|| सा विद्या या विमुक्तये ||

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

"ज्ञानतीर्थ" परिसर, विष्णुपूरी, नांदेड - ४३१६०६ (महाराष्ट्र)

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

"Dnyanteerth", Vishnupuri, Nanded - 431606 Maharashtra State (INDIA)

Established on 17th September 1994 – Recognized by the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'A' Grade

ACADEMIC (1-BOARD OF STUDIES) SECTION

Phone: (02462) 229542
Fax : (02462) 229574

Website: www.srtmun.ac.in

E-mail: bos.srtmun@gmail.com

संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील तृतीय वर्षाचे CBCS Pattern नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०२१–२२ पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, मा. विद्याशाखेने **दिनांक ३१ मे २०२१ रोजीच्या बैठकीतील केलेल्या शिफारशीप्रमाणे व दिनांक १२ जून २०२१ रोजी संपन्न झालेल्या ५१ व्या मा. विद्या परिषद बैठकीतील विषय क्र. २६/५१–२०२१**च्या ठरावानुसार प्रस्तुत विद्यापीठाच्या **संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील तृतीय वर्षाचे** खालील विषयांचे **C.B.C.S. (Choice Based Credit System) Pattern** नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०२१–२२ पासून लागू करण्यात येत आहेत.

1. B.Sc.-III Year-Biophysics
2. B.Sc.-III Year-Bioinformatics
3. B.Sc.-III Year-Biotechnology
4. B.Sc.-III Year-Biotechnology (Vocational)
5. B.Sc.-III Year-Botany
6. B.Sc.-III Year-Horticulture
7. B.Sc.-III Year-Agro Chemical Fertilizers
8. B.Sc.-III Year-Analytical Chemistry
9. B.Sc.-III Year-Biochemistry
10. B.Sc.-III Year-Chemistry
11. B.Sc.-III Year-Dyes & Drugs Chemistry
12. B.Sc.-III Year-Industrial Chemistry
13. B.C.A. (Bachelor of Computer Application)-III Year
14. B.I.T. (Bachelor of Information Technology)-III Year
15. B.Sc.-III Year-Computer Science
16. B.Sc.-III Year-Network Technology
17. B.Sc.-III Year-Computer Application (Optional)
18. B.Sc.-III Year-Computer Science (Optional)
19. B.Sc.-III Year-Information Technology (Optional)
20. B.Sc.-III Year-Software Engineering
21. B.Sc.-III Year-Dairy Science
22. B.Sc.-III Year-Electronics
23. B.Sc.-III Year-Environmental Science
24. B.Sc.-III Year-Fishery Science
25. B.Sc.-III Year-Geology
26. B. A./B.Sc.-III Year-Mathematics
27. B.Sc.-III Year-Microbiology
28. B.Sc.-III year Agricultural Microbiology
29. B.Sc.-III Year-Physics
30. B. A./B.Sc.-III Year Statistics
31. B.Sc.-III Year-Zoology

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या **www.srtmun.ac.in** या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी, ही विनंती.

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.
जा.क्र.: शैक्षणिक–१/परिपत्रक/पदवी–सीबीसीएस अभ्यासक्रम/२०२१–२२/७५

दिनांक : १२.०७.२०२१.

स्वाक्षरित
सहा.कुलसचिव
शैक्षणिक (१–अभ्यासमंडळ) विभाग

प्रत माहिती व पुढील कार्यवाहीस्तव :
१) मा. कुलसचिव यांचे कार्यालय, प्रस्तुत विद्यापीठ.
२) मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
३) प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
४) साहाय्यक कुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.
७) अधीक्षक, परिक्षा विभाग विज्ञान व तंत्रज्ञान विद्याशाखा प्रस्तुत विद्यापीठ.

