

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,
CHHATRAPATI SAMBHAJINAGAR.



NAAC- 'A' Grade

CIRCULAR NO.SU/ Sci./College/NEP-2020/73/2025

It is hereby inform to all concerned that, the syllabi prepared by the Board of Studies/ Ad-hoc Boards/Committee and recommended by the Dean, Faculty of Science & Technology, the Academic Council at its meeting held on 09 May 2025 has been accepted **the following B.Sc. Course Structure & Curriculum** under the Faculty of Science & Technology as per National Education Policy - 2020 run at the Affiliated Colleges of Dr. Babasaheb Ambedkar Marathwada University as appended herewith.

Sr.No.	Courses	Semester
1	B.SC. PHYSICS	III RD AND IV TH SEMESTER
2	B.SC. ELECTRONICS	III RD AND IV TH SEMESTER
3	B.SC. MATHEMATICS	III RD AND IV TH SEMESTER
4	B.SC. INDUSTRIAL CHEMISTRY	III RD AND IV TH SEMESTER
5	B.SC. AGROCHEMICAL AND FERTILIZE	III RD AND IV TH SEMESTER
6	B.SC. HORTICULTURE	III RD AND IV TH SEMESTER
7	B.SC. BIOCHEMISTRY	III RD AND IV TH SEMESTER
8	B.SC. BOTANY	III RD AND IV TH SEMESTER
9	B.SC. ZOOLOGY	III RD AND IV TH SEMESTER
10	B.SC. BIOTECHNOLOGY	III RD AND IV TH SEMESTER
11	B.SC. MICROBIOLOGY	III RD AND IV TH SEMESTER
12	B.SC. DIARY SCIENCE AND TECHNOLOGY	III RD AND IV TH SEMESTER
13	B.SC. STATISTICS	III RD AND IV TH SEMESTER
14	B.SC. COMPUTER SCIENCE	III RD AND IV TH SEMESTER
15	B.SC. GEOLOGY	III RD AND IV TH SEMESTER
16	B.SC. CHEMISTRY	III RD AND IV TH SEMESTER
17	B.SC. ANALYTICAL CHEMISTRY	III RD AND IV TH SEMESTER
18	B.SC. POLYMER CHEMISTRY	III RD AND IV TH SEMESTER
19	B.SC. ENVIRONMENTAL SCIENCE	III RD AND IV TH SEMESTER
20	B.SC. FISHERIES SCIENCE	III RD AND IV TH SEMESTER

21.	B.SC. HOME SCIENCE	III RD AND IV TH SEMESTER
22.	B.SC. DATA SCIENCE	III RD AND IV TH SEMESTER
23.	B.SC. INFORMATION TECHNOLOGY	III RD AND IV TH SEMESTER
24.	B.SC. NETWORKING AND MULTIMEDIA	III RD AND IV TH SEMESTER
25.	B.SC. AUTOMOBILE TECHNOLOGY	III RD AND IV TH SEMESTER
26.	B.SC. FORENSIC SCIENCE	III RD AND IV TH SEMESTER
27.	B.SC. FORENSIC SCIENCE & CYBER SECURITY	III RD AND IV TH SEMESTER
28.	B.SC. NON-CONVENTIONAL & CONVENTIONAL ENERGY	III RD AND IV TH SEMESTER
29.	B.SC. CLINICAL LABORATORY SCIENCE	III RD AND IV TH SEMESTER
30.	BACHELOR OF COMPUTER APPLICATION	III RD AND IV TH SEMESTER

This is effective from the Academic Year 2025-26 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Chhatrapati Sambhajnagar
-431 004.
Ref.No. SU/Sci./2025/ 827-29
Date:- 26/05/2025

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(Signature)
**Deputy Registrar,
Syllabus Section.**

Copy forwarded and necessary action to :-

- 1] **The Principal of all Affiliated Colleges,**
Dr. Babasaheb Ambedkar Marathwada University,
- 2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

Copy to :-

- 1] The Director, Board of Examinations & Evaluation, Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajnagar.

Dr. Babasaheb Ambedkar Marathwada University

Chhatrapati Sambhajinagar- 431001



B.Sc. Degree Programme

(Three Year / Four Years (Hons) / Four Years (Hons with Research))

Syllabus

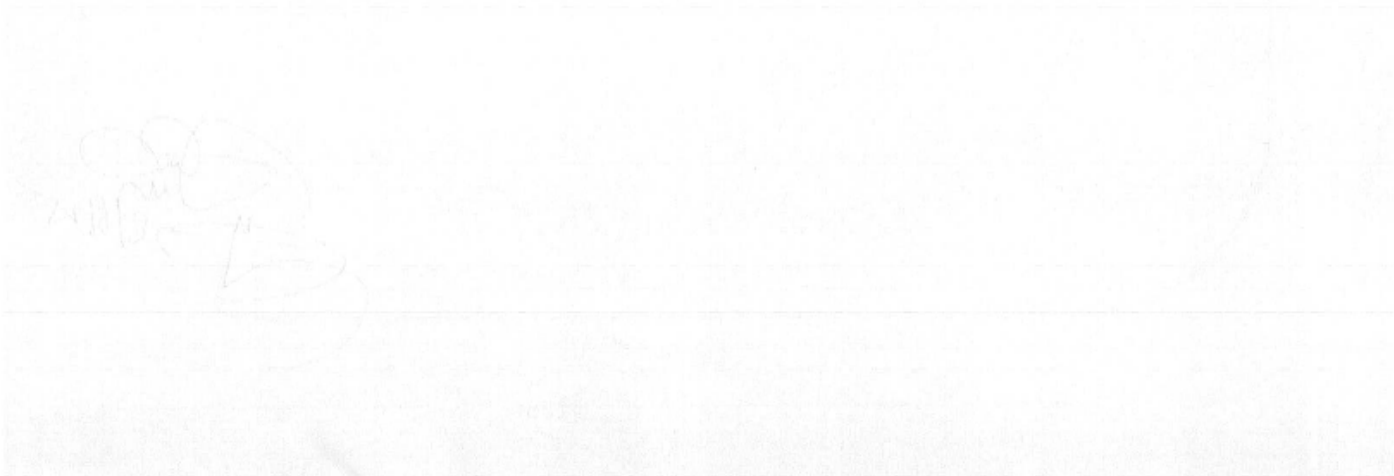
BSc. III & IV Semester

NEP 2020

ANALYTICAL CHEMISTRY

Effective from 2025-26

Prof. Pathan Mohd Arif Ali Khan
Chairman
Board of Studies in Chemistry,
Dr. Babasaheb Ambedkar Marathwada
University, Chh. Sambhajinagar (M.S.)
June 2025



BSc Second Year: 3rd Semester

Students will have to select / declare choice of **one major subject** and **one minor subject** from three major options M1, M2 and M3 (which were opted in the first year)

