|) E | very Se | m() |
| 7. Total Nu | umber of Lecture | s, Tutorials, Practicals | · · · | | | | | | | |
| | | ıres = 30 | Tutorials = 10 | | | | al = Nil | | | |
| | | | nd role of organometallic reagents in the synthesis of | | | | | | | |
| | | | ium aluminum hydride, Sodium borohydride, Alkox | | | - | | - | | - |
| | | ano-cuprates compounds. Al | so introduce the carbon nanotubes: synthesis, str | ucture, char | acteriza | ation, n | hechani | sm, mo | odificati | on and |
| applications. | OUTCOMES (CO) | • | | | | | | | | |
| | | ,. ompletion, learners will devel | op following attributes: | | | | | | | |
| COURSE O | OUTCOME (CO) | | ATTRIBUTES | | | | | | | |
| | CO1 | The study of various technique enzyme-catalyzed and microw | ues used in the organic synthesis gives additional str rave-induced reactions. | rength and u | ndersta | nding r | egardin | g bio-tr | ansform | nations |
| | CO2 | | e synthesis and applications of different organomet | allic reagents | such a | s Grign | ard rea | gents, (| Drgano- | lithium |
| | 02 | Zinc, Copper, Palladium and N | ickel compounds along with homogeneous catalytic r | eactions, hyd | lrogena | tion and | l hydrof | ormyla | tion. | |
| | CO3 | Students can analyze the synt | nesis and applications of organo-silicon, Organo-palla | dium and lith | ium org | gano-cu | prates o | ompou | nds. | |
| | | | rious chemical reactions: reduction with Lithium al ew dimension in the study. Dissolving metal reductio | | - | | | | | - |
| | CO5 | | rization, mechanism, modification and applications c | arbon nanot | ubes giv | ve addit | ional su | upport 1 | o the s | tudents |
| | ise detailed cont | to understand the carbon nan | otudes. | | | | | | | |
| Unit-1 | ise detailed cont | Number of lectures = 08 | Title of the unit: TECHNIQUES IN ORGANIC SYNTH | IFSIS | | | | | | |
| | natons – Enzym | | vave induced reactions-Principle, conditions, advant | | onventi | onal he | ating n | nethod | - Annli | cations |
| sonication. | | | | | onventi | | ating i | ictilou. | , ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | cations |
| Unit-2 | | Number of lectures =08 | Title of the unit: ORGANOMETALLIC REAGENTS | | | | | | | |
| Synthesis a | nd applications | of Grignard reagents-orga | nolithium, Zinc, Copper, Palladium, Nickel comp | pounds in a | organic | synthe | sis- Ho | omoger | eous d | catalytic |
| reactionshyd | drogenation, hyd | roformylation. | | | | | | | | |
| Unit-3 | | Number of lectures = 08 | Title of the unit: METHODS IN ORGANIC SYNTHESI | | | | | | | |
| U U | | | n organic synthesis; Applications of Pd (0) and Pd (II) |) complexes i | n orgar | nic syntl | nesis- S | uzuki a | nd Sono | ogashira |
| Unit-4 | eck reaction, Prep | paration and applications of lit Number of lectures = 08 | Title of the unit: METHODS IN ORGANIC SYNTHESI | C _ II | | | | | | |
| | vith lithium alun | | nydride, alkoxides, bismethoxyethoxyaluminium hyd | | alumini | um hvo | lride ar | d deriv | atives-r | ratalytic |
| | | | allic reducing agents including enzymatic and microbi | - | | | inde di | | utives (| Latarytic |
| Unit-5 | - | Number of lectures = 08 | Title of the unit: CARBON NANOTUBES | | | | | | | |
| Synthesis, Si | ingle walled carl | oon nanotubes, Structure and | characterization, Mechanism of formation, chemic | ally modified | l carbo | n nanot | ubes, D | oping, | Functio | nalizing |
| | | arbon nanotubes. | | | | | | | | |
| 11. CO-PO m | napping | | | | | | 1 | r | r | 1 |
| COs | | | Attributes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | P07 |
| | | | anic synthesis gives additional strength and understa | anding 1 | 1 | 1 | 1 | - | 1 | 3 |
| | | | and microwave-induced reactions. applications of different organometallic reagents su | ich ac | | | | | | |
| | | , , | Palladium and Nickel compounds along with homoge | | 1 | 2 | 1 | - | 1 | 2 |
| | • • • | hydrogenation and hydroform | | | - | _ | _ | | - | _ |
| CO3 Stu | | ze the synthesis and applicatio | ns of organo-silicon, Organo-palladium and lithium or | rgano- 2 | 1 | 2 | 1 | - | 1 | 1 |
| | · · | | ctions: reduction with Lithium aluminum hydride, So | odium | 1 | | | l | l | |
| rec | ductions and non | -metallic reducing reactions a | | | 1 | 2 | 1 | - | 1 | 2 |
| 005 | | e, characterization, mechanis to the students to understand | m, modification and applications carbon nanotube the carbon nanotubes. | s give 1 | 1 | 2 | 2 | - | 1 | 2 |
| | | 3 Stron | g contribution, 2 Average contribution , 1 Low contri | bution | | | | | | |
| - | | -learning / E-learning compo | | | | | | | | |
| | | m.ubc.ca/chemistry-412-indus annica.com/technology/chemi | trial-organic-chemistry cal-industry/Organic-chemicals. | | | | | | | |
| | - | cat/guiesdocents/2019-20/g10 | 2495a2019-20iENG.pdf | | | | | | | |
| | ecommended: | | | | | | | | | |
| | | · · | Chemical Engineering, Pubs:McGraw-Hill Book Compa | any, New Yor | k,1984. | | | | | |
| | | o o . | s: McGraw-Hill Book Company, NewYork, 1993. | | Mairt | im | | | | |
| | | | 2004): The Chemistry of Nanomaterials, Vol.1, and 2, V n to Nanotechnology Wiley Interscience, New Jersey. | | weinne | eim. | | | | |
| | | | erials in Chemistry, WileyInterscience, New York. | | | | | | | |
| | | | , they have been a second of the second of t | | | | | | | |
| 0. 0 | ary, F. A and Sun | | Organic Chemistry, Part A and B, 5th Edition, Springer. | | | | | | | |
| | | | | | | | | | | |
| 7. Si 8. Bi | mith,M. B. (2005 ansal R K(1999): | dberg,R. I. (2009) :Advanced C): Organic Synthesis, 2nd Editi Heterocyclic Chemistry, New 7 | on, McGraw-Hill: New York. | | | | | | | |

SEMESTER – III

| 1. Nam | e of the Departmer | nt: CHEMISTRY | | | | | | | | | | | |
|-----------|-----------------------|---------------------------------------|---------------|---|-----------------|------------|---------|---------|----------|----------|----------|-----------|----------|
| | se Name | MATERIALS AND ENERGY B | ALANC | ČE | | | L | | - | Г | | Р | |
| | se Code | CH204 | | - | | | 3 | | | 1 | | 0 | |
| 4. Type | of Course (use tick | mark) | | | | Cor | e(√) | | | () | | FC (|) |
| | requisite (if any) | 10+2 with Chemistry | 6. | Frequency (use tick marks) | Even () | | d (V) | | Either | • • |) E | very Se | |
| 7. Tota | Number of Lecture | es, Tutorials, Practicals | | · · · · · | . , | | . , | | | | | | |
| | Lect | ures = 30 | | Tutorials = 10 | | | | | Practic | al = Nil | | | |
| 8. COUR | SE OBJECTIVES: Th | e purpose of this course is to | study | the basic concepts of mole, sig | nificant figur | es, soluti | on che | mistry | and ur | nderstar | nding th | ne princ | iples o |
| | | y, normality mole fraction co | ncept | etc. Thereafter apply the mater | ials balance & | & energy | balan | ce con | cept an | d its ca | lculatio | ns to c | nemica |
| | s unit operations. | N | | | | | | | | | | | |
| | SE OUTCOMES (CO |): completion, learners will devel | on fol | lowing attributes: | | | | | | | | | |
| - | SE OUTCOME (CO) | Inpletion, learners will dever | <u>op jon</u> | - | RIBUTES | | | | | | | | |
| | . , | Students will be able to anal | vze th | e mathematical interdisciplinary | | problem a | and ch | emical | reactio | ons and | strates | gies to | oalance |
| | CO1 | them. | , | | | | | | | | 51.4102 | , | 2010110 |
| | CO2 | Students will be able to evalua | ate the | e solution chemistry numerical fo | r titrimetric a | nalysis. | | | | | | | |
| | | | | in the fundamentals and applica | | - | m and | basis | of mole | cular pr | ocesses | s with c | nemica |
| | CO3 | reactions. | aatioi | | | | | | | outur pr | | | |
| | CO4 | Students will have a firm fou | ndatic | on in the fundamentals & applic | ations materi | ials and e | energy | balan | ce for t | he parti | cular r | eaction | and it |
| | 04 | scheme. | | | | | | | | | | | |
| | CO5 | | | communicate the results of sci | entific work | in chem | ical e | nginee | ring op | erations | s such | as dist | illatior |
| 40.11.1 | | evaporation, absorption and c | rystall | ization. | | | | | | | | | |
| Unit-1 | t wise detailed con | Number of lectures = 08 | Tial | e of the unit: UNITS AND DIMEN | | | | | | | | | |
| | tion Dimensions (| | - | | | | | | | | | | |
| Introduc | tion, Dimensions & | Systems of Units, Fundamenta | i quan | tities, Derived Quantities, Conve | rsions & Prob | nems. | | | | | | | |
| Unit-2 | | Number of lectures =08 | | e of the unit: BASIC CHEMICAL C | | | | | | | | | |
| | | | 1ethoo | ds of expressing the composition | of mixtures | (mass pe | ercent, | volum | e perce | ent, mol | e perce | ent), equ | Jivalen |
| | ormality, molarity, | Mumber of lectures = 08 | Tiel | e of the unit: MATERIAL BALANC | ۲ . | | | | | | | | |
| Unit-3 | lassification Choic | | | processes with chemical reaction | | halanca | | tions | multinl | | ***** | Dogu | |
| bypass. | | e of system and basis of more | culai | processes with themical reactio | ins, material | Dalatice | Laicula | tions, | munup | e unit p | locesse | es, necy | |
| Unit-4 | | Number of lectures = 08 | Title | e of the unit: ENERGY BALANCE | | | | | | | | | |
| Energy ba | alance: Forms of en | ergy, Energy balance, Energy c | hange | s in physical processes, Energy ch | anges in read | ctions, En | ergy b | alance | Calcula | tions. | | | |
| Unit-5 | | Number of lectures = 08 | Title | e of the unit: MATERIAL BALANC | | CHEMICA | L REA | CTIONS | 5 | | | | |
| Material | Balance without ch | emical reactions: Flow diagran | n for m | naterial balance, simple material | balance with | out recyc | les or | bypass | for che | emical e | nginee | ring ope | eration |
| such as d | istillation, evaporat | ion, absorption and crystallizat | tion. | - | | - | | | | | | | |
| 11. CO-P | O mapping | | | | | | | | | | | | |
| COs | | | Attrib | utes | | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
| CO1 | | | natical | interdisciplinary numerical pro | blem and cl | hemical | 3 | 1 | 1 | | 2 | 1 | 1 |
| | reactions and strat | egies to balance them. | | | | | - | | _ | | | | ļ |
| CO2 | Students will be ab | le to evaluate the solution che | mistry | numerical for titrimetric analysis | 5. | | 3 | 1 | 2 | | 2 | 1 | |
| CO3 | | | ament | tals and application of Choice of | system and | basis of | 3 | 1 | 2 | | 2 | 1 | |
| | | es with chemical reactions. | | | | | | - | | | - | - | <u> </u> |
| CO4 | | | lamen | tals & applications materials and | d energy bala | ance for | 3 | 1 | 1 | | 3 | 2 | 1 |
| | | tion and its scheme. | tho | results of scientific work in cl | homical ongi | nooring | | | | | | | |
| CO5 | | distillation, evaporation, abso | | | lennear engi | neering | 3 | 1 | 1 | | 3 | 2 | 1 |
| | | | • | ribution, 2 Average contribution | . 1 Low cont | ribution | | | | 1 | | | |
| 12. Brie | f description of sel | f-learning / E-learning compo | - | , | , | | | | | | | | |
| 1. | | ary.wiley.com/doi/book/10.10 | | 81118237786 | | | | | | | | | |
| 2. | https://beeindia. | gov.in/sites/default/files/1Ch4 | .pdf | | | | | | | | | | |
| 3. | | | | naterial-energy-balance-calculati | - | | | | | | | | |
| 4. | | ogle.com/books/about/Handbo | ook_or | n_Material_and_Energy_Balance | .html?id=9l3o | o1K2B260 | QC | | | | | | |
| | s recommended: | | | | | | | | | | | | |
| 1. | | - | | ata McGraw-Hill Publishing Comp | - | | 984. | | | | | | |
| 2. 3. | - | | | al Engineering, Pubs: McGraw-Hil cal Engineering, Pubs: McGraw-H | | | N Vork | 100/ | | | | | |
| 5. 4. | | • | | Graw-Hill Book Company, New Yo | | parry, Nev | N TOTK | , 1504. | | | | | |
| 5. | - | | | s of chemical Engineering, 6th ed | | rentic Ha | II, 200 | 3. | | | | | |
| 6 | | | | n I. P. Principles of unit operation | | | | | d Conc | 1004 | | | |

- Forst A.S., Wenzel L.A., Clump C.W., Maus L., Andersen L.B., Principles of unit operations, 2nd edition, Pubs: John Wiley and Sons, 1994. Chattopadhay P., Unit Operations of Chemicals Engineering, Vol I, Pubs: Khanna Publishers, Delhi, 1996. 6.
- 7.

| 1 Name e | f the Departmen | +. CHEMISTRY | <u>JLIVILJILIX – III</u> | | | | | | | |
|-----------------------|--|---|---|------------------|-----------|----------|----------|-----------|-----------|---------|
| 2. Course l | of the Departmen | INDUSTRIAL ASPECTS OF MI | CROBIOLOGY | - | | - | - | 1 | | |
| | | | CROBIOLOGY | L | | | <u> </u> | | P | |
| 3. Course (| | CH205 | | 3 | | | L | | 0 | |
| | Course (use tick | - | | Core () | | DE | | | FC (| |
| • | quisite (if any) | 10+2 with Chemistry | 6. Frequency (use tick marks) Even () | Odd (v |) | Either | Sem (|) E' | very Se | m () |
| 7. Total Nu | | s, Tutorials, Practicals | | | | | | | | |
| | | ires = 30 | Tutorials = 10 | | | Practic | | | | |
| | | - | e is to study the classification and nomenclature of | | ms, cul | turing a | nd pres | servatio | n of m | icrobes |
| | • | • | blems and production mechanism of industrial met | abolites. | | | | | | |
| | OUTCOMES (CO) | : ompletion, learners will develo | on following attributes: | | | | | | | |
| - | OUTCOME (CO) | simpletion, learners will devel | ATTRIBUTES | | | | | | | |
| 0001132 (| | Students will be able to unde | stand the concept of microorganism classification a | and nomencla | ture de | neral cl | haracte | ristics a | nd imn | ortance |
| | | | cetes, algae and fungi and their applications in ferme | | | | laracter | istics a | | ortanec |
| | | | p the concept Growth kinetics of microbes cultur | | | vation t | echniqu | ues as v | well as | factors |
| | (0) | affecting the growth | · ··· ································ | | p | | | | | |
| | | | fermentation: which includes general structure of a | fermenter ar | nd its ty | pes. Bui | ld the f | irm fou | ndation | of USF |
| | CO3 | & DSP and its purification met | hods | | | | | | | |
| | CO4 | Evaluate mechanisms and pro | cess for the industrial production of metabolites suc | ch as Antibiot | cs, Enzy | /mes, So | olvents, | Vitami | ns and | Organio |
| L | 04 | Acids. | | | | | | | | |
| | 005 | | f industrial contamination problems: microbiologica | al examination | n of cor | itamina | nts and | their c | ontrol 1 | through |
| | | sterilization techniques. | | | | | | | | |
| | vise detailed cont | | | | | | | | | |
| Unit-1 | | Number of lectures = 08 | Title of the unit: CLASSIFICATION AND NOMENCI | | | | - | | | |
| - | | | tes, Introduction to Microbial Diversity: Genera | I characteris | tics and | d impo | rtance | of Viru | uses, B | acteria |
| | etes, algae and fur | ngi. Use of microorganisms in f | | | 2050 | | | | | |
| Unit-2 | | Number of lectures =08 | Title of the unit: PURE CULTURE AND PRESERVAT | | | | | | 6 | |
| | - | | ch and continuous culture. Factors affecting growth y of growth supporting substances- Amino acids and | | trition | & Ferme | entatior | n media | : Comp | onents |
| Unit-3 | synthetic media. | Number of lectures = 08 | Title of the unit: BASIC CONCEPTS OF FERMENTAT | | | | | | | |
| | rmontation Con | | . Introduction to upstream and downstream proce | | poratio | ac in D | ownetre | om pro | cossing | |
| | | ation, Extraction, Concentratio | | essing. Unit u | peratio | | JWIISLIE | ani pro | JCESSIIIE | s (DSP) |
| Unit-4 | on or cens, separa | Number of lectures = 08 | Title of the unit: INDUSTRIAL PRODUCTION | | | | | | | |
| | of antibiotics- Pe | | icillins. Production of enzymes-Amylase. Immobiliza | tion of enzym | es and a | applicat | ions of | immobi | ilized er | nzvmes |
| | | | nocobalamin. Production of Organic Acids- Acetic Ac | | | | | | | -, |
| Unit-5 | | Number of lectures = 08 | Title of the unit: CONTAMINATION PROBLEM IN F | ERMENTATIO | N | | | | | |
| Microbiologi | gical examination | of water and common contar | ninant. Food poisoning. Control of microorganisms, | Sterilization, | inhibiti | ng subs | tances- | Antibio | tics, M | inimum |
| inhibitory co | oncentration. | | | | | | | | | |
| 11. CO-PO m | mapping | | | | | | | | | |
| COs | | | Attributes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | P07 |
| Stı | udents will be ab | le to understand the concept | of microorganism classification and nomenclature, g | general | | | | | | |
| CO1 cha | naracteristics and | importance of Viruses, Bacteri | a, Actinomycetes, algae and fungi and their applicat | ions in 3 | 2 | 1 | | 1 | | 2 |
| | rmentation indus | | | | | | | | | |
| LUZ | | | wth kinetics of microbes culturing and their preser | vation 3 | 2 | 1 | | 1 | | 1 |
| tec | | as factors affecting the growth | | | | | | _ | | |
| | | | ch includes general structure of a fermenter and its | types. 3 | 3 | 1 | | 1 | | 2 |
| | | dation of USP & DSP and its pu | | | | | | | | |
| UU4 | | | ial production of metabolites such as Antibiotics, En | zymes, 3 | 2 | 1 | | 1 | | 1 |
| | | and Organic Acids. | ntamination problems: microbiological examinat | ion of | | | | | | |
| 1 105 | | heir control through sterilization | | 2 | 2 | 2 | | 1 | | 1 |
| | | | contribution, 2 Average contribution , 1 Low contr | ibution | | | 1 | 1 | | |
| 12 Brief d | lescription of self | f-learning / E-learning compon | | ibution . | | | | | | |
| | | tube.com/watch?v=V0BzQQCC | | | | | | | | |
| | | tube.com/watch?v=lm76h4h1f | 5 | | | | | | | |
| | | - | logy/Book%3A_Microbiology_(Boundless)/17%3A_Ir | ndustrial Micr | obiolog | v | | | | |
| | | - | nicrobiology/chapter/industrial-microbiology/ | - | 0 | , | | | | |
| | recommended: | - | | | | | | | | |
| 1. N | Medical Microbio | logy, Vol. 1: Microbial Infectior | , Vol. 2 : Practical Medical Microbiology, Authors- M | ackie and Mc | Cartney | | | | | |
| | | Infections, Author- Smith | | | , | | | | | |
| | | mections, Author- Simur | | | | | | | | |
| 3. N | | linical Practice, Author- D.C. Sh | anson. | | | | | | | |
| 4. D | Microbiology in Cl Diagnostic Microb | inical Practice, Author- D.C. Sh iology, Authors- Baron, Peters | on and Finegold. | | | | | | | |
| 4. D 5. T | Microbiology in Cl Diagnostic Microb Textbook of Indus | inical Practice, Author- D.C. Sh iiology, Authors- Baron, Peters trial Microbiology, Author- A. I | on and Finegold. | | | | | | | |
| 4. D 5. T 6. Ir | Microbiology in Cl Diagnostic Microb Textbook of Indus Industrial Microbi | inical Practice, Author- D.C. Sh iology, Authors- Baron, Peters | on and Finegold. | | | | | | | |

| CO1 The students will able to explain about the chemical structures of carbohydrate, and their classification and z z 1 1 1 z 1 1 1 1 1 1 1 1 1 1 1 1 1 | 2. Course Na 3. Course Co 4. Type of Co 5. Pre-requi 7. Total Num 8. COURSE OI 9. COURSE OI 9. COURSE OI After the succ COURSE OI COURSE OI COURSE OI 0. COURSE OI 0. COURS | ame BIOCHEMISTRY ode CH206 ourse (use tick mark) 10+2 with Chemistry isite (if any) 10+2 with Chemistry nber of Lectures, Tutorials, Practicals Lectures = 30 BJECTIVES: Understand the concept of Bioc UTCOMES (CO): essful course completion, learners will dev UTCOME (CO) O1 The students will able to exp O2 Student will able to know able O3 The students will explain the O5 The students will explain the O5 The students will understand e detailed content Number of lectures = 08 And classification, monosaccharide (glucosed) their uses. Polysaccharides (Starch and Ceell) Number of lectures = 08 Classification, and Preparation of Amino Amidary, Tertiary and Quaternary Structure of Number of lectures = 08 Mumber of lectures = 08 And Characteristic features of enzymes. Face Structures of enzymes. Face | Tutorials = 10 hemistry regarding BiomoleculesCarbohydrates, protein elop following attributes: ATTRIBUTES alain about the chemical structures of carbohydrate, an out amino acids and primary, secondary, tertiary, quatries w about enzymes and their characteristics. They also will e structure and function of lipids, circulating lipids and in d about the structure and function of nucleosides and n Title of the unit: CARBOHYDRATES e and fructose) physical and chemical properties and their use Title of the unit: AMINO ACIDS, PPTIDES AND PRC wcids: Strecker synthesis using Gabriel's phthalimide s proteins. Title of the unit: ENZYMES | 3 Core () Odd (v s, lipids, Nuc s, lipids, Nuc l their classif rnary structu l be able to k flammatory ucleotides. flammatory i. PTIENS | ication ure of p now th lipid m | DE Either Practic ds, Enzy and use proteins he impor ediators | 1 (√) Sem (cal = Nil rmes. es. es. | f enzyn | 0 FC (very Se | m () | |
|---|--|---|---|---|---|--|---|-------------|----------------------|----------|--|
| | 3. Course Co 4. Type of Co 5. Pre-requi 7. Total Num 8. COURSE OI 9. COURSE OI 9. COURSE OI After the succ COURSE OI CO CO CO CO 10. Unit wise Unit-1 Introduction a properties and Unit-2 Introduction, Primary, Secon Unit-3 Introduction a | ode CH206 ourse (use tick mark) 10+2 with Chemistry isite (if any) 10+2 with Chemistry nher of Lectures, Tutorials, Practicals Lectures = 30 BJECTIVES: Understand the concept of Bioc UTCOMES (CO): essful course completion, learners will dev UTCOME (CO) 01 The students will able to exp 02 Student will able to know able to know industries. 03 The students will explain the students will explain the students will explain the cost of the students of the stu | Tutorials = 10 hemistry regarding BiomoleculesCarbohydrates, protein elop following attributes: ATTRIBUTES alain about the chemical structures of carbohydrate, an out amino acids and primary, secondary, tertiary, quatries w about enzymes and their characteristics. They also will e structure and function of lipids, circulating lipids and in d about the structure and function of nucleosides and n Title of the unit: CARBOHYDRATES e and fructose) physical and chemical properties and their use Title of the unit: AMINO ACIDS, PPTIDES AND PRC wcids: Strecker synthesis using Gabriel's phthalimide s proteins. Title of the unit: ENZYMES | 3 Core () Odd (v s, lipids, Nuc s, lipids, Nuc l their classif rnary structu l be able to k flammatory ucleotides. flammatory i. PTIENS | ication ure of p now th lipid m | DE Either Practic ds, Enzy and use proteins he impor ediators | 1 (√) Sem (cal = Nil rmes. es. es. | f enzyn | 0 FC (very Se | m () | |
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| CO1 The students will able to explain about the chemical structures of carbohydrate, and their classification and z 2 1 1 1 2 1 1 CO2 Student will able to explain about anion acids and primary, secondary, tertiary, quaternary structure of z 2 1 1 1 1 1 1 CO3 The student will able to know about enzymes and their characteristics. They also will be able to know the mportance of enzymes in chemical industries. 2 2 1 1 1 1 1 1 1 1 1 1 CO4 The students will explain the structure and function of lipids, circulating lipids and inflammatory lipid 2 2 1 1 1 1 1 1 1 1 1 1 1 CO5 The students will understand about the structure and function of nucleosides and nucleotides. 2 2 1 1 1 1 1 1 1 1 Strong contribution, 2 Average contribution , 1 Low contribution 12. Brief description of self-learning / E-learning component 1. 1. https://www.youtube.com/watch?v=dKT_9A)098E 3. https://www.youtube.com/watch?v=GR40-oECxs 4. https://www.youtube.com/watch?v=GR40-oECxs 4. https://www.youtube.com/watch?v=GR40-oECxs 4. https://www.youtube.com/watch?v=Gr40-Sex 3. books recommended: 1. Organic Chemistry by Robert Thornton Morrison, Robert Neilson Boyd, and Saibal Kanti Bhattacharjee, Seventh edition, Pearson publication. | | | | | | | | | | | |
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| R.K. Murray, D.K. Granner, P.A. Mayes and V.W. Rodwell, Harper's Illustrated Biochemistry. XXVIII edition. Lange medical Books/ McGraw-Hill (2009). | | | | | | | | | | | |
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| 1. Nam | e of the Departmer | nt: CHEMISTRY | | | | | | | | |
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| | se Name | INDUSTRIAL CHEMISTRY LA | 3 – III | L | | Т | r | | Р | |
| 3. Cour | se Code | CH207 | | 0 | | C |) | | 8 | |
| 4. Type | of Course (use tick | mark) | | Core (√) | | DE | () | | FC (|) |
| 5. Pre- | requisite (if any) | 10+2 with Chemistry | 6. Frequency (use tick marks) Even () | Odd (v) | | Either S | Sem (|) E' | very Ser | m () |
| 7. Tota | Number of Lecture | es, Tutorials, Practicals | | | | | | | | |
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| | | | ectively and safely in a laboratory environment, p | practical/technic | al/ com | nmunica | ation sk | ills, cor | icepts t | o solve: |
| | | | e ability to work in teams as well as independently. | | | | | | | |
| | SE OUTCOMES (CO | ; completion, learners will develo | on following attributes: | | | | | | | |
| - | SE OUTCOME (CO) | | ATTRIBUTES | | | | | | | |
| | CO1 | Remember to keep records of | all performed experiments in themanner which is r | equired in labor | atory. | | | | | |
| | CO2 | Able to Evaluate water quality | parameters like chloride content and alkalinity. | | • | | | | | |
| | CO3 | . , | methods and technical skills to work in the differer | nt fields of chem | istry | | | | | |
| | CO4 | | qualitative and quantitative analysis of inorganic mi | | iisti y. | | | | | |
| | | | | | | | | | | |
| 10 Sull | CO5 | Analyze the importance of per | sonal safety and care of equipment's and chemical | 5. | | | | | | |
| 10. Syll | | Dotorming the dozetile are | cific gravity of an unknown liquid | | | | | | | |
| Exp - 0 | | | cific gravity of an unknown liquid. | | | | | | | |
| Exp – 0 | | To determine the water equiv | alent of calorimeter. | | | | | | | |
| Exp – 0 | 3 | Conductometric titration. | | | | | | | | |
| Exp – 0 | 4 | Preparation of chrome alum. | | | | | | | | |
| Exp – 0 | 5 | Preparation of borax/ boric a | cid. | | | | | | | |
| Exp – 0 | 6 | Estimatio n of Calcium in Cha | k by permagnatometry. | | | | | | | |
| Exp – 0 | 7 | To study the absorption of ac | id an activated charcoal. | | | | | | | |
| Exp – 0 | 8 | To determine the pH of given | HCl solution by using pH meter. | | | | | | | |
| Exp – 0 | 9 | Microbiology and Biochemist | ry: | | | | | | | |
| Exp – 1 | 0 | test). Qualitative test of carbohydr iodine test, Seliwanoff's test, Methods of sterilisation and p Identification of isolated bact Find out the isoelectric point Protein separation by polyacr Enumeration of microorganis | • | est, Benedict's | | | • | | | |
| 11. CO-P | O mapping | Furnication techniques serial | dilution, pour plate and streak plate method | | | | | | | |
| COs | | | Attributes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | P07 |
| CO1 | Remember to keep | records of all performed expe | riments in themanner which is required in laborato | ry. 3 | 1 | 1 | | 2 | 1 | 2 |
| CO2 | Able to Evaluate wa | ater quality parameters like ch | oride content and alkalinity. | 3 | 1 | 1 | | 1 | 2 | 2 |
| CO3 | Understand the ba | sic titration methods and techr | nical skills to work in the different fields of chemistr | v. 3 | 1 | 1 | | 1 | | 2 |
| CO4 | Know about the pr | inciples of qualitative and quar | ititative analysis of inorganic mixtures. | 3 | 1 | 1 | | 1 | | 2 |
| CO5 | Analyze the import | ance of personal safety and ca | re of equipment's and chemicals. | 3 | 1 | 1 | | 1 | 2 | 2 |
| | | | contribution, 2 Average contribution , 1 Low cont | - | _ | _ | | | _ | |
| 12. Brie | of description of sel | f-learning / E-learning compor | | | | | | | | |
| 1. 2. 3. 4. 5. | http://file.akfarm https://faculty.ps https://www.ster http://pioneer.ne | ahadhika.ac.id/E-BOOK/12-12 | | pdf | | | | | | |
| | s recommended: | Chemistry: Jagdamba Singh L | D.S. Vaday, Java Singh, J.D. Siddigui, DragatiEdition | | | | | | | |
| 1. 2. 3. | Practical Organic Practical Physical | Chemistry, A.I.Vogel. Chemistry: B. Viswanathan and | | | | | | | | |
| 4. | Experimental inol | rganic Chemistry –W.G.Palmer | | | | | | | | |