Swami Ramanand Teerth Marathwada University, Nanded

B. O. S. IN CHEMISTRY

B. SC. THIRD YEAR (INDUSTRIAL CHEMISTRY)

SEMESTER- V & VI

CBCS Course

Effective from JUNE – 2021

Swami Ramanand Teerth Marathwada University, Nanded
Choice Based Credit System (CBCS) Course
Structure Faculty of Science
B. Sc. Third Year Syllabus
Semester Pattern effective from June 2021
Subject: Industrial Chemistry

Semester	Course No	Name of the course	Instruction Hrs/Week	Total Period	CA (Int.)	ESC (Ext.)	Total Makrs	Credits
V	DSEIC V (Section A)	Theory Paper-XII Unit processes in Organic Synthesis (P-XII)	03	45	10	40	50	02
	DSEIC V [(Section B) Elective]	Theory Paper-XIII Process Equipment & Design & Process Instrumentation (P-XIII)- B1 OR (Elective Paper) Chemical Engineering Thermodynamics (P-XIII) (P-XIII) B2	03 03	45 45	10 10	40 40	50 50	02
	DSEICP- IV [DSIC V &VI (Section A)]	Practical's based on P-XII & P-XIV (P-XVI) OR (Elective Paper) Practical's based on Elective	04 04	Practicals 08 08 16	05 05 10	20 20 20	25 25 50	01 01
	DSEICP III SEC III (Skill)	Fermentation ,Pesticides &Cosmetics Perfumes Industry	02+01=03	45	25	25	50	(02)*
VI	DSEIC VI (Section B)	Theory Paper-XIV Unit Process in Inorganic Synthesis, Drug ,Dyes & Industrial Safety (P-XV)	03	45	10	40	50	02
	DSEIC VI [(Section A) Elective]	Theory Paper-XV Spectroscopy & Chromatography , Plant Utilities (P-XV) B1 OR (Elective Paper) Plant Design & Economics for Chemical Engineers Chemistry (P-XV) B2	03 03	45 45	10 10	40 40	50 50	02
	DSEICP- IV [DSIC V &VI (Section B)]	Practical's based on P-XIII & P-XV (P-XVII) OR Practical's based on Elective	04 04	Practicals 08 08 16	05 05 10	20 20 20	25 25 50	01 01
	DSEIC IV SEC IV (Skill)	Industrial Skill for Data Analysis	02+01=03	45	25	25	50	(02)*
	Total credits semester V and VI						12 (04)* = 16	

DSEIC: Discipline Subject Elective, in Industrial chemistry DSEICP: Discipline Subject Elective practical, in Industrial chemistry, ESE: End of Semester Examination, CA: Continuous Assessment, SECC: Skill Enhancement Course Chemistry.

Distribution of Credits: 80% of the total Marks for ESE and 20% for CA.

- CA of Marks 10 : 10 Marks for test.
- CA of 25 Marks : 15 Marks for Seminar & 10 Marks for test.

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure (New scheme)

B. Sc. Third year (Semester- V)

Semester Pattern effectivefrom-2021

Industrial Chemistry

DESIC V

(Section-A)

Unit Process in Organic Synthesis

(P-XII)

Unit Processes In Organic Synthesis : (45 hours)

1. Nitration : (10 hours)

Introduction, Nitrating Agents, Aromatic Nitration, Kinetics & Mechanism ofAromatic Nitration, Nitration of Paraffin hydrocarbons, Nitrate Esters, N-NitroCompounds, Process Equipment for Technical Nitration, Batch Nitration,Continuous Nitration, Mixed acid compositions, DVS calculations, Typical

Industrial Nitration Process- Preparation of Nitrobenzene, Preparation of dinitrobenzene

2. Amination by Reduction : (10 hours)

Introduction & Definitions, Methods of Reduction, Iron & Acid (Bechamp)Reduction-Reaction Mechanism, Chemical & Physical factors, Physical conditionof Iron, Amount of water used, Amount of Acid used, Effect of Agitation,Reaction Temperature, Addition of Solvents, Yields of amine. Equipment-Materials of Aniline & Recovery of Aniline, Distillation of Aniline.

3. Halogenation : (10 hours)

Introduction, Chlorination, Bromination, Fluorination, Iodination.

4. Sulfonation & Sulfation : (05 hours)

Introduction, Sulfonating & Sulfating agents, Sulfonation of Aromaticcompounds, Benzene & its derivatives, Naphalene & its derivatives,Anthraquinone & its derivatives.

5. Polymerization : (10 hours)

Introduction, Functionality, Polymerization Reactions, Polycondensation,Addition Polymerization, Free radical polymerization, Ionic Polymerization, BulkPolymerization, Solution Polymerization, Emulsion Polymerization, Suspension

Polymerization.

