

DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM & MARKING SCHEME

B.Sc. V, VI Semester
INDUSTRIAL CHEMISTRY
(Based on Choice Based Credit System)

SESSION : 2025-26



ESTD : 1958

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE,
DURG, 491001 (C.G.)

(Former Name – Govt. Arts & Science College, Durg)

NAAC Accredited Grade A⁺, College with CPE - Phase III (UGC), STAR COLLEGE (DBT)

Phone : 0788-2212030

Website - www.govtsciencecollegedurg.ac.in, Email – autonomousdurg2013@gmail.com

DEPARTMENT OF CHEMISTRY
GOVT. V.Y.T. PG AUTONOMOUS COLLEGE DURG (CG)



FOUR YEAR UNDERGRADUATE PROGRAM

Semester – V & VI

COURSE CURRICULUM

B. Sc. INDUSTRIAL CHEMISTRY

For DSC/GEC

SESSION: 2025-26

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM 2025-26
INDUSTRIAL CHEMISTRY

PART A: INTRODUCTION

Program: FYUP		Class: B.Sc. Semester - V	Session: 2025-2026
1	Course Code	CZIC/CMIC 501	
2	Course Title	INDUSTRIAL ECONOMICS	
3	Course Type	Discipline Specific Course (DSC)/Generic Specific Course(GEC)	
4	Course Learning Outcome (CLO)	This Course will enable the students to: • CO:1 To gain knowledge of the process of estimating the costs associated with completing a project within scope and according to its timeline. • CO:2 To understand about various resources for fixed assets and land and gain knowledge regarding start-up. • CO:3 To determining the real value of assets and fixing right price for products. • CO:4 To deal with controlling and regulating the flow of material in relation to changes in variables like demand, prices, availability, quality, delivery schedules etc. • CO:5 To learn about management skills and become efficient managers.	
5	Credit Value	3 Credits	1 credit =15 Hours – Learning and Observation
6	Total Marks	Maximum Marks :100	Minimum Passing Marks:40

PART B: CONTENT OF THE COURSE

Total No. of Teaching/ Learning Periods = 45 Periods (45 Hours)

Unit	Topics (COURSE CONTENTS)	No. of Periods
I	Factors involved in project cost estimation, methods employed for the estimation of capital investment. Capital formation, elements of cost accounting.	9
II	Interest & investment cost, time value of money equivalence. Depreciation, method of determining depreciation, taxes. Some aspects of marketing, pricing policy.	10
III	Profitability criteria, economics of selecting alternatives Break - even point, optimum batch sizes, Production, scheduling etc. Collection & processing data.	10

IV	Industrial Organization, Concept of scientific management in industry. Functions of management, decision making, planning, organizing. Location of industry.	8
V	Materials management. Inventory control. Management of human resources - Selection, incentives, Welfare & safety.	8

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

Text Books Recommended –

1. Industrial Organization & Management, Bethal, L.L.
2. Industrial Organization & Management, Tarachand, Vol. I & II.
3. Book on Management, Khandelwal, O.P.
4. Rheology Theory & Application, Vol, 5, Elrich, R.F.
5. Economics of Chemical Industry, Hempel, E.H.
6. Plant Design & Economics for Chemical Engineers, Peter T. Rhaas, McGraw Hill.
7. I.C.M.A. Booklets-9 & 10

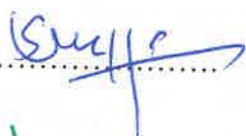
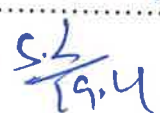
Online Resources–

- e-Resources / e-books and e-learning portals
- <https://ncert.nic.in/textbook/pdf/kech207.pdf>
- <https://archive.nptel.ac.in/courses/122/106/122106030/>
- <https://www.ncbi.nlm.nih.gov/books/NBK83730/>
- https://chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_Chemistry
- <https://byjus.com/chemistry/environmental-chemistry/>
- <https://www.envirotech-online.com/news/gas-analyser/157/envea/portable-multi-gas-analyser-gains-qal1-certification-for-so2/60799>.
- <https://crops.extension.iastate.edu/cropnews/2017/05/economics-soil-health#:~:text=The%20term%20E2%80%9Ceconomics%20of%20soil,is%20easier%20said%20than%20done>.

Online Resources–: e-Resources / e-books and e-learning portals.

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods:	
Maximum Marks:	100 Marks
Continuous Comprehensive Evaluation (CCE):	20 Marks
Semester End Exam (SEE):	80 Marks
Internal Assessment:	Internal Test of 20 Marks and Assignment of 20 Marks
Continuous Comprehensive Evaluation (CCE)	
Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D)from each Unit Question- A & B Very short answer type (02each) $04 \times 5 = 20$ Marks Question - C: Short answer type question $05 \times 5 = 25$ Marks Question - D: Long answer type question $07 \times 5 = 35$ Marks Total = 80 Marks

Name & Signature of Members of Board of Studies

Chairperson/H.O.D..... 	Departmental members:
SubjectExpert.....  (University Nominee)	Dr. Premer Kathane 
Subject Expert..... 	Dr. S. Mathew 
Subject Expert..... 	Dr. Ajin Pillai 
Representative.....	Dr. Varsha Joshi 
(Industry)Representative.....	 Neha 
(Alumni) 	
Representative.....	
(ProfessorScienceFacultyOtherDept.)	