| I Almon of the Department: CHANGITY Course Name POIVMRESCENCE L T P 3. Course Code POI208 Gard (1) 0 </th <th>1 Nam</th> <th>e of the Denartmen</th> <th>t: CHEMISTRY</th> <th><u>SEMESTER IV</u></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> | 1 Nam | e of the Denartmen | t: CHEMISTRY | <u>SEMESTER IV</u> | | | | | | | |
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| 3. Course Code 0.1008 0 4. Type of Course Quick List Kin with 0.1007 Feregousite (If any) 1.10.2 with Course Quick List Kin with Course Quick List Analy Even (V) 0.016 () Ether Stern () Even y Sem () 5. Proceroguike (If any) 1.10.2 with Course Quick List Analy Even (V) 0.016 () Ether Stern () Even y Sem () 7. Total Number of Lectures. Variables and applications of polymers, polymer tracessing courses, secondamine of polymer, polymer and the history of macromolecular science, polymer, hypes and physical state of polymer, polymer processing consess mechanism of polymers, polymer processing courses, including, polymers, courses, polymer processing techniques as moulding, polymer, course, polymers, courses, polymers, polymeras, course, polymers, polymers, polymera, polymers, cours | | | | | | | • | г | | D | |
| 4. Type of Course (use tick mark) Core {(V) DE(1) E(1) E(1) <td></td> | | | | | | | | | | | |
| S. Pre-requisite (if any) 10-2 with Chemistry 6. Frequency (use tick narrol) Odd () Enher Sem () Every Sem () Total Number of Lectures, Tutorials Particlais Tutorials = 10 Pre-tickal = Nill Every Sem () Every Sem () </td <td></td> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td>1</td> | | | | | | 1 | | | | | 1 |
| Total Number of Lectures 7:0 Practical = Nil Colspan="2">Practical = Nil Colspan="2">Source Completion, kenners will develop following attributes: Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2" Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2" Colspan="2">Colspan="2" Colspan="2" | | | | 6 Eroguongy (uso tick marks) Evon (y') | • | , | | • • |) 6 | | |
| Lectures 30 Tutorials 30 Practical NII 6c/0486 048CHVES Students will able to understand the history of macromolecular science, polymer, types and physical state of polymers, polymer processing complexes, mechanism of nodymeris, and applications of polymers. Social Science 300 0.00486 048CHVES (Students will average and applications of polymers, coss-linked copolymers, polymerization and functionality. To know the Classification of polymers, cross-linked copolymers, physical state of polymer; crystallinity, Glass Transition Temperature. C01 Remember the history of macromolecular science and basic definition of polymer, polymerization, initiators, linhibitors and lwing polymers. C03 To create basic Knowledge of the mechanism of addition, condensation, copolymers, addition polymers, copolymers, copolymers, copolymers, copolymers, copolymers, addition polymers, copolymers, copolymers, copolymers, copolymers, addition polymers, copolymers, process, the compact science, science, science, addition polymers, copolymers, copo | | | 1 | | Ouu (|) | Littlei | Jeni |) - | very Je | |
| 6. COUSE OBJECTVES: Students will able to understand the history of macromolecular science, polymer, types and physical state of polymer, polymer processing echniques, mechanism of polymeritanics, synthesis and applications of polymers. 9. COUSE SOUTCONES (CO) Fifter the successing function, kenners will develop following attributes: COUSE SOUTCONES (CO) If the the successing function, kenners will develop following attributes: COUSE SOUTCONE (CO) If the the successing function, kenners will develop following attributes: COO3 To insue the history of macromolecular science and basic definition of polymer, polymerization, initiators, inhibitors and living polymers. CO3 To insue thesk Knowledge of the mechanism of addition, condensation, copelymerization, initiators, inhibitors and living polymers. CO4 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, casting. CO5 knalye the importance of synthesis and applicators of corso linked copolymers, suddition polymers, condensation. How and hetero chain olymers, coopsinger. Unit 2 Number of fectures 08 Title of the unit: CLASPIRCATION OF POLYMERS. Unit 2 Number of fectures 08 Title of the unit: CLASPIRCATION OF POLYMERS. Unit 3 Number of fectures 08 Title of the unit: CLASPIRCATION OF POLYMERS. Unit 4 Number of fectures 08 Title of the unit: CLASP | 7. 10(a) | | · · | Tutorials - 10 | | | Practic | al – Nil | | | |
| echniques mechanism of polymerization, synthesis and applications of polymers. SOURSE OUTCOME (CO) SOURSE OUTCOME (CO) SOURCE (CO) SOURC | 8 COUR | | | | types and n | nysical s | | | rs nolvi | ner nro | ressing |
| 9. COURSE COURCINES (CO): 1. COURSE COO: 1. COP Constraining, met zpinning. 2. COURSE COO: 2. COO: 2. COP Constraining, met zpinning. 2. COO: 3. COP Constraining, met zpinning. 3. COP Constraining, met zpinning, developed metazing, definition of polymer, polymerization, copolymerization, copolymeriza | | | | | types and p | lysical s | | Jorymer | 5, pory | ner pre | ,eessing |
| OURSE OUTCOME (CO) ATTRIBUTES CO1 Remember the history of macromolecular science and basic definition of polymer, paylymerization and functionality. CO2 To know the Classification of polymers, cross-linked copolymers, tacticity, Physical state of polymer; crystallinity, Glass Transitor CO3 To create basic Know/tedge of the mechanism of addition, condensation, copolymerrization, initiators, inhibitors and living polymers. CO4 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, casting. CO5 Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, coopolymers. Unit vise defaulted content Visite of the unit: INTRODUCTION Unit vise default contents. Title of the unit: INTRODUCTION Unit vise default, integrand, organic, thermoplastics, thermosets, elastemers, fibres, speciality, linear, branched, cross linked copolymers (random, alternative, block and raft), tacticity (notacite, and atactic polymers). Title of the unit: CLASSIFICATION OF POLYMERS Unit vis Number of lectures - 08 Title of the unit: INTROD POLYMERS Unit vis Number of lectures - 08 Title of the unit: POLYMERIZATION Unit vis Number of lectures - 08 Title of the unit: POLYMERIZATION Unit vis Number of lectures - 08 Title of the unit: | | | | | | | | | | | |
| C01 Remember the history of macromolecular science and basic definition of polymer; polymerization and functionality. C02 To know the Classification of polymers; cross-linked copolymers, facticity, Physical state of polymer; crystallinity, Glass Transitor Temperature. C03 To create basic Knowledge of the mechanism of addition; condensation; copolymerization, initiators, inhibitors and living polymers. C04 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, casting. C05 Analyze the importance of synthesis and applications of cross-linked copolymers; addition polymers, coopolymers. 10. Unit wise detailed ontent Unit-1 Number of lectures = 08 Title of the unit: CLASSIPLATION OF POLYMERS Unit-1 Number of lectures = 08 Title of the unit: CLASSIPLATION OF POLYMERS Unit-2 Number of lectures = 08 Title of the unit: CLASSIPLATION OF POLYMERS Unit-3 Number of lectures = 08 Title of the unit: CLASSIPLATION OF POLYMERS Unit-4 Number of lectures = 08 Title of the unit: CLASSIPLATION OF POLYMERS Unit-4 Number of lectures = 08 Title of the unit: CLASSIPLATION OF POLYMERS Unit-4 Number of lectures = 08 Title of the unit: CLASSIPLATION OF POLYMERS Unit-4 Number of lectures = 08 | After the | successful course c | ompletion, learners will devel | op following attributes: | | | | | | | |
| CO2 To know the classification of polymers, cross-linked copolymers, tacticity, Physical state of polymer; crystallinity, Giass Transition CO3 To create basic Knowledge of the mechanism of addition, condensation, copolymerization, initiators, inhibitors and living polymers. CO4 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, casting. CO5 Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, copolymers. Unit via detailed content Number of lectures 08 Title of the unit: INTRODUCTION Unit2 Number of lectures 08 Title of the unit: CLASSIFICATION OF POLYMERS Jatural, synthetic, iongranic, organic, thermopastic, thermosets, elastomers, these, speciality, linear, branched, cross-linked copolymers, condensation polymerization (linechanism of free-radical, anionic, and catolic polymer: proballinity, Gias Transition Temperature Unit3 Number of lectures 08 Title of the unit: CLASSIFICATION OF POLYMERS Unit3 Number of lectures 08 Title of the unit: CLASSIFICATION OF POLYMERS Unit3 Number of lectures 08 Title of the unit: CVIVIER PROCESING Unit3 Number of lectures 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit4 Number of lectures 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS | COURS | SE OUTCOME (CO) | | ATTRIBUTES | | | | | | | |
| C02 Temperature. Temperature C03 To create basic knowledge of the mechanism of addition, condensation, copolymerization, initiators, inhibitors and living polymers. C04 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, casting. C05 knalyze the importance of synthesis and applications of cross-linked copolymers, copolymers, copolymers. 10. Unit Wise detailed content Unit-1 Number of lectures - 08 Title of the unit: INTRODUCTION Unit-1 Number of lectures - 08 Title of the unit: INTRODUCTION Hermospin (Joss) Unit-2 Number of lectures - 08 Title of the unit: CINSSHICATION OF POLYMERS Jaturdi Synthetic, inorganic, themoplastics, thermosets, elastomers, fibres, speciality, linear, branched, cross-linked copolymers (random, alternative, block and ratic, loorganic, themoplastics, thermosets, elastomers, fibres, speciality, linear, branched, cross-linked copolymers, condensation polymerization, coordination polymerization, could using polymerization, initiators, inhibitors, inhibitors, living polymers, condensation polymerization (mechanism of free-radia, anionic and calonic polymerization), initiators, inhibitors, inviting polymers, condensation polymerization polymerization femoforming, fourthesis, properties and applications of polytelene, polyterrafurcetryleter, polying/ challes, | | CO1 | Remember the history of mac | romolecular science and basic definition of polymer, | polymerizat | ion and i | function | ality. | | | |
| CO3 to create basic Knowledge of the mechanism of addition, condemsation, copolymerization, initiators, initiators, initiators, and living polymers. CO4 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, casting. CO5 Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, copolymers. How and the polymers of the other content of accounce, general characteristics of polymers, some basic definitions (functionality, polymer, polymerization, Homo and hetero chair objmers, copolymer). Unit 2 Number of lectures 08 Title of the unit: INTRODUCTION Unit 2 Number of lectures 08 Title of the unit: CLASSIFICATION OF POLYMERS Jatural, synthetic, inorganic, organic, thermopastics, thermosets, elastomers, fibres, speciality, linear, branched, cross-linked copolymers, condensation polymerization opolymerization (mechanism of free-ardiac), anotic and calonic polymerization, initiators, initiators, initiators, initiators, universe, condensation polymerization opolymerization polymerization epolymerization, endication, endication, endication, elastomeret contraction, endication, elastomeret, calender polymerization, polymerization endications of polythelene, polyteropylene, polyteration moulding, injection moulding, injection moulding, elastom endicate, endication, endicate, polytomerization, endicate, polytomerization, endicate, polytomerization, endicate, en | | CO2 | | of polymers, cross-linked copolymers, tacticity, I | Physical stat | e of po | olymer; | crystalli | nity, G | lass Tr | ansitior |
| OF the importance of synthesis and applications of cross-linked copplymers, addition polymers. Copplymers. 10. Unit wise detailed content Unit:1 Number of lectures = 08 THe of the unit: INTRODUCTION Inter of lectures = 08 THe of the unit: INTRODUCTION Inter of lectures = 08 THe of the unit: INTRODUCTION Unit:2 Number of lectures = 08 THe of the unit: INTRODUCTION OF POLYMERS Jatural synthetic, inorganic, organic, thermopatsics, thermosets, elastomers, fibres, speciality, linear, branched, cross-linked copolymers, condensation polymerization polymerization (bulk, suspension, emulsion, solution). Unit:3 Number of lectures = 08 THe of the unit: INPES OF POLYMERIZATION Unit:3 Number of lectures = 08 THe of the unit: SYNTHESS, POPCHERS AND APPLICATIONS Unit:3 Number of lectures = 08 THe of the unit: SYNTHESS, PROPERTIES AND APPLICATIONS Unit:3 Number of lectures = 08 THe of the unit: SYNTHESS, PROPERTIES AND APPLICATIONS Unit:5 Number of lectures = 08 THe of the unit: SYNTHESS, PROPERTIES AND APPLICATIONS Unit:5 Number of lectures = 08 THe of the unit: SYNTHESS, PROPERTIES AND APPLICATIONS <td></td> <td>CO3</td> <td></td> <td>the mechanism of addition, condensation, copolyme</td> <td>erization, init</td> <td>ators, in</td> <td>hibitors</td> <td>and livi</td> <td>ng poly</td> <td>mers.</td> <td></td> | | CO3 | | the mechanism of addition, condensation, copolyme | erization, init | ators, in | hibitors | and livi | ng poly | mers. | |
| 10. Unit wise detailed content Intervent of fectures = 08 Title of the unit: INTRODUCTION Unit 1 Number of lectures = 08 Title of the unit: INTRODUCTION Unit 2 Number of lectures = 08 Title of the unit: INTRODUCTION Unit 2 Number of lectures = 08 Title of the unit: INTRODUCTION Unit 2 Number of lectures = 08 Title of the unit: INTRODUCTION Unit 2 Number of lectures = 08 Title of the unit: SUSSIFICATION OF POLYMERS Unit 3 Number of lectures = 08 Title of the unit: TYPES OF POLYMERIZATION Unit 4 Number of lectures = 08 Title of the unit: TYPES OF POLYMERIZATION Unit 3 Number of lectures = 08 Title of the unit: TYPES OF POLYMERIZATION Unit 4 Number of lectures = 08 Title of the unit: POLYMERIZATION Unit 5 Number of lectures = 08 Title of the unit: POLYMERIZATION Unit 5 Number of lectures = 08 Title of the unit: POLYMERIZATION Unit 4 Number of lectures = 08 Title of the unit: POLYMERIZATION Unit 5 Number of lectures = 08 Title of the unit: POLYMERIZATION Unit 5 Number of lectures = 08 Title of the unit: POLYMERIS AND APPLICATIONS virtua 4, bua | | CO4 | Able to evaluate different type | es of polymer processing techniques as moulding, sp | inning, calen | daring, d | casting. | | | | |
| Unit Number of lectures = 08 Title of the unit: INTRODUCTION Unit of macromice/ular science, general characteristics of polymers, some basic definitions (functionality, polymer, polymer/zation, Homo and hetero chair objemes, coppolymer). Unit 2 Number of lectures = 08 Title of the unit: CLASSIFICATION OF POLYMERS Matural, synthetic, inorganic, capacity, thermoster, leadstomers, fibres, speciality, lines, branched, cross-linked copolymers (random, alternative, block and raft), isolatic, polymerization (mechanism of fice-radical, anionic and cationic polymerization, linitators, inhibitors, living polymers, condensation polymerization (polymerization (condination polymerization (bulk, suspension, emulsion, solution). Unit 4 Number of lectures = 08 Title of the unit: EVMENE POCESSING Compounding, vulcanization reinforcement, calendering, die-casting, filmcasting, compression moulding, injection moulding, blow moulding, extrusion moulding, braining, ext spinning. Unit 5 Number of lectures = 08 Title of the unit: EVMENE POCESSING Compounding, vulcanization reinforcement, calendering, die-casting, filmcasting, compression moulding, injection moulding, blow moulding, extrusion moulding, blow moulding, extrusion moulding, injection moulding, biolognere, polybutaleine, neoprene una N, buna s, phenoformal dehyde ureaformaldehyde, polyurethanes. 1. COP Omapping Cost Autributes P01 P02 P03 P04 P05 P05 P07 CO1 | | CO5 | Analyze the importance of syr | thesis and applications of cross-linked copolymers, a | addition poly | mers, co | polyme | ſS. | | | |
| rife history of macromlecular science, general characteristics of polymers, some basic definitions (functionality, polymer, polymerization, Homo and hetero chair colymers, copplymer). Unit 2 Number of lectures =08 Title of the unit: CLASSIFICATION OF POLYMERS datural, synthetic, inorganic, organic, thermoplastics, thermosets, elastomers, fibres, speciality, linear, branched, cross-linked copolymers (random, alternative, block and raft), tacticity (lostacite, and atacite polymers). Physical state of polymer; rystBiniton Temperature Unit 3 Number of lectures = 08 Title of the unit: TYES OF POLYMERIZATION Unit 4 Number of lectures = 08 Title of the unit: POLYMER PACCESSING Compounding, vulcanization reinforcement, clandering, dire-asting, filmcasting, compression moulding, injection moulding, extrusion moulding, vulcanization inforcement, clandering, dire-asting, filmcasting, compression moulding, injection moulding, extrusion moulding, tompounding, vulcanization reinforcement, clandering, dire-asting, filmcasting, compression moulding, injection moulding, extrusion moulding, hermoforming, foaming, melt spinning. Unit-5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectures = 08 Title of polymer, polymerization and 3 1 1 1 2 1 2 To know the Classification of polymers, cross-linked cooplymers, tacticity, Physical state of polymer for create basic Knowledge of the mechanism of addition, condensation, cooplymerization, initiators, 3 1 1 1 2 2 1 2 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, 3 1 1 1 2 2 1 2 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, 3 1 1 1 2 2 1 2 Able to evaluate different types of polymers/polymer-spolymer-spinners/lease science- and-hibitors com/spice/polymers/ Able to evaluate different types of polymers/polymer-spinners/le | 10. Unit | t wise detailed cont | tent | | | | | | | | |
| Oplymery, Oplymery, Oplymery, Physical state of polymer, crystallinity, Glass Transition Temperature Unit 2 Number of lectures =08 Title of the unit: CLASSIFICATION OF POLYMERS iatural, synthetic, inorganic, organic, thermoplastics, thermosets, elastomers, fibres, speciality, linear, branched, cross-linked copolymers (random, alternative, block and raft), tacticity (isotacit, and atactic polymers), Physical state of polymer; crystallinity, Glass Transition Temperature Unit 3 Number of lectures =08 Title of the unit: TPOS OF POLYMERXZITON Vinita Number of lectures =08 Title of the unit: POLYMER POCCESSING Number of lectures =08 Title of the unit: POLYMER PROCESSING Compounding, vulcanization reinforcement, calendering, die-casting, filmcasting, compression moulding, injection moulding, blow moulding, extrusion moulding, longering, met spinning. Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit 5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit 5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Number of lectures = 08 PO6 PO7 CO2 Remember the history of macromolecular science and basic definition of polymer, polymerization and living polymers, cross-linked copolymers, catclicity, Physical state of polymer andition spolymer anditing, Gaaring, Gaaniag, Cassing, Cassing, Cass | Unit-1 | | Number of lectures = 08 | Title of the unit: INTRODUCTION | | | | | | | |
| Unit 2 Number of lectures = 08 Title of the unit: CLASSFICATION OF POLYMERS Jatural, synthetic, iorganic, organic, thermoplastics, thermosets, elastomesr, fibres, speciality, linear, branched, cross-linked copolymers (random, alternative, block and raft), tacticity (stotactic, and tactic polymers, 0) Title of the unit: TYPES OF POLYMERIZATION Unit 3 Number of lectures = 08 Title of the unit: TYPES OF POLYMERIZATION Unit 4 Number of lectures = 08 Title of the unit: POLYMERIZATION Unit 4 Number of lectures = 08 Title of the unit: POLYMERIZATION Unit 5 Number of lectures = 08 Title of the unit: SVNTHESIS, PROPERTIES AND APPLICATIONS Unit 5 Number of lectures = 08 Title of the unit: SVNTHESIS, PROPERTIES AND APPLICATIONS vinte-5 Number of lectures = 08 Title of the unit: SVNTHESIS, PROPERTIES AND APPLICATIONS vinte-5 Number of lectures = 08 Title of the unit: SVNTHESIS, PROPERTIES AND APPLICATIONS vinte-5 Number of lectures = 08 Title of the unit: SVNTHESIS, PROPERTIES AND APPLICATIONS vinte-5 Number of lectures = 08 Title of the unit: SVNTHESIS, PROPERTIES AND APPLICATIONS vinte-5 Number of lectures = 08 Title of the unit: SVNTHESIS, PROPERTIES AND APPLICATIONS vinte-5 <t< td=""><td></td><td></td><td>llar science, general characte</td><td>ristics of polymers, some basic definitions (function</td><td>onality, polyr</td><td>ner, pol</td><td>ymerizat</td><td>ion, Ho</td><td>omo an</td><td>d heter</td><td>o chain</td></t<> | | | llar science, general characte | ristics of polymers, some basic definitions (function | onality, polyr | ner, pol | ymerizat | ion, Ho | omo an | d heter | o chain |
| Jatural, synthetic, inorganic, organic, thermoplastics, thermosets, elastomers, fibres, speciality, linear, branched, cross-linked copolymers (random, alternative, block and raft), tacticity (isotacic, and atactic polymers). Physical state of polymer: crystallinity, Glass Transition Temperature: Unit 3 Number of lectures = 08 Title of the unit: TVPS DF POLYMERIZATION Uddition polymerization (mechanism of free-radical, anionic and cationic polymerization), initiators, inhibitors, living polymers, condensation polymerization polymerization (mechanism of free-radical, anionic and cationic polymerization, initiators, inhibitors, living polymers, condensation polymerization polymerization (mechanism of free-radical, anionic and cationic polymerization, initiators, inhibitors, living polymers, condensation polymerization polymerization, adming mets spinning. Unit 4 Number of lectures = 08 Title of the unit: SVNTHESIS, PROPERTIES AND APPLICATIONS Unit 5 Number of lectures = 08 Title of the unit: SVNTHESIS, PROPERTIES AND APPLICATIONS Unit 5 Number of lectures = 08 Title of the unit: SVNTHESIS, PROPERTIES AND APPLICATIONS Unit 5 Number of networks, cross-linked copolymerk, polyterpropertene, polybityrene, polybityrene, polybityrene, polybitadiene, polybutadiene, neoprene una-N, buna-s, phenolformal dehyde ureaformaldehyde, polyurethanes. 1 1 1 2 1 2 CO3 Remember the history of macromolecular science and basic definition of polymer, polymerization, initiators, a 1 1 1 | | , copolymer). | | | | | | | | | |
| <pre>irafly, tacticity (isotactic, and atactic polymers). Physical state of polymer; crystallinity, Glass Transition Temperature Unit-3 Unit-4 Number of lectures = 08 Title of the unit: TYPES OF POLYMERIZATION Unit-4 Number of lectures = 08 Title of the unit: CPUS OF POLYMERIZATION Unit-4 Number of lectures = 08 Title of the unit: CPUS OF POLYMERIZATION Unit-4 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-4 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of polythelene, polytopylene, polytetrafluroethylene pyolystyrene, polytoutaliene, neoprene una-N, buans, phenolformal dehyde ureaformaldehyde, polyurerthanes. T.CO-PO mapping CO Remember the history of macromolecular science and basic definition of polymer, polymerization and 3 1 1 1 2 1 2 1 CO Remember the history of macromolecular science and basic definition, initiators, 3 1 1 1 2 1 2 1 2 CO Analyze the importance of synthesis and applications of ross-linked copolymerization, initiators, 3 1 1 1 2 2 2 2 CO Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, 3 1 1 1 2 2 2 2 2 CO Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, 3 2 2 CO Analyze the importance of synthesis and applications of cross-linked copolymers, 3 1 1 1 2 2 2 2 2 2 CO Analyze the importance of synthesis and applications of cross-linked copolymers, 3 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2</pre> | | | | | d and the | | | | - 11 | | |
| Unit3 Number of lectures = 08 Title of the unit: TYPES OF POLYMERIZATION Uddition polymerization (mechanism of free-radical, anionic and cationic polymerization), initiators, inibibitors, living polymers, condensation polymerization opolymerization, coordination polymerization opolymerization, emulsion, solution). Unit4 Number of lectures = 08 Title of the unit: POLYMER PROCESSING Compounding, vulcanization reinforcement, calendering, die-casting, filmcasting, compression moulding, injection moulding, blow moulding, extrusion moulding hermoforming, foraming, melt spinning. Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectures = 04 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectures = 04 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of macromolecular science and basic definition of polymer, polymerization and functionand functi | | | | | | ed copol | ymers (r | andom, | , alterna | ative, bi | оск апо |
| ddition polymerization (mechanism of free-radical, anionic and cationic polymerization), initiators, inhibitors, living polymers, condensation polymerization opolymerization (bulk, suspension, emulsion, solution). Unit 4 Inumber of lectures = 08 Title of the unit: POLYMER PROCESSING compounding, vulcanization reinforcement, calendering, die-casting, filmcasting, compression moulding, injection moulding, blow moulding, extrusion moulding, hermoforning, foaming, melt spinning. Unit 5 Inumber of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS vnthesis, properties and applications of polythelene, polytorpylene, polytetrafluroethylene pyolystyrene, polyvinyl chloride, polysioprene, polybutadiene, neoprene una-N, buna-s, phenolformal dehyde ureaformaldehyde, polyurethanes. 1. CO-PO mapping COS Attributes POI PO2 PO3 PO4 PO5 PO6 PO7 functionality. COS Internation for polymers, cross-linked copolymers, tacticity, Physical state of polymer anihibitors and living polymers. CO3 Inhibitors and living polymers. CO3 Inhibitors and living polymers. CO4 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, casting. CO5 Contexte basic. Knowledge of the mechanism of addition, condensation, copolymerization, initiators, inhibitors and living polymers. CO4 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, casting. CO5 Anaryte the importance of synthesis and applications of cross-linked copolymers, addition polymers, a 1 1 1 2 1 2 CO5 Anaryte the importance of synthesis and applications of cross-linked copolymers, addition polymers, a 1 1 1 2 1 2 CO5 Anaryte the importance of synthesis and applications of cross-linked copolymers, addition polymers, casting. CO6 Anaryte the importance of synthesis and applications of cross-linked copolymers, thtps://bemed.chem.putdue.du/genchem/topicreview/bp/1polymer/types.html 4. https://bemed.chem.putdue.du/genchem/topicreview/bp/1polymers/sillatio | | | | | ature | | | | | | |
| opolymerization, coordination polymerization (bulk, suspension, emulsion, solution). Unit-4 Number of lectures = 08 Title of the unit: POLYMER PROCESSING Compounding, vulcanization reinforcement, calendering, dire-casting, filmcasting, compression moulding, injection moulding, blow moulding, extrusion moulding, texturiation moulding, formation moulding, polymeration, compounding, formation, moulding, polymeration, polyters, polyters, properties and applications of polythelene, polyteropylene, polytetrafluroethylene pyolystyrene, polytinyl chloride, polytisoprene, polybutadiene, neoprene unan-N, buna-s, phenofformal dehyde ureaformaldehyde, polyurethanes. 1. CO-PO mapping COS Attributes PO1 PO2 PO3 PO4 PO5 PO6 PO7 CO1 Remember the history of macromolecular science and basic definition of polymer, polymerization and functionally. 3 1 1 1 2 1 2 CO2 To know the Classification of polymers, cross-linked copolymers, tacticity, Physical state of polymer; as a 1 1 1 2 1 2 CO3 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, as 1 1 1 2 1 2 CO4 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, as 1 1 1 2 1 2 </td <td></td> <td>polymerization (m</td> <td></td> <td></td> <td>hibitors, liv</td> <td>ing poly</td> <td>/mers, d</td> <td>condens</td> <td>ation p</td> <td>oolyme</td> <td>rization,</td> | | polymerization (m | | | hibitors, liv | ing poly | /mers, d | condens | ation p | oolyme | rization, |
| compounding, vulcanization reinforcement, calendering, die-casting, filmcasting, compression moulding, injection moulding, blow moulding, extrusion moulding hermoforming, feaming, melt spinning. Unit-5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS ynthesis, properties and applications of polythelene, polypropylene, polytetrafluroethylene pyolystyrene, polyvinyl chloride, polyisoprene, polybutadiene, neoprene Unit-5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Vint-5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectures = 08 Tote of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Vint-5 Number of lectures = 08 Tote of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Vint-6 Attributes PO1 PO2 PO4 PO5 PO6 PO7 CO1 Remember the history of macromolecular science and basic definition of polymer, polymerization and an incidentiation, incidentiation, class Transition Temperature. 3 1 1 1 2 1 2 CO2 To know the Classification of polymers, cross-linked copolymers, callendaring, and inhibitors and living polymers. 3 1 1 1 2 1 2 <t< td=""><td></td><td></td><td></td><td></td><td>,</td><td>017</td><td></td><td></td><td></td><td>,</td><td>,</td></t<> | | | | | , | 017 | | | | , | , |
| Number of lectres = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectres = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Unit-5 Number of lectres = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS Vintersion of polythelene, polyboropylene, polytetrafluroethylene pyolystyrene, polytingl chloride, polybiosprene, polybutadiene, neoprene una-N, buna-s, phenolformal dehyde ureaformaldehyde, polyurethanes. PO1 PO2 PO3 PO4 PO5 PO6 PO7 COP mapping PO1 PO2 PO3 PO4 PO5 PO6 PO7 COP mapping PO1 PO2 PO3 PO4 PO5 PO6 PO7 CO2 Remember the history of macromolecular science and basic definition of polymer, polymerization and 3 1 1 1 1 2 1 2 1 2 1 2 <td>Unit-4</td> <td></td> <td>Number of lectures = 08</td> <td>Title of the unit: POLYMER PROCESSING</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> | Unit-4 | | Number of lectures = 08 | Title of the unit: POLYMER PROCESSING | | | | | | | |
| Unit:5 Number of lectures = 08 Title of the unit: SYNTHESIS, PROPERTIES AND APPLICATIONS ynthesis, properties and applications of polythelene, polytoropylene, polytetrafluroethylene pyolystyrene, polyvinyl chloride, polytosprene, polybutadiene, neoprene una-N, buna-S, phenolformal dehyde ureaformaldehyde, polyurethanes. CO-PO mapping PO1 PO2 PO3 PO4 PO5 PO6 PO7 CO1 Remember the history of macromolecular science and basic definition of polymer, polymerization and functionality. 3 1 1 1 2 1 2 CO2 To know the Classification of polymers, cross-linked copolymers, tacticity, Physical state of polymer; crystallinity, Glass Transition Temperature. 3 1 1 1 2 1 2 CO3 To create basic Knowledge of the mechanism of addition, condensation, copolymerization, initiators, inhibitors and living polymers. 3 1 1 1 2 1 2 CO4 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, casting. 3 1 1 1 2 1 2 CO4 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, capolymers | Compour | nding, vulcanization | reinforcement, calendering, | die-casting, filmcasting, compression moulding, | injection mo | ulding, | blow m | oulding | , extru | sion m | oulding, |
| ynthesis, properties and applications of polythelene, polypropylene, polytetrafluroethylene pyolystyrene, polyvinyl chloride, polyiosprene, polybutadiene, neoprene juna-N, buna-s, phenofformal dehyde ureaformal dehyde, polyurethanes. 1. CO-PO mapping CO2 CO3 Remember the history of macromolecular science and basic definition of polymer, polymerization and functionality. CO2 To know the Classification of polymers, cross-linked copolymers, tacticity, Physical state of polymer: a 1 1 1 2 1 2 CO3 To know the Classification of polymers, cross-linked copolymers, tacticity, Physical state of polymer: a 1 1 1 2 1 2 To know the Classification of polymers polymers, cross-linked copolymers, tacticity, Physical state of polymer: a 1 1 1 2 1 2 To create basic Knowledge of the mechanism of addition, condensation, copolymerization, initiators, a 1 1 1 2 1 2 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, a 1 1 1 2 1 2 Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, a 1 1 1 2 1 2 Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, a 1 1 1 2 1 2 Analyze the importance of synthesis and applications of cross-linked copolymers, a http://chemistry-chemistry/Polymers/ http://bus.com/jee/polymers/ http://bus.com/jee/polymers/ http://bus.com/jee/polymers/ https://www.toppr.com/guides/chem.typolymers/classification-of-polymers/ 1. Chemical Thermodynamics by R.P.Rastogi et al Principles of Physical Chemistry, Burli Sharma and Pathan 3. Essentials of Physical Chemistry, Barna & Pathania, Vishal Publishing Co. 5. Simplified course in Physical Chemistry, Madan & Tuli, S. Chand & Co. Ltd. | | orming, foaming, me | | | | | | | | | |
| Numa-N, buna-s, phenolformal dehyde ureaformaldehyde, polyurethanes. I. CO-P mapping CO3 PO4 PO5 PO6 PO7 CO1 Remember the history of macromolecular science and basic definition of polymer, polymerization and an interval interva | | properties and ar | | | | | hicopro | no noli | (hutodi) | | |
| 1. CO-PO mapping Attributes PO1 PO2 PO3 PO4 PO5 PO6 PO7 C01 Remember the history of macromolecular science and basic definition of polymer, polymerization and unctionality. 3 1 1 1 2 1 2 C02 To know the Classification of polymers, cross-linked copolymers, tacticity, Physical state of polymer; 3 1 1 1 2 1 2 C03 To know the Classification of polymers, cross-linked copolymers, tacticity, Physical state of polymer; 3 1 1 1 2 1 2 C03 To create basic Knowledge of the mechanism of addition, condensation, copolymerization, initiators, as in initiators, and living polymers. 3 1 1 1 2 1 2 C04 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, as in a 1 1 1 2 1 2 C04 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, as in a 1 1 1 2 1 2 C05 Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, addition polymers, addition polymers, as in in in in z | - | | | | olyvinyi chio | nue, po | nyisoprei | ne, poly | pulaul | ene, ne | oprene, |
| COs Attributes PO1 PO2 PO3 PO4 PO5 PO6 PO7 C01 Remember the history of macromolecular science and basic definition of polymer, polymerization and unctionality. 3 1 1 1 2 1 2 C02 To know the Classification of polymers, cross-linked copolymers, tacticity, Physical state of polymer; 3 1 1 1 2 1 2 C03 To create basic Knowledge of the mechanism of addition, condensation, copolymerization, initiators, inhibitors and living polymers. 3 1 1 1 2 1 2 C04 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, asing. 3 1 1 1 2 1 2 C04 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, asing. 1 1 1 2 1 2 C05 Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, asing. 3 1 1 1 2 1 2 C05 Analyze the importance of synthesis com/chemister/Polimers/polymerscicnec-and-technology.pdf 1 </td <td></td> | | | | | | | | | | | |
| CO1 Remember the history of macromolecular science and basic definition of polymer, polymerization and functionality. 3 1 1 1 2 1 2 CO2 To know the Classification of polymers, cross-linked copolymers, tacticity, Physical state of polymer; as 1 1 1 1 2 1 2 CO3 To create basic Knowledge of the mechanism of addition, condensation, copolymerization, initiators, inhibitors and living polymers. 3 1 1 1 2 1 2 CO3 To create basic Knowledge of the mechanism of addition, condensation, copolymerization, initiators, inhibitors and living polymers. 3 1 1 1 2 1 2 CO4 Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, as 1 1 1 1 2 1 2 CO4 Aalyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, copolymers. 3 1 1 1 2 1 2 CO5 Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, as 1 1 1 1 2 1 2 CO5 Analyze the importance of synthesi | | | | Attributes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
| tunctionality.III< | 601 | Remember the his | | | on and | | | | | | |
| CO2crystallinity, Glass Transition Temperature.3111212CO3To create basic Knowledge of the mechanism of addition, condensation, copolymerization, initiators, inhibitors and living polymers.31111212CO4Able to evaluate different types of polymer processing techniques as moulding, spinning, calendaring, casting.31111212CO5Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, copolymers.31111212Betraning / E-learning Cemponent12. Brief description of self-learning / E-learning component1.https://chemistry-chemists.com/chemister/Polimers/polymer-science-and-technology.pdf2.https://chemistry-chemists.com/chemister/Polimers/polymer-science-and-technology.pdf1.https://chemed.chem.purdue.edu/genchem/topicreview/bp/1polymer/types.html4.https://chemid.chem.purdue.edu/genchem/topicreview/bp/1polymers/13. Books recommended:1.Chemical Thermodynamics by R.P.Rastogi et alPrinciples of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd.Principles of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd.Principles of Physical Chemistry, Madan & Tuli, S. Chand & Co. Ltd. | 01 | , | sification of notimors cross | linked conclumers testisity. Divised state of p | - | 1 | 1 | 1 | 2 | 1 | 2 |
| CO3 inhibitors and living polymers. 3 1 <th1< th=""> <th1< th=""> 1</th1<></th1<> | CO2 | crystallinity, Glass 1 | Fransition Temperature. | | 5 | 1 | 1 | 1 | 2 | 1 | 2 |
| CO4 casting. 3 1 1 1 2 1 2 CO5 Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, opolymers. 3 1 1 1 2 1 2 Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, additin polymer, additin polymer, addition polymers, addition polymer, | CO3 | | - | of addition, condensation, copolymerization, ini | tiators, 3 | 1 | 1 | 1 | 2 | 1 | 2 |
| COS Analyze the importance of synthesis and applications of cross-linked copolymers, addition polymers, opplymers, addition polymers, additis, additis, addition polymers, addition polymers, addit | CO4 | | different types of polymer p | rocessing techniques as moulding, spinning, calen | idaring, 3 | 1 | 1 | 1 | 2 | 1 | 2 |
| 3 Strong contribution, 2 Average contribution , 1 Low contribution 12. Brief description of self-learning / E-learning component 1. http://chemistry-chemists.com/chemister/Polimers/polymer-science-and-technology.pdf 2. https://byjus.com/jee/polymers/ 3. http://chemed.chem.purdue.edu/genchem/topicreview/bp/1polymer/types.html 4. https://www.britannica.com/science/polymer 5. https://www.toppr.com/guides/chemistry/polymers/classification-of-polymers/ 13. Books recommended: 1. 1. Chemical Thermodynamics by R.P.Rastogi et al 2. Principles of physical chemistry by Puri Sharma and Pathan 3. Essentials of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd. 4. Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co. 5. Simplified course in Physical Chemistry, Madan & Tuli, S. Chand & Co. Ltd. | CO5 | Analyze the impo | rtance of synthesis and app | lications of cross-linked copolymers, addition po | lymers, 3 | 1 | 1 | 1 | 2 | 1 | 2 |
| 12. Brief description of self-learning / E-learning component 1. http://chemistry-chemists.com/chemister/Polimers/polymer-science-and-technology.pdf 2. https://byjus.com/jee/polymers/ 3. http://chemed.chem.purdue.edu/genchem/topicreview/bp/1polymer/types.html 4. https://www.britannica.com/science/polymer 5. https://www.toppr.com/guides/chemistry/polymers/classification-of-polymers/ 13. Books recommended: 1. Chemical Thermodynamics by R.P.Rastogi et al 2. Principles of physical chemistry by Puri Sharma and Pathan 3. Essentials of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd. 4. Principles of Physical Chemistry, Madan & Tuli, S. Chand & Co. Ltd. | | copolymers. | 2 Stron | contribution 2 Average contribution 1 Low cont | ribution | | | | | | |
| http://chemistry-chemists.com/chemister/Polimers/polymer-science-and-technology.pdf https://byjus.com/jee/polymers/ http://chemed.chem.purdue.edu/genchem/topicreview/bp/1polymer/types.html https://www.britannica.com/science/polymer https://www.toppr.com/guides/chemistry/polymers/classification-of-polymers/ Books recommended: Chemical Thermodynamics by R.P.Rastogi et al Principles of physical chemistry by Puri Sharma and Pathan Essentials of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd. Principles of Physical Chemistry, Madan & Tuli, S. Chand & Co. Ltd. | 12 Brie | f description of self | | | | | | | | | |
| https://byjus.com/jee/polymers/ http://chemed.chem.purdue.edu/genchem/topicreview/bp/1polymer/types.html https://www.britannica.com/science/polymer https://www.toppr.com/guides/chemistry/polymers/classification-of-polymers/ 13. Books recommended: Chemical Thermodynamics by R.P.Rastogi et al Principles of physical chemistry by Puri Sharma and Pathan Essentials of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd. Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co. Simplified course in Physical Chemistry, Madan & Tuli, S. Chand & Co. Ltd. | | | | | | | | | | | |
| 4. https://www.britannica.com/science/polymer 5. https://www.toppr.com/guides/chemistry/polymers/classification-of-polymers/ 13. Books recommended: Chemical Thermodynamics by R.P.Rastogi et al Principles of physical chemistry by Puri Sharma and Pathan Essentials of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd. Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co. Simplified course in Physical Chemistry, Madan & Tuli, S. Chand & Co. Ltd. | | | | | | | | | | | |
| https://www.toppr.com/guides/chemistry/polymers/classification-of-polymers/ Books recommended: Chemical Thermodynamics by R.P.Rastogi et al Principles of physical chemistry by Puri Sharma and Pathan Essentials of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd. Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co. Simplified course in Physical Chemistry, Madan & Tuli, S. Chand & Co. Ltd. | 3. | | | icreview/bp/1polymer/types.html | | | | | | | |
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| Essentials of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd. Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co. Simplified course in Physical Chemistry, Madan & Tuli, S. Chand & Co. Ltd. | | | | and Pathan | | | | | | | |
| Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co. Simplified course in Physical Chemistry, Madan & Tuli, S. Chand & Co. Ltd. | | | | | | | | | | | |
| 5. Simplified course in Physical Chemistry, Madan & Tuli, S. Chand & Co. Ltd. | | | - | | | | | | | | |
| 6. Atkin's Physical Chemistry, Atkin, Oxford Press. | | Simplified course | in Physical Chemistry, Madan | - | | | | | | | |
| | 6. | Atkin's Physical Cl | nemistry, Atkin, Oxford Press. | | | | | | | | |