Reference Books :

1. Unit Process in Organic Synthesis – P.H.Groggins.

2. Dryden's Outlines of Chemical Technology – M.Gopal

3. Chemical Procress – Srreve

4. Industrial Chemistry – B.K.Sharma

Objective (S)	To acquire basic knowledge about Synthesis of Organic Products by Nitration, Amination by Reduction, Halogination,Sulphonation, Sulfation , & Polymerization.
Course Outcome(S)	
CO1	To learn the various Organic Methods for Industrial synthesis of Nitro Derivative & Methods of Nitration.
CO2	Explain the Various Industrial Methods of reduction of Nitro Compounds to Amine.
CO3	Intercepts the theoretical & Experimental Methods of Chlorination, Bromination, Fluorination,& Iodinations.
CO4	To Illustrate the synthesis& reaction Mechanism method of Sulfonation & Sulfation of Benzene,Napthalene ,Anthraquinone .
CO5	Know the application, types & Industrial Synthesis Method of Polymerization.

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure (New scheme)
B. Sc. Third year (Semester- V)

Semester Pattern effectivefrom-2021
Industrial Chemistry

DESIC VI(Section B)

Process Equipment Design, Process Instrumentation (P-XIII)

UNIT I Credits:02 ,Hours :45

Process Equipment Design Hours :10

1. Distillation & Fractionating Equipment :Introduction, Types Column, Stresses in column Shell, Determination of Shell thickness, Determination height "X", Allowable deflection, Column Internal details,Equilibrium stage column, Differential Column.

1. Agitators :Types of Agitators, Baffling.
2. Reaction Vessel :Introduction, Materials of Construction, Classification of Reaction Vessels, HeatingSystems, Design Considerations

UNIT-III Hours :05

1. Corrosion :Forms of Corrosion, Factors influencing corrosion, Factors preventing corrosion.

UNIT-IV Hours :10

Process Instrumentation.

1. Temperature Measurement

i. Filled-Bulb & Glass-Stem Thermometers Glass-Stem Thermometers Filled Thermal System

Liquid-Filled System,Vapor System

e) Gas-Filled System

ii. Bimetallic Thermometers iii. Resistance Temperature Detector (RTD's)

iv. Radiation & Pyrometers

2. Pressure Measurement

i. Manometers-U tube, Well, Inclined & Micromanoters.

ii. Bourdon & Helical pressure Sensors- bourdon Pressure SensorsSpiral Bourdon Pressure SensorsHelical bourdon Pressure Sensors

iii Diaphragm or Capsule type sensors iv. Pressure Gauges.

Reference Books :

1. Process Equipment – M.V.Joshi

2. Process Instrumentation – Kirk & Remboy

3. Process Measurement & Analysis (Instrument Engineers' Handbook), Third Edn, (Butterworth Heinemann Publication) – Bela G.Liptak

4. Hazards in Chemical Units – Pandya C.L. (Oxford ISH – 1991)

Objective (S)	To enable students to acquires basic knowledge in scope of equipment design & process Instrumentation.
Course Outcome(S)	
CO1	Know the importance of distillation process , types of distillation & different types Fractionating Column.
CO2	Understand the basic types of Agitators, Baffling &classification of Reaction Vessel.
CO3	Study the Corrosion.
CO4	Introduction &Application of Various types of Thermometers , Radiation & Pyrometers
CO5	Introduction &Application of Various types of Manometers, Diaphragm or Capsule type sensors, Pressure Gauges.

OR

(Elective)

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure (New scheme)
B. Sc. Third year (Semester- V)

Semester Pattern effectivefrom-2021
Industrial Chemistry

DESIC V (Section B)

Chemical Engineering Thermodynamics (P-XIII) 45 Hours

Credits:02

UNIT –I

1.1The Scope of Thermodynaics

Dimensions & Units ,Measures of amount or Size Force, Temperature ,Pressure, Work, Energy, Heat, 10Hours
The First Low & Other basic concepts ,Joule's Experiments, Internal Energy ,the First Low of thermodynamics Energy Balance for closed systems ,Thermodynamic state & state functions ,Equilibrium ,The phase rule , The Reversible Process ,constant-V & Constant –P processes ,Enthalpy ,Heat capacity, Mass & Energy Balances for open Systems ,Solve problem on unit First

2.1 Volumetric Properties of Pure Fluids

PVT Behavior of pure substances ,virial Equations of staes ,The Ideal gas,Applications of the virial Equations , Cubic Equations of states ,Generalized correlations for Gases , Generalized correlations for Liquids ,sensible Heat effects , Latent Heat of pure substances ,standard heat of reactions, standard heat of formations, standard heat Of Combustion Temperature dependence of ΔH^0 ,Heat effects of Industrial reactions .
Solve Problems of Unit second.