Course Type	Course Code	Examination Code (To be given by respective BoS)	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
				Theory	Practical	Theory	Practical	
Major (Core) Mandatory DSC	ANC/DSC/T/200	SAC0003200 3T	Theory Course Statistical methods in Analytical Chemistry	2		2		2+2+2+2 = 08
	ANC /DSC/T/201	SAC0003201 3T	Theory Course Electroanalytical Techniques	2		2		
	ANC /DSC/P/226	SAC0003226 3P	Practical based on SUB/DSC/T/200		4		2	
	ANC /DSC/P/227	SAC0003227 3P	Practical based on SUB/DSC/T/201		4		2	
Minor (Choose any two from pool of courses) It is from different discipline of the same faculty	ANC /Mn/T/200	SCC0003200 3T	To be chosen from other discipline of same faculty	2		2		2+2 = 04
	ANC /Mn/T/201	SCC0003201 3T	To be chosen from other discipline of same faculty	2		2		
Generic / Open Elective (GE/OE) (Choose any one from pool of courses) It should be chosen compulsorily from the faculty other than that of Major	ANC /GE/OE/T/200	SDC0003200 3T	To be chosen from other faculty	2		2		02
VSC (Vocational Skill Courses) (Choose any one from SUB/VSC/T/ 200 and SUB/VSC/T/ 201) and corresponding Practicals	ANC /VSC/T/200	SEC00032003 T	Theory Course	1		1		1+1 =02
	ANC /VSC/T/201	SEC00032013 T	Theory Course	1		1		
	ANC /VSC/P/226	SEC00032263 P	Practicals based on SUB/VSC/T/ 200		2		1	
	ANC /VSC/P/227	SEC00032273 P	Practicals based on SUB/VSC/T/ 201		2		1	
AEC, VEC, IKS	ANC /AEC/T/200		English (Common for all the faculty)	2		2		2 + 2 = 04
	ANC /VEC/T/201		Environmental Studies	2		2		
OJT/ FP/CEP/CC/RP	ANC /CC/P/226		Cultural Activity / NSS,NCC (Common for all the faculty)		4		2	02
				15	14	15	07	22

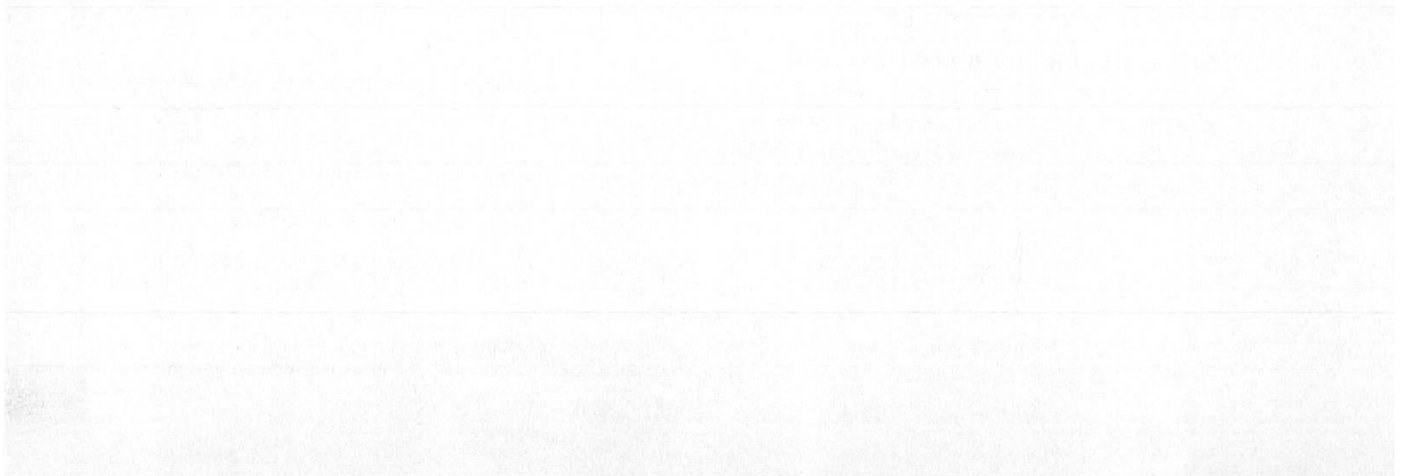
Minor Courses for other Discipline

ANC/Mn/T/ 200 : This is a 2 credit theory course to be designed for other discipline **Chromatographic Method**

ANC/Mn/T/ 201 : This is a 2 credit theory course to be designed for other discipline **Analytical Techniques**

Generic /Open Elective Courses for other faculty

ANC/GE/OE/T/200 : This is a 2 credit theory course to be designed for other faculty **Chemistry of Drugs**



BSc Second Year: 4th Semester

Course Type	Course Code	Examination Code (To be given by respective BoS)	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
				Theory	Practical	Theory	Practical	
Major (Core) Mandatory DSC	ANC /DSC/T/250	SAC0003250 4T	Theory Course Modern Analytical methods	2		2		2+2+2+2 = 08
	ANC /DSC/T/251	SAC0003251 4T	Theory Course Food Analysis	2		2		
	ANC /DSC/P/276	SAC0003276 4P	Practical based on SUB/DSC/T/250		4		2	
	ANC /DSC/P/277	SAC0003277 4P	Practical based on SUB/DSC/T/ 251		4		2	
Minor (Choose any two from pool of courses) It is from different discipline of the same faculty	ANC /Mn/T/250	SCC0003250 4T	To be chosen from other discipline of same faculty	2		2		2+2 = 04
	ANC /Mn/T/251	SCC0003251 4T	To be chosen from other discipline of same faculty	2		2		
Generic / Open Elective (GE/OE) (Choose any one from pool of courses) It should be chosen compulsorily from the faculty other than that of Major	ANC /GE/OE/T/250	SDC0003250 4T	To be chosen from other faculty	2		2		02
SEC (Skill Enhancement Courses) (Choose any one from SUB/SEC/T/250 and SUB/SEC/T/ 251) and corresponding Practicals	ANC /SEC/T/250	SEC00032504 T	Theory Course	1		1		1+1 =02
	ANC /SEC/T/251	SEC00032514 T	Theory Course	1		1		
	ANC /SEC/P/276	SEC00032764 P	Practicals based on SUB/SEC/T/250		2		1	
	ANC /SEC/P/277	SEC00032774 P	Practicals based on SUB/SEC/T/ 251		2		1	
AEC, VEC, IKS	ANC /AEC/T/250		Modern Indian Language (MIL-2) (Choose any one from pool of language courses)	2		2		02
OJT/ FP/CEP/CC/RP	ANC /FP/P/276		Field Project		4		2	2+2= 04
	ANC /CC/P/277		(Fine/ Applied/ Visual/ Performing Arts) (Common for all the faculty)		4		2	
				13	18	13	09	22
Exit Option : Award of UG Diploma in major and minor with 88 credits and an additional 4 credits NSQF course (related to major / minor) / Internship during summer vacation OR Continue with Major and Minor								

Minor Courses for other Discipline

ANC/Mn/T/ 250 : This is a 2 credit theory course to be designed for other discipline **Modern methods of Analysis I**

ANC/Mn/T/ 251: This is a 2 credit theory course to be designed for other discipline **Modern Methods of Analysis II**

Generic /Open Elective Courses for other faculty ANC/GE/OE/T/250 : This is a 2 credit theory course to be designed for other faculty **Soils and Fertilizers**


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Chairman

B. Sc Analytical Chemistry III & IV Semester NEP 2020
Board of Studies in Chemistry,
Dr. Babasaheb Ambedkar Marathwada
University, Chh.Sambhajinagar (M.S)

Total Credits: 02

University Assessment: 30 Marks

Maximum Marks: 50 Marks

Total Contact Hours: 30 Hrs

Internal Assessment: 20 Marks

Learning Objectives of the Course:

Course Outcomes (COs):

After completion of the course, students will be able to:

Course Content

Unit-I:

Statistical Analysis and analytical Figure of Merit

[10 Hrs]

Introduction, Errors (gross errors, systematic errors, random errors), validation parameters: calibration, (linear response functions (linear regression-errors in slope and the intercept, error in the estimate of concentration, standard additions), non-linear response functions and weighted regression analysis, internal standards), selectivity and specificity (chromatographic methods), limits of detections (spectrophotometric methods, chromatographic methods and related techniques, receptor binding assay), limit of quantification, sensitivity, ruggedness and robustness, analyte stability in the sample matrix, how to reduce systematic errors, mean and standard deviation, reliability of results, confidence interval, comparison of results, comparison of two means of two samples, experimental design

Unit-II:

Automated method of analysis

[5 Hrs]

Principles of automation, automated instruments, process control, automatic instruments, continuous analyzer, centrifugal analyzer, flow injection analysis, application.