| 1. Name of the Departme | | | | | | | | |
|---|--|---|---|--------------------------------------|--|------------|-----------------------------------|-----------------------------------|
| 2. Course Name | | PV. | | | - | | | |
| | MEDICINAL DRUGS CHEMIST | RY | L | | <u>T</u> | | Р | |
| 3. Course Code | CH209 | | 3 | | 1 | | 0 | - |
| 4. Type of Course (use tio | - | | Core (√) | | DE() | | FC (| |
| 5. Pre-requisite (if any) | 10+2 with Chemistry | 6. Frequency (use tick marks) Even (√) | Odd (|) E | Either Sem (|) E | ivery Se | m() |
| 7. Total Number of Lectu | res, Tutorials, Practicals | | | | | | | |
| Leo | tures = 30 | Tutorials = 10 | | P | Practical = N | il | | |
| 8. COURSE OBJECTIVES: T | o study the basic fundamentals o | of available drugs in various fields such as antibiotic | cs, antipyretics | , analges | ics, antimal | arial, car | diovascı | ular and |
| newer drugs for the newer | | | | | | | | |
| 9. COURSE OUTCOMES (C | | | | | | | | |
| | completion, learners will develo | p following attributes: | | | | | | |
| COURSE OUTCOME (CO | | ATTRIBUTES | | | | | | |
| CO1 | Evaluation and study of introc provided a better understandir | duction, examples and uses of various antibiotics of the antibiotics. | such as β-Lac | tam, Am | inoglycoside | es and C | hloramp | henico |
| CO2 | | ation, synthesis and uses of antipyretics and analge ine create more knowledge about their chemistry. | sics like Parac | etamol, A | Aspirin, Phei | nazone, F | henylb | utazone |
| | | of antimalarial drugs like Chloroquine phosphat | e. Primaguine | phosph | ate. Isopen | taguine. | Progua | nil HCl |
| CO3 | | new antimalarial drugs like Artemisinin and Mefl | | | | | | |
| CO4 | Introduction, classification, str | ucture and uses of cardiovascular drugs such as arrhythmic Agents: Lorcainide HCl and Verapamil H | | | - | | | - |
| CO5 | Knowledge regarding newer | available drugs such as Misoprostol, probucol, | Tamoxifen Cit | rate, Flu | tamide, Me | ethimazo | le, Etha | mbuto |
| | · · | picin and Linezolid for the newer disease create mo | ore understand | ling and b | become esse | entials of | moderr | i life. |
| 10. Unit wise detailed co | | | | _ | | | | |
| Unit-1 | Number of lectures = 08 | Title of the unit: ANTIBIOTICS | | | | | | |
| Introduction, examples and and Chloramphenicol. | l uses of β-Lactam Antibiotics; Ir | troduction, examples and uses of first, second, thin | rd and fourth | generatic | on Cephalos | porins, A | minogly | cosides/ |
| Unit-2 | Number of lectures =08 | Title of the unit: ANTIPYRETICS AND ANALGESICS | ; | | | | | |
| Introduction, examples and | uses of B-Lactam Antibiotics: Ir | troduction, examples and uses of first, second, thin | rd and fourth | generatio | on Cephalos | porins. A | minogly | /cosides |
| and Chloramphenicol. | , | ······································ | | 5 | | | | |
| Unit-3 | Number of lectures = 08 | Title of the unit: ANTIMALERIALS | | | | | | |
| | | loroquine phosphate, Primaquine phosphate, Isor | pentaguine. P | roguanil | Hydrochlori | de. Trim | ethopri | m. New |
| | inin and mefloquine Hydrochlori | | pentaquine) i | 0844111 | | , | ethopin | |
| Unit-4 | Number of lectures = 08 | Title of the unit: CARDIOVASCULAR DRUGS | | | | | | |
| | | | | | | | | |
| Introduction and Classific | tion of Cardiovascular Drugs | | nd digitoxin / | Antihyner | tensive dru | igs: Losa | rtan C | lonidine |
| | | tructure and uses: Cardiac glycosides; digoxin ar | | | | • | rtan, C | lonidine |
| Hydrochloride, Methyldopa | . Antiarrhythmic Agents; Lorcain | tructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety | | | | • | rtan, C | lonidine |
| Hydrochloride, Methyldopa Unit-5 | . Antiarrhythmic Agents; Lorcain Number of lectures = 08 | tructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety Title of the unit: ANTIARRHYTHMIC AGENTS | ylium tosylate, | Verapan | nil Hydrochl | oride. | - | |
| Hydrochloride, Methyldopa Unit-5 Lorcainide Hydrochloride, | . Antiarrhythmic Agents; Lorcain Number of lectures = 08 Propranolol Hydrochloride, Brety | tructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety Title of the unit: ANTIARRHYTHMIC AGENTS /lium tosylate, Verapamil Hydrochloride. Newer Dr | ylium tosylate, | Verapan | nil Hydrochl | oride. | - | |
| Hydrochloride, Methyldopa Unit-5 Lorcainide Hydrochloride, Misoprostol, probucol, Tan | . Antiarrhythmic Agents; Lorcain Number of lectures = 08 | tructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety Title of the unit: ANTIARRHYTHMIC AGENTS /lium tosylate, Verapamil Hydrochloride. Newer Dr | ylium tosylate, | Verapan | nil Hydrochl | oride. | - | |
| Hydrochloride, Methyldopa Unit-5 Lorcainide Hydrochloride, Misoprostol, probucol, Tan 11. CO-PO mapping | Antiarrhythmic Agents; Lorcain Number of lectures = 08 Propranolol Hydrochloride, Brety oxifen Citrate, Ethambutol Hydro | itructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety Title of the unit: ANTIARRHYTHMIC AGENTS /lium tosylate, Verapamil Hydrochloride. Newer Dr ochloride, Isoniazid, | ylium tosylate, rugs for Newe | Verapan r Disease | nil Hydrochl e: Introduct | ion, Stru | cture ar | nd uses |
| Hydrochloride, Methyldopa Unit-5 Lorcainide Hydrochloride, Misoprostol, probucol, Tan 11. CO-PO mapping COs | Antiarrhythmic Agents; Lorcain Number of lectures = 08 Propranolol Hydrochloride, Brety oxifen Citrate, Ethambutol Hydro A | itructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety Title of the unit: ANTIARRHYTHMIC AGENTS vlium tosylate, Verapamil Hydrochloride. Newer Dr ochloride, Isoniazid, | ylium tosylate, rugs for Newe PO1 | Verapan | nil Hydrochl | ion, Stru | - | |
| Hydrochloride, Methyldopa Unit-5 Lorcainide Hydrochloride, Misoprostol, probucol, Tan 11. CO-PO mapping COs Evaluation and | Antiarrhythmic Agents; Lorcain Number of lectures = 08 Propranolol Hydrochloride, Brety oxifen Citrate, Ethambutol Hydro A study of introduction, example | itructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety Title of the unit: ANTIARRHYTHMIC AGENTS lium tosylate, Verapamil Hydrochloride. Newer Dr ochloride, Isoniazid, .ttributes es and uses of various antibiotics such as β-L | ylium tosylate, rugs for Newe PO1 | Verapan r Disease | nil Hydrochl e: Introduct | ion, Stru | cture ar | nd uses |
| Hydrochloride, Methyldopa Unit-5 Lorcainide Hydrochloride, Misoprostol, probucol, Tan 11. CO-PO mapping COs CO1 Evaluation and Aminoglycosides | Antiarrhythmic Agents; Lorcain Number of lectures = 08 Propranolol Hydrochloride, Brety oxifen Citrate, Ethambutol Hydro A study of introduction, example and Chloramphenicol provided a | itructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety Title of the unit: ANTIARRHYTHMIC AGENTS //ium tosylate, Verapamil Hydrochloride. Newer Dr ochloride, Isoniazid, | ylium tosylate, rugs for Newe PO1 _actam, 2 | verapan r Disease | PO3 PO4 | ion, Stru | cture ar | nd uses |
| Hydrochloride, Methyldopa Unit-S Lorcainide Hydrochloride, Misoprostol, probucol, Tan 11. CO-PO mapping COs CO1 Evaluation and Aminoglycosides Study of introdu | Antiarrhythmic Agents; Lorcain Number of lectures = 08 Propranolol Hydrochloride, Brety oxifen Citrate, Ethambutol Hydro fudy of introduction, example and Chloramphenicol provided a tion, classification, synthesis a | itructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety Title of the unit: ANTIARRHYTHMIC AGENTS lium tosylate, Verapamil Hydrochloride. Newer Dr ochloride, Isoniazid, .ttributes es and uses of various antibiotics such as β-L | ylium tosylate, rugs for Newe PO1 .actam, 2 etamol, | verapan r Disease | PO3 PO4 | ion, Stru | cture ar | nd uses |
| Hydrochloride, Methyldopa Unit-S Lorcainide Hydrochloride, Misoprostol, probucol, Tan 11. CO-PO mapping COs CO1 Evaluation and Aminoglycosides Study of introdu | Antiarrhythmic Agents; Lorcain Number of lectures = 08 Propranolol Hydrochloride, Brety oxifen Citrate, Ethambutol Hydro fudy of introduction, example and Chloramphenicol provided a tion, classification, synthesis a | itructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety Title of the unit: ANTIARRHYTHMIC AGENTS //ium tosylate, Verapamil Hydrochloride. Newer Dr ochloride, Isoniazid, | ylium tosylate, rugs for Newe PO1 .actam, 2 etamol, | Verapan r Disease PO2 1 | PO3 PO4 2 2 | ion, Stru | cture ar PO6 2 | PO7 3 |
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| Hydrochloride, Methyldopa Unit-S Lorcainide Hydrochloride, Misoprostol, probucol, Tan 11. CO-PO mapping COs CO1 Evaluation and Aminoglycosides Study of introdu Aspirin, Phenazor chemistry. Overview, struct | Antiarrhythmic Agents; Lorcain Number of lectures = 08 Propranolol Hydrochloride, Brethoxifen Citrate, Ethambutol Hydro study of introduction, example and Chloramphenicol provided a tion, classification, synthesis a ite, Phenylbutazone along with M ure and uses of antimalarial dr | itructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety Title of the unit: ANTIARRHYTHMIC AGENTS vlium tosylate, Verapamil Hydrochloride. Newer Dr ochloride, Isoniazid, Attributes es and uses of various antibiotics such as β-L better understanding of the antibiotics. Ind uses of antipyretics and analgesics like Parace lorphine and Codeine create more knowledge about | ylium tosylate, rugs for Newe PO1 .actam, 2 etamol, ut their 2 sphate, | Verapan r Disease PO2 1 | PO3 PO4 2 2 | ion, Stru | cture ar PO6 2 | PO7 3 |
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| Hydrochloride, Methyldopa Unit-5 Lorcainide Hydrochloride, Misoprostol, probucol, Tan 11. CO-PO mapping COs CO1 Evaluation and Aminoglycosides Study of introdu Aspirin, Phenazor chemistry. Overview, struct CO3 Isopentaquine, P Mefloquine HCl h Introduction, cla Digitoxin; Antihy Verapamil HCl giv Knowledge regar CO5 Methimazole, Eth more understand 1. https://www.ys 2. https://www.to 13. Books recommended: 1. Chemical Therm 2. Principles of phy 3. Essentials of Physical Cos Content of the second CO3 CO3 CO3 CO4 CO4 CO4 CO5 CO5 CO5 CO5 CO5 CO5 CO5 CO5 | Antiarrhythmic Agents; Lorcain Number of lectures = 08 Propranolol Hydrochloride, Brety oxifen Citrate, Ethambutol Hydro Aution, Citrate, Ethambutol Hydro and Chloramphenicol provided a tion, classification, synthesis a ite, Phenylbutazone along with M are and uses of antimalarial dr roguanil HCl, Trimethoprim as v elpful to understand about the cl isification, structure and uses bertensive drugs: Losartan and es a better understanding and ar ding newer available drugs such ambutol Hydrochloride, Isoniazi ing and become essentials of mo 3 Strong elf-learning / E-learning compon mubooks.am/uploads/Ph_Ch_te armacologicalsciences.us/medici opr.com/guides/chemistry/chem | tructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety Title of the unit: ANTIARRHYTHMIC AGENTS /lium tosylate, Verapamil Hydrochloride. Newer Dr ochloride, Isoniazid, | ylium tosylate, rugs for Newe PO1 Lactam, 2 etamol, ut their 2 sphate, hin and 2 es and ICI and 2 tamide, create 2 ribution | r Disease PO2 1 1 1 1 | PO3 PO4 2 2 1 2 1 2 1 2 1 2 | ion, Stru | PO6 2 2 2 2 2 2 | PO7 3 3 3 3 3 3 |
| Hydrochloride, Methyldopa Unit-5 Lorcainide Hydrochloride, Misoprostol, probucol, Tan 11. CO-PO mapping COs CO1 Evaluation and Aminoglycosides Study of introdu Aspirin, Phenazor chemistry. Overview, struct CO3 Isopentaquine, P Mefloquine HCl h Introduction, cla CO4 Digitoxin; Antihy Verapamil HCl giv Verapamil HCl giv Knowledge regar CO5 Methimazole, Eth more understand 12. Brief description of so 1. https://www.ys 2. https://www.to 13. Books recommended: 1. Chemical Therm 2. Principles of Phy 3. Essentials of Phy | Antiarrhythmic Agents; Lorcain Number of lectures = 08 Propranolol Hydrochloride, Brety oxifen Citrate, Ethambutol Hydro Aution, Citrate, Ethambutol Hydro and Chloramphenicol provided a tion, classification, synthesis a ite, Phenylbutazone along with M are and uses of antimalarial dr roguanil HCl, Trimethoprim as v elpful to understand about the cl isification, structure and uses bertensive drugs: Losartan and es a better understanding and ar ding newer available drugs such ambutol Hydrochloride, Isoniazi ing and become essentials of mo 3 Strong elf-learning / E-learning compon mubooks.am/uploads/Ph_Ch_tta armacologicalsciences.us/medici opr.com/guides/chemistry/chem odynamics by R.P.Rastogi et al sical chemistry, Bahl & Tuli, S. Cl | tructure and uses: Cardiac glycosides; digoxin ar ide Hydrochloride, Propranolol Hydrochloride, Brety Title of the unit: ANTIARRHYTHMIC AGENTS vilum tosylate, Verapamil Hydrochloride. Newer Drochloride, Isoniazid, tributes es and uses of various antibiotics such as β-L better understanding of the antibiotics. and uses of antipyretics and analgesics like Parace lorphine and Codeine create more knowledge abou- ugs like Chloroquine phosphate, Primaquine phos- rell as some new antimalarial drugs like Artemisine memistry of these drugs. of cardiovascular drugs such as Cardiac glycosid Methyldopa; Antiarrhythmic Agents: Lorcainide H halyzing ability. as Misoprostol, probucol, Tamoxifen Citrate, Flut d, Rifampicin and Linezolid for the newer disease dern life. contribution, 2 Average contribution , 1 Low contre extbook.pdf nal-chemistry/classification-of-drugs.html istry-in-everyday-life/drugs-and-their-classification/ md Pathan hand & Co. Ltd. Pathania, Vishal Publishing Co. | ylium tosylate, rugs for Newe PO1 Lactam, 2 etamol, ut their 2 sphate, hin and 2 es and ICI and 2 tamide, create 2 ribution | r Disease PO2 1 1 1 1 | PO3 PO4 2 2 1 2 1 2 1 2 1 2 | ion, Stru | PO6 2 2 2 2 2 2 | PO7 3 3 3 3 3 3 |