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM 2025-26
INDUSTRIAL CHEMISTRY: Lab Course-5

PART A: INTRODUCTION

Program: FYUP		Class: B.Sc. Semester -V	Session: 2025-2026
1	Course Code	CZIC/CMIC 501	
2	Course Title	INDUSTRIAL CHEMISTRY Lab Course: 05	
3	Course Type	DSC/GEC	
4	Course Learning Outcome (CLO)	This Course will enable the students to: • Synthesis of common industrial compounds involving two-step reactions • Describe analysis of common raw materials as per industrial specification: Phenol, Aniline, Formaldehyde, Hydrogen peroxide • Evaluate/ estimation drugs by Spectrophotometric methods. • Understand saponification value of oil/polymeric materials	
5	Credit Value	1 Credit	1 credit =30 Hours – Learning and Observation
6	Total Marks	Maximum Marks :50	Minimum Passing Marks 20

PART B: CONTENT OF THE COURSE

S. No.	List of Experiments
1	Synthesis of common industrial compounds involving two-step reactions. -bromoaniline, 3-Nitroaniline, Sulphanilamide, 4-Aminobenzoic acid, -Nitrobenzoic acid, di-halo benzenes, Nitro halobenzenes.
2	Industrial analysis of common raw materials as per industrial specification: Phenol, Aniline, Formaldehyde, Hydrogen peroxide, Acetone, Epoxide, Olefins, Oils etc.
3	Spectrophotometric estimation of drugs–ciprofloxacin, paracetamol, etc.
4	Preparation of pharmaceutical formulations like cream, suspension and emulsions.
5	Determination of saponification value of oil/polymeric materials.
6	Determination of iodine value of oil/polymeric materials.
8	Determination of ash content in polymeric substance.

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS RECOMMENDED:

- Rattenbury, Evelyn M. Introductory Titrimetric and gravimetric analysis.
- Vogel A.I., TextBook of Qualitative Inorganic Analysis, III edition(1976).
- Singh A.K. Singh A.K., Computer "C" Programming, Concept principle and program.
- Scott P.W. Techniques and Practice of Chromatography

Online Resources:

- <http://nptel.ac.in>
- <http://swayam.gov.in>
- <http://epathshala.nic.in>

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks:

50 Marks

(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)

Semester End Exam (SEE)

Laboratory performance: As per Department (LOCF)

Name & Signature of Members of Board of Studies

Chairperson/H.O.D.....

Departmental members:

Subject Expert.....

(University Nominee)

Subject Expert.....

Subject Expert.....

Representative.....

(Industry) Representative.....

(Alumni).....

Representative.....

(Professor Science Faculty Other Dept.)

Dr. P. Kathane

Dr. S. Mathew

Dr. Ajay Pillai

Dr. Varsha Joshi

Neha She

DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM 2025-26
INDUSTRIAL CHEMISTRY

PART A: INTRODUCTION			
Program: FYUP		Class: B.Sc. Semester -VI	Session:2025-20256
1	Course Code	CZIC/CMIC 601	
2	Course Title	PHARMACEUTICALS	
3	Course Type	Discipline Specific Course (DSC)/ Generic Specific Course(GEC)	
4	Course Learning Outcome (CLO)	This Course will enable the students to: • To correlate and compare historical background/development of Indian and other important pharmacopoeias and understand formulations/routes of administration/aseptic conditions and sterilization in pharmaceuticals. • To describe the manufacture and quality specifications of pharmaceutical excipients/additives and applications of sutures, ligatures in surgical dressing. • To acquaint with the packaging/ancillary materials, machinery and important legal aspects of food and drug industry. • To learn classification of crude drugs, collection, manufacture and storage of sulpha drugs. • To understand fundamentals and applications of various chromatographic techniques like paper HPLC, GLC, TLC, column for evaluation/identification of crude drugs.	
5	Credit Value	3 Credits	1 credit =15 Hours – Learning and Observation
6	Total Marks	Maximum Marks :100	Minimum Passing Marks:40
PART B: CONTENT OF THE COURSE			
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)			
Unit	Topics (COURSE CONTENTS)		No. of Periods
I	Historical background & development of pharmaceutical industry in brief. Pharmacopoeias:- Development of Indian pharmacopoeia & introduction of B.P., U.S.P., E.P., N.F & other important pharmacopoeias. Introduction to various types of formulations & routes of administration. Aseptic conditions, need for sterilization, various methods of sterilization.		9

II	Various types of pharmaceutical excipients, their chemistry, process of manufacture & quality specifications. Glidants, lubricants, diluents, preservatives, antioxidants, emulsifying agents, coating agents, binders, coloring agents, flavouring agents, gelatin and other additives, sorbitol, mannitol, viscosity builders etc. Surgical dressing, sutures, ligatures with respect to the process, equipment used for manufacture.	9
III	Pharmaceutical packaging introduction, package selection, packaging materials, ancillary materials, packaging machinery, quality control of packaging materials. F.D.A. Important schedules & some legal aspects of drugs. Pharmaceutical quality control (other than analytical methods covered under core subject) sterility testing, pyrogenic testing, glass testing, bulk density of powder etc.	9
IV	Phytochemicals - Introduction to plant classification & crude, drugs, cultivation, collection, preparations for the market & storage of medicinal plants. Classification of various types of drugs with examples. Raw materials, process of manufacture, effluent handling, etc of the following bulk drugs: Sulpha drugs - sulphaguanidine.	9
V	Evaluation of crude drugs- Moisture content, extractive value, volatile oil content, introduction to chromatographic method for identification of crude drugs. Chromatography: Paper chromatography, TLC, HPLC, GLC.	9

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

Text Books Recommended:–

- Trivedy, R. K., & Raman, N. S. (2002). Industrial Pollution and Environmental Management. Scientific Publishers.
- Brusseau, M. L., Pepper, I. L., & Gerba, C. P. (2019). The Extent Of Global Pollution. In Environmental and Pollution Science (Pp. 3-8). Academic Press.
- Rathore, H. S., & Nollet, L. M. (Eds.). (2012). Pesticides: Evaluation Of Environmental Pollution. CRC Press.
- Rad, P. F. (2001). Project Estimating and Cost Management. Berrett-Koehler Publishers.
- Sharma, B. K. (2000). Industrial Chemistry (Including Chemical Engineering). Goel Publishing House.
- Mahajan, (2010). Environmental Chemistry. New Delhi: S Chand & Company Ltd.
- De, A. K. (2003). Environmental Chemistry. New Delhi: New Age International.

