

SRI VENKATESWARA UNIVERSITY
B.Sc. DEGREE COURSE IN INDUSTRIAL CHEMISTRY
THIRD SEMESTER
(Syllabus under CBCS w.e.f. 2021-22)

Course-IV

**Dyes, Drugs, Pharmaceuticals, Leather chemistry, Paperindustry and
Industrial waste management**

60hrs (4 hours/week)

Course Outcomes

At the end of the course student will be able to

- CO1 Describe the classification of dyes.
- CO2 Write down the industrial preparation of Common dyes.
- CO3 Describe the manufacture of leather.
- CO4 Write down the manufacture of pulp.
- CO5 Demonstrate the preparation of paper.
- CO6 Gain knowledge about the synthesis of important drugs.
- CO7 Demonstrate the steps involved in waste management.
- CO8 Describe the different water purification methods.

Unit-1

12 hours

Dyes

Introduction, Classification with special reference to textile and edible dyes and fabric brighteners. Industrial preparation and uses of methyl orange, malachite green, indigo, bismark brown, alizarin.

Unit-2

08 hours

Leather Chemistry- Introduction, Manufacture of Leather and Preparation of hides for tanning, vegetable, chrome and oil tanning.

Unit-3

Paper Industry

10 hours

Pulp and Paper- Introduction, Manufacture of pulp, sulphate or kraft pulp, soda pulp, sulphite pulp, rag pulp, beating, refining, filling, sizing and coloring of pulp, manufacture of paper.

Unit-4
Drugs and Pharmaceuticals

15 hours

Synthesis of the representative drugs of the following classes: analgesics agents, antipyretic agents, anti-inflammatory agents (Aspirin, paracetamol, ibuprofen); antibiotics (Chloramphenicol); antibacterial and antifungal agents (Sulphonamides; Sulfamethoxazole and Sulphacetamide); antiviral agents (Acyclovir), Central Nervous System agents (Phenobarbital, Diazepam), Cardiovascular (Glyceryl trinitrate), antileprosy (Dapsone), HIV/AIDS related drug (AZT- Zidovudine).

Unit-5
Industrial Waste Management

15 hours

Waste water treatment - primary, secondary & tertiary treatment

Solid Waste Management Pyramid – Key Technologies for SWM (collection, handling, transformation, landfills, incinerators, composting)

Water treatment and purification (reverse osmosis, electro dialysis, ion exchange)

Co-curricular activities and Assessment Methods

1. **Assessment of Learning:** Summative assessment- Conduct of semester end exams.
2. **Assessment for Learning:** Formative assessment-Different assessment tools like Minute paper, Muddiest point, Think-Pair-Share, 3-2-1 chart etc.,
3. **Assessment as learning:** Self-assessment-assignments, slip tests etc.,
4. **Quizzes, Guest Lecture, Student seminar, educational tour, field trip etc., .**

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IV SEMESTER
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Laboratory Course –IV

50 Marks

Practical Paper- IV (at the end of semester IV) 30 hours (2 hours/week)

Course Outcomes

At the end of the course student will be able to

CO1 Prepare Methyl orange

CO2 Synthesize important compounds

1. Preparation of Methyl Orange.
2. Synthesis of common industrial compounds involving two step reactions, e.g. 4- bromo aniline, 3-nitroaniline, sulphanilamide, 4-amino benzoic acid, 4-nitro benzoic acid, nitrohalobenzenes, oil of winter green)(**ANY THREE**)

Reference Books

1. E. Stocchi: *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK
2. J. A. Kent: *Riegel's Handbook of Industrial Chemistry*, CBS Publishers, New Delhi.
3. P. C. Jain, M. Jain: *Engineering Chemistry*, Dhanpat Rai & Sons, Delhi.
4. *Practicals and Calculation in Engineering Chemistry* – S.S. Dara
5. S.P. Mahajan: *Pollution control in process industries*, Tata McGraw-Hill publishing company limited, New Delhi.
6. G.L. Patrick: *Introduction to Medicinal Chemistry*, Oxford University Press, UK.
7. Hakishan, V.K. Kapoor: *Medicinal and Pharmaceutical Chemistry*, Vallabh Prakashan, Pitampura, New Delhi.
8. William O. Foye, Thomas L., Lemke, David A. William: *Principles of Medicinal Chemistry*, B.I. Waverly Pvt Ltd. New Delhi.
9. Jayashree Ghosh: *Text Book of Pharmaceutical Chemistry*, 2nd edition, S.Chand & Company, New Delhi