Measurement of pH

[5 Hrs]

Introduction, determination of pH, Ion selective electrodes, instrumentation, application of pH measurement, Numerical problems based on pH and hydrogen ion concentration.

Unit-III:

Radioanalytical techniques

[6 Hrs]

Radio chemical technique, source of neutron, neutron capture and γ -emission, principles of neutron activation analysis, application of activation analysis, principles of isotope dilution method, application of isotope dilution method.

Refractometry

[4 Hrs]

Introduction, Principles of refractometry, refractometer, qualitative and quantitative measurement, analytical applications of refractometer.

Reference Books:

- 1) Instrumental method of chemical analysis by B.K Sharma
- 2) Instrumental methods of analysis by Anand & Chatwal
- 3) Principles of instrumental analysis by F. J Holler & J. A Nieman
- 4) Introduction to instrumental analysis R D Braun.
- 5) Analytical chemistry by J.D Christian
- 6) Analytical chemistry by B.K Sharma
- 7) Analytical chemistry by Alka Gupta
- 8) Analytical chemistry by H Kaur
- 9) Analytical Chemistry by S. M Khopkar

12-Digit Examination Code : SAC00032263P

ANC/DSC/P/226:

Lab Course based on ANC/DSC/T/200:

Total Credits: 02

University Assessment: 30 Marks

Maximum Marks: 50 Marks

Total Contact Hours: 60 Hrs

Internal Assessment: 20 Marks

Learning Objectives of the Course:

Course Outcomes (COs):

After completion of the course, students will be able to:

Course Content

1. Detection of nitrogen, sulphur and halogens from packed food sample.
2. Estimate the amount of carbon and hydrogen from packed food sample.
3. Estimate the amount of protein from egg albumin by biuret method.
4. Quantitative estimation of reducing sugar from Jam and Jelly.
5. Calculate the amount of starch from given sample.
6. Estimate the amount of sucrose from cane sugar.
7. Estimate the amount of glucose and sucrose in cane juice.
8. Estimate the amount Na^+ and K^+ from tomato sauce by flame photometer.
9. Estimation of polyphenols in tea sample.
10. Estimate the percentage of ash in milk powder.
11. Determination of phosphoric acid content in soft drinks.
12. Separation of amino acid by TLC. (Glycine & Glutamic acid)
13. Separation of amino acid by TLC. (Alanine & Glutamic acid)
14. Separation of amino acid by TLC. (Glycine & Glutamine)
15. Separation of amino acid by TLC. (Alanine & Glutamine)

Reference Books

- 1) Food analysis by Pearson
- 2) Food analysis by S. S. Neilson.
- 3) Standard methods of biochemical analysis by S. R Thimmaiah
- 4) Biophysical chemistry (Principles and techniques), Upadhyay, Upadhyay and Nath
- 5) Instrumental method of chemical analysis by B.K Sharma
- 6) Instrumental methods of analysis by Anand & Chatwal

12-Digit Examination Code : SAC00032013T

ANC/DSC/T/201:

Electroanalytical Techniques

Total Credits: 02

Total Contact Hours: 30 Hrs

University Assessment: 30 Marks Internal Assessment: 20 Marks Maximum Marks: 50 Marks

Learning Objectives of the Course:

.Course Outcomes (COs):

After completion of the course, students will be able to:

Course Content

Unit-I

[10 Hrs]

General Introduction

Over view of electrode process, ion selective electrodes: types and construction of electrode, glass electrode, precipitate electrode, liquid-liquid membrane electrode, enzyme electrode, Weston cell, application of ion selective electrode.

Unit-II

[10 Hrs]

Conductance measurement

Introduction, some important laws, Definition and relation, effect of dilution, conductance measurement, application of conductance measurement, application of conductance measurement, type of conductometric titration, disadvantages of conductometric titration.

Potentiometry

Introduction, Instrumentation, electrodes used in potentiometry, reference electrode, types of potentiometric titration, variation in potentiometric titration, Limitations, Numerical

Unit-III

[10 Hrs]

Voltametric techniques

Introduction, Instrumentation, charging or capacitive current, linear potential sweep voltammetry, potential step methods, cyclic potential sweep voltammetry, hydrodynamic method, stripping voltammetry, voltametric application.

Polarography

Introduction, principle, the Ilkovic equation, apparatus, Diffusion limiting current, factor affecting the limiting current, cells, form of wave, concept of half wave potentials, Rapid scan polarography, organic polarography, pulse polarography, applications of polarography, voltammetry, chronopotentiometry, tensimetry.

Reference Books:

- 1) Electroanalytical chemistry by H. W Nierenberg
- 2) Instrumental method of chemical analysis by B.K Sharma
- 3) Instrumental methods of analysis by Anand & Chatwal
- 4) Analytical chemistry by B.K Sharma
- 5) Analytical chemistry by Alka Gupta
- 6) Analytical chemistry by H Kaur
- 7) Analytical Chemistry by S. M Khopkar

12-Digit Examination Code: SAC00032273P

ANC/DSC/P/227:

Lab Course on ANC/DSC/T/201

Total Credits: 02

Total Contact Hours: 60 Hrs

University Assessment: 30 Marks Internal Assessment: 20 Marks Maximum Marks: 50 Marks

Learning Objectives of the Course:

Course Outcomes (COs):

After completion of the course, students will be able to:

Course Content

Contact Hours: 60

1. Estimation of boric acid conductometric method
2. Estimation of tin in solder alloy
3. Estimate the amount of haemitite ore
4. Estimation of calcium from dolomite ore
5. Estimate the amount of Mg from neem plant leaves
6. Estimate the amount of sodium carbonate in washing soda
7. Determination of active chlorine in the sample of bleaching powder
8. Assay of sulph drug

Inorganic chemistry: Semi-microanalysis of inorganic salt mixture containing two acidic radical and two basic radical of same or different groups.

Following radicals to be given in carbonate, nitrile, sulphite, chloride, bromide, iodide, nitrate and sulphate. Silver(I), copper(II), bismuth(III), cadmium(II), tin(II), Arsenic(III), antimony(III), iron(III), chromium(III), aluminium(III), nickel(II), cobalt(II), manganese(II), zinc(II), calcium(II), strontium(II), barium(II), magnesium(II).