Reference Books:

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

- <https://nptel.ac.in/courses/126105016>
- <https://nptel.ac.in/courses/105103205>
- <https://nptel.ac.in/courses/126105010>
- <https://nptel.ac.in/courses/105/102/105102089/>
- <https://nptel.ac.in/courses/122/106/122106030/>
- <https://nptel.ac.in/content/storage2/courses/120108004/module1/lecture1.pdf>

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods:	
Maximum Marks:	100 Marks
Continuous Comprehensive Evaluation (CCE):	20 Marks
Semester End Exam (SEE):	80 Marks
Internal Assessment:	Internal Test of 20 Marks and Assignment of 20 Marks
Continuous Comprehensive Evaluation (CCE)	
Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D)from each Unit
	Question A & B(Compulsory)Very short answer type (02each)04 x 5 = 20 Marks
	Question - C: Short answer type question 05 x 5 = 25 Marks
	Question - D: Long answer type question 07 x 5 = 35 Marks
	Total = 80 Marks

Name & Signature of Members of Board of Studies

Chairperson/H.O.D.....	Departmental members:
Subject Expert..... (University Nominee)	
Subject Expert.....	
Subject Expert.....	
Representative..... (Industry)Representative	
(Alumni) Representative.....	
(Professor Science Faculty Other Dept.)	

Dr. P. Kathane
 Dr. S. Mathew
 Dr. Ajin Pillai
 Dr. Varsha Joshi
 Neha
 S.

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM 2025-26
INDUSTRIAL CHEMISTRY: Lab Course-6

PART A: INTRODUCTION			
Program: FYUP		Class: B.Sc.	Semester -VI
		Session:2025-2026	
1	Course Code	CZIC/CMIC 601	
2	Course Title	INDUSTRIAL CHEMISTRY Lab Course- 6	
3	Course Type	DSC/GEC	
4	Course Learning Outcome (CLO)	This Course will enable the students to: - Describe pharmaceutical industry and identify the distinguishing features of its components like packaging and storage, quality control etc. - Identify appropriate resources required for an assigned task/project to accomplish it. - Identify various pharmaceutical products. - To evaluate raw materials and communicate the results of their work to chemists and non-chemists - To evaluate finished products and communicate the results to the chemists. Evaluate crude drugs - Undertake hands on lab work and practical activities and develop problem solving abilities required for successful career in pharmaceuticals industries, teaching, research, environmental monitoring, product quality etc.	
5	Credit Value	1 Credit	1 Credit =30 Hours – Learning and Observation
6	Total Marks	Maximum Marks :50	Minimum Passing Marks:20
PART B: CONTENT OF THE COURSE			
S. No.	List of Experiments		
1	Demonstration of various pharmaceutical packaging materials, quality control tests of some materials, Strips, Cartons, Glass bottles.		
2	Evaluation of crude drugs - macroscopic examination, determination & identification of starch granules, calcium oxalate.		
3	Limit tests for chlorine, heavy metals, arsenic, etc. of two representative bulk drug.		
4	Demonstration of various pharmaceutical products.		

5	Active ingredient analysis of few types of formulations representing different methods of analysis -acidimetry, alkalimetry, non-aqueous
6	Determination of sulphate ash, loss of drying & other tests of bulk drugs, complete IP monograph of the drugs representing variety of testing methods.
7	Palisade ratio, stomatal index -determination and identification of few drugs, TLC method for identification.

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

Text Books Recommended:

1. Instrumental methods of analysis, Willard, Merit, Dean.
2. Introduction to instrumental methods of analysis, Braun, R.D. McGraw Hill.
3. Analytical chemistry, J.B. Dick, McGraw Hill.
4. Quantitative Inorganic analysis, A. Vogel.
5. Instrumental methods of analysis, Skoog & West.
6. Instrumental methods of analysis, B.K. Sharma.
7. Practical Pharmacognosy, T.B. Wills
8. Practical Pharmacognosy, T.N. Vasudevan
9. Modern Pharmacognosy Remstad, McGraw Hill
10. Indian Pharmacopoeia, 1985
11. British Pharmacopoeia, 1990
12. Handbook of Drugs and Cosmetic Act., Mehrotra

Online Resources: –

- e-Resources / e-books and e-learning portals
- <https://ncert.nic.in/textbook/pdf/kech207.pdf>
- <https://archive.nptel.ac.in/courses/122/106/122106030/>
- <https://www.ncbi.nlm.nih.gov/books/NBK83730/>
- <https://byjus.com/chemistry/environmental-chemistry/>
- <https://www.envirotech-online.com/news/gas-analyser/157/envea/portable-multi-gas-analyser-gains-qal1-certification-for-so2/60799>.

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods: Maximum Marks: 50 Marks (Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)	
Semester End Exam (SEE)	Laboratory performance: As per Dept. (LOCF)

Name & Signature of Members of Board of Studies

Chairperson/H.O.D.....	Departmental members:
Subject Expert..... (University Nominee)	Dr. P. Kathane
Subject Expert.....	Dr. S. Mathur
Subject Expert.....	Dr. Gan. Pillai
Representative.....	Dr. Varsha Joshi
(Industry) Representative.....	Dr. Master
(Alumni) Representative.....	Neha She
(Professor Science Faculty Other Dept.)	

DEPARTMENT OF CHEMISTRY
GOVT. V.Y.T. PG AUTONOMOUS COLLEGE DURG (CG)



FOUR YEAR UNDERGRADUATE PROGRAM

Semester – V & VI

COURSE CURRICULUM

B. Sc. INDUSTRIAL CHEMISTRY

For DSE

SESSION: 2025-26

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG**FOUR YEAR UNDERGRADUATE PROGRAM****DEPARTMENT OF CHEMISTRY****COURSE CURRICULUM 2025-26****INDUSTRIAL CHEMISTRY**

PART A: INTRODUCTION			
Program: FYUP		Class: B.Sc. Semester - V	Session: 2025-2026
1	Course Code	CZICE/CMICE 503	
2	Course Title	Data Analysis and Separation Techniques	
3	Course Type	Discipline Specific Elective (DSE) – I	
4	Course Learning Outcome (CLO)	This Course will enable the students to: • To learn the data analysis, significant figure and error. • To learn Chromatographic separation techniques. • To learn the purification technique of chemical compound. • To learn the computer program useful in industrial chemistry	
5	Credit Value	3Credits	1 credit =15 Hours – Learning and Observation
6	Total Marks	Maximum Marks :100	Minimum Passing Marks:40
PART B: CONTENT OF THE COURSE			
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)			
Unit	Topics (COURSE CONTENTS)		No. of Periods
I	Data analysis, theory of errors, idea of significant figures and its importance with examples, precision, accuracy, methods of expressing accuracy. Error analysis, minimizing errors, method of expressing precision, average deviation, standard deviation and confidence limit.		9
II	Purification of solid organic compounds:extraction, use of immiscible solvents, soxhlet extraction, crystallization, use of miscible solvents, fractional crystallization, sublimation. Purification of liquids, experimental techniques of distillation, fractional distillation, vacuum distillation, steam distillation, tests for purity.		9