| 1. Nam | e of the Departmen | t: CHEMISTRY | | | | | | | | | | | |
|-----------|-----------------------|---|----------|--|---------------|--------------|-----------|---------|---------|----------|-----------|----------|----------|
| | se Name | PETRO – CHEMICALS | | | | L | | | 1 | Γ | | Р | |
| 3. Cour | se Code | CH210 | | | | 3 | | | 1 | | | 0 | |
| | of Course (use tick | | | | | Core | | | DE | | | FC (|) |
| | requisite (if any) | 10+2 with Chemistry | 6. | Frequency (use tick marks) | Even (V) | Odd | | | Either | |) E | very Se | |
| | | es, Tutorials, Practicals | | | | | () | | | | , – | | |
| | | ires = 30 | | Tutorials = 10 | | | | | Practic | al = Nil | | | |
| 8. COUR | | | wledge | of origin, composition, exploration | on and desa | alting of cr | ude oil | | | | essenti | als, pro | file and |
| | | | | esses of petroleum. Similarly, stud | | | | | | | | | |
| | SE OUTCOMES (CO) | - | 01 | | , , , | | | | | | | | |
| After the | successful course c | ompletion, learners will devel | op folle | owing attributes: | | | | | | | | | |
| COUR | SE OUTCOME (CO) | | | ATTRI | BUTES | | | | | | | | |
| | | Introduction of crude oil, expl and enhance the understandir | | y methods, oil reservoirs, transpor ne petrochemicals. | rtation of cr | ude oil, th | e consti | tutio | n of cr | ude oil | and nat | ural ga: | s create |
| | | | | il, separation of natural gas alor int, octane number improve the e | | | | | | | oint dep | oressan | ts, drag |
| | CO3 | Discussion of the different o | peratic | ons such as catalytic cracking, hy d and their applications helpful to | /drocracking | g, isomeriz | ation, r | efor | | | lation of | concern | ing the |
| | | | | els and their characteristics concer | | | | | vlene | acetyle | ne and | nronvle | ne with |
| | | | | provide new dimensions to the a | | anaractarii | ig of the | | yiene, | accepter | ine und | propyre | |
| | CO5 | | anol, a | cetaldehyde, acetic acid, vinyl ac | | inolamines | , and v | inyl (| chlorid | e enhai | nce the | knowl | edge to |
| 10. Uni | t wise detailed cont | · · | icinisti | | | | | | | | | | |
| Unit-1 | | Number of lectures = 08 | Title | e of the unit: | | | | | | | | | |
| - | ion to crude oil evo | | | sportation of crude oil, Constitution | on of crude | oil and Na | tural ga | c | | | | | |
| millouuci | tion to crude on, exp | - | 1 | - | | | turai ga | 3. | | | | | |
| Unit-2 | | Number of lectures =08 | | of the unit: | | | | | | | | | |
| | | - | | ctions based on relative volatilitie | es, Composi | tions of dif | ferent o | listill | ates. N | leaning | of term | ns such | as-Pou |
| | pressants, drag redu | cers, viscocity reducers, flash p | | | | | | | | | | | |
| Unit-3 | | Number of lectures = 08 | | of the unit: | | | | | | | | | |
| | | | spect t | o process, mechanism, catalysts | used and | applicatio | ns, Crao | cking | : Catal | ytic cra | acking, | Hydroc | racking, |
| | ation, Reforming, All | , , | | | | | | | | | | | |
| Unit-4 | | Number of lectures = 08 | | of the unit: | 1 . | | | ••• | | | | | |
| Types of | hydrocarbon fuels a | nd their characteristics. Manuf | facture | of the following compounds: eth | ylene, acety | lene, Prop | ylene w | ith re | eaction | s and p | rocess | diagram | |
| Unit-5 | | Number of lectures = 08 | Title | of the unit: | | | | | | | | | |
| Preparati | ion of the following | compounds from ethylene: eth | hanol, a | acetaldehyde, acetic acid, vinyl ace | etate, ethan | olamines, | and vin | yl ch | loride. | | | | |
| 11. CO-P | O mapping | | | | | | | | | | | | |
| COs | | | Attribu | ites | | P | 01 P | 02 | PO3 | PO4 | PO5 | PO6 | P07 |
| | Introduction of crue | | | voirs, transportation of crude oil, | the constitu | ution of | - | | 100 | | 100 | | |
| CO1 | | | | tanding of the petrochemicals. | the constitu | | 2 | 1 | 2 | 1 | - | 2 | 3 |
| CO2 | Study of the distilla | tion of crude oil, separation of | f natur | al gas along with the meaning of the second se | | | 2 | 1 | 1 | 1 | _ | 2 | 3 |
| | applications of petr | ochemicals. | | | | | | | | | | | |
| CO3 | | - | - | c cracking, hydrocracking, isome nd catalyst used and their appli | | - | 2 | 1 | 2 | 1 | - | 2 | 3 |
| | evaluate the quality | | | | | | | | | | | | |
| CO4 | ethylene, acetylene | | | aracteristics concerning the mains and process diagrams provide r | | | 2 | 1 | 1 | 1 | - | 2 | 3 |
| CO5 | | | | acid, vinyl acetate, ethanolamines | , and vinyl c | chloride | 2 | 1 | 2 | 1 | - | 2 | 3 |
| | | edge to analyze these chemica | | ibution, 2 Average contribution , | 1 1 000 0000 | ribution | | | | I | | | I |
| 12 Brid | f description of cold | s strong f-learning / E-learning compor | - | Sation, 2 Average contribution , | I LOW CON | insution | | _ | | | | | _ |
| | | annica.com/science/petrochen | | | | | | | | | | | |
| 1. 2. | | annica.com/science/petrochen ucation.ca/encyclopedia/Petro | | al | | | | | | | | | |
| 3. | | tube.com/watch?v=NJbNg3Glk | | | | | | | | | | | |
| 4. | | | | y-chemical-economics-handbook | .html | | | | | | | | |
| | s recommended: | | | | | | | | | | | | |
| 1. | | dynamics by R.P.Rastogi et al | | | | | | | | | | | |
| 2. | | ical chemistry by Puri Sharma a | and Pat | than | | | | | | | | | |
| 3. | | ical Chemistry, Bahl & Tuli, S. C | | | | | | | | | | | |
| 4. | | ical Chemistry, Puri, Sharma & | | _ | | | | | | | | | |
| 5. | | in Physical Chemistry, Madan 8 | & Tuli, | S. Chand & Co. Ltd. | | | | | | | | | |
| 6. | Atkin's Physical Ch | nemistry, Atkin, Oxford Press. | | | | | | | | | | | |
| | | | | | | | | | | | | | |

| 1. Name of the Departme | nt: CHEMISTRY | | | | | | | | |
|------------------------------|---|---|------------------|------------|-----------|-----------|-----------|----------|----------|
| 2. Course Name | AGRO – CHEMICALS | | L | | | т | | Р | |
| 3. Course Code | CH211 | | 3 | | : | 1 | | 0 | |
| 4. Type of Course (use tick | (mark) | | Core (√ |) | DE | () | | FC (|) |
| 5. Pre-requisite (if any) | 10+2 with Chemistry | 6. Frequency (use tick marks) Even (√) | Odd (|) | Either | Sem (|) E | very Sei | m () |
| 7. Total Number of Lectur | es, Tutorials, Practicals | | | | | | | | |
| Lect | ures = 30 | Tutorials = 10 | | | Practic | al = Nil | | | |
| 8. COURSE OBJECTIVES: T | o understand about Organochl | orines, organophosphate and carbamates Insectic | ides natural o | organic i | nsectici | desand | their m | node of | action, |
| | | of action and their applications f aromatic acid de | rivatives like | 2,4-D & | 2,4,5-T, | concept | ts of for | mulatio | ons (dry |
| and wet)in pesticide and gro | <u> </u> | | | | | | | | |
| 9. COURSE OUTCOMES (CO | | <i></i> | | | | | | | |
| | completion, learners will develo | | | | | | | | |
| COURSE OUTCOME (CO) | | ATTRIBUTES | | | | | | | |
| C01 | Remembergeneral introductio | n, chemical classification of Insecticides and natural | l organic inseq | ticides l | ike pyre | throids | and pyr | ethrins. | |
| CO2 | Comprehension of concepts or | f formulations (dry and wet)in pesticide and synthes | sis, application | ns of rod | enticide | s | | | |
| CO3 | | fungicides and different classes of fungicides and d | | | | | | | |
| 03 | | | | | | - | | | |
| CO4 | | s of commercial synthetic methodologies of 2,4-D | & 2,4,5-T an | d roden | ticides I | ikeZinc | phosph | ides, W | artarin, |
| | sodium monofluoroacetate. | nhosnhata insoctisidas over Organachlarinas lasad | ticidos Sunth | ncic ma | do of ar | tion | 00 204 | formul | ation of |
| CO5 | | phosphate insecticides over Organochlorines Insect phates and carbamates insecticides. | ncines, synth | zsis, 1110 | ue or ac | LIUN, US | es and | iormula | |
| 10. Unit wise detailed con | | | | | | | | | |
| Unit-1 | Number of lectures = 08 | Title of the unit: | | | | | | | |
| | | s, contact poisons, systemic poisons, fumigants. Ch | nemical classi | ication | of nesti | cidos: In | sorticia | los fun | aicidas |
| | | des. Natural organic insecticidcs: pyrethroids and py | | ication | or pesti | ciues. In | isection | ies, iun | giciues |
| Unit-2 | Number of lectures =08 | Title of the unit: | | | | | | | |
| | esis, mode of action and app | lications: (a) Organochlorine Insecticides: DDT, BH | IC. aldrin. en | losulfon | . (b) Or | ganoph | osphori | us insec | ticides |
| | | c) Carbamate insecticides: Carbaryl, Carbofuran. | -,, | | (-) | 8 | | | |
| Unit-3 | Number of lectures = 08 | Title of the unit: | | | | | | | |
| General introduction, synthe | esis, mode of action and application | tions: (a) Inorganic fungicides: Sulphur, Lime sulph | ur, copper sul | phate, B | urgundy | y mixtur | e, copp | er oxyc | hloride, |
| Dithiocarbamates: Ziram, th | | | | | | | | | - |
| Unit-4 | Number of lectures = 08 | Title of the unit: | | | | | | | |
| | | Herbicides: 2, 4, dichloro phenoxy acetic acid (2, 4- | -D), alachlor, s | ulphony | l urea c | ompour | nds. Roo | denticid | es- Zinc |
| phosphides, Warfarin, sodiu | | | | | | | | | |
| Unit-5 | Number of lectures = 08 | Title of the unit: | | | | | | | |
| | | cytokinins. Formulation of pesticides: Dry formula | tion: Dusts, g | anules, | wettabl | e powd | ers, see | d disinf | ectants |
| liquid formulation: Emulsion | is and suspensions. | | | | | | | | |
| 11. CO-PO mapping | | | | | | | | | |
| COs | | Attributes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | P07 |
| (O) ~ | | cation of Insecticides and natural organic insecticit | des like 3 | 1 | 1 | | 2 | 2 | 2 |
| pyrethroids and py | | dry and wet)in pesticide and synthesis, applicat | ions of | _ | | | | | |
| | i concepts of formulations (| ary and weijin pesticide and synthesis, applicat | 3 | 1 | 1 | | 2 | 2 | 2 |
| rodenticides | chemistry of fungicides and diff | erent classes of fungicides and dithiocarbamates as | notent | | | | | | |
| CO3 fungicides. | una di su | erent classes of rangiciaes and ditillocarballates as | 3 | 1 | 1 | | 2 | 2 | 2 |
| Able toevaluatedit | ferent types of commercial svi | nthetic methodologies of 2,4-D & 2,4,5-T and rode | nticides _ | | | | - | _ | - |
| 604 | s, Warfarin, sodium monofluor | e | 3 | 1 | 1 | | 2 | 2 | 2 |
| CO5 Analyze and comp | are Organophosphate insectici | des over Organochlorines Insecticides, Synthesis, n | node of 3 | 1 | 1 | | 2 | 2 | 2 |
| action, uses and fo | ormulation of Organochlorines, | Organophosphates and carbamates insecticides. | 3 | L | | | 2 | 2 | 2 |
| | 3 Strong | g contribution, 2 Average contribution , 1 Low cont | ribution | | | | | | |
| 12. Brief description of se | lf-learning / E-learning compor | lent | | | | | | | |
| | | stry-articles/agrochemicals-types-and-their-effects. | | | | | | | |
| | | pedias-almanacs-transcripts-and-maps/agrochemic | cals | | | | | | |
| • • • | annica.com/technology/agroch | | | | | | | | |
| 1 1/ | n/biology/effects-of-agrochemi | Cals/ | | | | | | | |
| 13. Books recommended: | 1 1 1 2 2 2 1 1 | | | | | | | | |
| | odynamics by R.P.Rastogi et al | a Dathara | | | | | | | |
| | sical chemistry by Puri Sharma a | | | | | | | | |
| | sical Chemistry, Bahl & Tuli, S. C | | | | | | | | |
| | sical Chemistry, Puri, Sharma & | - | | | | | | | |
| | in Physical Chemistry, Madan 8 Chemistry, Atkin, Oxford Press. | | | | | | | | |
| U. AUNITS FILYSICAL | ARTING Y, ARTIN, OXIOI U FIESS. | | | | | | | | |

| 1. Nam | e of the Departmen | t: CHEMISTRY | | | | | | | | |
|----------|-----------------------------------|---------------------------------------|---|-----------------|------------|------------|------------|------------|----------|----------|
| 2. Cour | se Name | INDUSTRIAL WASTE TREATM | IENT | L | | | т | | Р | |
| 3. Cour | se Code | CH212 | | 3 | | | 1 | | 0 | |
| 4. Type | of Course (use tick | mark) | | Core (|) | DE | (√) | | FC (|) |
| 5. Pre- | requisite (if any) | 10+2 with Chemistry | 6. Frequency (use tick marks) Even (√) | Odd (|) | Either | Sem (|) E | very Se | m() |
| 7. Total | Number of Lecture | s, Tutorials, Practicals | | | | | | | | |
| | Lectu | ıres = 30 | Tutorials = 10 | | | Practic | al = Nil | | | |
| | | | aste management technologies, acquaintance wit | h basic wast | e treatr | nent tec | hnologi | es and | enviror | nmental |
| | | s wastes will be taught to stud | ents. | | | | | | | |
| | SE OUTCOMES (CO) | | | | | | | | | |
| - | - | ompletion, learners will devel | | | | | | | | |
| COOK | SE OUTCOME (CO) | Analysis working mothodologi | ATTRIBUTES es of treatment technologies to tackle waste from h | ourschold and | linducti | rios is do | n 0 | | | |
| | | , , , | č | | | | | | | |
| | | | pacts of wastes on climate and human health creat | | | | | | | |
| | | | al measures to check waste volume and strength de | - | | | | | measu | res. |
| | CO4 | Awareness about waste gener | ation, its impact and mitigation strategies would be | created to re | move h | azardous | s wastes | 5. | | |
| | CO5 | Remembrance of important as | pects of environmental audits would lead to its app | lication in ind | lustries. | | | | | |
| | t wise detailed cont | | | | | | | | | |
| Unit-1 | | Number of lectures = 08 | Title of the unit: INTRODUCTION | | | | | | | |
| | | | of industrial wastes; Population equivalent; Bioassa | | | | | | | , sewer, |
| | age treatment plan | | nental legislations related to prevention and control | of industrial | effluent | ts and ha | zardous | s wastes | 5. | |
| Unit-2 | | Number of lectures =08 | Title of the unit: CLEANER PRODUCTION | | | | | | | |
| Waste m | anagement Approac | ch; Waste Audit; Volume and s | rength reduction; Material and process modificatio | ns Recycle, re | euse and | d byprod | uct reco | overy; A | pplicati | ons. |
| Unit-3 | | Number of lectures = 08 | Title of the unit: POLLUTION FROM MAJOR INDU | | | | | | | |
| | | | selected industries such as Textiles, Tanneries, Pha | armaceuticals | , Dairy, | Sugar, P | aper, d | istillerie | s, Steel | plants, |
| | oower plants; Waste | water reclamation concepts. | Title of the unit. TREATMENT TECHNOLOGIES | | | | | | | |
| Unit-4 | ion: Noutralization: | Number of lectures = 08 | Title of the unit: TREATMENT TECHNOLOGIES solved organic solids; Chemical oxidation, Adsorptic | n Domovol o | fdiccolu | ad in ara | onios. C | ombing | d traat | mont of |
| | | tes; Residue management; Dev | | | | eu morg | anics, c | ombine | u treat | ment of |
| Unit-5 | | Number of lectures = 08 | Title of the unit: HAZARDOUS WASTE MANAGEN | IENT | | | | | | |
| Hazardou | is wastes - Physico c | hemical treatment, solidificati | on, incineration, Secure land fills. | | | | | | | |
| 11 CO-P | O mapping | | | | | | | | | |
| COs | | | Attributes | PO | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
| cos | Analysis working m | | hnologies to tackle waste from household and indu | - | . PU2 | P03 | P04 | PU5 | PU6 | P07 |
| CO1 | done | | | 2 | | 2 | 2 | 2 | 3 | 1 |
| CO2 | An evaluation of h students. | nazardous impacts of wastes | on climate and human health create awareness | among 2 | | 2 | | | 3 | 2 |
| | | erent remedial measures to | check waste volume and strength develops a so | ense of | | - | | | | |
| CO3 | sustainable environ | mental measures. | | 3 | 1 | 2 | 2 | 2 | 3 | 1 |
| CO4 | Awareness about hazardous wastes. | waste generation, its impact | and mitigation strategies would be created to | remove 2 | | 1 | 2 | | 3 | 2 |
| CO5 | Remembrance of in | nportant aspects of environme | ntal audits would lead to its application in industrie | s. | 3 | 2 | | | | 3 |
| | | · · · · · · · · · · · · · · · · · · · | contribution, 2 Average contribution , 1 Low cont | ribution | | | | | | |
| | | f-learning / E-learning compor | | | | | | | | |
| 1. | | em.com/en/industrial-wastewa | | | | | | | | |
| 2. 3. | | | 018/understand-industrial-wastewater-treatment/ ncyclopedias-almanacs-transcripts-and-maps/indus | | | | | | | |
| 3. 4. | 1 11 1 | er.wa.gov.au/ data/assets/po | <i>,</i> , , , , , , , , , , , , , , , , , , | וומו־שמגנכ-נו | catificiti | L | | | | |
| | s recommended: | | | | | | | | | |
| 1. | | dynamics by R.P.Rastogi et al | | | | | | | | |
| 2. | | ical chemistry by Puri Sharma a | ind Pathan | | | | | | | |
| 3. | • • • | ical Chemistry, Bahl & Tuli, S. C | | | | | | | | |
| 4. | | | Pathania, Vishal Publishing Co. | | | | | | | |
| 5. | • | in Physical Chemistry, Madan | & Tuli, S. Chand & Co. Ltd. | | | | | | | |
| 6. | Atkin's Physical Ch | nemistry, Atkin, Oxford Press. | | | | | | | | |