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MODEL PAPER

Course-IV: Dyes, Drugs, Pharmaceuticals, Leather chemistry, Paper industry and Industrial waste management

Time: 3 hours

Maximum Marks: 75

PART- A

5 X 5 = 25 Marks

Answer any **FIVE** of the following questions. Each question carries **FIVE** marks.

1. Write the preparation and uses of alizarin.
2. What are fabric brighteners? Explain in brief.
3. Explain in brief preparation of hide for tanning.
4. What is rag pulp. Explain briefly.
5. Write the structure and uses of Acyclovir.
6. Write a note on Zidovudine.
7. Define the term 'Incineration'. Explain in brief.
8. Explain in brief how ion exchange method is used for the purification of water.

PART- B

5 X 10 = 50 Marks

Answer **ALL** the questions. Each carries **TEN** marks

9. (a) Describe the classification of textile dyes.

(or)

(b) Explain the industrial preparation and uses of methyl orange and malachite green.

10. (a) Describe in detail important steps involved in the manufacture of Leather.

(or)

(b) Describe the vegetable tanning process in detail.

11. (a) Explain the Kraft process for the production of pulp.

(or)

(b) Explain with a neat diagram several stages involved in the paper manufacturing process.

12. (a) Write the synthesis of paracetamol and aspirin.

(or)

(b) Write the synthesis of Phenobarbital and Dapsone.

13. (a) Explain in detail the different stages involved in the waste water treatment.

(or)

(b) What is Reverse osmosis? Explain how it is used for the purification of water.

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Course-V Polymers and Instrumental methods of analysis

60hrs (4 hours/week)

Course Outcomes

At the end of the course student will be able to

- CO1 Describe the classification of polymers.
- CO2 Write down the manufacture of commonly used polymers.
- CO3 Describe about Specialty polymers.
- CO4 Write down about boron containing, phosphorus containing and, siliconcontaining polymers.
- CO5 Describe about important electro analytical techniques.
- CO6 Describe the thermo analytical techniques.
- CO7 Write about the principle and applications of flame photometry.
- CO8 Write about the principle and applications of atomic absorption spectroscopy.

Unit-1

15 hours

Organic Polymers-1

Basic definitions, degree of polymerization, classification of polymers- Natural and Synthetic polymers, Organic and Inorganic polymers, Thermoplastic and Thermosetting polymers, Plastics, Elastomers, Fibers and Resins, Linear, Branched and Cross Linked polymers, Addition polymers and Condensation Polymers, mechanism of polymerization-Free radical, ionic and Zeigler-Natta polymerization. Industrial manufacturing and applications of following polymers, Polystyrene, Polyacrylonitrile, Polymethacrylate, Polymethyl- methacrylate, Polyethene, poly vinyl chloride, PTFE, Polyesters, Polyurethanes, Nylon (6 and 66).

Unit-2

15 hours

Organic Polymers-2

Specialty Polymers (Electro-luminescent, Biopolymers, Conducting polymers), Rubbers (synthetic and natural) and their processing, Elastomers, Cellulosics, Natural and Synthetic

fibers. Comparison of natural and synthetic polymers. Polymer Processing: Moulding, compounding, blending. Polymer designing: packaging, certification and process evaluation.

Unit-3

8 hours

Inorganic Polymers: Classification, preparation, properties and uses of boron containing polymers, phosphorus containing polymers, silicon containing polymers- Silicones (fluid, elastomers and resins) and Sulphur containing polymers(SN)x.

Unit-4

16 hours

Instrumental methods of analysis

Electro analytical techniques- Potentiometry, voltammetry, polarography and Colorimetry- principle, instrumentation and applications.