III	Chromatography- principles and techniques of column, paper and thin layer chromatography- Rf value- applications. Ion exchange chromatography-principle-experimental techniques and applications. HPLC and GC-Principle, instrumentation and applications GC-MS and LC-MS-Principle, instrumentation and applications	9
IV	Introduction to computer and its application in chemistry – characteristics of a computer – types of computer – block diagram of a digital computer – the art of programming – general features of a programming language – algorithm and flow charts.	9
V	Introduction to C, structure of a C program, character set of C data types , identifiers, reserved words, variables, constants, keywords, escape sequence, type conversion C operation (basic aspects only). Application of computer in chemistry, determination of molarity, normality and molality of solutions, calculation of pH.	9

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended:

1. Gopalan, R., Subramanian, P. S., & Rengarajan, K. (1997). Elements of analytical chemistry. New Delhi, India: S. Chand and Sons.
2. Chatwal, A. (2000). Instrumental methods of chemical analysis. New Delhi, India: Anand-Himalaya Publishing House.
3. de la Vie, R. (1997). A spreadsheet workbook for quantitative chemical analysis. New Delhi, India: McGraw-Hill, Inc.
4. Raman, K. V. (1993). Computers in chemistry. New Delhi, India: Tata McGraw-Hill Ltd.
5. Srivastava, V. K., & Srivastava, K. K. (1991). Introduction to chromatography. S. Chand and Sons.

Online Resources–

- <http://nptel.ac.in>
- <http://swayam.gov.in>
- <http://epathshala.nic.in>

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods:	
Maximum Marks:	100 Marks
Continuous Comprehensive Evaluation (CCE):	20 Marks
Semester End Exam (SEE):	80 Marks
Internal Assessment:	Internal Test of 20 Marks and Assignment of 20 Marks
Continuous Comprehensive Evaluation(CCE)	
Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D)from each Unit
	Question A & B(Compulsory)Very short answer type(2 each)04 x 5 = 20 Marks
	Question - C: Short answer type question 05 x 5 = 25 Marks
	Question -D: Long answer type question 07 x 5 = 35 Marks
	Total = 80 Marks

Name &Signature of Members of Board of Studies

Chairperson/H.O.D..... 	Departmental members:
Subject Expert.....  (University Nominee)	
Subject Expert.....	Dr. P. Kathane 
Subject Expert..... 	Dr. S. Mathew 
Representative..... 	Dr. Anil Pillai 
(Industry)Representative.....	Dr. Vansha Joshi 
(Alumni) 	
Representative.....	Neha Jha 
(Professor Science Faculty Other Dept.)	

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM 2025-26

INDUSTRIAL CHEMISTRY: Lab Course- 3

PART A: INTRODUCTION

Program: FYUP		Class: B.Sc. Semester -V	Session: 2025-2026
1	Course Code	CZICE/CMICE 503	
2	Course Title	Industrial Chemistry: Lab Course-3	
3	Course Type	DSE – I	
4	Course Learning Outcome (CLO)	This Course will enable the students to: • To learn the data analysis, significant figure and error. • To learn Chromatographic separation techniques. • To learn the purification technique of chemical compound. • To learn the computer program useful in industrial chemistry.	
5	Credit Value	1 Credit	1 credit = 30 Hours – Learning and Observation
6	Total Marks	Maximum Marks :50	Minimum Passing Marks:20

PART B: CONTENT OF THE COURSE

S.No.	List of Experiments
1	Gravimetric estimation a. Estimation of sulphate as barium sulphate. b. Estimation of barium as barium sulphate. c. Estimation of barium as barium chromate. d. Estimation of lead as lead chromate.
2	Principles involved in chromatographic separation: Paper Chromatography, Column Chromatography TLC: Separation of following metal ions: (a) Ni(II) and Co(II) (b) Fe(III) and Al(III).
3	Volumetric analysis: (i) Determination of commercial vinegar in acetic acid.
4	(ii) Estimation of ferrous and ferric by dichromate method
5	(iii) Estimation of Copper using thiosulphate.
6	Programming Making and running the program.

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

Text Books Recommended –

- Rattenburry, Evelyn M. Introductory Titrimetric and gravimetric analysis.
- Vogel A.I., TextBookofQualitativeInorganicAnalysis, IIIedition(1976).
- Singh A.K. Singh A.K., Computer “C” Programming, Concept principle and program.
- Scott P.W. Techniques and Practice of Chromatography.

Online Resources:

- <http://nptel.ac.in>
- <http://swayam.gov.in>
- <http://epathshala.nic.in>

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks:

25 Marks

(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)

Semester End Exam (SEE)

Laboratory performance: As per Dept. (LOCF)

Name & Signature of Members of Board of Studies

Chairperson/H.O.D.....	Departmental members:
SubjectExpert.....	
(University Nominee)	
Subject Expert.....	Dr. P. Kathane
Subject Expert.....	Dr. S. Mathew
Representative.....	Dr. Anil P. Kar
(Industry)Representative.....	Dr. Varsha Joshi
(Alumni).....	Neha Dhe
Representative.....	
(ProfessorScienceFacultyOtherDept.)	