Reference Books

- 1) Inorganic chemistry by Satya Prakash
- 2) Advanced inorganic chemistry by J.D Lee.
- 3) Qualitative inorganic analysis 5th edition A. I Vogel
- 4) Qualitative organic analysis by A. I Vogel
- 5) Practical organic chemistry 5th edition Vogel
- 6) Advanced practical in organic chemistry by O. P Agarwal

SCC00032003T

ANC/MN/T/200:

Chromatographic Method

12-Digit Examination Code: Total Credits: 02 Total Contact Hours: 30 Hrs

University Assessment: 30 Marks Internal Assessment: 20 Marks Maximum Marks: 50 Marks

Learning Objectives of the Course:

Course Outcomes (COs):

After completion of the course, students will be able to:

Course Content

Unit I: Instrumental method of chromatographic analysis (10 Hrs)

Principles of chromatographic separation, classification, theory of column efficiency in chromatography, theoretical plate, rate theory, the Van Demeter equation, efficiency and particle size in HPLC, retention factor efficiency and resolution.

Unit II: Chromatography Analysis (10 Hrs)

Introduction. Principle of separation, match box, model theoretical plate and efficiency of chromatography column. Types of chromatography, column chromatography, ion exchange, paper, thin layer chromatography.

TLC: Principles, theory, stationary phase for TLC, adsorption TLC chromatography. Types of thin layer chromatography liquid-liquid partition, ion exchange, size exclusion, applications TLC of chromatography.


Paper Chromatography: Principle, theory, types of papers, applications of paper chromatography.

Unit III: Gas Chromatography (10 Hrs)

Introduction, principles of GLC, GSC, apparatus used in gas-liquid chromatography. Thermal conductivity detector (TCD), FID (flame ionization detector), ECD (electron capture detector), quantitative analysis by Gas Chromatography, elemental analysis by Gas Chromatography.

Books:

- Analytical Chemistry by G.D. Christian


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University, Chh. Sambhajinagar (M.S.)

- Analytical Chemistry by D.A. Skoog
 - Chromatography by D.R. Brown
 - Analytical Chemistry by R.N. Verma
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- College Analytical Chemistry by Baliga, Zaveri, Ghalsas

Learning Objectives of the Course:

Course Outcomes (COs):

After completion of the course, students will be able to:

Course Content

Unit I: Gravimetry:

(10 Hrs)

Introduction, precipitation method, colloidal state, supersaturation and precipitation formation, purity of ppt, co-precipitation, condition of precipitation, precipitation from homogenous solution, washing, ignition of precipitation, quantitative separation based upon precipitation method, fractional precipitation, organic precipitation (8 hydroxy quinoline, DMG cupferron, nitron and benzoin, oxime anthranilic acid). Applications of gravimetry.

Unit II: Thermal method of analysis

(10Hrs)

Principle of thermal method of analysis, classification of thermal analysis, instrumentation, TGA, DTA. Application of TGA & DTA, factors affecting on the thermal analysis.

Unit III: Solvent extraction

(10Hrs)

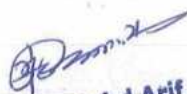
Introduction, principles of solvent extraction, distribution coefficient, distribution ratio, relation between distribution coefficient and distribution ratio, factors affecting solvent extraction, percentage extraction, solvent extraction method. Separation factor, batch extraction, counter current extraction, applications and numerical problems of solvent extraction.

Reference Books:

- Analytical Chemistry by G.D. Christain
- Fundamental of Analytical Chemistry by D.A. Skoog
- Quantitative analysis R.A. Day, A.L. Underwood


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- Vogels textbook of quantitative chemical analysis, 5th edition by G.H. Jeffery, J. Basset, J. Mandhan, R.C. Denray.
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Learning Objectives of the Course:**Course Outcomes (COs):**

After completion of the course, students will be able to:

Course Content

Unit No.	Unit Title and Topics	No. of Clock Hours
	Introduction to Agricultural Chemistry	
1	Role of agriculture chemistry Scope and importance of agricultural chemistry Agricultural chemistry and other science.	5 Hrs
	Soil Chemistry I	
	Definition of soil, Soil components-mineral component, organic matter or humus, soil atmosphere, soil water, soil microorganism	
	Soil Chemistry II	
2	Physical properties of soil- soil texture, soil structure, soil colour, soil temp, soil density, the porosity of the soil. Surface soil and sub-soil. Chemical properties of soil, soil reactions and solutions. Factor controlling soil reaction, buffering capacity, importance of buffer action in agriculture, ion exchange.	5 Hrs


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Chairman

Quality of Irrigation Water

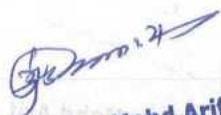
Sources of Water- Atmospheric Water, Surface Water, Stored Water, Ground Water. Impurities in Water, Water quality, related problems in public health, environment and agriculture. Analysis of irrigation Water

Dissolved constituents and their functions Major constituents- Ca, Mg, Na, K,

- 3 Carbonate, bicarbonate, sulfate, Chloride and nitrate Minor constituents- B, Si, 5 Hrs nitrite, Sulfide and fluoride. Water quality standard- total soluble salt (TSS), sodium adsorption ratio (SAR), Exchangeable sodium percentage (ESP), Residual sodium carbonate, salinity classes for irrigation water.

Books

- 1) Instrumental method of chemical analysis by B.K Sharma
- 2) Instrumental methods of analysis by Anand & Chatwal
- 3) Principles of instrumental analysis by F. J Holler & J. A Nieman
- 4) Introduction to instrumental analysis R D Braun.
- 5) Analytical chemistry by J.D Christian
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- 9) Analytical Chemistry by S. M Khopkar



Prof. Pathan Mohd Arif Ali Khan
Chairman

B. Sc Analytical Chemistry III & IV Semester, 2020-21
Board of Studies in Chemistry,
Dr. Babasaheb Ambedkar Marathwada
University, Chh. Sambhajinagar (M.S)

12-Digit Examination Code: **SEC00032263P**

ANC/VSC/P/226:

Lab Course on **Analysis of Soil**

Total Credits: 01

Total Contact Hours: 30 Hrs

University Assessment: 30 Marks Internal Assessment: 20 Marks

Maximum Marks: 50 Marks

Learning Objectives of the Course:

Course Outcomes (COs):

After completion of the course, students will be able to:

Course Content

Practical

[30 hrs]

1. Sampling method for soil and water.
2. Determination of pH and electrical conductivity of water.
3. Determination of pH and electrical conductivity of agricultural soil.
4. Determination of total hardness of water.
5. Determination of Ca and Mg in soil.
6. Estimation of Chloride content in water.
7. Determination of Alkalinity of soil.
8. Determination of lime, gypsum requirement
9. Determination of Potassium on Flame Photometer
10. Estimation of the acid requirement of soil.



Prof. Pathan Mohd Arif Ali Khan

Chairman

B. Sc Analytical Chemistry III & IV Semester (2020-21) 2020-21 June 2025
Board of Studies in Chemistry
Dr. Babasaheb Ambedkar Marathwada
University, Chh.Sambhajinagar (M.S)

Total Credits : 1

Total Contact Hours : 15 Hrs

Maximum Marks : 50

Learning Objectives of the Course:

The students are expected to learn -

1. Water treatment Process and chemical methods of sterilization.
2. Physical methods of sterilization & Determination of hardness of water.
3. Industrial water treatment- removal of iron, removal of silica, removal of dissolved oxygen.