| | ent: CHEMISTRY | | | | | | | | |
|--|--|--|---|---|--|---|------------------|------------------|------------------|
| 2. Course Name | WATER TREATMENT AND AN | IALYSIS | L | | 1 | Г | | Р | |
| 3. Course Code | CH213 | | 3 | | 1 | 1 | | 0 | |
| 4. Type of Course (use ti | k mark) | | Core () | | DE | (√) | | FC (|) |
| 5. Pre-requisite (if any) | 10+2 with Chemistry | 6. Frequency (use tick marks) Even (√) | Odd () | | Either | Sem (|) E | very Sei | m () |
| 7. Total Number of Lectu | res, Tutorials, Practicals | | | | | | | | |
| Le | tures = 30 | Tutorials = 10 | | | Practic | al = Nil | | | |
| 8. COURSE OBJECTIVES: Th | e aim of this course is to introduc | ce the students to the area of water and wastewater tre | atment. Th | e cour | se will c | over wa | ater che | emistry; | |
| characteristics of water & | vastewater; primary, secondary 8 | & tertiary treatment processes; sludge disposal; and desi | ign of wate | r and v | vastewa | ater trea | atment | plants. | |
| 9. COURSE OUTCOMES (C | D): | | | | | | | | |
| After the successful course | completion, learners will develo | p following attributes: | | | | | | | |
| COURSE OUTCOME (CO | | ATTRIBUTES | | | | | | | |
| CO1 | Ability to describe the purpo Coagulation, precipitation, chlo | ose and operational steps of key water treatment porination etc. | processes u | used t | o impr | ove wa | ter qu | ality ind | cluding |
| CO2 | Identify the parameters that ch | naracterize the constituents found in potable water and | wastewate | r; | | | | | |
| CO3 | Illustrate the fundamentals of v | water and wastewater treatment | | | | | | | |
| CO4 | Recognise the common physica | al, chemical and biological unit operations encountered | in treatmer | nt proc | esses | | | | |
| CO5 | Examine biological parameters | of water. | | | | | | | |
| 10. Unit wise detailed co | ntent | | | | | | | | |
| Unit-1 | Number of lectures = 08 | Title of the unit: PURIFICATION OF WATER FOR DRIN | KING PUR | POSE | | | | | |
| Clarification, coagulation, (| ontact & electro chemical coagul | ation, sterilization & disinfections of water, precipitation | n, aeration, | ozonis | ation a | nd Chlo | rinatior | า. | |
| Unit-2 | Number of lectures =08 | Title of the unit: DETERMINATION OF HARDNESS AN | | | THODS | FOR W | ΔTFR | | |
| | | mplexometric method using EDTA. | 0.001.1211 | | mobo | | | | |
| | | zeolite process, Ion exchange process or demineralizati | on of wate | r, Desa | alinatio | n of wa | ter: ele | ecrodiay | sis and |
| Unit-3 | Number of lectures = 08 | Title of the unit: WATER ANALYSIS | | | | | | | |
| Water analysis: sampling | f water for analysis - chemical su | bstances affecting potability - colour, turbidity odour, ta | iste, tempe | rature | , pH and | d electri | cal con | ductivit | y. |
| | | ved solids, total acidity, alkalinity, free CO2, and free chl | | | • | | | | • |
| Unit-4 | Number of lectures = 08 | Title of the unit: ANALYSIS OF CHEMICAL SUBTANCES | S AFFECTIN | G HEA | LTH | | | | |
| Analysis of chamical cubet | Number of lectures – 08 | | - | | | | | | |
| Analysis of chemical substa | | Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu | | | | | | | |
| Analysis of chemical substa | nces affecting health: Ammonia, nces indicative of pollution: Disso | Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu olved oxygen, Bio Chemical oxygen demand (BOD), Cher | uoride. nical oxygei | n dem | |)D). | | | |
| Analysis of chemical substa Unit-5 | nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 | Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu olved oxygen, Bio Chemical oxygen demand (BOD), Chen Title of the unit: BACTERIOLOGICAL EXAMINATION C | uoride. nical oxygei DF WATER | | and (CO | , | | | |
| Analysis of chemical substa Unit-5 | nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 | Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu olved oxygen, Bio Chemical oxygen demand (BOD), Cher | uoride. nical oxygei DF WATER | | and (CO | , | | | |
| Analysis of chemical substa Unit-5 | nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 | Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu olved oxygen, Bio Chemical oxygen demand (BOD), Chen Title of the unit: BACTERIOLOGICAL EXAMINATION C | uoride. nical oxygei DF WATER | | and (CO | , | | | |
| Analysis of chemical substa Unit-5 Bacteriological examinatio | nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli | Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu olved oxygen, Bio Chemical oxygen demand (BOD), Chen Title of the unit: BACTERIOLOGICAL EXAMINATION C | uoride. nical oxygei DF WATER | | and (CO | , | P05 | P06 | P07 |
| Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to describ | nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli 6 6 7 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 | Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu blved oxygen, Bio Chemical oxygen demand (BOD), Chen Title of the unit: BACTERIOLOGICAL EXAMINATION C test, E.coli index, most probable number method, Biolo Attributes steps of key water treatment processes used to impro- | uoride. nical oxyger PF WATER gical exami PO1 | ination | and (CC | er. | PO5 | PO6 2 | P07 3 |
| Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to describ water quality inc | nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli e the purpose and operational suding: Coagulation, precipitation, | Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu olved oxygen, Bio Chemical oxygen demand (BOD), Chem Title of the unit: BACTERIOLOGICAL EXAMINATION C test, E.coli index, most probable number method, Biolo Attributes steps of key water treatment processes used to impro- , chlorination etc. | uoride. nical oxyger F WATER gical exami PO1 vve 3 | ination PO2 3 | of wate | er. PO4 1 | 1 | 2 | 3 |
| Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs CO1 Ability to descrit water quality inc CO2 Identify the para | nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli e the purpose and operational s uding: Coagulation, precipitation, neters that characterize the cons | Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu olved oxygen, Bio Chemical oxygen demand (BOD), Chem Title of the unit: BACTERIOLOGICAL EXAMINATION C test, E.coli index, most probable number method, Biolo Attributes steps of key water treatment processes used to impro- , chlorination etc. tituents found in potable water and wastewater; | uoride. nical oxyger F WATER gical exami PO1 vve 3 3 | PO2 3 3 | of wate | er. PO4 1 1 | 1 | 2 2 | 3 |
| Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to describ water quality inc CO2 Identify the para CO3 Illustrate the fun Becognise the co | nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli e the purpose and operational s uding: Coagulation, precipitation, neters that characterize the cons lamentals of water and wastewa | Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu olved oxygen, Bio Chemical oxygen demand (BOD), Chem Title of the unit: BACTERIOLOGICAL EXAMINATION C test, E.coli index, most probable number method, Biolo Attributes steps of key water treatment processes used to impro- , chlorination etc. tituents found in potable water and wastewater; | uoride. nical oxygeu FF WATER gical exami PO1 ove 3 3 3 | PO2 3 3 3 | of wate | PO4 1 1 2 | 1 1 1 | 2 2 2 | 3 3 3 |
| Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to describ water quality inc CO2 Identify the para CO3 Illustrate the fun CO4 Recognise the co processes | nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli e the purpose and operational s uding: Coagulation, precipitation, neters that characterize the cons lamentals of water and wastewar mmon physical, chemical and bio | Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu blved oxygen, Bio Chemical oxygen demand (BOD), Chen Title of the unit: BACTERIOLOGICAL EXAMINATION C test, E.coli index, most probable number method, Biolo Attributes steps of key water treatment processes used to improc , chlorination etc. tituents found in potable water and wastewater; ter treatment | voride. mical oxyger F WATER gical exami PPO1 vve 3 3 3 3 3 3 | PO2 3 3 3 3 3 | of wate PO3 3 3 3 3 3 | PO4 1 1 2 2 | 1 1 1 1 | 2 2 2 2 | 3 3 3 3 |
| Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to describ water quality inc CO2 Identify the para CO3 Illustrate the fun CO4 Recognise the co processes | nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli e the purpose and operational s uding: Coagulation, precipitation, neters that characterize the cons lamentals of water and wastewar mmon physical, chemical and bio | Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu olved oxygen, Bio Chemical oxygen demand (BOD), Chem Title of the unit: BACTERIOLOGICAL EXAMINATION C test, E.coli index, most probable number method, Biolo Attributes steps of key water treatment processes used to impro- , chlorination etc. tituents found in potable water and wastewater; ter treatment logical unit operations encountered in treatment | Joride. nical oxyger FWATER gical exami ve 3 3 3 3 3 3 3 3 3 | PO2 3 3 3 | of wate | PO4 1 1 2 | 1 1 1 | 2 2 2 | 3 3 3 |
| Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to describ water quality inc CO2 Identify the para CO3 Illustrate the fun CO4 Recognise the co processes CO5 Examine biologic | nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli e the purpose and operational s uding: Coagulation, precipitation, neters that characterize the cons lamentals of water and wastewar mmon physical, chemical and bio al parameters of water. 3 Strong | Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu blved oxygen, Bio Chemical oxygen demand (BOD), Chen Title of the unit: BACTERIOLOGICAL EXAMINATION C test, E.coli index, most probable number method, Biolo Attributes steps of key water treatment processes used to impro- , chlorination etc. tituents found in potable water and wastewater; ter treatment logical unit operations encountered in treatment contribution, 2 Average contribution , 1 Low contribute | Joride. nical oxyger FWATER gical exami ve 3 3 3 3 3 3 3 3 3 | PO2 3 3 3 3 3 | of wate PO3 3 3 3 3 3 | PO4 1 1 2 2 | 1 1 1 1 | 2 2 2 2 | 3 3 3 3 |
| Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to descrit water quality inc CO2 Identify the para CO3 Illustrate the fun CO4 Recognise the co processes CO5 Examine biologic 12. Brief description of s | An of water: total count test; E.coli An of water and w | Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu olved oxygen, Bio Chemical oxygen demand (BOD), Chem Title of the unit: BACTERIOLOGICAL EXAMINATION C test, E.coli index, most probable number method, Biolo Attributes steps of key water treatment processes used to impro- , chlorination etc. tituents found in potable water and wastewater; ter treatment logical unit operations encountered in treatment contribution, 2 Average contribution , 1 Low contribute ent | Joride. nical oxyger F WATER gical exami PO1 ve 3 3 3 3 3 3 3 ion | PO2 3 3 3 3 3 3 3 3 | and (CC) of wate 903 3 3 3 3 3 3 3 | PO4 1 1 2 2 2 2 | 1 1 1 1 | 2 2 2 2 | 3 3 3 3 |
| Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to descrit water quality inc CO2 Identify the para CO3 Illustrate the fun CO4 Recognise the co processes CO5 Examine biologic 12. Brief description of s 1. https://sswm.ir | An of water: total count test; E.coli Number of lectures = 08 An of water: total count test; E.coli An of water: test; E.coli An | Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu blved oxygen, Bio Chemical oxygen demand (BOD), Chem Title of the unit: BACTERIOLOGICAL EXAMINATION C test, E.coli index, most probable number method, Biolo Attributes steps of key water treatment processes used to impro- , chlorination etc. tituents found in potable water and wastewater; ter treatment logical unit operations encountered in treatment contribution, 2 Average contribution , 1 Low contribute ent attachments/MCCAFFREY%20ny%20Water%20Quality% | Joride. nical oxyger F WATER gical exami PO1 ve 3 3 3 3 3 3 ion 20Paramet | PO2 3 3 3 3 3 3 3 cers%20 | and (CC) of wate 903 3 3 3 3 3 3 3 3 0&%201 | PO4 1 1 2 2 2 ndicato | 1 1 1 1 | 2 2 2 2 | 3 3 3 3 |
| Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to describ water quality inc CO2 Identify the para CO3 Illustrate the fun CO4 Recognise the co processes CO5 Examine biologic 12. Brief description of s 1. https://sswm.ir 2. https://www.yo | nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli e the purpose and operational s uding: Coagulation, precipitation, neters that characterize the cons lamentals of water and wastewar mmon physical, chemical and bio al parameters of water. 3 Strong elf-learning / E-learning compone fo/sites/default/files/reference_ utube.com/watch?v=60t2t9YyzK | Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu blved oxygen, Bio Chemical oxygen demand (BOD), Cher Title of the unit: BACTERIOLOGICAL EXAMINATION C test, E.coli index, most probable number method, Biolo Attributes steps of key water treatment processes used to impro- , chlorination etc. tituents found in potable water and wastewater; ter treatment logical unit operations encountered in treatment contribution, 2 Average contribution , 1 Low contribute ent attachments/MCCAFFREY%20ny%20Water%20Quality% (U&list=RDCMUCYa1Wtl-vb_bx-anHdmpNfA&start_radiu | Joride. nical oxyger F WATER gical exami PO1 ve 3 3 3 3 3 3 ion 20Paramet | PO2 3 3 3 3 3 3 3 cers%20 | and (CC) of wate 903 3 3 3 3 3 3 3 3 0&%201 | PO4 1 1 2 2 2 ndicato | 1 1 1 1 | 2 2 2 2 | 3 3 3 3 |
| Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to describ water quality inc CO2 Identify the para CO3 Illustrate the fun CO4 Recognise the co processes CO5 Examine biologic 12. Brief description of s 1. https://sswm.ir 2. https://www.yo 3. https://wedc.ku | nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli e the purpose and operational s uding: Coagulation, precipitation, neters that characterize the cons lamentals of water and wastewar mmon physical, chemical and bio al parameters of water. 3 Strong elf-learning / E-learning compone fo/sites/default/files/reference_ utube.com/watch?v=60t2t9YyzK owledge.lboro.ac.uk/resources/e | Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu blved oxygen, Bio Chemical oxygen demand (BOD), Chem Title of the unit: BACTERIOLOGICAL EXAMINATION C test, E.coli index, most probable number method, Biolo Attributes steps of key water treatment processes used to impro- , chlorination etc. tituents found in potable water and wastewater; ter treatment logical unit operations encountered in treatment contribution, 2 Average contribution , 1 Low contribute ent attachments/MCCAFFREY%20ny%20Water%20Quality% | Joride. nical oxyger F WATER gical exami PO1 ve 3 3 3 3 3 ion 20Paramet | PO2 3 3 3 3 3 3 3 cers%20 | and (CC) of wate 903 3 3 3 3 3 3 3 3 0&%201 | PO4 1 1 2 2 2 ndicato | 1 1 1 1 | 2 2 2 2 | 3 3 3 3 |
| Analysis of chemical substa Unit-5 Bacteriological examinatio 11. CO-PO mapping COs Ability to describ water quality inc CO2 Identify the para CO3 Illustrate the fun CO4 Recognise the co processes CO5 Examine biologic 12. Brief description of s 1. https://sswm.ir 2. https://www.yo 3. https://wedc.ku | nces affecting health: Ammonia, nces indicative of pollution: Disso Number of lectures = 08 of water: total count test; E.coli e the purpose and operational s uding: Coagulation, precipitation, neters that characterize the cons lamentals of water and wastewai mmon physical, chemical and bio al parameters of water. 3 Strong elf-learning / E-learning compone fo/sites/default/files/reference_a utube.com/watch?v=6Ot2t9YyzK owledge.lboro.ac.uk/resources/e deshare.net/doctortvrao/bacterio | Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, flu blved oxygen, Bio Chemical oxygen demand (BOD), Cher Title of the unit: BACTERIOLOGICAL EXAMINATION C test, E.coli index, most probable number method, Biolo Attributes steps of key water treatment processes used to impro- , chlorination etc. tituents found in potable water and wastewater; ter treatment logical unit operations encountered in treatment contribution, 2 Average contribution , 1 Low contribute ent attachments/MCCAFFREY%20ny%20Water%20Quality% (U&list=RDCMUCYa1Wtl-vb_bx-anHdmpNfA&start_radie e/mn/006-Bacteriological-testing-of-water.pdf | Joride. nical oxyger F WATER gical exami PO1 ve 3 3 3 3 3 ion 20Paramet | PO2 3 3 3 3 3 3 3 cers%20 | and (CC) of wate PO3 3 3 3 3 3 3 3 3 3 | PO4 1 1 2 2 2 ndicato | 1 1 1 1 | 2 2 2 2 | 3 3 3 3 |
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| 1. Name of the De | epartment | : CHEMISTRY | | | | | | | | | |
|---|---|---|--|-------------|-----------|--------|---------|----------|-----------|----------|---------|
| 2. Course Name | | INDUSTRIAL CHEMISTRY LAB | 3 – IV | | L | | 1 | Г | | Р | |
| 3. Course Code | | CH214 | | | 0 | | (|) | | 8 | |
| 4. Type of Course | - | | | | ore (| | DE | <u> </u> | | FC (|) |
| 5. Pre-requisite (i | | 10+2 with Chemistry | 6. Frequency (use tick marks) Even (V |) C | 0dd () | | Either | Sem (|) E' | very Sei | m () |
| 7. Total Number o | | , Tutorials, Practicals res = 00 | Tutorials = 00 | | | | Practic | al = 09 | | | |
| 8. COURSE OBJECT | | | ectively and safely in a laboratory environment | , practical | /technica | l/ con | | | ills. cor | ncepts t | o solve |
| | | | e ability to work in teams as well as independent | - | | • | | | | • | |
| 9. COURSE OUTCO | | | <i></i> | | | | | | | | |
| After the successful COURSE OUTCO | | mpletion, learners will develo | op following attributes: ATTRIBUTES | | | | | | | | |
| CO1 | | Remember to keep records of | all performed experiments in themanner which | is required | in labora | tory. | | | | | |
| CO2 | | · | parameters like DO,BOD,COD,TDS and alkalinity | • | | | | | | | |
| CO3 | | | methods and technical skills to work in the diffe | | of chemi | strv. | | | | | |
| CO4 | | now the preparation of resing | | | | | | | | | |
| CO5 | | | sonal safety and care of equipment's and chemi | cals. | | | | | | | |
| 10. Syllabus | | , | , | | | | | | | | |
| Exp - 01 | | Preparation of urea formaldel | hyde resin. | | | | | | | | |
| Exp - 02 | | Preparation of Phenol formal | dehyde (Bakelite) resin. | | | | | | | | |
| Exp - 03 | | Preparation of Nylon 6, 6. | | | | | | | | | |
| Exp - 04 | 1 | Preparation of Acetyl Salicylic | acid (Aspirin). | | | | | | | | |
| Exp – 05 | 1 | Preparation of acetanilide. | | | | | | | | | |
| Exp – 06 | 1 | Preparation of Methyl salicyla | te (oil of winter). | | | | | | | | |
| Exp — 07 | | Determination of total hardne | ess in the given water sample. | | | | | | | | |
| Exp - 08 | 1 | Determination of Dissolved ov | xygen (DO) in the given water sample. | | | | | | | | |
| Ехр — 09 | 1 | Determination of Biological or | xygen demand (BOD) in the given water sample. | | | | | | | | |
| Exp — 10 | | Determination of Chemical ox | tygen demand (COD) in the given water sample. | | | | | | | | |
| Exp — 11 | | Determination of Total dissolv | ved solid (TDS) in the given water sample. | | | | | | | | |
| Exp – 12 | | Determination of alkali conter | nt in antacid tablet using HCl. | | | | | | | | |
| 11. CO-PO mapping | 8 | | | | 1 · [| | | | | | |
| COs | | | Attributes | | | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
| CO1 Remembe | er to keep r | ecords of all performed expension | riments in themanner which is required in labora | itory. | 3 | 1 | 1 | | 2 | 1 | 2 |
| | | |),BOD,COD,TDS and alkalinity. | | 3 | 1 | 1 | | 1 | 2 | 2 |
| | | | nical skills to work in the different fields of chemi | stry. | 3 | 1 | 1 | | 1 | | 2 |
| | | on of resins and acetanilide. | | | 3 | 1 | 1 | | 1 | | 2 |
| CO5 Analyze th | ne importa | | re of equipment's and chemicals. | | 3 | 1 | 1 | | 1 | 2 | 2 |
| 12 Drief descripti | on of colf | | | ontribution | า | | | | | | |
| | | | | | | | | | | | |
| | | | 13-akfarmahad-16-1-vogelqu-d.pdf | | | | | | | | |
| | | | pdf-f06110ef2e1e1ae119cbacf71dd17732-origir | nal.pdf | | | | | | | |
| | | | | | | | | | | | |
| 13. Books recomm | | | | | | | | | | | |
| | | Chemistry, Bahl & Bahl, S. Cha | and & Co. Ltd. | | | | | | | | |
| 2. Advance | Practical C | Chemistry: Jagdamba Singh, L. | .D.S Yadav, Jaya Singh, I.R. Siddiqui, Pragati Editio | on. | | | | | | | |
| | | hemistry A.I. Vogel. hemistry: B. Viswanathan anc | | | | | | | | | |
| H. FIALILA | i i i ysicai C | anic Chemistry –W.G.Palmer. | 5 | | | | | | | | |
| CO5 Analyze th 12. Brief descripti 1. https://vi 2. http://fil 3. https://fi 4. https://vi 5. http://pi 13. Books recomm 1. Advance 2. Advance 3. Practical | ne importa ion of self- www.fandr le.akfarmal aculty.psat www.stem. ioneer.nets ended: d Organic (Practical C Organic Cl | nce of personal safety and car 3 Strong learning / E-learning compon n.edu/uploads/files/7964570 hadhika.ac.id/E-BOOK/12-121 u.edu.sa/filedownload/doc-6- .org.uk/resources/collection/3 serv.chula.ac.th/~sanongn1/p Chemistry, Bahl & Bahl, S. Cha Chemistry: Jagdamba Singh, L. hemistry A.I. Vogel. | g contribution, 2 Average contribution , 1 Low content and the second s | nal.pdf | 3 | | | | | 2 | |

| | e of the Departmen | it: CHEMISTRY | | | | | | | | |
|--|--|--|--|---|-------------------|--------------------|-------------------|----------|-----------|-----------|
| 2. Cours | se Name | CHROMATOGRAPHY TECHN | IQUES | L | | | Г | | Р | |
| 3. Cours | se Code | СН301 | | 3 | | | 1 | | 0 | |
| 4. Type | of Course (use tick | mark) | | Core (√) | | DE | () | | FC (|) |
| 5. Pre-r | requisite (if any) | 10+2 with Chemistry | 6. Frequency (use tick marks) Even () | Odd (V |) | Either | Sem (|) E | very Se | m () |
| | | es, Tutorials, Practicals | | | , . | | | , | , | . , |
| | | ures = 30 | Tutorials = 10 | | | Practic | al = Nil | | | |
| 8. COUR | | | paration techniques such as Thin layer chromatogra | aphy. Paper o | hroma | | | chroma | tograph | nv. Higi |
| | | tography and Ion exchange chro | | , , , , , , , , , , , , , , , , , , , | | | ,, | | | ,, 0 |
| 9. COUR | SE OUTCOMES (CO) |): | | | | | | | | |
| After the | successful course c | ompletion, learners will develo | op following attributes: | | | | | | | |
| COURS | SE OUTCOME (CO) | | ATTRIBUTES | | | | | | | |
| | CO1 | Understand the chromatograp | hic techniques and its classification. | | | | | | | |
| | CO2 | Evaluate Thin layer chromato mixture. | graphy; principle and its applications. Paper chroma | atography and | d its ap | plicatio | ns. Sep | aration | of ami | no acio |
| | CO3 | | f gas-liquid chromatography, Instrumentation and its | Industrial ap | plicatio | ns. | | | | |
| | CO4 | Able to discuss Normal and detector and Industrial applica | reverse phase HPLC, Isocratic and gradient elutior tions of HPLC. | , Instrument | ation; r | nobile | phase i | reservoi | ir, colui | nn and |
| | CO5 | | experimental techniques, applications, separation | of metal ions | , separ | ation of | f chlorid | de and | Bromid | e ions |
| 10. Unit | t wise detailed cont | | | | | | | | | |
| Unit-1 | | Number of lectures = 08 | Title of the unit: SEPARATION TECHNIQUES | | | | | | | |
| | ography. Classificat | | ods, Elution in column chromatography, chromato | grams, distri | bution | constar | nt. rete | ntion ti | me. sta | tionar |
| phase, m | | | n chromatography, column chromatography; princip | | | | | | | |
| elution. Unit-2 | | Number of lectures =08 | Title of the unit: THIN LAYER CHROMATOGRAPHY | | | | | | | |
| principle, | , choice of adsorbe | nt and solvent, Rf value, appli | cations. Paper chromatography; solvents used, prin | ciple, Rf valu | e, facto | ors influ | encing | Rf valu | e, appli | cations |
| Separatio | on of amino acid mix | dure. | | | | | | | | |
| Unit-3 | | Number of lectures = 08 | Title of the unit: GAS CHROMATOGRAPHY | | | | | | | |
| Introduct | tion, Principles of g | as-liquid chromatography, Inst | trumentation; Carrier gas system, Sample injection, | Columns, Sta | ationary | phase, | Detect | ors (Fla | me lor | ization |
| | capture and Therma | al conductivity) and Industrial a | | | | | | | | |
| Unit-4 | - | Number of lectures = 08 | Title of the unit: HIGH PERFORMANCE LIQUID CHF | | | | | | | |
| | - | | Isocratic and gradient elution, Instrumentation; m | obile phase | reservo | oir, colu | imn an | d detec | tor (U\ | /-visible |
| Unit-5 | on, Electrochemical) | and Industrial applications of H Number of lectures = 08 | Title of the unit: ION EXCHANGE CHROMATOGRA | עונ | | | | | | |
| | , resins, action of r | | is, applications, separation of metal ions, separatio | | and B | romide | ions - | remova | l of int | erferin |
| radicals. | ,, | | | | | | | | | |
| 11. CO-P(| O mapping | | | | | | | | | |
| COs | | | Attributes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
| CO1 | Understand the ch | romatographic techniques and | its classification | 3 | 1 | 1 | 2 | 2 | 1 | 2 |
| | | | e and its applications. Paper chromatography a | - | - | - | - | - | - | |
| (0) | | ation of amino acid mixture. | e and its applications. Paper chromatography a | 3 | 1 | 1 | 2 | 2 | 1 | 2 |
| | | | | | | | | | | 2 |
| CO3 | Comprehension of | Principles of gas-liquid chroma | tography, Instrumentation and its Industrial applicati | ons. 3 | 1 | 1 | 2 | 2 | 1 | |
| CO4 | Able to discuss No | ormal and reverse phase HPLC | tography, Instrumentation and its Industrial applicati C, Isocratic and gradient elution, Instrumentation; r | | 1 | 1 | 2 2 | 2 2 | 1 | 2 |
| CO4 | Able to discuss No phase reservoir, co Analyze the action | ormal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn | C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat | nobile 3 | | | | | | |
| CO4 | Able to discuss No phase reservoir, co Analyze the action | ormal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn de ions - removal of interfering | C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. | nobile 3 ion of 3 | 1 | 1 | 2 | 2 | 1 | 2 |
| CO4 CO5 | Able to discuss Nc phase reservoir, co Analyze the action chloride and Bromi | ormal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn ide ions - removal of interfering 3 Strong | C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. g contribution, 2 Average contribution, 1 Low contri | nobile 3 ion of 3 | 1 | 1 | 2 | 2 | 1 | 2 |
| CO4 CO5 12. Brie | Able to discuss Nc phase reservoir, co Analyze the action chloride and Bromi | ormal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn ide ions - removal of interfering 3 Strong f-learning / E-learning compon | C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. g contribution, 2 Average contribution, 1 Low contri- tent | nobile 3 ion of 3 | 1 | 1 | 2 | 2 | 1 | 2 |
| CO4 CO5 | Able to discuss Nc phase reservoir, co Analyze the action chloride and Bromi ef description of self https://microbene https://www.khai | ormal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn ide ions - removal of interfering 3 Strong f-learning / E-learning compon otes.com/chromatography-prir nacademy.org/science/class-11 | C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. grontribution, 2 Average contribution, 1 Low contri- tent hciple-types-and-applications/ L-chemistry-india/xfbb6cb8fc2bd00c8:in-in-organic-cl | nobile 3 ion of 3 bution | 1 1 e-basic | 1 | 2 2 | 2 2 | 1 | 2 |
| CO4 CO5 12. Brie 1. 2. | Able to discuss Nc phase reservoir, co Analyze the action chloride and Bromi ef description of self https://microbene https://www.khau techniques/xfbb6 | normal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn ide ions - removal of interfering 3 Strong f-learning / E-learning compon otes.com/chromatography-prir nacademy.org/science/class-11 cb8fc2bd00c8:in-in-methods-o | C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. gradicals. grontribution, 2 Average contribution, 1 Low contri- tent heciple-types-and-applications/ L-chemistry-india/xfbb6cb8fc2bd00c8:in-in-organic-co f-purification-of-organic-compounds/v/basics-of-chro | nobile 3 ion of 3 bution | 1 1 e-basic | 1 | 2 2 | 2 2 | 1 | 2 |
| CO4 CO5 12. Brie 1. 2. 3. | Able to discuss Nc phase reservoir, co Analyze the action chloride and Bromi ef description of self https://microbene https://www.khan techniques/xfbb6 https://www.slide | normal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn ide ions - removal of interfering 3 Strong f-learning / E-learning compon otes.com/chromatography-prir nacademy.org/science/class-11 cb8fc2bd00c8:in-in-methods-o eshare.net/nadeemakhter7374 | C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. gradicals. grontribution, 2 Average contribution, 1 Low contri- tent heciple-types-and-applications/ L-chemistry-india/xfbb6cb8fc2bd00c8:in-in-organic-cl f-purification-of-organic-compounds/v/basics-of-chr /chromatography-34247423 | nobile 3 ion of 3 bution nemistry-som omatography | 1 1 e-basic | 1 1 -princip | 2 2 les-and | 2 | 1 | 2 |
| CO4 CO5 12. Brie 1. 2. 3. 4. | Able to discuss Nc phase reservoir, co Analyze the action chloride and Bromi ef description of self https://microbene https://www.khan techniques/xfbb6 https://www.slide http://www.biolo | normal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn ide ions - removal of interfering 3 Strong f-learning / E-learning compon otes.com/chromatography-prir nacademy.org/science/class-11 cb8fc2bd00c8:in-in-methods-o eshare.net/nadeemakhter7374 | C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. gradicals. grontribution, 2 Average contribution, 1 Low contri- tent heciple-types-and-applications/ L-chemistry-india/xfbb6cb8fc2bd00c8:in-in-organic-co f-purification-of-organic-compounds/v/basics-of-chro | nobile 3 ion of 3 bution nemistry-som omatography | 1 1 e-basic | 1 1 -princip | 2 2 les-and | 2 | 1 | 2 |
| CO4 CO5 1. 2. 3. 4. 13. Book | Able to discuss Nc phase reservoir, co Analyze the action chloride and Bromi ef description of self https://microbene https://www.khan techniques/xfbb6 https://www.biolo ktp://www.biolo ks recommended: | na detector and Industr lumn and detector and Industr of resins, experimental techn ide ions - removal of interfering 3 Strong f-learning / E-learning compon otes.com/chromatography-prin nacademy.org/science/class-11 cb8fc2bd00c8:in-in-methods-o eshare.net/nadeemakhter7374 gydiscussion.com/biochemistro | C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. gradicals. grontribution, 2 Average contribution, 1 Low contri- tent heciple-types-and-applications/ L-chemistry-india/xfbb6cb8fc2bd00c8:in-in-organic-cl f-purification-of-organic-compounds/v/basics-of-chr /chromatography-34247423 | nobile 3 ion of 3 bution nemistry-som omatography | 1 1 e-basic | 1 1 -princip | 2 2 les-and | 2 | 1 | 2 |
| CO4 CO5 12. Brie 1. 2. 3. 4. 13. Book 1. | Able to discuss Nc phase reservoir, co Analyze the action chloride and Bromi ef description of self https://microbene https://www.khai techniques/xfbb6 https://www.slide http://www.biolo ks recommended: Chemical Thermo | ormal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn ide ions - removal of interfering 3 Strong f-learning / E-learning compon otes.com/chromatography-prir nacademy.org/science/class-11 cb8fc2bd00c8:in-in-methods-o eshare.net/nadeemakhter7374 gydiscussion.com/biochemistro dynamics by R.P.Rastogi et al | C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. gradical | nobile 3 ion of 3 bution nemistry-som omatography | 1 1 e-basic | 1 1 -princip | 2 2 les-and | 2 | 1 | 2 |
| CO4 CO5 12. Brie 1. 2. 3. 4. 13. Book 1. 2. | Able to discuss Nc phase reservoir, co Analyze the action chloride and Bromi ef description of self https://microbene https://www.khan techniques/xfbb6 https://www.biolo ktp://www.biolo ks recommended: Chemical Thermo Principles of phys | ormal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn ide ions - removal of interfering 3 Strong f-learning / E-learning compon otes.com/chromatography-prin nacademy.org/science/class-11 cb8fc2bd00c8:in-in-methods-o eshare.net/nadeemakhter7374 gydiscussion.com/biochemistru dynamics by R.P.Rastogi et al ical chemistry by Puri Sharma a | C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. gradical | nobile 3 ion of 3 bution nemistry-som omatography | 1 1 e-basic | 1 1 -princip | 2 2 les-and | 2 | 1 | 2 |
| CO4 CO5 12. Brie 1. 2. 3. 4. 13. Book 1. | Able to discuss Nc phase reservoir, co Analyze the action chloride and Bromi ef description of self https://microbene https://www.khan techniques/xfbb6 https://www.biolo ktp://www.biolo ks recommended: Chemical Thermo Principles of phys Essentials of Phys | ormal and reverse phase HPLC lumn and detector and Industr of resins, experimental techn ide ions - removal of interfering 3 Strong f-learning / E-learning compon otes.com/chromatography-prir nacademy.org/science/class-11 cb8fc2bd00c8:in-in-methods-o eshare.net/nadeemakhter7374 gydiscussion.com/biochemistro dynamics by R.P.Rastogi et al | C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. gradical | nobile 3 ion of 3 bution nemistry-som omatography | 1 1 e-basic | 1 1 -princip | 2 2 les-and | 2 | 1 | 2 |
| CO4 CO5 12. Brie 1. 2. 3. 4. 13. Book 1. 2. 3. 3. | Able to discuss No phase reservoir, co Analyze the action chloride and Bromi ef description of self https://microbene https://www.khai techniques/xfbb6 https://www.slide http://www.biolo srecommended: Chemical Thermo Principles of phys Essentials of Phys | A strong f-learning / E-learning compon otes.com/chromatography-prin nacademy.org/science/class-11 cb8fc2bd00c8:in-in-methods-o eshare.net/nadeemakhter7374 gydiscussion.com/biochemistry dynamics by R.P.Rastogi et al ical chemistry by Puri Sharma a ical Chemistry, Bahl & Tuli, S. C | C, Isocratic and gradient elution, Instrumentation; r ial applications of HPLC. iques, applications, separation of metal ions, separat gradicals. g contribution, 2 Average contribution, 1 Low contri- lent nciple-types-and-applications/ I-chemistry-india/xfbb6cb8fc2bd00c8:in-in-organic-cd f-purification-of-organic-compounds/v/basics-of-chr /chromatography-34247423 y/chromatography-techniques/top-12-types-of-chron und Pathan hand & Co. Ltd. Pathania, Vishal Publishing Co. | nobile 3 ion of 3 bution nemistry-som omatography | 1 1 e-basic | 1 1 -princip | 2 2 les-and | 2 | 1 | 2 |