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG
FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM 2025-26
INDUSTRIAL CHEMISTRY

PART A: INTRODUCTION

Program: FYUP		Class: B.Sc. Semester -V	Session: 2025-2026
1	Course Code	CZICE/CMICE 503	
2	Course Title	Environmental Remediation and Waste Management	
3	Course Type	Discipline Specific Elective (DSE) – II	
4	Course Learning Outcome (CLO)	This Course will enable the students to: • Understand pollutants, types of pollution from industries, their effects, statutory limits and evaluation methods. • To understand the air pollution as well as water pollution. • Acquire knowledge and handling of pesticide pollution. • To gain knowledge environmental regulatory legislations and standards and evaluation methods. • To acquaint with principles and equipment for effluent treatment and waste management technology.	
5	Credit Value	3 Credits	1 credit = 15 Hours – Learning and Observation
6	Total Marks	Maximum Marks : 100	Minimum Passing Marks: 40

PART B: CONTENT OF THE COURSE

Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)

Unit	Topics (COURSE CONTENTS)	No. of Periods
I	Pollutants and Pollution: Definition and classification of pollutants, primary and secondary pollutants, Various pollutants, organic/inorganic pollutants, air, oxygen, nitrogen cycle, water, biosphere, flora and fauna, energy, soil. Pollutants and their statutory limits, pollution evaluation methods.	9
II	Air pollution: Sources and classification of air pollution, major air pollutants and their health impacts, phenomenon of acid rain, photo chemical smog and ozone depletion, composition of fly-ash, pollution control equipment/techniques, green house effect.	9
III	Water pollution: Types of water pollution, organic and inorganic pollutants, point and nonpoint sources of water pollution, estimation of chlorine in water, measurement of BOD & COD techniques for removal of waste from water.	8

IV	Pesticide pollution: Classification of chemical pesticides, examples of organochlorines and organophosphates, persistent organic pollutants (POPs) and their half-lives, environmental effects of pesticides, soil and water contamination and its impact, bio accumulation of pesticides and pesticide contamination in food.	9
V	Solid & gaseous wastes: Removal of solid contaminants of wastes-coagulation, sedimentation, flocculation, solid waste disposal, incineration, fuel pelletization, soil conditioning. Adsorption, catalytic/non catalytic conversion, recovery of important gases, CO ₂ , SO ₂ , NO etc. electrostatic precipitation and bag filters. Effluent treatment and waste management: Sewage analysis principles and equipment for aerobic, anaerobic treatment, adsorption, filtration, sedimentation.	10

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS RECOMMENDED:

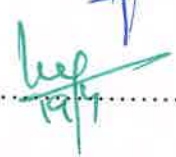
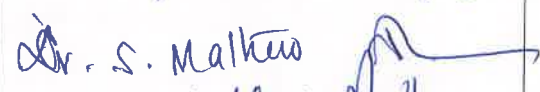
1. Trivedy, R. K., & Raman, N. S. (2002). Industrial Pollution and Environmental Management. Scientific Publishers.
2. Brusseau, M. L., Pepper, I. L., & Gerba, C. P. (2019). The Extent of Global Pollution. In Environmental and Pollution Science (Pp. 3-8). Academic Press.
3. Rathore, H. S., & Nolle, L. M. (Eds.). (2012). Pesticides: Evaluation of Environmental Pollution. CRC Press.
4. Rad, P. F. (2001). Project Estimating and Cost Management. Berrett-Koehler Publishers.
5. Sharma, B. K. (2000). Industrial Chemistry (Including Chemical Engineering). Goel Publishing House.
6. Mahajan, (2010). Environmental Chemistry. New Delhi: S Chand & Company Ltd.
7. De, A. K. (2003). Environmental Chemistry. New Delhi: New Age International.

Online Resources : e-Resources / e-books and e-learning portals

- ☐ <https://nptel.ac.in/courses/126105016>
- ☐ <https://nptel.ac.in/courses/105103205>
- ☐ <https://nptel.ac.in/courses/126105010>
- ☐ <https://nptel.ac.in/courses/105/102/105102089/>
- ☐ <https://nptel.ac.in/courses/122/106/122106030/>
- ☐ <https://nptel.ac.in/content/storage2/courses/120108004/module1/lecture1.pdf>

PART D: ASSESSMENT AND EVALUATION		
Suggested Continuous Evaluation Methods:		
Maximum Marks:		100 Marks
Continuous Comprehensive Evaluation (CCE):		20 Marks
Semester End Exam (SEE):		80 Marks
Internal Assessment:		Internal Test of 20 Marks and Assignment of 20 Marks
Continuous Comprehensive Evaluation (CCE)		
Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D)from each Unit Total = 80 Marks Pattern -FOUR Questions (A, B, C, D)from each Unit Question A & B(Compulsory)Very short answer type(2 each) 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks Total = 80 Marks	

Name & Signature of Members of Board of Studies

Chairperson/H.O.D.....  Subject Expert.....  (University Nominee) Subject Expert..... Subject Expert.....  Representative.....  (Industry)Representative..... (Alumni)  Representative..... (Professor Science Faculty Other Dept.)	Departmental members:  Dr. P. Kathane  Dr. S. Mathur  Dr. Ajai Pillai  Dr. Vansha Jasli  Neha
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GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG**FOUR YEAR UNDERGRADUATE PROGRAM****DEPARTMENT OF CHEMISTRY****COURSE CURRICULUM 2025-26****INDUSTRIAL CHEMISTRY: Lab Course- 5**

PART A: INTRODUCTION			
Program: FYUP		Class: B.Sc.	Semester -V
		Session:2025-2026	
1	Course Code	CZICE/CMICE 604	
2	Course Title	INDUSTRIAL CHEMISTRY: Lab Course- 5	
3	Course Type	DSE - II	
4	Course Learning Outcome (CLO)	This Course will enable the students to: • Understand the techniques of water analysis, acidity and alkalinity. • To get experience with the calculations of BOD and COD • To Understand the basics of water analysis viz. pH, Conductivity. • To get experience about determination of heavy metals in water sample.	
5	Credit Value	1 Credit	1 credit =30 Hours – Learning and Observation
6	Total Marks	Maximum Marks :50	Minimum Passing Marks:20
PART B: CONTENT OF THE COURSE			
S. No.	List of Experiments		
1	Determination of acidity and alkalinity of water samples.		
2	Determination of temporary, permanent, and total hardness of water.		
3	Determination of chloride, sulphate, nitrite, and phosphates in water samples		
4	Determination of D.O, BOD, and COD.		
5	Determination of pH of water samples.		
6	Determination of conductivity of water samples		
7	Determination of metal (Ca & Mg).		

8	Determination of heavy metals like Cd, Pb, Cr, Zn.
9	Project/survey on environmental management/technologies, and quality control.