UNIT -3 10Hours

3.1 The Second Low of Thermodynamics ,

Statements of second low, Heat Engines , Thermodynamic temperature Scales, Entropy, Entropy changes of an Ideal Gas, Mathematical statement of the Second Law,Entropy balance for open Systems , Calculation of Ideal work, Lost Work, the Third Law of thermodynamics, Entropy from the Microscopic Viewpoint, Property relations for homogeneous phases, residual properties ,residual properties by Equations of State, Two- Phase Systems, Thermodynamic Diagrams, Tabels of Thermodynamic properties ,generalized property Correlations for gases . solve problems on unit third

UNIT -4 05 Hours

4.1 Applications of thermodynamics to flow processes , duct flow of compressible fluids ,Turbines (Expanders)

Compressions processes , production of power from Heat ,the steam power plant, Internal –combustion Engines , Jet Engines ,Rocket Engines Solve Problems on Unit Four.

Reference Books

Chemical Engineerinng thermodynamics by JM Smith,HCVan Ness,MM Abbott Adopted by B I Bhatt.

Objective (S)	To enale the students to acquire basic knowledge in scope of thermodynamics & Classification of Energy
Course Outcome(S)	
CO1	To understand the basic concepts of Thermodynamics ,Physical Parameters like Pressure,Volume,temperature etc & Lows of Thermodynamics.
CO2	Analyze the PVT Behavior of pure substances various types of Reactions & Standard heat of formation.
CO3	Know the theory & application of thermodynamics,thermodynamic properties
CO4	To Illustrate the Classification of Various Combustion Engines, JET Engines ,Rocket Engines .
CO5	Calculation of Enthalpy, Work done etc.

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure (New scheme)

B. Sc. Third year (Semester- V and VI)

Semester Pattern effectivefrom-2021

Industrial Chemistry

DESICP-II(CCIC-V& VI)

(section A)

Practical's based on P-XII&P-XIV(Paper – XVI)

Credits: 02

List of Experiments to be taken

Experiments on Unit Processes

1. Preparation of P-nitroacetanilide from acetanilide & Calculate % Yield.
2. Preparation of tri-nitrophenol (picric acid) from Phenol & Calculate % Yield.
3. Preparation of oxalic acid from cane sugar & Calculate % Yield.
4. Preparation of benzophenoloxine from benzophonone & Calculate % Yield.
5. Prepartion of P-Bromoaniline from P-bromoacetanalide & Calculate % Yield.
6. Preparation of Phenyl acetate from phenol & Calculate % Yield.
7. Preparation of Polystyrene by Bulk/Suspension/Emulsion Polymerization method & Calculate % Yield.
8. Preparation of 6,6 and 6,10 thread by condensation & Calculate % Yield.
9. Preparation of Novalac & Resole – Thermosetting resin & Calculate % Yield.
10. Preparation of Urea formaldehyde resin & Calculate % Yield.
11. Preparation of Polysulphide rubber (Thiokol) & Calculate % Yield.
12. Prepration of Orange II dye
13. Estimation of Glucose.
14. Estimation of Maganese in Pyrolusite ore
15. Estimation of Zink from Zink Blend ore
16. Estimation of Antimony in type metal
17. Determination of percetage of Purity of Aluminium Metal
18. Determination of Nickel in Stainless Steel.
19. Estimation of available oxygen in Hydrogen peroxide.

Ref. Book:-

1. Vogel's Textbook of Practical Organic Chemistry-Brain S. Furniss.
2. Advanced Pratical Organic Chemistry – N.K. Vishnoi

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure (New scheme)

B. Sc. Third year (Semester- V&VI)

Semester Pattern effectivefrom-2021

Industrial Chemistry

DESICP-II(CCIC-V& VI)

(section A)

Practical's based on P-XII&P-XIV(Paper – XVI)

Credits: 02

List of Experiments to be taken.