| 1 Nam | e of the Departme | nt: CHEMISTRY | | | _ | | | | | | | | |
|-----------|---|--|----------|---------------------------------|----------------|------------|--------------|----------|----------|----------------------|----------|---------------|---------|
| | e of the Departments se Name | PROCESS IN ORGANIC CHEN | | | | | L | | | T | | Р | |
| | se Code | CH302 | IICALS | SWANDFACTORING | | + | 3 | | | | | <u>Р</u> 0 | |
| | of Course (use tick | | | | | | 5 ore (√) | | DE | $\frac{1}{\sqrt{2}}$ | | FC (| · · · |
| | requisite (if any) | 10+2 with Chemistry | 6. | Fraguancy (usa tick marks) | Even () | |)dd (√ | \ | Either | <u> </u> |) [| very Se | |
| | | es, Tutorials, Practicals | 0. | Frequency (use tick marks) | Even() | | uu (v |) | EILIIEI | Seni (|) [| very se | III () |
| 7. 101a | | ures = 30 | | Tutorials = 10 | | | | | Dractic | al = Nil | | | |
| | | terest will be developed amo | ng stu | | chomistry ar | d introd | uction (| of bas | | | micals' | manuf | acturin |
| | | mechanisms and their applica | | | | u muou | | Ji Das | ic orga | | inicals | manure | acturin |
| - | SE OUTCOMES (CO | | | | | | | | | | | | |
| | • | completion, learners will devel | op foll | lowing attributes: | | | | | | | | | |
| COUR | SE OUTCOME (CO) | | | A | TTRIBUTES | | | | | | | | |
| | CO1 | An understanding of the haza | dous d | outcomes of certain commerce | ial procedures | is and th | e altern | atives | are sugg | gested. | | | |
| | <u> </u> | Commercial preparations of ir | | | • | | | | | · | | | |
| | CO2 | | | | | | | | | | | | |
| | CO3 | Merits and demerits of variou manufacture. | is orga | anic procedures like batch an | d continuous | oreparati | ons are | analyse | ed in co | ontext w | ith org | anic ch | emicals |
| | CO4 | How common organic reaction | ns are | applied in commercial chemic | als' manufact | ure is don | e along | with th | neir meo | chanisti | c action | • | |
| | CO5 | Interest for organic synthesis i | n cont | text with industrial chemistry | s created amo | ong stude | nts. | | | | | | |
| 10. Uni | t wise detailed con | tent | | | | | | | | | | | |
| Unit-1 | | Number of lectures = 08 | Titl | le of the unit: NITRATION | | | | | | | | | |
| Introduct | ion - Nitrating age | ents and mechanism of nitration | on pro | ocess such as nitration: i) Be | zene to nitro | benzene | and m- | dinitrol | benzene | e ii) Chl | oroben | zene to | o- an |
| • | orobenzenes iii) To | luene. Continuous vs batch nitr | 1 | | | | | | | | | | |
| Unit-2 | | Number of lectures =08 | | e of the unit: SULPHONATION | | | | | | | | | |
| | | agents, Chemical and physica | l facto | ors affect sulphonation, mec | nanism of sul | phonatio | n reacti | ons, Co | ommero | cial sulp | honatio | on of b | enzene |
| · · | ene, Toluene, batch | n vs continuous sulphonation. | | 6.1 I | | | | | | | | | |
| Unit-3 | | Number of lectures = 08 | | e of the unit: ALKYLATION | | 1 | | 1 | | | | | |
| Introduct | tion, Types of alkyla | tion, Alkylating agents, mechar | nism o | of alkylation reactions, manufa | cture of alcoh | ol, N-alky | laniline | s (mon | o dimet | hyl and | ethyl a | nilines.) |). |
| Unit-4 | | Number of lectures = 08 | Title | e of the unit: ESTERIFICATION | | | | | | | | | |
| Introduct | ion, Esterfication b | y organic acids, by addition of | unsatı | urated compounds, esterifica | ion of carbox | /l acid de | rivative | s, comr | mercial | manufa | cture o | f ethyl a | acetate |
| , | tate, cellulose aceta | | | | | | | | | | | | |
| Unit-5 | | Number of lectures = 08 | | e of the unit: HALOGENATIO | | _ | | | - | | | | |
| | | or halogenations, mechanism | | halogenation, , halogenatio | n of aromati | cs. Com | mercial | manu | factures | s - chl | oroben | zenes, | chlora |
| | | methanes, dichlorofluorometh | ane. | | | | | | | | | | |
| COs | O mapping | | A | | | | 201 | 202 | 000 | 004 | 0.05 | DOC | 007 |
| COS | A second s | | Attrib | | and the others | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
| CO1 | suggested. | of the hazardous outcomes of | | | | | 2 | 1 | 1 | 1 | 2 | 3 | 2 |
| CO2 | feasibility. | rations of important organic su | | | | | 1 | | | | 1 | 2 | 1 |
| CO3 | | its of various organic procedur nic chemicals' manufacture. | es like | e batch and continuous prepa | rations are ar | alysed in | 2 | 1 | | | 2 | 2 | 1 |
| CO4 | | anic reactions are applied in co | ommer | rcial chemicals' manufacture | s done along | with their | 2 | | | | | | 1 |
| CO5 | | c synthesis in context with indu | strial o | chemistry is created among si | udents. | | 2 | 1 | 1 | | 1 | 2 | 2 |
| | | | | ribution, 2 Average contribut | | ntributio | | | 1 | 1 | 1 | 1 | 1 |
| 12, Brie | of description of sel | If-learning / E-learning compor | - | Average contribut | | | • | | | | | | |
| 1. | | annica.com/technology/chemi | | dustry/Organic-chemicals | | | | | | | | | |
| 2. | | s.org/documents/chpt77e.htm | | and if or Barrie circuitens | | | | | | | | | |
| 3. | | essengineeringlibrary.com/bro | | andbook-of-industrial-chemis | try-organic-ch | emicals/c | 978007 | 141037 | /3ch01 | | | | |
| 4. | | mistryexplained.com/Hy-Kr/Ind | | | - | | | | | | | | |
| 13. Bool | ks recommended: | | | | | | | | | | | | |
| 1. | | odynamics by R.P.Rastogi et al | | | | | | | | | | | |
| 2. | | sical chemistry by Puri Sharma | | | | | | | | | | | |
| 3. | | sical Chemistry, Bahl & Tuli, S. C | | | | | | | | | | | |
| 4. | | sical Chemistry, Puri, Sharma & | | | | | | | | | | | |
| 5. | | in Physical Chemistry, Madan | α iuli, | , S. Chand & CO. Ltd. | | | | | | | | | |

6. Atkin's Physical Chemistry, Atkin, Oxford Press.

| CO1 Isolation and separation procedures are understood to separate individual components in natural products 2 2 2 2 CO2 Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry. 2 2 1 CO3 Classification and structure of vitamins is understood and utility of vitamins is applied in biological 2 2 1 | 1. Name o | of the Departmen | t: CHEMISTRY | | | | | | | | | | |
|---|--------------|----------------------|-----------------------------------|----------|------------------------------------|------------------|-------------------|----------------|-----------|----------|------------------|----------|----------|
| 4. Type of Course (use tick mark) Core (V) DE () FC () 5. Pre-requisite (if any) 10+2 with Chemistry 6. Frequency (use tick marks) Even () Odd (V) Either Sem () Every Sem (7. Total Number of Lectures; Tutorials, Practicals Tutorials = 10 Practical = Nil E. 8. COURSE OUECOMES: Students will be capanited with important terpenoids, alkaloids and hormones their synthesis and structure elucidation is done in context: rudustrial chemistry. A special emphasis will be laid on plant based phytochemicals and their medicinal utility. 9. COURSE OUTCOME (CO) Practical = Nil 6. COURSE OUTCOME (CO) ATTRIBUTES COURSE OUTCOME (CO) COURSE OUTCOME (CO) COURSE OUTCOME (CO) ATTRIBUTES COURSE OUTCOME (CO) COURSE OUTCOME (CO) CO1 solation and separation procedures are understood to separate individual components in natural products chemistry. CO3 Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures. CO4 Phytopharmaceuticals and their utility is analysed in context with industrial chemistry CO4 Phytopharmaceuticals and their utility is analysed in context with industrial chemistry CO4 Phytopharmaceuticals and their utility is analysed in context with industrial chemistry CO4 Phytopharmaceuticals and their utility is analysed in context with industrial chemistry CO4 <td>2. Course</td> <td>Name</td> <td>PHYTOCHEMISTRY</td> <td></td> <td></td> <td></td> <td>L</td> <td></td> <td></td> <td>г</td> <td></td> <td>Р</td> <td></td> | 2. Course | Name | PHYTOCHEMISTRY | | | | L | | | г | | Р | |
| S. Pre-requisite (if any) 10-2 with Chemistry 6. Frequency (use tick marks) Even () Odd (V) Either Sem () Eveny Sem () 7. Total Number of Lectures, Tutorials Practicals Tutorials = 10 Practical = Nil Eveny Sem () Eve | 3. Course | Code | СН303 | | | | 3 | | | 1 | | 0 | |
| 7. Total Number of Lectures - 30 Tutorials = 10 Practical = Nil COURSE OBJECTIVES: Students will be capainted with important terpenoids, alkaloids and hormones their synthesis and structure elucidation is done in context industrial chemistry. A special emphasis will be laid on plant based phytochemicals and their medicinal utility. 9. COURSE OUTCOMES (CO) After the successful course completion, learners will develop following attributes: COURSE OUTCOMES (CO) COURSE OUTCOME (CO) ATTRIBUTES COURSE OUTCOME (CO) ATTRIBUTES COURSE OUTCOME (CO) COURSE OUTCOME (CO) COURSE OUTCOME (CO) ATTRIBUTES CO1 solation and separation procedures are understood to separate individual components in natural products chemistry. CO2 Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytopharmaceuticals and their utility is analysed in context with industrial chemistry CO3 Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures. CO4 Phytopharmaceuticals and their utility is analysed in context with industrial chemistry Unit-1 Number of lectures = 08 Title of the unit: TERPENOIDS Introduction, nomenchature, chemical classifi | 4. Type of | Course (use tick | mark) | | | | Core (√) | | DE | () | | FC (|) |
| Lectures = 30 Tutorials = 10 Practical = Nil 8. COURSE OBJECTIVES: Students will be laid on plant based phytochemicals and their medicinal utility. Account of the acquainted with important terpenoids, aikaloids and hormones their synthesis and structure elucidation is done in context industrial chemistry. A special emphasis will be laid on plant based phytochemicals and their medicinal utility. 9. COURSE OUTCOMES (CO): ATTRIBUTES CO1 solation and separation procedures are understood to separate individual components in natural products chemistry. CO2 Structure elucidation of various aikaloids, terpenoids is done to better understand the fundamentals of phytochemistry. CO3 Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures. CO4 Phytopharmaceuticals and their utility is analysed in context with industrial chemistry CO5 Physiological action of important steroids and hormones is evaluated. 10. Unit vise detailed content Unit-1 Unit-2 Number of lectures = 08 Title of the unit: TERPENDIDS Introduction, nomenclature, courrence, general properties, classification, sloation of terpenoids, isoprene rule; synthesis of Citral and Menthol. Carotence introduction, classification, and isolation, isolation, and general properties of aikaloid. Introduction and physiological action; Epidet the unit: STENDIDS AND HORMONES Introduction, C | 5. Pre-req | uisite (if any) | 10+2 with Chemistry | 6. | Frequency (use tick marks) | Even () | Odd (V |) | Either | Sem (|) E [.] | very Ser | m () |
| B. COURSE OBJECTIVES: Students will be acquainted with important terpenoids, alkaloids and heir medicinal utility. 9. COURSE OUTCOMES (CO): After the successful course completion, learners will develop following attributes: COURSE OUTCOMES (CO): After the successful course completion, learners will develop following attributes: COURSE OUTCOMES (CO): After the successful course completion, learners will develop following attributes: COURSE OUTCOME (CO) CO1 solation and separation procedures are understood to separate individual components in natural products chemistry. CO3 Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures. CO4 Phytopharmaceuticals and their utility is analysed in context with industrial chemistry. CO5 Physiological action of important steroids and hormones is evaluated. 10. Unit wise detailed content Unit-1 Unit-2 Number of lectures = 08 Title of the unit: TERPENOIDS Introduction, cocurrence, functions, nome | 7. Total Nu | umber of Lecture | s, Tutorials, Practicals | | | | | | | | | | |
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| Introduction, occurrence, structure and physiological action; cholesterol, Ergosterol. Steroidal hormones; Progesterone, Testosterone, Androgen, Oestrogens. Unit-4 Number of lectures = 08 Title of the unit: VITAMINS Introduction, Classification, Sources of vitamins and their deficiency diseases. Physiological function of water and fat soluble vitamins. Structure and uses; Vit. A, Vit. B2 B6, and Vit. C. Unit-5 Number of lectures = 08 Title of the unit: PHYTOPHARMACEUTICALS Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine. Introduction and separation procedures are understood to separate individual components in natural products 2 <th2< th=""> 2 2</th2<> | | or Epinephrine, N | | | · · | | | | | | | | |
| Unit-4 Number of lectures = 08 Title of the unit: VITAMINS Introduction, Classification, Sources of vitamins and their deficiency diseases. Physiological function of water and fat soluble vitamins. Structure and uses; Vit. A, Vit. B2 B6, and Vit. C. Unit-5 Number of lectures = 08 Title of the unit: PHYTOPHARMACEUTICALS Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine. 11. CO-PO mapping COs Attributes PO1 PO2 PO3 PO4 PO5 PO6 Pr CO1 Isolation and separation procedures are understood to separate individual components in natural products chemistry. 2 2 2 2 1 CO2 Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry. 2 2 1 2 1 CO3 Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures. 2 1 1 | | | | | | | | | | | | | |
| Introduction, Classification, Sources of vitamins and their deficiency diseases. Physiological function of water and fat soluble vitamins. Structure and uses; Vit. A, Vit. B2 B6, and Vit. C. Unit-5 Number of lectures = 08 Title of the unit: PHYTOPHARMACEUTICALS Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine. 11. CO-PO mapping PO1 PO2 PO3 PO4 PO5 PO6 Pri C01 Isolation and separation procedures are understood to separate individual components in natural products in natural products. 2 2 2 2 2 2 2 1 C02 Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry. 2 2 1 </td <td>Introduction</td> <td>n, occurrence, stru</td> <td>ucture and physiological action</td> <td>i; chol</td> <td>lesterol, Ergosterol. Steroidal ho</td> <td>rmones; Proge</td> <td>esterone, Testo</td> <td>steron</td> <td>e, Andro</td> <td>ogen, Oe</td> <td>estrogei</td> <td>ns.</td> <td></td> | Introduction | n, occurrence, stru | ucture and physiological action | i; chol | lesterol, Ergosterol. Steroidal ho | rmones; Proge | esterone, Testo | steron | e, Andro | ogen, Oe | estrogei | ns. | |
| B2 B6, and Vit. C. Unit-5 Number of lectures = 08 Title of the unit: PHYTOPHARMACEUTICALS Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine. 11. CO-PO mapping COs PO1 PO2 PO3 PO4 PO5 PO6 P COs Attributes PO1 PO2 PO3 PO4 PO5 PO6 P COs Attributes PO1 PO2 PO3 PO4 PO5 PO6 P CO1 Isolation and separation procedures are understood to separate individual components in natural products 2 2 2 2 2 2 2 2 2 2 2 2 1 CO2 Structure elucidation of various alkaloids, terpenoids is done to b | | | | | | | | | | | | | |
| Unit-5 Number of lectures = 08 Title of the unit: PHYTOPHARMACEUTICALS Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine. 11. CO-PO mapping COs Attributes PO1 PO2 PO3 PO4 PO5 PO6 Pri CO1 Isolation and separation procedures are understood to separate individual components in natural products chemistry. 2 2 2 2 2 2 2 2 1 CO2 Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry. 2 2 2 1 <td></td> <td></td> <td>ources of vitamins and their d</td> <td>leficie</td> <td>ncy diseases. Physiological func</td> <td>tion of water</td> <td>and fat soluble</td> <td>vitami</td> <td>ins. Stru</td> <td>cture ar</td> <td>d uses;</td> <td>Vit. A,</td> <td>Vit. B1</td> | | | ources of vitamins and their d | leficie | ncy diseases. Physiological func | tion of water | and fat soluble | vitami | ins. Stru | cture ar | d uses; | Vit. A, | Vit. B1 |
| Recent development and commercialization of plant derived natural products. Structure and medicinal uses of caffeine, theophylline and theobromine. 11. CO-PO mapping COs Attributes PO1 PO2 PO3 PO4 PO5 PO6 Pr C01 Isolation and separation procedures are understood to separate individual components in natural products chemistry. 2 2 2 2 2 2 2 2 2 1 2 | | vit. C. | Number of lectures - 08 | Title | | | | | | | | | |
| 11. CO-PO mapping COs Attributes PO1 PO2 PO3 PO4 PO5 PO6 Pi C01 Isolation and separation procedures are understood to separate individual components in natural products chemistry. 2 2 2 2 2 2 1 C02 Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry. 2 2 1 2 2 1 2 2 <td></td> <td>alonment and con</td> <td></td> <td></td> <td></td> <td></td> <td>caffeine theor</td> <td>hylling</td> <td>and the</td> <td>ohromi</td> <td>no</td> <td></td> <td></td> | | alonment and con | | | | | caffeine theor | hylling | and the | ohromi | no | | |
| COsAttributesPO1PO2PO3PO4PO5PO6PCO1Isolation and separation procedures are understood to separate individual components in natural products chemistry.2222CO2Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry.2221CO3Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures.221 | | • | | anatt | and products. Structure and me | | currence, theory | , in y in it c | | 20010111 | iic. | | |
| CO1Isolation and separation procedures are understood to separate individual components in natural products chemistry.2222CO2Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry.221CO3Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures.21 | | napping | | | | | | | | | | | |
| CO1 chemistry. 2 2 2 2 CO2 Structure elucidation of various alkaloids, terpenoids is done to better understand the fundamentals of phytochemistry. 2 2 1 CO3 Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures. 2 1 1 | | | | | | | - | PO2 | PO3 | PO4 | PO5 | PO6 | P07 |
| CO2 phytochemistry. 2 1 CO3 Classification and structure of vitamins is understood and utility of vitamins is applied in biological structures. 2 1 | CO1 | | ation procedures are understo | od to | separate individual componen | ts in natural p | roducts 2 | | | | 2 | 2 | 2 |
| CO3 Classification and structure of vitamins is understood and utility of vitamins is applied in biological 2 | CO2 | | on of various alkaloids, terpe | noids | is done to better understand | the fundame | ntals of 2 | | | | 2 | 1 | 1 |
| | CO3 | assification and | structure of vitamins is und | lersto | od and utility of vitamins is | applied in bi | ological 2 | | | | | | 2 |
| CO4Phytopharmaceuticals and their utility is analysed in context with industrial chemistry21121 | | | als and their utility is analysed | in cor | ntext with industrial chemistry | | 2 | 1 | 1 | | 2 | 1 | 2 |
| | | | | | | | | | 1 | | | | 1 |
| 3 Strong contribution, 2 Average contribution , 1 Low contribution | I | | 3 Strong | cont | ribution, 2 Average contributio | n , 1 Low cont | ribution | 1 | 1 | L | | | 1 |
| 12. Brief description of self-learning / E-learning component | 12. Brief d | lescription of self | | · | | | | | | | | | |
| 1. https://medlineplus.gov/vitamins.html | | - | | | | | | | | | | | |
| 2. https://www.health.harvard.edu/staying-healthy/listing_of_vitamins | | | | y/listir | ng_of_vitamins | | | | | | | | |
| 3. https://medlineplus.gov/steroids.html | | | | | | | | | | | | | |
| 4. https://www.versusarthritis.org/about-arthritis/treatments/drugs/steroids/ 13. Books recommended: | | | usarthritis.org/about-arthritis/ | treatr | ments/drugs/steroids/ | | | | | | | | |
| 13. Books recommended: 1. Chemical Thermodynamics by R.P.Rastogi et al | | | dynamics by R.P. Pastori et al | | | | | | | | | | |
| | | | | and Pa | athan | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | - | | | | | | | | | | |
| 3. Essentials of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd. | | | - | | - | | | | | | | | |
| 3. Essentials of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd. | 5. S | Simplified course | in Physical Chemistry, Madan a | ዿ Tuli, | , S. Chand & Co. Ltd. | | | | | | | | |

| 1. Name | e of the Departmer | nt: CHEMISTRY | | | | | | | | |
|------------|-----------------------|---|--|------------------|-----------|-----------|------------|------------------|-----------|----------|
| 2. Cours | se Name | UNIT OPERATION IN CHEMI | CAL INDUSTRY | L | | • | Г | | Р | |
| 3. Cours | se Code | CH304 | | 3 | | | 1 | | 0 | |
| 4. Type | of Course (use tick | mark) | | Core (√) | | DE | () | | FC (|) |
| 5. Pre-ı | requisite (if any) | 10+2 with Chemistry | 6. Frequency (use tick marks) Even () | Odd (√ |) | Either | Sem (|) E [.] | very Sei | m() |
| 7. Total | Number of Lecture | es, Tutorials, Practicals | | | | | | | | |
| | | ures = 30 | Tutorials = 10 | | | | al = Nil | | | |
| | | | o develop the deep understanding of theory distill | | | | | | | |
| - | | | nt in a binary/ ternary component with the contex | t of industrial | separa | tion teo | chniques | s incluc | ling soli | d state |
| | SE OUTCOMES (CO | | anism of solid crystal for industrial perspective. | | | | | | | |
| | • | ompletion, learners will devel | op following attributes: | | | | | | | |
| | SE OUTCOME (CO) | | ATTRIBUTES | | | | | | | |
| | | Students will create an under | standing of the design and application of an analysi | is related to a | questi | on of re | levance | based | on exp | erience |
| | CO1 | in separations techniques. | | | | | | | | |
| | CO2 | | rstanding of the connection between common ap | proximation | methoo | ls and s | standard | d chem | ical ads | orptior |
| | | absorption. | | | | | | | | |
| | CO3 | | stand about the ingredients of filtering and drying of | | • | ucts. | | | | |
| | CO4 | Students will have a firm foun | dation in the fundamentals and applications of crysta | allization proce | ess. | | | | | |
| | CO5 | Students will gain an understa | nding of extraction of the compounds in mixtures. | | | | | | | |
| 10. Uni | t wise detailed con | tent | | | | | | | | |
| Unit-1 | | Number of lectures = 08 | Title of the unit: DISTILLATION | | | | | | | |
| | | | of azeotropes, Plates columns and packed column | s Absorption: | Introd | uction: | Equipme | ents- p | acked c | olumn |
| | umns, bubble colun | | nechanically agitated contractors. | | | | | | | |
| Unit-2 | · | Number of lectures =08 | Title of the unit: EVAPORATION | | · | . / | | <u> </u> | | · · · |
| | | short tube (standard) Evapora | tor forced circulation evaporators, falling film evap | orators, climb | oing filr | n (upw | ard flow |) evap | orators, | , wiped |
| Unit-3 |) film evaporator. | Number of lectures = 08 | Title of the unit: FILTRATION | | | | | | | |
| | : Introduction, filte | | ments- plate and frame filter press, nutch filter, r | otarv drum fi | lter, sr | arkler f | ilter. ca | ndle fi | ter, ba | g filter |
| | | | ture drying curve; equipments- tray dryer, rotary dry | | | | | | | |
| Unit-4 | | Number of lectures = 08 | Title of the unit: CRYSTALLIZATION | | | | | | | |
| Introduct | ion: solubility, supe | r-saturation nucleation, crysta | growth; Equipment- tank crystallizer, agitated crysta | allizer, evapor | ator, cr | ystallize | r, draft i | tube cr | ystallize | r. |
| Unit-5 | | Number of lectures = 08 | Title of the unit: EXTRACTION | | | | | | | |
| Introduct | ion: selection of sol | lvent; Equipments- Spray colur | nn, packed column rotating disc column, mixer-settle | er. Mixing- Int | roducti | on; mixi | ng of lic | uid-liq | uid solic | l- Solid |
| liquid-sol | id systems | | - | | | | | | | |
| 11. CO-P | O mapping | | | | | | | | | |
| COs | | | Attributes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | P07 |
| CO1 | | | ign and application of an analysis related to a ques | tion of 3 | 1 | 1 | | 1 | 3 | |
| | | n experience in separations tec | • | | | | | | | |
| CO2 | | te an understanding of the co adsorption /absorption. | nnection between common approximation metho | ds and 3 | 1 | 1 | | 1 | 3 | |
| CO3 | | | redients of filtering and drying of the commercial pro | oducts. 3 | 1 | 3 | | 2 | 1 | |
| | | | | | | | | | | |
| CO4 | Students will have | a firm foundation in the funda | nentals and applications of crystallization process. | 3 | 1 | 3 | | 2 | 1 | |
| CO5 | Students will gain a | an understanding of extraction | of the compounds in mixtures. | 3 | 1 | 1 | | 2 | 1 | |
| | | 3 Strong | contribution, 2 Average contribution , 1 Low contr | ibution | | | | | | |
| 12. Brie | | f-learning / E-learning compor | | | | | | | | |
| 1. | | | ical-technology/chemical-processing-unit-operation | | | | | | | |
| 2. | 1 11 0 | du.iq/ched/images/lectures/ch | | | | | | | | |
| 3. 4. | | oo.it/en/teaching/course-unit- tube.com/watch?v=H_Nc7SJw | catalogue/course-unit/2016/367440 | | | | | | | |
| | s recommended: | | | | | | | | | |
| 13. 000 | | dynamics by R.P.Rastogi et al | | | | | | | | |
| 2. | | ical chemistry by Puri Sharma a | and Pathan | | | | | | | |
| 3. | | ical Chemistry, Bahl & Tuli, S. C | | | | | | | | |
| 4. | | ical Chemistry, Puri, Sharma & | - | | | | | | | |
| 5. | | in Physical Chemistry, Madan | & Tuli, S. Chand & Co. Ltd. | | | | | | | |
| 6. | Atkin's Physical C | hemistry, Atkin, Oxford Press. | | | | | | | | |