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

Text Books Recommended –

1. Vogel, A. I. (1955). A text-book of quantitative inorganic analysis: theory and practice. Longmans, Green and Company.
2. Harrison, R. M. (Ed.). (2012). Handbook of air pollution analysis. Springer Science & Business Media.
3. Sandell, E. B. (1945). Colorimetric determination of traces of metals (Vol. 59, No. 6, p. 481). LWW.
4. Boubel, R. W., Vallero, D., Fox, D. L., Turner, B., & Stern, A. C. (2013). Fundamentals of air pollution. Elsevier.

Online Resources: – (e-Resources / e-books and e-learning portals)

- <https://ncert.nic.in/textbook/pdf/kech207.pdf>
- <https://archive.nptel.ac.in/courses/122/106/122106030/>
- <https://www.ncbi.nlm.nih.gov/books/NBK83730/>
- [https://chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_Chemistry_-_The_Central_Science_\(Brown_et_al.\)/18%3A_Chemistry_of_the_Environment](https://chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_Chemistry_-_The_Central_Science_(Brown_et_al.)/18%3A_Chemistry_of_the_Environment)
- <https://byjus.com/chemistry/environmental-chemistry/>
- <https://www.envirotech-online.com/news/gas-analyser/157/envea/portable-multi-gas-analyser-gains-qal1-certification-for-so2/60799>.
- <https://crops.extension.iastate.edu/cropnews/2017/05/economics-soil-health#:~:text=The%20term%20%E2%80%9Ceconomics%20of%20soil,is%20easier%20said%20than%20done>.

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks:

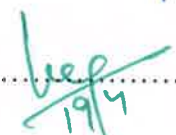
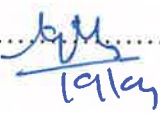
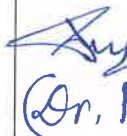
50 Marks

(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)

Semester End Exam (SEE)

Laboratory performance: As per Dept. (LOCF)

Name & Signature of Members of Board of Studies

Chairperson/H.O.D..... 	Departmental members:
Subject Expert.....  (University Nominee)	 Dr. V.S. Geete
Subject Expert.....	 Dr. S. Mathew
Subject Expert..... 	 (Dr. P. Kalthane)
Representative.....  (Industry) Representative.....	
(Alumni)	
Representative..... 	 Neha
(Professor Science Faculty Other Dept.)	

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG
FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM 2025-2026
INDUSTRIAL CHEMISTRY

PART A: INTRODUCTION

Program: FYUP		Class: B.Sc. Semester -VI	Session:2025-2026
1	Course Code	CZICE/CMICE 603	
2	Course Title	Inorganic Materials of Industrial importance	
3	Course Type	Discipline Specific Elective (DSE) – I	
4	Course Learning Outcome (CLO)	This Course will enable the students to: - To address the student about the inorganic materials which is important in industries. - To understand the preparation, type and use of silicates. - To understand the types of fertilizer as inorganic compound. - To understand the alloy formation and batteries in industries	
5	Credit Value	3 Credits	1 credit =15 Hours – Learning and Observation
6	Total Marks	Maximum Marks :100	Minimum Passing Marks:40

PART B: CONTENT OF THE COURSE

Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)

Unit	Topics (COURSE CONTENTS)	No. of Periods
I	Glass: Glassy state and its properties, classification (silicate and non-silicate glasses). Manufacture and processing of glass. Composition and properties of the following types of glasses: Soda lime glass, lead glass, armoured glass, safety glass, borosilicate glass, fluorosilicate, coloured glass, photosensitive glass.	9
II	Ceramics: Important clays and feldspar, ceramic, their types and manufacture. High technology ceramics and their applications, superconducting and semiconducting oxides, fullerenes, carbon nanotubes and carbon fibre.	9

III	Fertilizers: Different types of fertilizers. Manufacture of the following fertilizers: Urea, ammonium nitrate, calcium ammonium nitrate, ammonium phosphates; polyphosphate, superphosphate, compound and mixed fertilizers, potassium chloride, potassium sulphate.	9
IV	Alloys: Classification of alloys, ferrous and non-ferrous alloys, Specific properties of elements in alloys. Manufacture of Steel (removal of silicon decarbonization, demanganization, desulphurization dephosphorisation) and surface treatment (argon treatment, heat treatment, nitriding, carburizing). Composition and properties of different types of steels.	9
V	Batteries: Primary and secondary batteries, battery components and their role, Characteristics of Battery. Working of following batteries: Pb acid, Li-Battery, Solid state electrolyte battery. Fuel cells, Solar cell and polymer cell.	9

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended:

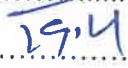
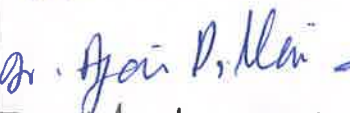
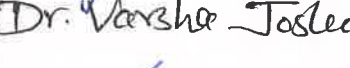
1. E. Stocchi: Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK.
2. R. M. Felder, R. W. Rousseau: Elementary Principles of Chemical Processes, Wiley Publishers, New Delhi.
3. W. D. Kingery, H. K. Bowen, D. R. Uhlmann: Introduction to Ceramics, Wiley Publishers, New Delhi.
4. J. A. Kent: Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
5. P. C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
6. R. Gopalan, D. Venkappayya, S. Nagarajan: Engineering Chemistry, Vikas Publications, New Delhi.
7. B. K. Sharma: Engineering Chemistry, Goel Publishing House, Meerut.