Thermo analytical techniques- Thermal gravimetric analysis (TGA), differential thermal analysis (DTA), differential scanning calorimetry (DSC) – principle and applications.

Unit-5

06 hours

Instrumental methods of analysis

Atomic spectroscopy

Atomic Spectroscopy- Flame photometry, Atomic absorption spectroscopy-Principles and their applications.

Co-curricular activities and Assessment Methods

- 1. Assessment of Learning:** Summative assessment- Conduct of semester end exams.
- 2. Assessment for Learning:** Formative assessment-Different assessment tools like Minute paper, Muddiest point, Think-Pair-Share, 3-2-1 chart etc.,
- 3. Assessment as learning:** Self-assessment-assignments, slip tests etc.,
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Laboratory Course –V

50 Marks

Practical Paper- V (at the end of semester V) 30 hours (2 hours/week)

Course Outcomes

At the end of the course student will be able to

CO1 Carry out the extraction of natural coloring and flavoring agents

CO2 Prepare Nylon 6,6

CO3 Determine Na^+ and K^+ using Flame Photometry.

CO4 Verify Beer Lambert's by using spectrophotometry

1. Extraction of natural coloring and flavoring agents from flowers and fruits (extraction of any three coloring and flavoring agents).
2. Preparation of nylon 6,6.
3. Determination of concentration of Na^+ and K^+ using Flame Photometry.
4. Verification of Beer Lambert's by using spectrophotometry.

Reference Books

1. K.J. Saunders: *Organic Polymer Chemistry*, Chapman & Hall, London.
2. P.J. Flory: *Principles of Polymer Chemistry*, Cornell University Press, NY.
3. G. Odian: *Principles of Polymerization*, John Wiley & Sons Inc, NY.
4. James E. Mark, Harry Allcock, Robert West, *Inorganic Polymers*, Prentice Hall Englewood.
5. Polymer science V. R. Gowariker, N. V. Viswanathan and Jayadev Sreedhar, Halsted Press (John Wiley & Sons), New York, 1986.
6. H.H. Willard, L.L. Merritt, J.A. Dean, F. A. Settle: *Instrumental Methods of Chemical Analysis*, Wadsworth Publishing Company, California.
7. G. D. Christian: *Analytical Chemistry*, John Wiley, NY.
8. S.M. Khopkar: *Basic Concepts of Analytical Chemistry*, Wiley Eastern Ltd, New Delhi.
9. D.A. Skoog, D.M. West, F.J. Holler: *Fundamentals of Analytical Chemistry*, Cengage Learning.

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MODEL PAPER

Course-V: Polymers and Instrumental methods of analysis

Time: 3 hours

Maximum Marks: 75

PART- A

5 X 5 = 25 Marks

Answer any **FIVE** of the following questions. Each question carries **FIVE** marks.

1. Describe in brief classification of polymers.
2. Write the preparation and properties of PVC.
3. Explain in brief the Zeigler-Natta polymerisation.
4. What is PTFE. Write the preparation and properties of PTFE.
5. Write a note conducting polymers.
6. Explain in brief about the preparation and properties of Sulphur containing polymers.
7. Write the principle and applications of Polarography.
8. What is DSC? Write its applications.

PART- B

5 X 10 = 50 Marks

Answer **ALL** the questions. Each carries **TEN** marks

9. (a) Explain the preparation and properties of i) polystyrene and ii) Nylon 6,6.
(or)
(b) What is free radical polymerization? Explain in detail the mechanism.
10. (a) Describe about natural and synthetic rubbers .
(or)
(b) Write a note on i) Cellulosics and ii) Biopolymers
11. (a) Explain the preparation, properties and applications of Boron containing polymers,
(or)
(b) Explain the preparation, properties and applications of silicones.
12. (a) Explain the principle, instrumentation and applications of potentiometry.
(or)
(b) Describe the principle and applications of Thermal gravimetric analysis (TGA).
13. (a) Explain the principle and applications of Flame photometry.
(or)

(b) Explain the principle and applications of Atomic absorption spectroscopy