Course Outcomes (COs) : After completion of the course -**CO1 :** The students are learned typical chemical methods of sterilization**CO2 :** Physical methods of sterilization & Determination of hardness of water**CO3 :** Industrial water treatment- removal of iron, removal of silica, removal of dissolved oxygen.**Course Content**

Module No.	Topics / actual contents of the syllabus	Contact Hours
Unit - I	Unit 1 - Water treatment – Water for Industry, Chemistry of water, water as a solvent, Main quality characteristics of water, Potability of water, Coagulation of water, Contact and electrochemical coagulation, Flocculants, Sterilisation and disinfection of water, Chemical methods of sterilization	5 Hrs
Unit - II	Physical methods of sterilization -Softening of water, Lime Soda Process, Modified lime soda process, Ion exchange process, Demineralization of water, Determination of hardness-1) Calculation method, 2) Titration method, 3) Soap method 4) Complexometric method. Industrial water treatment - removal of iron, removal of silica, removal of dissolved oxygen, Removal of slime and algae from water, removal of smell and odour from water, deaeration and deoxygenation of water, Chemical deoxygenation of water, removal of gas from water, Electrodialysis method, Reverse Osmosis method, Removal of iron and manganese from water, removal of silicic acid from water, Magnetic treatment of water.	5 Hrs
Unit - III		5 Hrs

TextBooks: 1 Industrial Chemistry- B.K.Sharma, Goel publishing House, Meerut.

1. Environmental Chemistry- B.K.Sharma, Goel publishing House, Meerut

Reference Books:1. Industrial Chemistry- B.K.Sharma, Goel publishing House, Meerut.

2. Environmental Chemistry- B.K.Sharma, Goel publishing House, Meerut

Stocchi, E.(1990),Industrial Chemistry, Vol-I,Ellis Horwood Ltd.UK. Kent,J.A .(ed)(1997),
Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
Pani, B.(2017), Textbook of Environmental Chemistry, I.K. International Publishing House.
De, A.K.(2012), Environmental Chemistry, New Age International Pvt, Ltd, New Delhi.
Khopkar, S.M.(2010), Environmental Pollution Analysis, New Age International Publisher.



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Chairman

Board of Studies in Chemistry,
University, Chh.Sambhajinagar (M.S)
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12-Digit Examination Code SEC00032273P

ANC/VSC/T/227: Practicals based /VSC/T/ 201

Total Credits : 1

Total Contact Hours : 30 Hrs

Maximum Marks : 50

Learning Objectives of the Course:

The students are expected to learn practical skills on-

1. Determination of Hardness of water by complexometric method/by EDTA method, Determination of Alkalinity of waste water,
2. Determination of dissolved oxygen in water, Determination of Chemical Oxygen Demand(COD), Determination of Biological Oxygen Demand(BOD), Percentage of available chlorine in bleaching powder.

Course Outcomes (COs) : After completion of the course , the students are able to know the skills related to waste water treatments.

Course Content

Module No.	Topics / actual contents of the syllabus	Contact Hours
Unit - I	<ol style="list-style-type: none">1. Determination of Hardness of water by complexometry method/by EDTA method.2. Determination of Alkalinity of waste water.3. Determination of dissolved oxygen in water.4. Determination of Chemical Oxygen Demand(COD)5. Determination of Biological Oxygen Demand(BOD)6. Percentage of available chlorine in bleaching powder.7. Measurement of chloride, sulphate and salinity of waste/water samples by simple titration method. (AgNO_3) and potassium chromate)8. Estimation of total alkalinity of water samples (CO_3^{2-}, HCO_3^-) using double titration method.9. Isolation of compound using solvent extraction method.	30Hrs

TextBooks:

- 1 . Industrial Chemistry- B.K.Sharma, Goel publishing House, Meerut.
 - 2 . Environmental Chemistry- B.K.Sharma, Goel publishing House, Meerut
- Systematic Experiments in Engineering Chemistry-S.S.Dara

Reference Books:1 . Industrial Chemistry- B.K.Sharma, Goel publishing House, Meerut.

2 . Environmental Chemistry- B.K.Sharma, Goel publishing House, Meerut

Stocchi,E.(1990),IndustrialChemistry,Vol-I,EllisHorwoodLtd.UK.c

Kent,J.A.(ed)(1997),Riegel'sHandbookofIndustrialChemistry,CBSPublishers,New Delhi.

Pani,B.(2017), TextbookofEnvironmentalChemistry,I.K.InternationalPublishingHouse.


Prof. Pathan Mohd Arif Ali Khan

B. Sc Analytical Chemistry III & IV Semester NEP 2020 w.e.f June 2025

Board of Studies in Chemistry
Dr. Babasaheb Ambedkar Marathwada
Sambhajinagar (M.S)

12-Digit Examination Code: SDC00032003T

ANC/GE/OE/T/200:	Chemistry of drugs
ANC/MN/T/200: TITLE OF PAPER	
Total Credits: 02	Total Contact Hours: 30 Hrs
University Assessment: 30 Marks	Internal Assessment: 20 Marks
Maximum Marks: 50 Marks	

Course Outcomes: After studying this course, students would be able to :

CO1: know about the basic concepts of petro-chemistry,

CO2: knowledge of conventional and non-conventional fuels ,

CO3: recognize of origin, composition and classification of petroleum

CO4: how is refining of petroleum done, knowledge of various chemical test applied in quality monitoring of petroleum product and elementary idea of petroleum gases liquefied petroleum gas (LPG), compressed natural gas (CNG) and liquefied natural gas(LNG).

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	General Introduction Introduction -Health, disease, Introduction to Medicines, Definition of a Medicinal drug, classification of drugs and their origin. Comparison of Generic and Branded drugs, Identification of expiry and manufacturing date, Storing medicines and its importance & disposal of medicines.	10 Hrs
II	Different class of medicines Classification of drugs and some common drugs used in our daily life uses, side effects and their natural remedies: Analgesics and antipyretics- Aspirin, paracetamol, ibuprofen, morphine, codeine Antibiotics- Amoxicillin, norfloxacin, ciprofloxacin Antihistamines or antiallergics- Cetirizine and Levocetirizine Antiparasitic- Albendazole, Diuretic- Lasix Antidiabetics- Insulin, Glipizide and metformin Antihypertensive – Amlodipine and its natural remedies- Rauwolfia. Antidepressant-Zoloft and its natural treatment Antifungal – fluconazole, Itraconazole	10 Hrs

Antacids- Ideal properties of antacids, combinations of antacids, Sodium Bicarbonate, ranitidine, milk of magnesia, aluminium hydroxide gel
Anticoagulants/antiplatelet drugs- Warfarin, heparin and Ecosprin
Anaesthetics- Atracurium, Desflurane

Poison and Antidote: Sodium thiosulphate, Activated charcoal, Sodium nitrite

Astringents: Zinc Sulphate, Potash Alum, Supplements- zinc and calcium, vitamins

III Chemistry in Ayurveda

10 Hrs

History and overview of Ayurveda, Classification of Ayurvedic Drugs, Plant parts used in Ayurveda, Good Agricultural Practices, Drug Development for Ayurveda Siddha medicines, Modern extraction methods and standardization of extracts, Pharmacological actions of chemical constituents, Analysis of Ayurveda medicines
Qualitative and quantitative checking of phytochemical constituents inside the Ayurvedic Formulations.