Online Resources–

- <http://nptel.ac.in>
- <http://swayam.gov.in>
- <http://epathshala.nic.in>

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods:	
Maximum Marks:	100Marks
Continuous Comprehensive Evaluation (CCE):	20 Marks
Semester End Exam (SEE):	80 Marks
Internal Assessment:	Internal Test of 20Marks and Assignment of 20 Marks
Continuous Comprehensive Evaluation (CCE)	
Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D)from each Unit Total = 80 MarksPattern -FOUR Questions (A, B, C, D)from each Unit Question A & B(Compulsory)Very short answer type(2 each)04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks Total = 80 Marks

Name & Signature of Members of Board of Studies

Chairperson/H.O.D.....  Subject Expert.....  (University Nominee) Subject Expert..... Subject Expert.....  Representative.....  (Industry)Representative.....  (Alumni)  Representative..... (Professor Science Faculty Other Dept.)	Departmental members:  Dr. P. Kathane  Dr. S. Mathew  Dr. Ajai P. Mani  Dr. Varsha Joshi  
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GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM 2025-26
INDUSTRIAL CHEMISTRY: Lab Course- 4

PART A: INTRODUCTION			
Program: FYUP		Class: B.Sc.	Semester VI Session: 2025-2026
1	Course Code	CZICE/CMICE 603	
2	Course Title	INDUSTRIAL CHEMISTRY: Lab Course- 4	
3	Course Type	DSE - II (I)	
4	Course Learning Outcome (CLO)	This Course will enable the students to: - To learn the analysis of components of fertilizers. - To learn the analysis of alloy - To perform the sample analysis of ore to find the metal percentage. - To demonstrate the metallic coating on ceramics.	
5	Credit Value	1 Credit	1 credit=30 Hours – Learning and Observation
6	Total Marks	Maximum Marks :50	Minimum Passing Marks:20
PART B: CONTENT OF THE COURSE			
S. No.	List of Experiments		
1	Determination of free acidity in ammonium sulphate fertilizer.		
2	Estimation of Calcium in Calcium ammonium nitrate fertilizer.		
3	Estimation of phosphoric acid in superphosphate fertilizer.		
4	Electroless metallic coatings on ceramic and plastic material.		
5	. Preparation of pigment (zinc oxide).		
6	Determination of percentage of metal in alloy.		

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

Text Books Recommended –

1. E. Stocchi: Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK.
2. R. M. Felder, R. W. Rousseau: Elementary Principles of Chemical Processes, Wiley Publishers, New Delhi.
3. W. D. Kingery, H. K. Bowen, D. R. Uhlmann: Introduction to Ceramics, Wiley Publishers, New Delhi.
4. J. A. Kent: Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
5. P. C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
6. R. Gopalan, D. Venkappayya, S. Nagarajan: Engineering Chemistry, Vikas Publications, New Delhi.
7. B. K. Sharma: Engineering Chemistry, Goel Publishing House, Meerut.

Online Resources:

- ☐ <http://nptel.ac.in>
- ☐ <http://swayam.gov.in>
- ☐ <http://epathshala.nic.in>

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks:

50 Marks

(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)

Semester End Exam (SEE)

Laboratory performance: As per Dept. (LOCF)

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks:

50 Marks

(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)

Semester End Exam (SEE)

Laboratory performance: As per Dept. (LOCF)

Name & Signature of Members of Board of Studies

Chairperson/H.O.D.....

Departmental members:

Subject Expert.....

(University Nominee)

Subject Expert.....

Subject Expert.....

Representative.....

(Industry) Representative.....

(Alumni) Representative.....

Representative.....

(Professor Science Faculty Other Dept.)

Dr. P. Kathane

Dr. S. Malhe

Dr. P. D. Dhar

Dr. Varsha Joshi

Neha She

Name & Signature of Members of Board of Studies

Chairperson/H.O.D.....		Departmental members:
Subject Expert.....		
(University Nominee)		
Subject Expert.....		
Subject Expert.....		Dr. P. Kathane 
Representative.....		Dr. S. Malhe 
(Industry) Representative.....		Dr. Ajay P. Khan 
(Alumni) 		Dr. Varsha Jasli 
Representative.....		Dr. Sornasen. 
(Professor Science Faculty Other Dept.)		Neha the 

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG
FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM 2025-26
INDUSTRIAL CHEMISTRY

PART A: INTRODUCTION			
Program: FYUP		Class: B.Sc. Semester -VI	Session: 2025-2026
1	Course Code	CZICE/CMICE 604	
2	Course Title	Organic Synthesis	
3	Course Type	Discipline Specific Elective (DSE) – II	
4	Course Learning Outcome (CLO)	This Course will enable the students to: • understand stereochemical concepts to predict the outcomes of chemical reactions • To understand the reaction mechanism of named reactions. • To understand the reaction mechanism of rearrangement reactions. • Acquire knowledge about uses and preparation of reagents • To develop the ability to apply knowledge of heterocyclic chemistry to predict the behavior of heterocyclic compounds in various chemical reactions	
5	Credit Value	3 Credits	1 credit = 15 Hours – Learning and Observation
6	Total Marks	Maximum Marks : 100	Minimum Passing Marks: 40
PART B: CONTENT OF THE COURSE			
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)			
Unit	Topics (COURSE CONTENTS)		No. of Periods
I	Stereochemistry: Introduction to conformation and conformational analysis, Conformation of cyclohexane and its mono, di and poly substitute derivatives, Declain, perhydroanthracene, perhydrophenanthrene, role of spectroscopy in the study of conformational analysis, Conformational and reactivity.		9
II	Reactions: Introduction & Mechanism of Mannich reaction, Introduction & Mechanism of Oppenauer oxidation, Introduction & Mechanism of Meerwein-Ponndorf-Verley reduction, Introduction & Mechanism of Ullman reaction, Introduction & Mechanism of Sandmeyer reaction, Introduction & Mechanism of Buckner reaction, Introduction & Mechanism of Grignard reaction, Introduction & Mechanism of Kolbe's Schmidt reaction.		9

III	Rearrangement: Introduction & Mechanism of Fries rearrangement, Introduction & Mechanism of Benzidine rearrangement, Introduction & Mechanism of Von Richter rearrangement, Introduction & Mechanism of Whitmore rearrangement, Introduction & Mechanism of Schmidt rearrangement, Introduction & Mechanism of Hoffman rearrangement, Introduction & Mechanism of Curties rearrangement, Introduction & Mechanism of Pinacol – Pinacolone rearrangement.	10
IV	Reagents: Properties, uses and preparation of N-bromosuccinamide, Aluminum isopropoxide, Polyphosphoric acid, Sodium borohydride, Lithium Aluminium Hydride, Diazo methane, Liquid ammonia.	8
V	Heterocyclic Compounds: Introduction, Classification and nomenclature, importance of heterocyclic compounds. Preparation and properties; Simple (five member) – Pyrroles, Furan, Thiophene, Pyrazole, Imidazole, Iminazole, Oxazole, Thiazole, Fused (five member) – Indole, Benzofuran, Benzothiophene, Simple (six member) – Pyridine, Pyrans, Pyridazine, Pyrimidine, Pyrazine, Fused (six member) – Quinoline, Phenoxazine	9