1. Determination of Acid Value of Plastics.
2. Determination of Saponification value of Plastics.
3. Determination of Hydroxyl value of plastics.
4. Proximate analysis of Coal.
5. Ultimate analysis of Coal.
6. Determination of Calorific value of solid or liquid.
7. Determination of iron in water sample by Colorimetric.
8. Determination of sodium & Potassium by flame photometry.
9. Determination of Aniline point of lubricant oil.
10. Separation of metal ions by paper Chromatography.
11. Determination of molecular weight of polymer.
12. Separation of sugars by paper chromatography.
13. Thermometric titration of Boric acid with NaOH.
14. Surface tension determination by stalagmometer.
15. Separation of Fe & Mg by solvent.
16. To determine the solubility of given salt at a room temperature & also to draw its solubility Curve

Ref. Book:-

1. Experiments & Calculations in Engineering Chemistry – S.S Dara (S Chand publication)

2. Experimental in Chemistry – D.V.Jahagirdar (Himalaya Pubication)

3.Advanced Practical Chemistry –Jagdamba Singh (Pragati Prakashan)

4 .Advanced experimental Chemistry J.N.Gurtu &R.Kapoor

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure (New scheme) B. Sc.Third year (Semester- V) DSICP II

SEC III (Skill)

Semester Pattern effectivefrom-2021

Industrial Chemistry

DESICP-II(DSIC-V),(Skill)

(section A)

(section-A) SEC III Fermentation ,Pesticides &Cosmetics Perfumes Industry

1. Cosmetics and Perfumes
   General study including preparation and uses of the following Hair dye,hair spray,suntan lotions,face powder ,ipistics,talcum powder,nailenamel,creams , Artificial flavours artificial oils & their importance in cosmetic industries With refferance to Geraniol, sandlewood oil,rose oil,jasmine,civatone,muscone
2. Pesticides
   General introduction to pesticides,benefit & adverse effects,changing concepts of pesticides,strecture activity relationship, synthesis & technical manufacture & uses of representative pesticides in following classes organochlorine(,DDT,Gamahexane) Organophosphates, (malathione ,Parathion) Carbamates, (Carbofuran & Carbaryl) Quinone (chloranil), Anilides (Alachlor &Butachlor)
3. Fermentation Industries
   Aerobic & anaerobic Fermentation , production of (1) Ethyl alcohl & citric acid , (2) Antibiotics ,penicillin, Cephalosporin, Chloromycetine & Streptomycin, (3) Lysine, Glutamic acid, Vitamin B2, Vitamin B12, Vitamin C

Reference Books:

1 Industrial Chemistry – B.K. Sharma

Objective (S)	To acquire basic knowledge about Synthesis of Industrial products Fermantation ,Pesticides,& Cosmetics Perfumes Industry
Course Outcome(S)	
CO1	To learn the various Organic Methods forIndustrial synthesis of Cosmetics & Perfumes & extraction of Various Oils like Geraniol,Sandlewood, Jasmine, Muskon
CO2	Explain the Various Industrial Methods ofSynthesis Types,Benifitsof Pesticides like Organochlorine,Quinone,Anilides etc.
CO3	Intercepts the theoretical & Experimental Methods of Fermentation Industries Explain types Antibiotics etc.

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure (New scheme)

B. Sc. Third year (Semester- VI)

Semester Pattern effectivefrom-2021

Industrial Chemistry

DESIC VI (Section B)

Unit Process in Inorganic synthesis & Drugs, Dyes, Industrial safety

Paper No XIV Credits:02

UNIT-I

Unit Process in Inorganic synthesis, : (15Hours)

1. Industrial Process of Sulfur & Sulfuric acid
2. Nitrogen Industries : Ammonia, Nitric acid & Urea .

Polymer Manufacturing Process :

1. Polyethylene & Polypropylene
2. Polyvinyl Chloride
3. Phenol Formaldehyde
4. Epoxy Polymers
5. Butadiene-Styrene Copolymer

UNIT-II

Drugs : (10Hours)

Introduction, Disease Classification, Drug Definition, types Of Drugs.Sulfa Drugs or Sulfonamides & Antibiotics.