Prof. Pathan Mohd Arif Ali Khan
Chairman

SEMESTER-4

12-Digit Examination Code: SAC00032504T

ANC/DSC/T/250:

Modern Analytical methods of Analysis

Total Credits: 02

Total Contact Hours: 30 Hrs

University Assessment: 30 Marks

Internal Assessment: 20 Marks

Maximum Marks: 50 Marks

Learning Objectives of the Course:

Course Outcomes (COs):

After completion of the course, students will be able to:

Course Content

Unit-I

[10 Hrs]

Modern method of solvent extraction Principle of solvent extraction, classification of extraction, extraction by solvent, extraction equilibria for salvation, Supercritical fluid, working of supercritical fluid, selection of supercritical fluid, application, microwave assisted extraction.

Thermal analysis

Introduction to thermal analysis, thermogravimetry, thermobalance, block diagram of modern thermobalance, derivative of thermogravimetry (DTG), differential thermal analysis (DTA), application,

Unit-II X-ray spectrometry

[10 Hrs]

General theory, basic principles of x-ray spectroscopy, x-ray source, interaction of x-rays with matter, diffraction, Bragg's law, Bragg's ionization spectrometer, general instrumentation, miller indices, application of x-ray diffraction.

Unit-III

[10 Hrs]

Atomic absorption spectroscopy Introduction, principles, instrumentation, flame and non-flame atomization, source of Atomic absorption spectroscopy (EDL, TGL, HCL), interference and applications, advantages of Atomic absorption spectroscopy.

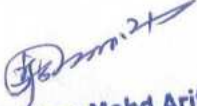
Atomic Emission spectroscopy

Introduction, principles of emission spectroscopy, source of excitation, instrumentation of atomic emission spectroscopy, analysis by emission spectroscopy, principles of flame photometry, applications.

Reference Books:

- 1) Instrumental method of chemical analysis by B.K Sharma
- 2) Instrumental methods of analysis by Anand & Chatwal
- 3) Analytical chemistry by J.D Christian
- 4) Principles of instrumental analysis by F. J Holler & J. A Nieman
- 5) Introduction to instrumental analysis R D Braun.
- 6) Instrumental method of chemical analysis by Willard, Merritt and Dean

- 7) Analytical chemistry by B.K Sharma
 - 8) Analytical chemistry by Alka Gupta
 - 9) Analytical chemistry by H Kaur
 - 10) Analytical Chemistry by S. M Khopkar
-


Prof. Pathan Mohd Arif Ali Khan
Chairman

B. Sc Analytical Chemistry III & IV Sem. Studies in Chemistry,
Board Semester V.E.P. 2020-21
Dr. Babasaheb Ambedkar Marathwada
University, Chh. Sambhajinagar (M.S.)

12-Digit Examination Code : SAC00032764P

ANC/DSC/P/276:

Lab Course ANC/DSC/T/250:

Total Credits: 02

Total Contact Hours: 60 Hrs

University Assessment: 30 Marks

Internal Assessment: 20 Marks

Maximum Marks: 50 Marks

Learning Objectives of the Course:

Course Outcomes (COs):

After completion of the course, students will be able to:

Course Content

Module No. 1: Title

Contact Hours: 10

1. Determination of saponification value of coconut oil.
2. Determination of COD and dissolved oxygen from waste water sample.
3. Determination of amount chloride from bleaching powder.
4. Determination of amount of sodium bicarbonate in washing soda.
5. Estimation of Ni⁺ in the sample solution by EDTA titration.
6. Determine the amount of magnesium from Neem plant leave, volumetrically.
7. Estimation of phenol/aniline by bromination method.
8. Estimation of hardness of water by EDTA.
9. Estimate the amount of Mg from talcum powder.
10. Determination of volume strength of commercial hydrogen peroxide using KMnO₄.
11. Estimation of iron using 8-hydroxyl quinoline by solvent extraction.
12. Determination of acid value of given oil sample.
13. Determination of percentage of total salt from salted chips.
14. Determination ascorbic acid from given juice sample.
15. Estimate the percentage of moisture contained from sand sample.

Reference Books

- 1) Food analysis by Pearson
- 2) Food analysis by A. G Woodman. Mc Graw Hill
- 3) Food analysis by S. S. Neilson.
- 4) Standard methods of biochemical analysis by S. R Thimmaiah
- 5) Biophysical chemistry (Principles and techniques), Upadhyay, Upadhyay and Nath
- 6) Instrumental method of chemical analysis by B.K Sharma
- 7) Instrumental methods of analysis by Anand & Chatwal


Prof. Pathan Mohd Arif Ali Khan
Chairman

Board of Studies in Chemistry,
Dr. Babasaheb Ambedkar Marathwada
University, Chh.Sambhajinagar (M.S)
B. Sc Analytical Chemistry III & IV Semester, NEP 2020, dated June 2025

12-Digit Examination Code: **SAC00032514T**

ANC/DSC/T/251:

TITLE OF PAPER

Food Analysis

Total Credits: 02 Total Contact Hours: 30 Hrs

University Assessment: 30 Marks

Internal Assessment: 20 Marks

Maximum Marks: 50 Marks

Learning Objectives of the Course:

Course Outcomes (COs):

After completion of the course, students will be able to:

Course Content

Unit-I

[10 Hrs]

Introduction to food analysis Nutrient value of food, physical characteristics and chemical constituents, proximate composition of food and its analysis, legislation related to food, general idea regarding food processing and preservation, food contamination, food safety consideration, adulteration, types of adulteration, test for adulteration, control.

Analysis of food I

Introduction and estimation of food preservatives, estimation of food emulsifier, food stabilizer, food thickener,

Unit-II

[10 Hrs]

Analysis of food II

Standard composition and analysis of the following: Milk, tea, coffee, cereal and flour, Honey

Carbohydrate

Introduction, Classification and general properties, structures of Monosaccharide (glucose and fructose), disaccharides (sucrose, maltose, lactose, polysaccharides, starch and cellulose), sample extraction and estimation of sugars, estimation of reducing sugar, estimation of non-reducing sugar, estimation of total soluble sugar.

Unit-III

[10 Hrs]

Vitamins

Introduction, classification of vitamins, water soluble and oil soluble vitamins, estimation of ascorbic acid (vitamin C) Volumetric and colorimetric method, estimation of vitamin A, Estimation of vitamin D₂ and D₃, estimation of tocopherol (Vitamin E).

Reference Books:

- 1) Analytical chemistry by B.K Sharma
- 2) Analytical chemistry by Alka Gupta

- 3) Analytical chemistry by H Kaur
 - 4) Analytical Chemistry by S. M Khopkar
 - 5) Food analysis by Pearson
 - 6) Food analysis by S. S. Neilson.
 - 7) Standard methods of biochemical analysis by S. R Thimmaiah
 - 8) Biophysical chemistry (Principles and techniques), Upadhyay, Upadhyay and Nath
-



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Chairman

12-Digit Examination Code:

SAC00032774P

ANC/DSC/P/277:

Lab Course on ANC/DSC/T/251:

Total Credits: 02

Total Contact Hours: 60 Hrs

University Assessment: 30 Marks

Internal Assessment: 20 Marks

Maximum Marks: 50 Marks

Learning Objectives of the Course:

Course Outcomes (COs):

After completion of the course, students will be able to:

Course Content

1. Estimate the amount of acetylsalicylic acid from aspirin tablet volumetrically.
2. Estimation of amount of Ibuprofen from brofen tablet.
3. Estimate the amount of ascorbic acid from vitamin-C tablet.
4. Determine the amount of Fe from given tablet.
5. Estimate the amount of phosphoric acid present in cold drink, conductometrically.
6. Estimate the amount of glucose present in fruits.
7. Determination of benzoic acid in soft drink by potentiometric method.
8. Determination of micronutrients from the given soil sample (Cu or Fe,)
9. Determination of micronutrients from the given soil sample Ni or Zn
10. Qualitative analysis of alkaloids from any leaves sample.
11. Determination of API from any anti-diabetic drugs.
12. Determination of API from any anta-acid drugs.
13. Assay of paracetamol syrup by UV-spectrophotometer.
14. Determination of Ni⁺ from given solution by colorimetric method.
15. Assay of sodium benzoate from the pharmaceutical drug sample.