SEMESTER – V

| 1 Name | e of the Departmen | +- CHEMISTRY | | | | | | | | | |
|------------|--|---|----------|--|---------------|----------|----------|-----------|----------|----------|----------|
| | se Name | PULP, PAPER, LEATHER AND | TEXTI | | L | | 1 | - | 1 | Р | |
| 3. Cours | | CH305 | | | 3 | | | | | р 0 | |
| | of Course (use tick | | | | Core () | | DE | | | FC (| · · · · |
| | equisite (if any) | 10+2 with Chemistry | 6. | Frequency (use tick marks) Even () | Odd (V) |) | Either | |) F | very Sei | |
| | • • • | es, Tutorials, Practicals | 0. | | ouu (v | / | Little | | / - | very ser | |
| | | ires = 30 | | Tutorials = 10 | | | Practic | al = Nil | | | |
| 8. COURS | | | of the | nature of chemical materials and the emerging t | rend. In ac | dition. | | | ress the | e massiv | /e drive |
| | | | | ler to meet material requirements | | , | | | | | |
| | SE OUTCOMES (CO) | | | | | | | | | | |
| | | ompletion, learners will develo | op foll | - | | | | | | | |
| COURS | SE OUTCOME (CO) | | | ATTRIBUTES | | | | | | | |
| | CO1 | Student will be able to apply the | ne kno | wledge to produce various types of pulp and pape | ers. | | | | | | |
| | CO2 | Student will be able know the | proces | sing techniques to produce special types of paper | s. | | | | | | |
| | CO3 | Student will be able to demon | strate | the basic mechanism and processes involved in le | ather indu | stry. | | | | | |
| | CO4 | Student will be able to know a | bout a | challenge which arises from leather industries an | d their har | ndling. | | | | | |
| | CO5 | Student will able to know abou | ut India | an industries and products. | | | | | | | |
| 10. Unit | wise detailed cont | tent | | | | | | | | | |
| Unit-1 | | Number of lectures = 08 | Title | e of the unit: PULP AND PAPER | | | | | | | |
| | | of pulp, Sulphate or Kraft pulp essing aids, functional additive | | a pulp, Sulphite pulp Rag pulp, Beating, refining, nethodatives and binders. | filling, sizi | ng and | colorin | g, man | ufactur | e of pap | per and |
| Unit-2 | | Number of lectures =08 | <u> </u> | of the unit: SPECIAL TYPES OF PAPERS AND THE | IR MANUF | ACTUR | ING PR | DCESS | | | |
| Ammonia | paper, Art paper, E | Bituminized water proof paper, | Emery | / Paper, Toilet paper, Wall paper , Wax coated pap | per and po | lymeric | modifie | d pape | rs. | | |
| Unit-3 | | Number of lectures = 08 | Title | of the unit: LEATHER INDUSTRY-I | | | | | | | |
| Introducti | ion - Constituents o | f Animal Skin - Preparing skins | and hi | des - Cleaning and soaking - Liming and degreasin | g. | | | | | | |
| Unit-4 | | Number of lectures = 08 | Title | of the unit: LEATHER INDUSTRY-II | | | | | | | |
| Introducti | ion, Manufacture of | f leather, Preparation of hides | for tan | ning, Vegetable, chrome and oil tanning - Byprod | uct. | | | | | | |
| Unit-5 | | Number of lectures = 08 | | of the unit: TEXTILES CHEMISTRY | | | | | | | |
| | - | | bres: | cotton, wool, silk, and rayon fibres; General con | siderations | s of syn | thetic f | ibres; lı | ndetific | ation of | textile |
| - | ater soluble resins, a D mapping | and epoxy resins. | | | | | | | | | |
| COs | | | Attribu | *** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
| | o | | | | | | | - | | | _ |
| CO1 | Student will be able | e to apply the knowledge to pro | oduce | various types of pulp and papers. | 1 | 1 | 1 | 2 | 3 | 3 | 1 |
| | | | | produce special types of papers. | 1 | 1 | 1 | 2 | 3 | 3 | 1 |
| CO3 | Student will be able | e to demonstrate the basic med | chanisi | m and processes involved in leather industry. | 1 | 1 | 1 | 2 | 3 | 3 | 1 |
| CO4 | Student will be able | e to know about a challenge wł | nich ar | ises from leather industries and their handling. | 1 | 1 | 1 | 3 | 3 | 3 | 1 |
| CO5 | Student will able to | know about Indian industries | and pr | oducts. | 1 | 1 | 2 | 3 | 3 | 3 | 1 |
| | | 3 Strong | ; contr | ibution, 2 Average contribution , 1 Low contribu | tion | | | | | | |
| 12. Brie | | f-learning / E-learning compon | | | | | | | | | |
| 1. | 1 , | tube.com/watch?v=4pWBknxL | | | | | | | | | |
| 2. 3. | | tube.com/watch?v=z6QnUCc72 tube.com/watch?v=5Lusmpg 1 | • | | | | | | | | |
| 3. 4. | 1 , | tube.com/watch?v=5Lusmpg_1 tube.com/watch?v=Lu31Zt8f3x | | | | | | | | | |
| | s recommended: | | | | | | | | | | |
| 1. | | industries N.R Nerris shreve | | | | | | | | | |
| 2. | Chemical process | principales: part 1 & II – O.A / | Houge | n, K.M Watson RA Ragatz (CBS) | | | | | | | |
| 3. | - | | - | ge T. Austin, Mc Graw Hill Book Co. | | | | | | | |
| 4. | Handbook of indu | strial chemistry: Volume I & II , | KH Da | avis , FS Berner, CBS Publication. | | | | | | | |
| 5. | Plastic Additives T | echnology Hand Book: Himadr | i Pand | a, Engineers India Research Institute. | | | | | | | |
| 6 | Industrial Chamist | try B K Sharma, goel nublishing | house | | | | | | | | |

6. Industrial Chemistry B.K.Sharma, goel publishing house

| I manie of the Departin | ent: CHEMISTRY | | | | | | | | |
|---|--|---|---|---|---------------|------------------------------|-----------------------------------|---------------|-----------------------------------|
| 2. Course Name | DYES | | L | | ٦ | 1 | | Р | |
| 3. Course Code | СН306 | | 3 | | 1 | | | 0 | |
| 4. Type of Course (use ti | ck mark) | | Core () | | DE | (√) | | FC (|) |
| 5. Pre-requisite (if any) | 10+2 with Chemistry | 6. Frequency (use tick marks) Even () | Odd (V |) | Either | Sem (|) E [.] | very Sei | m () |
| 7. Total Number of Lect | ures, Tutorials, Practicals | | | | | | | | |
| | ctures = 30 | Tutorials = 10 | | | Practic | - | | | |
| | | and era and history, color and chemical constitution | Develop basic | chemi | cal reac | tion and | d synth | esis of a | azodyes |
| and applications of some t 9. COURSE OUTCOMES (C | | | | | | | | | |
| | .0): e completion, learners will devel | on following attributes: | | | | | | | |
| COURSE OUTCOME (CC | | ATTRIBUTES | | | | | | | |
| C01 | | d synthesis of benzene intermediates. | | | | | | | |
| | | the dyes with respect to general structural features | mode of ann | lication | to fibo | r color | chados | classif | fication |
| CO2 | mode of application, Color and | | s, mode of app | lication | to fibe | 1, COIOI | shaues | , Classii | ication, |
| | | pes of Anthraguinone Dyes like Anthraguinone mo | ordant dyes, A | nthragu | inone v | at dyes | , Anthi | raguino | ne acid |
| CO3 | dyes, Anthraquinone Disperse | | , <i>, ,</i> | | | , | | | |
| CO4 | Able to create basic Knowled | ge of azodyes, Diazotization, Diazo Coupling, Acidi | c azo dyes, Ba | sic azo | dyes, D | irect or | substa | intive a | zodyes, |
| | Mordant azodyes | | | | | | | | |
| CO5 | | ations of Phenolphthalein, fluorescein, Eosin, Mal | achite green, l | Methyle | ene blue | e, Indig | o. Napl | hthol ye | ellow-S, |
| 10. Unit wise detailed co | Crystal violet. | | | | | | | | |
| Unit-1 | Number of lectures = 08 | Title of the unit: CHEMISTRY OF INTERMEDIATES | s | | | | | | |
| | | prical development from Natural to synthetic dyes. | - | nediate | s-Chloro | onitrobe | nzenes | . Nitroa | nilines |
| Bromonitroanilines, Nitroa | | | | .culuic | | | | ,, | |
| Unit-2 | Number of lectures =08 | Title of the unit: CLASSIFICATION | | | | | | | |
| | | ture and the mode of application to the fibre. Colou | | l consti | tution c | of dyes; | Chemis | stry of t | he dyes |
| | | ation to fibre, colour shades, synthesis of typical 4-5 | dyes., uses. | | | | | | |
| Unit-3 | Number of lectures = 08 | Title of the unit: ANTHRAQUINONE DYES | | | <u> </u> | | | | |
| Anthraquinone mordant d Disperse dye. | yes; Alizarin, Alizarin Orange, Ali | zarin Red S. Anthraquinone vat dyes; Indanthrone b | lue, Pyranthror | ne. Anti | nraquin | one acio | d dyes, i | Anthrac | quinone |
| Unit-4 | | | | | | | | | |
| onic 4 | Number of lectures = 08 | Title of the unit: AZO DYES | | | | | | | |
| Diazotization, Diazo Coup | Number of lectures = 08 | Title of the unit: AZO DYES azo dyes (Methyl Orange, Tartrazine), Basic azo dy | ves: aniline, bu | utter ve | llow. D | irect or | substa | ntive a | zodves: |
| | ling, Types of Azo dyes; Acidic | Title of the unit: AZO DYES azo dyes (Methyl Orange, Tartrazine). Basic azo dy ochrome Black-T. synthetic fibre dyes; red disperse d | | itter ye | llow. D | irect or | substa | intive a | zodyes; |
| | ling, Types of Azo dyes; Acidic | azo dyes (Methyl Orange, Tartrazine). Basic azo dy | | itter ye | llow. D | irect or | substa | intive a | zodyes; |
| Congored. Ingrain azodyes Unit-5 | ling, Types of Azo dyes; Acidic ; ; para red.Mordant azodyes; Eric Number of lectures = 08 | azo dyes (Methyl Orange, Tartrazine). Basic azo dy pchrome Black-T. synthetic fibre dyes; red disperse d | ye. | | llow. D | irect or | substa | intive a | zodyes; |
| Congored. Ingrain azodyes Unit-5 Structure and uses; Pheno | ling, Types of Azo dyes; Acidic ; ; para red.Mordant azodyes; Eric Number of lectures = 08 | azo dyes (Methyl Orange, Tartrazine). Basic azo dy ochrome Black-T. synthetic fibre dyes; red disperse d Title of the unit: MISCELLANEOUS DYES | ye. | | llow. D | irect or | substa | intive a | zodyes; |
| Congored. Ingrain azodyes Unit-5 Structure and uses; Pheno 11. CO-PO mapping | ling, Types of Azo dyes; Acidic : ; para red.Mordant azodyes; Eric Number of lectures = 08 Iphthalein, fluorescein, Eosin, Ma | azo dyes (Methyl Orange, Tartrazine). Basic azo dy ochrome Black-T. synthetic fibre dyes; red disperse d Title of the unit: MISCELLANEOUS DYES alachite green, Methylene blue, Indigo. Naphthol yel | ye. low-S, Crystal v | violet. | | | | | |
| Congored. Ingrain azodyes Unit-5 Structure and uses; Pheno 11. CO-PO mapping COs | ling, Types of Azo dyes; Acidic ;; para red.Mordant azodyes; Eric Number of lectures = 08 lphthalein, fluorescein, Eosin, Ma | Azo dyes (Methyl Orange, Tartrazine). Basic azo dy bochrome Black-T. synthetic fibre dyes; red disperse d Title of the unit: MISCELLANEOUS DYES alachite green, Methylene blue, Indigo. Naphthol yel Attributes | ye. low-S, Crystal v PO1 | violet. | PO3 | PO4 | PO5 | PO6 | P07 |
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| | FES: Student will be able to work effectively and safely in a laboratory environment, putative problems, transferable skills like ability to work in teams as well as independently. | ractical/technic | al/ con | nmunica | ation sk | ills, cor | icepts t | o solve |
| 9. COURSE OUTCON | | | | | | | | |
| | burse completion, learners will develop following attributes: | | | | | | | |
| COURSE OUTCOM | | | | | | | | |
| C01 | Remember to keep records of all performed experiments in themanner which is re | equired in labor | atory. | | | | | |
| CO2 | Able to detect adulterants in the given food sample. | | | | | | | |
| CO3 | Understand the basic titration methods and technical skills to work in the different | t fields of chem | istry. | | | | | |
| CO4 | Explain the principles of chromatographic techniques. | | | | | | | |
| CO5 | Analyze the importance of personal safety and care of equipment's and chemicals | | | | | | | |
| 10. Syllabus | | | | | | | | |
| Exp – 01 | Separation of amino acid by Thin layer chromatography. | | | | | | | |
| Exp – 02 | Separation of amino acid by paper chromatography. | | | | | | | |
| Exp – 03 | Separation of sugar by Thin layer chromatography. | | | | | | | |
| Ехр — 04 | Isolation of lactose & casein. | | | | | | | |
| Ехр — 05 | Isolation of lycopene from tomato. | | | | | | | |
| Ехр — 06 | Isolation of caffeine from tea. | | | | | | | |
| Ехр — 07 | Isolation of piperine from black pepper. | | | | | | | |
| Ехр — 08 | Isolation of eugenol from cloves. | | | | | | | |
| Ехр — 09 | Isolation of nicotine from tobacco. | | | | | | | |
| Exp — 10 | Determination of protein content of food. | | | | | | | |
| Exp — 11 | Determination of fat content of food. | | | | | | | |
| Exp – 12 | Determination of acetic acid content of vinegar. | | | | | | | |
| Exp – 13 | Determination of acid value of oil. | | | | | | | |
| Exp – 14 | Preparation of methyl orange. | | | | | | | |
| 11. CO-PO mapping | | | | | | | | |
| COs | Attributes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | P07 |
| CO1 Remember | o keep records of all performed experiments in themanner which is required in laborator | y. 3 | 1 | 1 | | 2 | 1 | 2 |
| CO2 Able to det | ct adulterants in the given food sample. | 3 | 1 | 1 | | 1 | 2 | 2 |
| CO3 Understand | the basic titration methods and technical skills to work in the different fields of chemistry | . 3 | 1 | 1 | | 1 | | 2 |
| CO4 Explain the | rrinciples of chromatographic techniques. | 3 | 1 | 1 | | 1 | | 2 |
| CO5 Analyze the | importance of personal safety and care of equipment's and chemicals. | 3 | 1 | 1 | | 1 | 2 | 2 |
| 12 Drief description | 3 Strong contribution, 2 Average contribution, 1 Low contribution of colf learning / E learning component | ribution | | | | | | |
| | of self-learning / E-learning component w.youtube.com/watch?v=MTsn1-ToKqQ 2. | | | | | | | |
| 2. http://ww | v.bellevuecollege.edu/wp-content/uploads/sites/140/2014/06/aspirin_tablets_titration.p | odf | | | | | | |
| | w.frontiersin.org/articles/10.3389/fonc.2015.00196/full w.youtube.com/watch?v=1tmqUVSVPo4 | | | | | | | |
| | w.youtube.com/watch?v=ttmq0v5vPo4 w.youtube.com/watch?v=KZ35K05SA7g | | | | | | | |
| 13. Books recomme | ded: | | | | | | | |
| | actical Chemistry: Jagdamba Singh, L.D.S Yadav, Jaya Singh, I.R. Siddiqui, PragatiEdition. rganic Chemistry A.I.Vogel. | | | | | | | |
| | ysical Chemistry : B. Viswanathan and P.S.Raghavan. | | | | | | | |
| 4. Experimer | tal Inorganic Chemistry –W.G.Palmer. | | | | | | | |

| 1. Name | e of the Departmen | t: CHEMISTRY | <u>SEMESTER VI</u> | | | | | | | |
|---|---|--|---|-------------|-----------|-----------|-----------|-----------|---------------|------------|
| | se Name | SPECTROSCOPIC TECHNIQUE | S | L | | 1 | • | | Р | |
| 3. Cours | | CH308 | | 3 | | 1 | | | <u>Р</u> 0 | |
| | of Course (use tick | | | Core (√) | | DE | | | FC (| <u>۱</u> |
| | requisite (if any) | 10+2 with Chemistry | 6. Frequency (use tick marks) Even (V) | Odd () | | Either | · · |) Ev | very Ser | |
| | | s, Tutorials, Practicals | | 000 () | | LILITET | | / | very ser | |
| 7110101 | | res = 30 | Tutorials = 10 | | | Practic | al – Nil | | | |
| 8. COUR | | | interaction of electromagnetic radiation with the mate | rials, spec | trosco | | | like Ult | raviolet | ET-IR |
| | | spectroscopy and mass spectr | 5 | indis, spec | | | inques | | raviolet | ., i i iii |
| | SE OUTCOMES (CO) | | , | | | | | | | |
| After the | successful course co | ompletion, learners will develo | p following attributes: | | | | | | | |
| COURS | SE OUTCOME (CO) | | ATTRIBUTES | | | | | | | |
| | CO1 | Woodward – Fieser rules for ca | | | | - | | | | _ |
| | | vibrational frequencies, charac | in the infrared region, theory of infrared spectroscopy, in teristic absorptions in common classes of compounds. | | | | | | | |
| | CO3 | To create basics of NMR spect coupling. | roscopy, instrumentation, chemical shift, equivalent and | nonequiv | alent p | rotons, | spin-sp | in splitt | ing and | l vicina |
| | 0.04 | Able to evaluate the NMR spe of NMR spectroscopy. | ctra of some representative compounds: Hydrocarbons, | Aldehyde | s, Keto | nes, Aci | ds and | Alcohol | s, Appli | cations |
| | CO5 | • • | ntation, important useful terms in mass spectrometry; groups (alkanes, alkenes, alkynes, alcohols, ketones, alde | | • | | | • | fragme | ntatior |
| 10. Unit | t wise detailed cont | ent | | | | | | | | |
| Unit-1 | | Number of lectures = 08 | Title of the unit: UV SPECTROSCOPY | | | | | | | |
| Wave-like | e propagation of ligh | it, absorption of electromagne | tic radiation by organic molecules allowed and forbidder | transitior | ns, instr | umenta | tion, co | njugate | ed syste | ms and |
| | n energies, Woodwa | | arbonyl compounds, conjugated dienes and polyenes. | | | | | | | |
| Unit-2 | | Number of lectures =08 | Title of the unit: IR SPECTROSCOPY | | | | | | | |
| | | | of infrared spectroscopy, instrumentation, molecular | | | rs affec | ting vi | orationa | al frequ | iencies |
| | ristic absorptions in | | , characteristic vibrational frequencies of some organic of | ompound | S. | | | | | |
| Unit-3 | in the second ALAD | Number of lectures = 08 | Title of the unit: NMR SPECTROSCOPY | | | | | | | |
| | | spectroscopy, instrumentation entative compounds. | n, chemical shift, equivalent and nonequivalent protons | spin-spin | splittir | ig, vicin | al coup | ing,, In | terpreta | ation of |
| Unit-4 | ctra or some represe | Number of lectures = 08 | Title of the unit: MASS SPECTROSCOPY | | | | | | | |
| | ion basic theory in | | ul terms in mass spectrometry, fragmentation patterns of | fvarious | functio | nal grou | ins (alka | anes all | enes a | lkvnes |
| | - | - | ters, acids, anhydrides), molecular ion peak, metastable | | | - | | | | |
| Unit-5 | • | Number of lectures = 08 | Title of the unit: ATOMIC ABSORPTION SPECTROPHO | • | <u> </u> | | <u> </u> | · | <u> </u> | |
| Introducti | ion, Principle, Instru | mentation, Sample preparatio | n, Internal standard and standard addition, calibration a | nd applica | tions of | AAS. | | | | |
| 11 CO-PC | O mapping | | | | | | | | | |
| COs | | | Attributes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
| | Understanding Way | | ectronic transitions, instrumentation, conjugated system | nc | PUZ | PU3 | PU4 | PUS | PUO | P07 |
| .01 | and transition energe | gies, Woodward – Fieser rules | for calculation of wave length. | 3 | 1 | 2 | | 1 | | 2 |
| CO2 | | • | egion, theory of infrared spectroscopy, instrumentatic frequencies, characteristic absorptions in common class | | 1 | 2 | | 1 | | 2 |
| 603 | To create basics o | f NMR spectroscopy, instrum plitting and vicinal coupling. | nentation, chemical shift, equivalent and nonequivale | nt 3 | 1 | 2 | | 1 | | 2 |
| CO4 | Able to evaluate th | | sentative compounds: Hydrocarbons, Aldehydes, Keton | es, 3 | 1 | 1 | | 1 | | 2 |
| | | | useful terms in mass spectrometry; molecular ion per | ık. | | | | | | |
| | | | ous functional groups (alkanes, alkenes, alkynes, alcoho | | 1 | 1 | | 1 | | 2 |
| | ketones, aldehydes |), Mclafferty rearrangements. | | | | | | | | |
| | | 3 Strong | contribution, 2 Average contribution , 1 Low contribut | on | | | | | | |
| | | | | | | | | | | |
| 12. Brie | | -learning / E-learning compon | | | | | | | | |
| 1. | https://www.yout | ube.com/watch?v=2Y8pSoS0d | lg | | | | | | | |
| 1. 2. | https://www.yout http://www.infoc | ube.com/watch?v=2Y8pSoS0d bbuild.com/education/audio-v | 1g ideo-courses/chemistry/ApplicationOfSpectroscopicMet | nods-IIT-N | 1adras/ | lecture- | 25.htm | 1 | | |
| 1. 2. 3. | https://www.yout http://www.infoc https://scrippslabs | ube.com/watch?v=2Y8pSoS0d obuild.com/education/audio-v s.com/summary-of-spectrosco | 1g ideo-courses/chemistry/ApplicationOfSpectroscopicMet pic-techniques/ | nods-IIT-N | 1adras/ | lecture- | 25.htm | 1 | | |
| 1. 2. 3. 4. | https://www.yout http://www.infoce https://scrippslab https://nptel.ac.in | ube.com/watch?v=2Y8pSoS0d bbuild.com/education/audio-v | 1g ideo-courses/chemistry/ApplicationOfSpectroscopicMet pic-techniques/ | nods-IIT-N | 1adras/ | lecture- | 25.htm | | | |
| 1. 2. 3. 4. 13. Book | https://www.yout http://www.infocd https://scrippslab: https://nptel.ac.in ss recommended: | ube.com/watch?v=2Y8pSoS0d obuild.com/education/audio-v s.com/summary-of-spectrosco /content/storage2/courses/10 | 1g ideo-courses/chemistry/ApplicationOfSpectroscopicMet pic-techniques/ 2103044/pdf/mod2.pdf | nods-IIT-N | 1adras/ | lecture- | 25.htm | 1 | | |
| 1. 2. 3. 4. 13. Book | https://www.yout http://www.infoc https://scrippslab https://nptel.ac.in screcommended: Introduction to sp | ube.com/watch?v=2Y8pSoS0d obuild.com/education/audio-v s.com/summary-of-spectrosco /content/storage2/courses/10 ectroscopy: Pavia, Lampman 8 | 1g ideo-courses/chemistry/ApplicationOfSpectroscopicMet pic-techniques/ 2103044/pdf/mod2.pdf Kriz, 3rd Ed, Books/cole. | nods-IIT-N | 1adras/ | lecture- | 25.htm | 1 | | |
| 1. 2. 3. 4. 13. Book | https://www.yout http://www.infoc https://scrippslab https://nptel.ac.in s recommended: Introduction to sp Spectroscopic met | ube.com/watch?v=2Y8pSoS0d obuild.com/education/audio-v s.com/summary-of-spectrosco /content/storage2/courses/10 ectroscopy: Pavia, Lampman 8 chods in organic chemistry: H. ¹ | 1g ideo-courses/chemistry/ApplicationOfSpectroscopicMet pic-techniques/ 2103044/pdf/mod2.pdf Kriz, 3rd Ed, Books/cole. Williams and Ian fleminig, V Edition Tata Mc Grawhills | nods-IIT-N | 1adras/ | lecture- | 25.htm | I | | |
| 1. 2. 3. 4. 13. Book 1. 2. | https://www.yout http://www.infoc https://scrippslab https://nptel.ac.in serecommended: Introduction to sp Spectroscopic met Organic spectrosco | ube.com/watch?v=2Y8pSoS0d obuild.com/education/audio-v s.com/summary-of-spectrosco /content/storage2/courses/10 ectroscopy: Pavia, Lampman 8 chods in organic chemistry: H. 1 opy: William Kemp, 3rd Editior | 1g ideo-courses/chemistry/ApplicationOfSpectroscopicMet pic-techniques/ 2103044/pdf/mod2.pdf Kriz, 3rd Ed, Books/cole. Williams and Ian fleminig, V Edition Tata Mc Grawhills | | | | | I | | |
| 1. 2. 3. 4. 13. Book 1. 2. 3. | https://www.yout http://www.infoc https://scrippslab https://nptel.ac.in s recommended: Introduction to sp Spectroscopic mel Organic spectrosc Fundamentals of <i>i</i> | ube.com/watch?v=2Y8pSoS0d obuild.com/education/audio-v s.com/summary-of-spectrosco /content/storage2/courses/10 ectroscopy: Pavia, Lampman 8 chods in organic chemistry: H. 1 opy: William Kemp, 3rd Editior Analytical chemistry, Douglas A | 1g ideo-courses/chemistry/ApplicationOfSpectroscopicMet pic-techniques/ 2103044/pdf/mod2.pdf Kriz, 3rd Ed, Books/cole. Williams and Ian fleminig, V Edition Tata Mc Grawhills , Palgrave publications. | | | | | 1 | | |
| 1. 2. 3. 4. 13. Book 1. 2. 3. 4. 5. 6. | https://www.yout http://www.infoc https://scrippslab https://nptel.ac.in ss recommended: Introduction to sp Spectroscopic mel Organic spectrosc Fundamentals of A Principles and pra Analytical chemist | ube.com/watch?v=2Y8pSoS0d obuild.com/education/audio-v s.com/summary-of-spectrosco /content/storage2/courses/10 ectroscopy: Pavia, Lampman & chods in organic chemistry: H. Y opy: William Kemp, 3rd Editior Analytical chemistry, Douglas A ctice of analytical chemistry, F. ry, Gary D. Christian, 6th editic | 1g ideo-courses/chemistry/ApplicationOfSpectroscopicMet pic-techniques/ 2103044/pdf/mod2.pdf Kriz, 3rd Ed, Books/cole. Williams and Ian fleminig, V Edition Tata Mc Grawhills , Palgrave publications. . Skoog, Donald M. West, F. James Holler, 7th edition, Ha W. Fifield, D. Kealey, 5th edition, Blackwell publication. m, Wiley and sons publication. | | | | | 1 | | |
| 1. 2. 3. 4. 13. Book 1. 2. 3. 4. 5. | https://www.yout http://www.infoc https://scrippslab: https://nptel.ac.in ss recommended: Introduction to sp Spectroscopic met Organic spectrosc Fundamentals of A Principles and pra Analytical chemist Spectrometric ide | ube.com/watch?v=2Y8pSoS0d obuild.com/education/audio-v s.com/summary-of-spectrosco /content/storage2/courses/10 ectroscopy: Pavia, Lampman & chods in organic chemistry: H. Y opy: William Kemp, 3rd Edition Analytical chemistry, Douglas A ctice of analytical chemistry, F. ry, Gary D. Christian, 6th edition ntification of organic compoun | 1g ideo-courses/chemistry/ApplicationOfSpectroscopicMet pic-techniques/ 2103044/pdf/mod2.pdf Kriz, 3rd Ed, Books/cole. Williams and Ian fleminig, V Edition Tata Mc Grawhills , Palgrave publications. . Skoog, Donald M. West, F. James Holler, 7th edition, Ha W. Fifield, D. Kealey, 5th edition, Blackwell publication. | | | | | I | | |