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended:

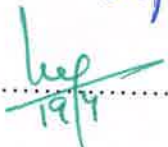
1. R. M. Felder, R. W. Rousseau: Elementary Principles of Chemical Processes, Wiley Publishers, New Delhi.
2. March, J. (1985). Advanced Organic Chemistry: Reactions, Mechanisms, and Structure (3rd ed.). Wiley.
3. Morrison, R. T., & Boyd, R. N. (1992). Organic Chemistry (6th ed.). Prentice-Hall of India.
4. Finar, I. L. (1973). Organic Chemistry: Stereochemistry and the Chemistry of Natural Products (Vol.1 & 2). Longman.
5. Fieser, L. F., & Fieser, M. (1967). Current Topics in Organic Chemistry (Vol. 1). Reinhold.
6. Verma, D. K. (2005). Handbook of Organic Name Reactions, Reagents, and Applications (1st ed.) Elsevier.

Online Resources– (e-Resources / e-books and e-learning portals)

- <http://nptel.ac.in>
- <http://swayam.gov.in>
- <http://epathshala.nic.in>

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods:	
Maximum Marks:	100 Marks
Continuous Comprehensive Evaluation (CCE):	20 Marks
Semester End Exam (SEE):	80 Marks
Internal Assessment:	Internal Test of 20 Marks and Assignment of 20 Marks
Continuous Comprehensive Evaluation (CCE)	
Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D)from each Unit Total = 80 Marks Pattern -FOUR Questions (A, B, C, D)from each Unit Pattern -FOUR Questions (A, B, C, D)from each Unit Total = 80 Marks Pattern -FOUR Questions (A, B, C, D)from each Unit Total = 80 Marks Question A & B(Compulsory)Very short answer type(2 each) $04 \times 5 = 20$ Marks Question - C: Short answer type question $05 \times 5 = 25$ Marks Question -D: Long answer type question $07 \times 5 = 35$ Marks Total = 80 Marks

Name & Signature of Members of Board of Studies

Chairperson/H.O.D..... 	Departmental members:
Subject Expert.....  (University Nominee)	
Subject Expert.....	Dr. P. Kathane 
Subject Expert..... 	Mr. S. Malhotra 
Representative..... 	Dr. Anjali P. Rai 
(Industry)Representative.....	Dr. Varsha Jaslu Dastur 
(Alumni) 	 
Representative.....	Neha Dhe 
(Professor Science Faculty Other Dept.)	

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM 2025-26

INDUSTRIAL CHEMISTRY: Lab Course- 6

PART A: INTRODUCTION			
Program: FYUP		Class: B.Sc.	Semester -VI Session:2025-2026
1	Course Code	CZICE/CMICE 604	
2	Course Title	INDUSTRIAL CHEMISTRY: Lab Course- 6	
3	Course Type	Discipline Specific Elective (DSE) – II	
4	Course Learning Outcome (CLO)	This Course will enable the students to: • Apply knowledge of organic reaction mechanisms to perform single and two-stage syntheses of various aromatic and heterocyclic compounds. • Develop essential laboratory skills in organic synthesis, including purification techniques (crystallization, distillation, etc.) and characterization methods (melting point, IR spectroscopy). • Demonstrate proficiency in the preparation and characterization of key aromatic and heterocyclic molecules. • Gain experience in the synthesis of diverse organic functional groups	
5	Credit Value	1 Credit	1 credit =30 Hours – Learning and Observation
6	Total Marks	Maximum Marks :50	Minimum Passing Marks:20
PART B: CONTENT OF THE COURSE			
S. No.	List of Experiments		
1	Single and Two stage organic preparations and purification: Benzylic acid from Benzoin, p- Chlorotoluine from p-Toludine,		
2	Preparations and purification: 2,4- Dinitrophenol from Chlorobenzene,2,4-Dinitrophenylhydrazine from Chlorobenzene, m- Nitrobenzoic acid from methyl benzoate		

3	Preparations and purification: Thiazoles from acetophenones, pyrimidines from aldehydes/ketones and thiourea, ,
4	Preparations and purification: eosin from resorcinol & phthalic anhydride, Indigo from anthranilic acid,
5	Preparations and purification: methyl orange from aniline, 5-hydroxy-1,3-benzothiole from hydroquinone, Benzimidazole from urea.

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

Text Books Recommended –

1. Singh, P. R., Kapoor, V. P., & Kapoor, I. P. S. (1981). Experimental Organic Chemistry (Vol. I & II). Tata McGraw Hill.
2. Dey, A. K., & Sitaraman, K. (1992). Laboratory Manual in Organic Chemistry. Allied Publishers.
3. Furniss, B. S., Hannaford, A. J., Smith, P. W. G., & Tatchell, A. R. (1989). Vogel's Textbook of Practical Organic Chemistry (including Qualitative Organic Analysis). Longman Scientific & Technical.
4. Jag Mohan. (2003). Organic Analytical Chemistry: Theory and Practice. Narosa Publishing House.
5. Mann, F. G., & Saunders, B. C. (1970). Practical Organic Chemistry (4th ed.). Longman.
6. Bansal, R. K. (1990). Laboratory Manual of Organic Chemistry (2nd ed.). Wiley Eastern.

Online Resources:

- ☐ <http://nptel.ac.in>
- ☐ <http://swayam.gov.in>
- ☐ <http://epathshala.nic.in>

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks:

50 Marks

(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)

Semester End Exam (SEE)

Laboratory performance: As per Dept. (LOCF)

Name & Signature of Members of Board of Studies

Chairperson/H.O.D.....

Subject Expert.....

(University Nominee)

Subject Expert.....

Subject Expert.....

Representative.....

(Industry) Representative.....

(Alumni)

Representative.....

(Professor Science Faculty Other Dept.)

Departmental members:

Dr. V. S. Gupta

Dr. S. Mathur

Dr. P. Kathane

Neha Jha