Reference Books

- 1) Standard methods of biochemical analysis by S. R Thimmaiah
- 2) Biophysical chemistry (Principles and techniques), Upadhyay, Upadhyay and Nath
- 3) Instrumental method of chemical analysis by B.K Sharma
- 4) Instrumental methods of analysis by Anand & Chatwal
- 5) Practical organic chemistry 5th edition Vogel
- 6) Advanced practical in organic chemistry by O. P Agarwal
- 7) Indian Pharmacopeia
- 8) British Pharmacopeia


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Total Credits: 02

Total Contact Hours: 30 Hrs

University Assessment: 30 Marks

Internal Assessment: 20 Marks

Maximum Marks: 50 Marks

Learning Objectives of the Course:

Course Outcomes (COs):

After completion of the course, students will be able to:

Course Content**Unit I: Calorimetric Measurements****(10 Hrs)**

Introduction, interaction of electromagnetic radiation with matter, radiant power, transmittance, absorbance, Lambert & Beer's law, Molar absorptivity, deviation from Beer's law, calorimeter, principle, instrumentations, applications, determination of unknown concentration of Fe (III) and 5 Sulphosalicylic acid.

Unit II: Conductometric Measurement**(10 Hrs)**

Introduction, electrolytic conductance, resistance, conductance, Ohm's law, cell constant, specific and equivalent conductance, molar conductance, variation of equivalent and specific conductance. Kohlrausch's law and its applications, conductivity cells, conductometer, Wheatstone bridge, determination of cell constant, conductometric titration strong acid base, strong acid weak base.

Unit III: pH-metric measurements**(10 Hrs)**

Introduction, pH-meter, glass pH-electrode, combined electrodes, complete cell, standard buffer, reference for pH – measurements, accuracy of pH measurements, applications of pH-meter.

Reference:

- Analytical Chemistry by R.M. Verma
- Analytical Chemistry problems & solutions by S.M. Khopkar
- Instrumental method of chemical analysis by Gurdeep R. Chatwal & Sham K. Anand



Prof. Pathan Mohd Arif Ali Khan

B. Sc Analytical Chemistry III & IV Semester NEP 2020 w.e.f June 2025

Chairman
Board of Studies in Chemistry,
Dr. Babasaheb Ambedkar Marathwada
University, Ch. S. Pr. ...

12-Digit Examination Code: **SCC00032514T**

ANC/MN/T/251:

TITLE OF PAPER **Modern method of Analysis II**

Total Credits: 02 Total Contact Hours: 30 Hrs

University Assessment: 30 Marks

Internal Assessment: 20 Marks

Maximum Marks: 50 Marks

Learning Objectives of the Course:

Course Outcomes (COs):

After completion of the course, students will be able to:

Course Content

Unit I: Electrophoresis

(10 Hrs)

Introduction, principle & theory of electrophoresis different types of electrophoresis techniques, moving boundary electrophoresis, zone electrophoresis, paper cellulose acetate and gel electrophoresis, applications.

Unit II: Ion Exchange Chromatography

(10 Hrs)

Introduction, principle, cation, anion, ion exchange column used in chromatographic separation, selection of suitable systems, ion-exchange capacity, ion exchange technique, application of ion exchanger.

Unit III: HPLC

(10 Hrs)

Introduction, need of liquid chromatography, separation, mechanism involved in adsorption and partition HPLC, instrumentation and working of HPLC, application of HPLC, RPHPLC, NPHPLC.

Books:



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B. Sc Analytical Chemistry III & IV Semester (NEP 2020) June 2025

Board of Studies in Chemistry
Dr. Babasaheb Ambedkar Marathwada
University, Chh. Sambhajinagar (M.S)

- Instrumental methods of chemical analysis, Gurdeep R. Chatwal, Shan K. Anand.
 - Fundamental of analytical chemistry by Skoog-West-Hotter.
 - Basic principles of Analytical Chemistry, K. Raghuraman, D.V. Prabhu, C.S. Prabhu, P.A. Sathe.
-



12-Digit Examination Code: **SEC00032504T**

ANC/SEC/T/250:

Incense Stick Manufacturing

Total Credits: 01

Total Contact Hours: 15 Hrs

University Assessment: 30 Marks

Internal Assessment: 20 Marks

Maximum Marks: 50 Marks

Learning Objectives of the Course:

Course Outcomes (COs):

After completion of the course, students will be able to:

Course Content

Unit -I.

05 Hours

Introduction, Raw materials and ingredients, Basic composition, chemicals used : aromatic compounds, oxidisers, fuel, binding agents, essential oils. Chemical Structures of components, types of incense sticks, incense sticks cups/ cones, Mosquito repellent incense sticks ..

Unit -II.

05 Hours

Introduction and their chemical composition, advantages and disadvantages of mosquitorepellent incense sticks Two methods of incense sticks manufacturing

a. Essential oil Incense sticks

b. Hand Rolled Incense sticks

Unit -III.

05 Hours

Basic Process of Incense sticks manufacturing, Science behind incense sticks, Present scenario in India in Agarbatti making, Elemental composition of incense sticks ash,

Effects of herbs used in making incense sticks, Advantages and disadvantages of incense sticks on human body.


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Chairman

12-Digit Examination Code: **SEC00032764P**

ANC/SEC/P/276:

TITLE OF PAPER Lab Course on Incense Stick Manufacturing

Total Credits: 01

Total Contact Hours: 30 Hrs

University Assessment: 30 Marks

Internal Assessment: 20 Marks

Maximum Marks: 50 Marks

Learning Objectives of the Course:

Course Outcomes (COs):

After completion of the course, students will be able to:

Course Content

Contact Hours: 30

1. To Recover Iron nano minerals from sacred incense sticks ash by dry separation method
2. To prepare Base of Incense sticks
3. To extract Incense/ Fragrance material from three different plants
4. To study proportional mixing of basic components of base and fragrance
5. Composition analysis of ash of some regularly used Incense sticks
6. Preparation of incense sticks using three different fragrance components
7. To prepare low smoke home made mosquito repellent incense sticks using three different essential oils
8. To prepare incense cones using three different fragrances
9. To study production of Incense sticks in any one district of Marathwada region
10. To study marketing of Incense sticks in any one district of Marathwada region


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B. Sc Analytical Chemistry III & IV Semester NEP 2020 w.e.f June 2025

Dr. Babasaheb Ambedkar Marathwada
University, Chh. Samthar

Total Credits : 1

Total Contact Hours : 15 Hrs

Maximum Marks : 50

Learning Objectives of the Course:

The students are expected to learn –

1. **Pollution and its measurements.**
2. **Sewage and sewage Treatment & Industrial wastes and treatment processes:**

Course Outcomes (COs) : After completion of the course student known -**CO1: Pollution and its measurements.****CO2: Sewage and sewage Treatment & Industrial wastes and treatment processes****Module**

No.	Topics / actual contents of the syllabus	Contact Hours
Unit - I	Pollution and its measurements: Nature of industrial effluents, gaseous and liquid effluents, methods of gas analysis, analysis of CO, SO ₂ , NO _x , S, Cl ₂ in the gaseous effluents. Methods of removal of pollutants from gaseous effluents, particulate matter, and particle size analysis. AAS applications process for waste water.	05 Hrs
Unit – II	Sewage and sewage Treatment: Municipal waste water, important definitions, sewage and its composition, bacteriology of sewage and treatment, stabilization, properties of sewage, purpose of sewage treatment, methods of sewage treatment , method of sewage treatment, removal of phosphorous and nitrogen from waste water , filtration of sewage, types of aerobic oxidation plant, anaerobic biological oxidation plant, miscellaneous method of sewage treatment, cycle of decomposition, self-cleaning velocity, system of sewerage, analysis of sewage, sludge disposal, methods of sludge disposal, methods of sewage disposal, sewage sickness, selfpurification of natural water, methods of sewage disposal, waste water and its treatment (recycling of sewage).	5 Hrs
Unit - III	Industrial wastes and treatment processes: Introduction, the problem of sustenance and the chemical industry, characteristics of industrial wastes, types of industrial waste , solid industrial wastes , principles of industrial waste treatment , protection of biosphere, basic trends in biosphere protection for industrial wastes, protection of surface waters from pollution with industrial sewage, treatment and disposal of industrial wastes	5 Hrs

TextBooks:

1. S P Mahajan: Pollution control in process industry ,2. M Sitting: Resources recovery recycling handbook and industrial waste, 3.A K Dey: Environmental

chemistry 4. S.M. Khopkar: Environmental pollution analysis 5. Industrial chemistry B.K Sharma.

Reference Books: 1 . Industrial Chemistry- B.K.Sharma, Goel publishing House, Meerut.

2 . Environmental Chemistry- B.K.Sharma, Goel publishing House, Meerut

Stocchi,E.(1990),**Industrial Chemistry**,Vol-I,EllisHorwoodLtd.UK.

Kent,J.A.(ed)(1997),**Riegel's Handbook of Industrial Chemistry**,CBS Publishers,New Delhi.

Pani,B.(2017),**Textbook of Environmental Chemistry**,I.K.International Publishing House.

De,A.K.(2012), **Environmental Chemistry**,NewAgeInternationalPvt,Ltd,NewDelhi.

Khopkar,S.M.(2010),

Environmental Pollution Analysis,NewAgeInternationalPublisher.



Prof. Pathan Mohd Arif Ali Khan

Chairman

B. Sc Analytical Chemistry III & ~~Basic Semester I~~ **2020** int. of June 2025

Dr. Babasaheb Ambedkar Marathwada
University, Chh.Sambhajinagar (M.S)

ANC/SEC/P/277

: Practicals based on ANC./SEC/T/ 251

Total Credits : 1

Total Contact Hours : 30 Hrs

Maximum Marks : 50

Module No.	Topics / actual contents of the syllabus	Contact Hours
Unit - I	1. Determination of Colour & Turbidity of water & waste water sample. 2. Determination of free Chlorine in the water sample. . 3. Determination of Chlorine Demand of give waste water sample. 4. Determination or Monitor of Nitrate & Nitrite in water sample. 5. Determination of Chloride in a Freshly filtered water sample titrimetrically. 6. Determination of Alkalinity of water sample. 7. Determination of Total acidity , Free mineral acids, free carbon dioxide and suspended solids, 8. Determination of Dissolved Solids in a Gooch Crucible . 9. Determination Fluoride content in water by using Zirconium Alizarin reagent.	30Hrs

TextBooks: 1 . Industrial Chemistry- B.K.Sharma, Goel publishing House, Meerut.

2 . Environmental Chemistry- B.K.Sharma, Goel publishing House, Meerut Systematic Experiments in Engineering Chemistry-S.S.Dara

Reference Books:

- 1 . Industrial Chemistry- B.K.Sharma, Goel publishing House, Meerut.
- 2 . Environmental Chemistry- B.K.Sharma, Goel publishing House, Meerut Stocchi,E.(1990), Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK. Kent, J.A.(ed)(1997), Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi. Pani, B.(2017), Textbook of Environmental Chemistry, I.K. International Publishing House. De, A.K.(2012), Environmental Chemistry, New Age International Pvt, Ltd, New Delhi. Khopkar, S.M.(2010), Environmental Pollution Analysis, New Age International Publisher.


Prof. Pathan Mohd Arif Ali Khan

Chairman

B. Sc Analytical Chemistry III & IV Semester, May 2020 to June 2025

Board of Studies
 Dr. Babasaheb Ambedkar Marathwada
 University, Chh. Sambhajinagar (M.S)

Total Credits: 02

Total Contact Hours: 30 Hrs

University Assessment: 30 Marks

Internal Assessment: 20 Marks

Maximum Marks: 50 Marks

Learning Objectives of the Course:

- LO1 Understand the role of polymers in advanced electronic applications.
- LO2 Analyze the properties and functionalities of electroactive polymers and polymer composites.
- LO3 Understand the use of polymers in energy storage devices and wearable electronics.
- LO4 Examine the criteria for selecting polymers for defense applications and compare them with conventional materials.
- LO5 Investigate high-temperature stability, corrosion-resistant coatings, and stealth coatings in defense applications.

Course Outcomes (COs):

After completion of the course, students will be able to:

1. know the formation, nature, origin, composition, classification of soils.
2. understand the essential and beneficial elements, macro and micronutrients.
3. know the different types of fertilizers.
4. understand the concept of biofertilizers, green manuring.

Course Content

**Unit I
Soils**

[10 Hrs]

Formation, nature, origin, composition, classification. Characteristics, acidity, salinity, alkalinity and chemical properties (Cation Exchange Capacity) of soils. Chemistry of weathering of materials, soils and clay minerals.

Biofertilizers

The general account about the microbes used as biofertilizers: Rhizobium – isolation, identification, mass multiplication, carrier-based inoculants, Actinorrhizal symbiosis. Organic farming – Green manuring and organic fertilizers, agricultural and industrial wastes – bio compost making methods, types and methods of vermicomposting and its field application

Unit II Mineral Nutrients

(10 Hrs)

Essential and beneficial elements, macro and micronutrients, methods of study, criteria for essentiality, mineral deficiency symptoms, roles of essential elements, chelating agents.

3. Types of Fertilizers

(8 Hrs)

Different types of fertilizers (N, P and K) and their soil reactions. Manufacture of the following fertilizers: Urea, ammonium nitrate, calcium ammonium nitrate, ammonium phosphates, superphosphate of lime, potassium Sulfate. Controlled release fertilizers. Environmental aspects of fertilizers.

Reference Books

1. A Practical Book on Soil, Plant, Water and Fertilizer Analysis, Dubey, S.K., Arora, A., 2011.
2. Stewart, Robert E.. "fertilizer". *Encyclopedia Britannica*, 6 May. 2023


Prof. Pathan Mohd Arif Ali Khan
Chairman