UNIT-III

Dyes & Dye Intermediates: (10Hours)

Introduction, Colour & constitution, methods of Dyeing, classification of Dyes according to Their modes Based on chemical constitution &application.

UNIT-IV

Industrial safety : (10Hours)

Introduction ,Fir & explosion , Personal Protective Equipment Fire causes of Industrial Fire Electrial Equipment Fire Extinguishers-Fixed Fire fighting system. Portable fire Extinguishers –Soda acid type, Dry Chemical Powder type, Carbon dioxide type &Foam type Extinguisher. Selection of Personal Protective equipment.

Reference Books :

1. Chemical Process – Srreve
2. Industrial Chemistry – B.K.Sharma
3. Polymer Chemistry – Gowarikar
4. Polymer Chemistry – Billmyer
5. Introduction to Industrial Safety – K.T.Kulkarni (2002) Or Concept & Practices in

Industrial Safety – K.T.Kulkarni (2007)

6. Handbook of Fire Technology – Gupta R.S. Orient Longman Publication (1993)7. Hazards in Chemical Units – Pandya C.L. (OxfordISH-1991) 8 Industrial chemistry – J.S. Jangwan ,A.S. Mathuria (Pragati Prakashan)

Objective (S)	Creative awareness among students about the importance of various unit process in Inorganic Synyhesis
Course Outcome(S)	
CO1	Know the importance synthesis of ammonia ,Nitric acid & Urea & various polymer, polyvinyl Chloride ,Phenol formaldehyde & Epoxy Polymer
CO2	Explain the Various Industrial Methods of reduction of Nitro Compounds to Amine.
CO3	Understand the classification , types & Synthesis of Drugs.
CO4	Study the applications ,Classification & application of Dyes.
CO5	Analyse the Application of Industrial Safety various types of Fire Extiguisher

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure (New scheme)
B. Sc. Third year (Semester- VI)

Semester Pattern effectivefrom-2021
Industrial Chemistry

Theory Paper-XV DDIC VI (Section B)
Spectroscopy Chromatography & Plant Utilities(P-XV) B1

UNIT-I credits:02

Spectroscopy 10

Elementary principles, Instrumentations, sampling methods of UV,IR, NMR, MassSpectrometry.Introduction and Instrumentation XRD.Instrumentation & Techniques HPLC & HPTLC.

UNIT-II 05

Chromatography:

Column chromatography, Paper Chromatography, TLC, calculate RF values

UNIT-III 10

Plant Utilities

Water

Sources of Water, Hard & Soft water, Causes of Hardness, Disadvantages of hardwater, Methods of softening of water, Preboiling of water-Lime soda Process-IonExchange process. Essential characteristic of drinking water, purification ofwater-Screening, Sedimentation, Coagulation, Filteration, Treatment to BoilerFeed Water-Formation of Scale, Corrosion, Priming & Foaming, Caustic embitterment.

UNIT-IV 10

Steam & Steam Generator

Steam-Formation of Steam at constant Pressure, Enthalpy-Enthalpy of water,Enthalpy of Evaporation, Enthalpy of dry saturated steam, Wet Steam,Superheated Steam, Specific Volume of steam.Steam Generator- Classification, Factors for Boiler selection

Reference Books :

1. Organic Spectroscopy , William Kemp, ILBS 3rd edition

2. Spectrometric identification of organic compounds, Silver stein, John willey pub. 6th

edition

3. Instrumental method of chemical analysis , B.K.Sharma, Goal pub., 26th edition.

4. Spectroscopy of organic compounds, P.S.Kalsi,Willey eastern ltd.

5. HPTLC,D.Sethi,CBS 2ND edition.

6. Plant Utilities- D.B.Dhone (Nirali Prakashan)- D.B.Dhone

7. Advanced Practical Organic Chemistry – N.K. Vishnoi

Objective (S)	To Familiarize the students with the concepts & Principle of Spectroscopy ,Chromatography & Plant Utilities
Course Outcome(S)	
CO1	To learn the basic concepts of Electromagnetic Waves & study of UV, IR, NMR, Mass spectroscopy
CO2	Understanding the Column Chromatography ,Paper Chromatography, TLC, Calculate RF Values
CO3	Know the sources of Water, Industrial Treatment of Water
CO4	Explain the types, Classification of Industrial Steam generator
CO5	Explain the types, Classification of Industrial Boiler