| 1. Name of the Department | nt: CHEMISTRY | | | | | | | | | |
|--|---|--|---|--|----------------------------|----------------------------|-----------------------|------------------|------------------|-----------------------|
| 2. Course Name | CHEMICAL PROCESS INDUST | TRY | | L | | • | г | | Р | |
| 3. Course Code | СН309 | | | 3 | | | L | | 0 | |
| 4. Type of Course (use tick | mark) | | (| Core (√) | | DE | () | | FC (|) |
| 5. Pre-requisite (if any) | 10+2 with Chemistry | 6. | Frequency (use tick marks) Even (V) | Odd (|) | Either | Sem (|) E | very Sei | n() |
| 7. Total Number of Lecture | es, Tutorials, Practicals | | | | | | | | | |
| Lect | ures = 30 | | Tutorials = 10 | | | Practic | al = Nil | | | |
| | | | study the composition, preparation, properties and | d uses of | ammo | nia, nitr | ic acid, | phosph | iorus ch | emical |
| | | oxic ha | zards on the health of consumer. | | | | | | | |
| 9. COURSE OUTCOMES (CO | | | | | | | | | | |
| COURSE OUTCOME (CO) | completion, learners will develo | op foll | | | | | | | | |
| | Evaluate different preparation | | sses for the manufacture of ammonia, nitric acid, a | mmoniu | m nitra | to and a | mmon | ium culi | hate a | nd thai |
| CO1 | related quality control, hazard | | | innioniu | mmua | | | uni sui | Jiate a | iu thei |
| CO2 | | | thods of caustic soda and phosphorus chemicals an | d their n | ronerti | es and i | | | | |
| | | - | | | operti | | 505. | | | |
| CO3 | Understand the composition of | of glass | and their types, properties and uses. | | | | | | | |
| CO4 | Analyze the composition, type | es, prop | perties and preparation of cement and its setting tin | ne. | | | | | | |
| CO5 | Understand the classification, | prope | ties and uses of ceramics and refractories and thei | r respect | ive cha | racteris | tics. | | | |
| 10. Unit wise detailed con | tent | | | | | | | | | |
| Unit-1 | Number of lectures = 08 | Titl | e of the unit: SYNTHETIC NITROGEN PRODUCTS | | | | | | | |
| | | ulphat | e their manufacture with reference to; consumption | n Pattern | , Raw r | naterial | s, Produ | uction p | rocess, | Quality |
| control, Hazards and safety a | | | | | | | | | | |
| Unit-2 | Number of lectures =08 | | of the unit: CHLOR – ALKALI INDUSTRIAL PRODUC | | | | | | | <u>C'l'</u> |
| Caustic soda Chlorine. Pho: calcium carbide. | sphorus chemicals; Phosphoru | is, pho | sphoric acid, ammonium phosphate, superphosp | hate, tri | ole sup | erphosp | bhate. I | .ime, g | psum, | Silicon |
| Unit-3 | Number of lectures = 08 | Title | of the unit: GLASS | | | | | | | |
| | | | acteristics, raw Materials, Chemical Reactions, Meth | nods of M | lanufad | ture an | d Uses | | | |
| | | | · · · · | | | | u 0303. | | | |
| Unit-4 | Number of lectures = 08 | | of the unit: CEMENT | | | | | | · · | |
| Testing & Uses of cement. | Types of cement, Portland cer | ment; i | raw Materials, manufacture of Cement by wet & I | Dry proce | ess, Rea | action II | n the K | in, sett | ing of c | ement |
| Unit-5 | Number of lectures = 08 | Title | of the unit: CERAMICS AND REFRACTORIES | | | | | | | |
| Introduction, Types of cerar | nics materials, properties and | applic | ations. Refractories, classification of refractories, c | haracter | istics of | refract | ories m | aterials | , prope | rties o |
| refractories. Neutral refracto | ories; Silicon carbide. Acid refra | octories | ; High Alumina refractories. | | | | | | | |
| 11. CO-PO mapping | | | | | | | | | | |
| COs | | | | | | | | | | |
| | | Attribu | ites | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | P07 |
| (0) | preparation processes for the | manu | facture of ammonia, nitric acid, ammonium nitrat | <u>م</u> | - | | | | | - |
| and ammonium su | preparation processes for the lphate and their related quality | manu y contr | facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. | ^{.e} 3 | PO2 2 | PO3 3 | PO4 3 | PO5 2 | PO6 3 | PO7 2 |
| and ammonium su Evaluate different | preparation processes for the lphate and their related quality | manu y contr | facture of ammonia, nitric acid, ammonium nitrat | ^{.e} 3 | - | | | | | - |
| CO1 and ammonium su CO2 Evaluate different and uses. | preparation processes for the lphate and their related quality manufacturing methods of ca | manu y contro ustic s | facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie | ²⁸ 3 | 2 | 3 | 3 | 2 | 3 | 2 |
| col and ammonium su col Evaluate different and uses. col Understand the col | preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ | manu y contro ustic s pes, pro | facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses. | ^e 3 ²⁵ 3 3 | 2 2 2 2 | 3 3 3 | 3 3 3 | 2 1 1 | 3 3 3 | 2 2 2 |
| col and ammonium su col Evaluate different and uses. col Understand the col | preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ | manu y contro ustic s pes, pro | facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie | ²⁸ 3 | 2 | 3 | 3 | 2 | 3 | 2 |
| CO1 and ammonium su CO2 Evaluate different and uses. CO3 Understand the co CO4 Analyze the compo CO5 Understand the co | preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ ssition, types, properties and p | manu y contri ustic s pes, pro | facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses. | ²⁵ 3 3 3 3 | 2 2 2 2 2 | 3 3 3 3 | 3 3 3 3 | 2 1 1 1 | 3 3 3 3 | 2 2 2 2 2 |
| col and ammonium su col Evaluate different and uses. col Understand the col col Analyze the compo | preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ position, types, properties and pro- classification, properties and pro- | reparat | facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses. tion of cement and its setting time. f ceramics and refractories and their respectiv | e 3 25 3 3 3 re 3 | 2 2 2 2 | 3 3 3 | 3 3 3 | 2 1 1 | 3 3 3 | 2 2 2 |
| col and ammonium su co2 Evaluate different and uses. co3 Understand the co co4 Analyze the comport characteristics. | preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ position, types, properties and pro- classification, properties and pro- 3 Strong | y contra ustic s pes, pro repara uses o g contr | facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses. tion of cement and its setting time. | e 3 25 3 3 3 re 3 | 2 2 2 2 2 | 3 3 3 3 | 3 3 3 3 | 2 1 1 1 | 3 3 3 3 | 2 2 2 2 2 |
| CO1 and ammonium su CO2 Evaluate different and uses. CO3 Understand the co CO4 Analyze the compo CO5 Understand the co characteristics. 12. Brief description of set | preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ position, types, properties and pr classification, properties and pr 3 Strong f-learning / E-learning compore | manu y contri ustic s pes, pro reparat uses o g contri nent | facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses. tion of cement and its setting time. f ceramics and refractories and their respectiv ibution, 2 Average contribution , 1 Low contributio | e 3 25 3 3 3 re 3 | 2 2 2 2 2 | 3 3 3 3 | 3 3 3 3 | 2 1 1 1 | 3 3 3 3 | 2 2 2 2 2 |
| CO1 and ammonium su CO2 Evaluate different and uses. CO3 Understand the co CO4 Analyze the comport Understand the co characteristics. 12. Brief description of set 1. https://encycloped | preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ position, types, properties and pr lassification, properties and pr 3 Strong f-learning / E-learning compor edia2.thefreedictionary.com/ch | manu y contri ustic s pes, pro reparat uses o g contri nent nemica | facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses. tion of cement and its setting time. f ceramics and refractories and their respectiv ibution, 2 Average contribution , 1 Low contributio | e 3 25 3 3 3 re 3 | 2 2 2 2 2 | 3 3 3 3 | 3 3 3 3 | 2 1 1 1 | 3 3 3 3 | 2 2 2 2 2 |
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| col and ammonium su co2 Evaluate different and uses. co3 Understand the co co4 Analyze the compo co5 Understand the co characteristics. 12. Brief description of sel 1. https://encyclope 2. https://www.you 3. https://www.che | preparation processes for the lphate and their related quality manufacturing methods of ca mposition of glass and their typ sition, types, properties and p lassification, properties and p 3 Strong f-learning / E-learning compor edia2.thefreedictionary.com/ch tube.com/watch?v=RjZJjneJ5fk | manu y contru ustic s pes, pro repara uses o g contru nent nemica | facture of ammonia, nitric acid, ammonium nitrat ol, hazards, safety and effluent management. oda and phosphorus chemicals and their propertie operties and uses. tion of cement and its setting time. f ceramics and refractories and their respectiv ibution, 2 Average contribution , 1 Low contributio I+process+industry | e 3 25 3 3 3 re 3 | 2 2 2 2 2 | 3 3 3 3 | 3 3 3 3 | 2 1 1 1 | 3 3 3 3 | 2 2 2 2 2 |
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Chemical process principales: part 1 & II – O.A / Hougen, K.M Watson RA Ragatz (CBS)
 Shrev's Chemical process Industries: 5th edition – George T. Austin, Mc Graw Hill.

| Course Name FUNDAMENTAL OF FOOD CHEMISTRY L T P 6. Course Course (use take wark) Course Course (use take wark) Course Course (use take wark) FC () FC | 1. Name of the Departmen | t: CHEMISTRY | | | | | | | | |
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| C02 witamins and minerals. C03 Describe the principles in food processing techniques and differentiate food preservation methods like heat preservation and co preservation, food packaging. C04 Able to explain different types of food additives with examples and judge its value in real life. C05 Analyze the importance of food safety and food related physical, chemical and biological hazards. 10. Unit wise detailed content Unit-1 Number of lectures = 08 Title of the unit: GOVENNMENTAL REGULATIONS Introduction, Food laws and standards: Indian food safety aws and standards. Quality and safety assurance in food industry: BIS Laboratory Services and Certification I BIS. Number of lectures = 08 Title of the unit: CONSTITUENTS OF FOOD AND THEIR NUTRITIVE ASPECTS Carbohydrates, Proteins, Fats and olis, Vitamins and Minerals. Inite of the unit: FOOD PROCESSING TECHNIQUES Common unit operations, Food deterioration and their control; Heat preservation and processing. Colouring agents, Sweetening agents & Flavori agents. Unit-5 Number of lectures = 08 Title of the unit: FOOD ADDTIVES Vonted Number of lectures = 08 Title of the unit: FOOD SAFETY, RISK AND HAZARDS Food related Hazards, Microbiological Considerations in food safety. Effects of processing and storage on microbial safety. Chemical hazards associated with food yevention methods from food bar dus and food standards, value of quality assurance and safety assuranc | C01 | Understanding of Indian food | law and food standards, value of quality assurance a | and safety assu | rance | | | | | |
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| Unit-1 Number of lectures = 08 Title of the unit: GOVERNMENTAL REGULATIONS Introduction, Food laws and standards: Indian food safety laws and standards; Quality and safety assurance in food industry: BIS Laboratory Services and Certification I BIS. Unit-2 Number of lectures = 08 Title of the unit: CONSTITUENTS OF FOOD AND THEIR NUTRITIVE ASPECTS Carbohydrates, Proteins, Fats and oils, Vitamins and Minerals. Unit-3 Number of lectures = 08 Title of the unit: FOOD PROCESSING TECHNIQUES Common unit operations, Food deterioration and their control: Heat preservation and processing. Cold preservation and processing Food dehydration, Foot concentration & food packaging. Unit-4 Number of lectures = 08 Title of the unit: FOOD ADDITIVES Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents agents. Unit-5 Number of lectures = 08 Title of the unit: FOOD SAFETY, RISKS AND HAZARDS Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food prevention methods from food born disease. 11.0 -PO mapping 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 </td <td>CO5</td> <td>Analyze the importance of foc</td> <td>d safety and food related physical, chemical and bio</td> <td>ological hazards</td> <td>.</td> <td></td> <td></td> <td></td> <td></td> <td></td> | CO5 | Analyze the importance of foc | d safety and food related physical, chemical and bio | ological hazards | . | | | | | |
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| bis. Unit-2 Number of lectures =08 Title of the unit: CONSTITUENTS OF FOOD AND THEIR NUTRITIVE ASPECTS Carbohydrates, Proteins, Fats and olis, Vitamins and Minerals. Unit-3 Number of lectures = 08 Title of the unit: FOOD PROCESSING TECHNIQUES Common unit operations, Food deterioration and their control; Heat preservation and processing, Cold preservation and processing Food dehydration, Food concentration & food packaging. Unit-4 Number of lectures = 08 Title of the unit: FOOD ADDITIVES Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents & Flavorir agents. Unit-5 Number of lectures = 08 Title of the unit: FOOD SAFETY, RISKS AND HAZARDS Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food Prevention methods from food born disease. 11. CO-PO mapping COS Mathematical Structure, properties and argue importance of food components, including 3 2 3 3 2 3 3 3 3 CO2 Comprehension of chemical structure, properties and argue importance of food components, including 3 2 2 2 3 3 3 3 3 CO3 heat preservation and cold preservation, food packaging CO4 blue to explain different types of food additives with examples and judge its value in real life. 3 2 2 2 3 3 3 3 3 CO4 Able to explain different types of food additives with examples and judge its value in real life. 3 Leff description of self-learning <i>Chemistry</i> . Average contribution, 1 Low contribution 12. Brief description of self-learning <i>Chemistry</i> . 13. http://www.basicknowledge101.com/pdf/Food%20chemistry.basics/ 3 https://www.cabdirect.org/cabdirect/abstract/19710406009 4. https://www.cabdirect.org/cabdirect/abstract/19710406009 4. https://www.cabdirect.org/cabdirect/abstract/19710406009 4. https://www.cabdirect.org/cabdirect/abstract/19710406009 4. https://www.cabdirect.org/cabdirect/abstract/19710406009 4. https://wwww.cabdirect.o | Unit-1 | Number of lectures = 08 | Title of the unit: GOVERNMENTAL REGULATION | S | | | | | | |
| Unit-2 Number of lectures =08 Title of the unit: CONSTITUENTS OF FOOD AND THEIR NUTRITIVE ASPECTS Carbohydrates, Proteins, Fats and oils, Vitamins and Minerals. Number of lectures = 08 Title of the unit: FOOD PROCESSING TECHNIQUES Common unit operations, Food deterioration and their control; Heat preservation and processing. Cold preservation and processing Food dehydration, Foo concentration & food packaging. Number of lectures = 08 Title of the unit: FOOD ADDITIVES Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents & Flavorir agents. Number of lectures = 08 Title of the unit: FOOD SAFETY, RISKS AND HAZARDS Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food Provemption methods from food barn disease. PO1 PO2 PO3 PO4 PO5 PO6 PO7 CO1 Understanding of Indian food law and food standards, value of quality assurance and safety assurance 3 2 3 3 3 3 CO2 Coarprehension of chemical structure, properties and argue importance of food components, including all preservation and coid preservation, food packaging 3 2 2 3 3 3 CO2 Coarprehension of chemical structure, properties and argue importance of food | | standards: Indian food safety | laws and standards; Quality and safety assurance in | food industry; | BIS La | borator | y Servic | es and | Certifica | ation by |
| Carbohydrates, Proteins, Fats and oils, Vitamins and Minerals. Unit-3 Number of lectures = 08 Title of the unit: FOOD PROCESSING TECHNIQUES Common unit operations, Food deterioration and their control; Heat preservation and processing, Cold preservation and processing Food dehydration, Foo concentration & food packaging. Unit-4 Number of lectures = 08 Title of the unit: FOOD ADDITIVES Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents & Flavorin agents. Unit-5 Number of lectures = 08 Title of the unit: FOOD SAFETY, RISKS AND HAZARDS Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food Prevention methods from food born disease. 11. CO-PO mapping CO1 Understanding of Indian food law and food standards, value of quality assurance and safety assurance 3 2 3 3 3 CO2 Comprehension of chemical structure, properties and argue importance of food components, including a z 2 3 3 3 3 3 3 3 3 3 3 2 2 | | | | | | | | | | |
| Unit:3 Number of lectures = 08 Title of the unit: FOOD PROCESSING TECHNIQUES Common unit operations, Food deterioration and their control; Heat preservation and processing, Cold preservation and processing Food dehydration, Food concentration & food packaging. Unit:4 Number of lectures = 08 Title of the unit: FOOD ADDITIVES Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents & Flavorin agents. Unit:5 Number of lectures = 08 Title of the unit: FOOD SAFETY, RISKS AND HAZARDS Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food prevention methods from food born disease. 11. CO-PO mapping COs Attributes PO1 PO2 PO3 PO4 PO5 PO6 PO7 CO1 Understanding of Indian food law and food standards, value of quality assurance and safety assurance 3 2 3 3 3 CO3 Comprehension of chemical structure, properties and argue importance of food components, including a 2 2 3 3 3 CO3 Describe the principles in food processing techniques and judge its value in real life. 3 2 2 3 3 3 3 <td></td> <td></td> <td></td> <td>HEIR NUTRITI</td> <td>/e aspe</td> <td></td> <td></td> <td></td> <td></td> <td></td> | | | | HEIR NUTRITI | /e aspe | | | | | |
| Common unit operations, Food deterioration and their control; Heat preservation and processing, Cold preservation and processing Food dehydration, Foc Unit-4 Number of lectures = 08 Title of the unit: FOOD ADDITIVES Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents & Flavorir agents. Unit-5 Number of lectures = 08 Title of the unit: FOOD SAFETY, RISKS AND HAZARDS Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food Prevention methods from food born disease. 11. CO-PO mapping PO1 PO2 PO3 PO4 PO5 PO6 PO7 CO1 Understanding of Indian food law and food standards, value of quality assurance and safety assurance 3 2 3 3 3 CO2 Comprehension of chemical structure, properties and argue importance of food components, including a 2 2 3 3 3 CO3 Describe the principles in food processing techniques and differentiate food preservation methods like a 2 2 2 3 3 3 CO4 Able to explain different types of food additives with examples and judge its value in real life. 3 2 2 2 3 | , | | | | | | | | | |
| Concentration & food packaging. Number of lectures = 08 Title of the unit: FOOD ADDITIVES Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents & Flavoring agents. Unit 5 Number of lectures = 08 Title of the unit: FOOD SAFETY, RISKS AND HAZARDS Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food prevention methods from food born disease. 11. CO-PO mapping COs Attributes PO1 PO2 PO3 PO4 PO5 PO6 PO7 CO1 Understanding of Indian food law and food standards, value of quality assurance and safety assurance 3 2 3 2 3 3 3 CO2 Comprehension of chemical structure, properties and argue importance of food components, including as the preservation and cold preservation, food packaging 3 2 2 2 3 3 3 CO3 heat preservation and cold preservation, food packaging 3 2 2 2 3 3 3 CO4 Able to explain different types of food additives with examples and judge its value in real life. 3 2 2 3 3 <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> | | | | - | | | | | | |
| Unit-4 Number of lectures = 08 Title of the unit: FOOD ADDITIVES Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents & Flavorin agents. Unit-5 Number of lectures = 08 Title of the unit: FOOD SAFETY, RISKS AND HAZARDS Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food Prevention methods from food born disease. 11. CO-PO mapping COs Attributes PO1 PO2 PO3 PO4 PO5 PO6 PO7 CO1 Understanding of Indian food law and food standards, value of quality assurance and safety assurance 3 2 3 3 3 CO2 Comprehension of chemical structure, properties and argue importance of food components, including acribohydrates, protein, lipids, vitamins and minerals. 3 2 2 3 3 3 CO3 Describe the principles in food processing techniques and judge its value in real life. 3 2 2 2 3 3 3 CO4 Able to explain different types of food additives with examples and judge its value in real life. 3 2 2 2 3 3 3 | | | control; Heat preservation and processing, Col | d preservation | n and | process | ing Foo | od deh | ydratior | n, Food |
| Preservatives, Antioxidants, Chelating agents, Surface active agents, Stabilizing and Thickening agents, Buffering agents, Colouring agents, Sweetening agents & Flavorir agents. Unit-5 Unit-5 Unit-5 Unit-5 Unit-5 Unit-5 Unit-5 Title of the unit: FOOD SAFETY, RISKS AND HAZARDS Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food Prevention methods from food born disease. 11. CO-PO mapping CO1 Understanding of Indian food law and food standards, value of quality assurance and safety assurance CO1 Understanding of Indian food law and food standards, value of quality assurance and safety assurance CO2 Comprehension of chemical structure, properties and argue importance of food components, including CO2 Comprehension of chemical structure, properties and argue importance of food components, including CO3 Co2 Comprehension of chemical structure, properties and argue importance of food components, including CO3 Co3 Describe the principles in food processing techniques and differentiate food preservation methods like heat preservation and cold preservation, food packaging CO4 Able to explain different types of food additives with examples and judge its value in real life. CO5 Analyze the importance of food safety and food related physical, chemical and biological hazards. CO3 Co5 Analyze the importance of food safety and food related physical, chemical and biological hazards. CO5 Analyze the importance of sold startar() PO0/PO0/PO0/PO0/PO0/PO0/PO0/PO0/PO0/PO0/ | | | Title of the unit: FOOD ADDITIVES | | | | | | | |
| Agents. Number of lectures = 08 Title of the unit: FOOD SAFETY, RISKS AND HAZARDS Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food Prevention methods from food born disease. 11. CO-PO mapping COS Attributes PO1 PO2 PO3 PO4 PO5 PO6 PO7 CO1 Understanding of Indian food law and food standards, value of quality assurance of food components, including a 2 3 2 3 | | | | ng agents, Colo | uring a | gents, S | weeten | ing age | nts & Fl | lavoring |
| Food related Hazards, Microbiological Considerations in food safety, Effects of processing and storage on microbial safety, Chemical hazards associated with food Prevention methods from food born disease. 11. CO-PO mapping CO1 PO1 PO2 PO3 PO4 PO5 PO6 PO7 CO1 Understanding of Indian food law and food standards, value of quality assurance and safety assurance 3 2 3 2 3 2 3 2 2 3 2 2 3 2 2 3 3 2 2 3 3 2 2 3 3 2 2 3 3 2 2 3 3 2 2 3 3 2 2 2 3 3 | | | | | | | | | | |

| 1. Name of the Department | nt: CHEMISTRY | | | | | | | | | |
|--|---|---|-----------------|------------------|----------|-----------|-----------|----------|----------|----------|
| 2. Course Name | DAIRY CHEMISTRY | | | L | | 1 | г | | Р | |
| 3. Course Code | CH311 | | | 3 | | | 1 | | 0 | |
| 4. Type of Course (use tick | (mark) | | | Core () | | DE | (√) | | FC (|) |
| 5. Pre-requisite (if any) | 10+2 with Chemistry | 6. Frequency (use tick marks) | Even (V) | Odd (| | Either | |) E | very Se | - |
| 7. Total Number of Lectur | es, Tutorials, Practicals | | i | | | | | | | |
| Lect | ures = 30 | Tutorials = 10 | | | | Practic | al = Nil | | | |
| 8. COURSE OBJECTIVES: TO | o introduce students to an un | derstanding of the chemistry of milk | constituents | . Milk and var | ous da | airy prod | ducts a | re discu | issed fr | om the |
| perspective of the chemical, | physical and biological change | s that occur during processing. | | | | | | | | |
| 9. COURSE OUTCOMES (CO | <u> </u> | | | | | | | | | |
| After the successful course of | completion, learners will devel | op following attributes: | | | | | | | | |
| COURSE OUTCOME (CO) | | ATT | RIBUTES | | | | | | | |
| C01 | Students will be able to descri | be the composition of milk, identify the | e approximat | e content of ind | lividua | l types p | resent | | | |
| CO2 | Students will integrate their k | nowledge of food chemistry and descri | be physicoch | emical characte | ristics | of the m | nain cor | nponen | ts. | |
| СОЗ | Student will be able to explain processing steps involved. | how dairy products (such as fluid milk | , yogurt, butt | er, powder, che | eese) a | re made | and th | e key fu | inctions | of the |
| CO4 | Student will be able explain ar the adulteration. | nd apply the processing techniques to p | produce milk | products such a | s butte | er, crear | n, ghee | etc. an | d also d | etect |
| CO5 | Students will integrate their ki | nowledge of food chemistry to produce | e fermented r | nilk products su | ıch as i | ice-crea | ns milk | powde | r etc. | |
| 10. Unit wise detailed con | tent | | | | | | | | | |
| Unit-1 | Number of lectures = 08 | Title of the unit: INTRODUCTION | | | | | | | | |
| Definition, Composition, Mil | k lipids, Milk proteins, vitamins | and minerals. Factors affecting the co | mposition of | milk, adulteran | ts, pres | servative | es. | | | |
| Unit-2 | Number of lectures =08 | Title of the unit: PROPERTIES OF MI | LK | | | | | | | |
| Flavour and aroma, acidity, s | specific gravity, viscosity and co | nductivity. Estimation of fat, acidity an | nd total solids | in milk. | | | | | | |
| Unit-3 | Number of lectures = 08 | Title of the unit: PROCESSING OF N | 1ILK | | | | | | | |
| Effect of heat on milk, chen | nical changes taking place in m | ilk due to processing, sterilization, ho | mogenizatior | n and pasteuriz | ation, v | vacuum | pasteu | rization | and Ul | tra high |
| temperature pasteurization. | | | | | | | | | | |
| Unit-4 | Number of lectures = 08 | Title of the unit: MILK PRODUCTS | | | | | | | | |
| | | definition, composition, theory of cl | nurning, desi- | -butter, salted | butter | . Ghee; | major (| constitu | ients, c | ommon |
| adulterants and their detect Unit-5 | Number of lectures = 08 | Title of the unit: FERMENTAED MIL | | | | | | | | |
| | | 5. Composition, types, manufactures of | | stabilizers, emi | lsifiers | and th | eir role. | Milk p | owder. | process |
| of making milk powder. | | | ··· · · , | | | , | | r | , | |
| 11. CO-PO mapping | | | | | | | | | | |
| COs | | Attributes | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
| CO1 Students will be a types present | ble to describe the composition | on of milk, identify the approximate of | content of in | dividual 1 | 1 | 1 | 1 | 2 | 3 | 3 |
| CO2 | | nemistry and describe physicochemical | characteristi | cs of 2 | 1 | 1 | 1 | 3 | 2 | 3 |
| the main compone | | | | | | | | | | |
| made and the key | functions of the processing ste | | | 3 | 1 | 1 | 1 | 2 | 3 | 3 |
| cream, ghee etc. a | nd also detect the adulteration | | | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| CO5 Creams milk powd | _ | nemistry to produce fermented milk pr | oducts such a | as ice- | 1 | 1 | 1 | 2 | 2 | 2 |
| | 3 Strong | g contribution, 2 Average contribution | , 1 Low cont | ribution | | | | | | |
| | If-learning / E-learning compor | | | | | | | | | |
| | itube.com/watch?v=S4brYhScY | | | | | | | | | |
| | | es_of_milk_dairy_and_food_engineerir | ng.pdf | | | | | | | |
| | itube.com/watch?v=iAaRs4vM8 itube.com/watch?v=QvSw68wJ | | | | | | | | | |
| 13. Books recommended: | | μųν | | | | | | | | |
| | ry-K.Bagavathi Sundari MJP Pub | lishers Chennai, 2006. | | | | | | | | |
| | y technology - Robert Jenness | | | | | | | | | |
| - | lucts - Rangappa and Acharya, I | | | | | | | | | |
| | Dairy chemistry - Wond. F.P. S | 0 | | | | | | | | |
| | Technology - Sukumar De. – Ox | | | | | | | | | |
| Applied chemistr | y for home science & allied scie | nce - 1.Jacob, Micmillan. | | | | | | | | |

| 1. Name of the | Departmen | t: CHEMISTRY | | | | | | | | | | |
|--------------------------|--|----------------------------------|---------|---------------------------------|-----------------|------------|-----|---------|----------|-----|----------|-----|
| 2. Course Name | e | PROJECT TRAINING (3 MON | THS) | | | L | | 1 | Г | | Р | |
| 3. Course Code | | CH312 | | | | 0 | | (|) | | 0 | |
| 4. Type of Cour | rse (use tick | mark) | | | | Core (√) | | DE | () | | FC (|) |
| 5. Pre-requisite | e (if any) | 10+2 with Chemistry | 6. | Frequency (use tick marks) | Even (√) | Odd () |) | Either | Sem (|) E | very Sei | m() |
| 7. Total Numbe | er of Lecture | es, Tutorials, Practicals | | | | | | | | | | |
| | Lectu | ires = 30 | | Tutorials = 10 | | | | Practic | al = Nil | | | |
| 8. COURSE OBJE | B. COURSE OBJECTIVES: The main objective is to enhance the technical skills and to provide students industrial exposure. | | | | | | | | | | | |
| 9. COURSE OUTCOMES (CO): | | | | | | | | | | | | |
| After the success | ful course c | ompletion, learners will devel | op foll | owing attributes: | | | | | | | | |
| COURSE OUTO | COME (CO) | | | AT | TRIBUTES | | | | | | | |
| CO1 | | Hands on training | | | | | | | | | | |
| CO2 | | Integrate classroom theory wi | th labo | pratory scale practice. | | | | | | | | |
| CO3 | | Understanding professional et | hics of | f industry and code of conduct. | | | | | | | | |
| 10. CO-PO mapp | ing | | | | | | | | | | | |
| COs | | | Attribu | utes | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | P07 |
| CO1 Hands of | on training | | | | | 3 | 2 | 3 | 2 | 3 | 3 | 3 |
| CO2 Integra | O2 Integrate classroom theory with laboratory scale practice. | | | | | | | 2 | 3 | 3 | 3 | 3 |
| CO3 Unders | tanding pro | fessional ethics of industry and | code | of conduct. | | 3 | 2 | 2 | 2 | 3 | 3 | 3 |
| | | 3 Strong | g contr | ribution, 2 Average contributio | on , 1 Low cont | tribution | | | | | | |

| 1. Name of the Departmen | 1. Name of the Department: CHEMISTRY | | | | | | | | | | | |
|--------------------------|--------------------------------------|---|---|---|--|--|--|--|--|--|--|--|
| 2. Course Name | ORAL PRESENTATION | L | т | Р | | | | | | | | |
| 3. Course Code | CH313 | 0 | 0 | 8 | | | | | | | | |