OR (Elective Paper)

Theory Paper-XV

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure (New scheme)
B. Sc. Third year (Semester- VI)

Semester Pattern effectivefrom-2021
Industrial Chemistry

DESIC VI (Section B)
Plant Design & Economics for Chemical Engineers Theory Paper-XV credits:02

UNIT-1

(10Hours)

Prologue –The International System of units (SI)
Introduction, Chemical Engineering plant Design ,Process Design Development ,General Design considerations,cost Estimation ,factors affecting profitability of Investments, Optimum Design,

UNIT-2

(10Hours)

Process Design Development
Introduction ,Design Process Procedure ,Type of Design ,Feasibility SurveyProcess development ,Design ,Construction & operation,
Design Information from the literature,
Flow Diagrams ,the preliminary Design
UNIT-3 (10Hours) General design Consideration

plant Location ,Plant Layout, Utilities ,Structural Design ,storage ,Waste DisposalCost asset accounting Outline of accounting procedure ,Basic relationship of accounting ,the balance sheet ,the income statement, maintaining accounting
Record
UNIT-4 (10Hours)

Cost Estimation
Cash flow for Industrial Operations, Cumulative cash positionsFactors affecting investment & productions cost, Governmental Policies, CapitalInvestments, estimation of Capital Investments
Interest & Investments Costs,
Types of Interest, Compound Interest ,Nominal &
Effective interest rates ,Continuous interest Present Worth & Discount ,Annuities

Reference Books –

Plant Design & Economics for Chemical Engineers by Max S. Peters & Klaus .D.Timmerhaus

Objective (S) To	study the Plant Design &Economics for Chemical Engineers
Course Outcome(S)	
CO1	To learn the International System of Units
CO2	Explain the process Design Development. To Know the Design Information the Litereture.
CO3	Intercepts the theoretical Knowledge Plant Location, Pant Layout Structural Design
CO4	To Illustrate the Cash Flow for Industrial Operations ,Cost Estimation,Interest & Investement Cost .

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Industrial Chemistry

DESICP-IV(DSIC-V& VI)

(section-B)

Practical's based on P-XIII&P-XV(P-XVII)

Credit:-02

Industrial Visit & Project Work.

1. Industrial Visit & Submission of Visit report

2. Submission the technical project on any one of Industrial product on basis of

Introduction, History, Chemical & Physical Properties, Raw Materials,

Methods of Production, Manufacturing process description, Flow sheet,

Outlines of material Balance, Plant layout, Plant utility, Industrial safety aspect,

Uses of Product, Feasibility of Process-Cost Estimation, Interest, Depreciation,

Profitability, references.

3.Presentation on Industrial Product.

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B. Sc. Third year (Semester- VI)

Semester Pattern effectivefrom-2021

Industrial Chemistry

DESICP-IV(DSIC-V& VI)

(section-B)

Practical's based on P-XIII&P-XV(P-XVII)

Credit:-02

1. Visit Small scale Industry & submission visit report
2. Visit large scale Industry & submission visit report
3. Group Discussion on basis of Current situation of Industrial marketing.
4. Synopsis submission.
5. Viva voce.

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Choice Based Credit System (CBCS) Course Structure (New scheme)

B. Sc. Third year (Semester- IV)

Semester Pattern effectivefrom-2021

Industrial Chemistry

DESICP-III (DDIC-VI),

(section B)

(SEC IV) -Industrial Skill for Data Analysis.

1. Replicate analysis of reliability of analytical Data.
2. Illustration of Precision & Accuracy. & Solve Problem on It
3. Concepts of Errors & Solve Problem on It
4. Test for Rejection of Data. & Solve Problem on It
5. Methods of Averages. & Solve Problem on It

Reference Book

Analytical Chemistry by Gurudeep Raj

Analytical Chemistry by Verma

Objective (S)	To acquire basic knowledge about Analysis of Data.
Course Outcome(S)	
CO1	To replicate analysis of analytical Data.
CO2	Explain the Precision & Accuracy &solve problem on it
CO3	To Illustrate Concept of Error & solve problem on it
CO4	Learn the Test for Rejection of Data &Solve problem on it
CO5	Know the averages.& Solve Problem on it.