

REVISED POOL OF COURSES TO BE INCLUDE IN SCHEME A & C
AS PER NEP 2020 CURRICULUM FRAMEWORK FOR UNDERGRADUATE PROGRAMMES

Chaudhary Ranbir Singh University Jind

Subject: Chemistry

Semester	Course Type	Course Code	Nomenclature of paper	Credits	Credits		Contact hours	Internal Assessment Marks	End term Examination Marks	Total Marks	Examination hours
					Theory	Practical/ Tutorial					
1 st	SEC-1	B23-SEC-101	Office and Spreadsheet Tools Learning	3	2	1	2+2	15+5	35+20	75	3+3
		B23-SEC-102	Advance Spreadsheet Tools	3	2	1	2+2	15+5	35+20	75	3+3
		B23-SEC-103	Basic IT Tools	3	2	1	2+2	15+5	35+20	75	3+3
		B23-SEC-104	Essentials of Python	3	2	1	2+2	15+5	35+20	75	3+3
		B23-SEC-105	Introductory Course in R	3	2	1	2+2	15+5	35+20	75	3+3
		B23-SEC-106	Computer Programming in C	3	2	1	2+2	15+5	35+20	75	3+3
2 nd	SEC-2	B-23-SEC-205	Chemistry of fats, oils, paints & detergents	3	2	1	2+2	15+5	35+20	75	3+3
		B-23-	Chemistry Lab-	3	2	1	2+2	15+5	35+20	75	3+3

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		SEC-219	Maintenance and Handling								
		B-23-SEC-205(A)	Chemistry of Food Flavours, & Colorants	3	2	1	2+2	15+5	35+20	75	3+3
		B-23-SEC-219(A)	Analytical Chemistry	3	2	1	2+2	15+5	35+20	75	3+3
3 rd	SEC-3	B-23-SEC-307	Waste Management Techniques	3	2	1	2+2	15+5	35+20	75	3+3
		B-23-SEC-308	Food Adulteration Testing	3	2	1	2+2	15+5	35+20	75	3+3



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Semester	Course Type	Course Code	Nomenclature of paper	Credits	Credits		Contact hours	Internal Assessment Marks	End term Examination Marks	Total Marks	Examination hours
					Theory	Practical/ Tutorial					
1	AEC-1	B23-AEC-1	English Language and Communication Skills: Level 1	2	2	0	2+0	15+0	35+0	50	3+0
		B23-PNB-AEC-141	Punjabi Language and Communication-I (ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਅਤੇ ਸੰਚਾਰ-1)	2	2	0	2+0	15+0	35+0	50	3+0
		B23-AEC-131	Sanskrit Language and Communication-1 (संस्कृत भाषा एवं संप्रेषण-1)	2	2	0	2+0	15+0	35+0	50	3+0
		B23-HIN-121	Hindi Language and Literature (हिंदी भाषा और साहित्य)	2	2	0	2+0	15+0	35+0	50	3+0

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2	AEC-2	B23-AEC-2	English Language and Communication Skills: Level 2	2	2	0	2+0	15+0	35+0	50	3+0
		B23-PNB-AEC-241	Punjabi Language and Communication-II (ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਅਤੇ ਸੰਚਾਰ-II)	2	2	0	2+0	15+0	35+0	50	3+0
		B23-AEC-132	Sanskrit Language and Communication-2 (संस्कृत भाषा एवं संप्रेषण-2)	2	2	0	2+0	15+0	35+0	50	3+0
3	AEC-3	B23-AEC-3	English Language and Communication Skills: Level 3	2	2	0	2+0	15+0	35+0	50	3+0
		B23-PNB-AEC-341	Punjabi Language and Communication-III (ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਅਤੇ ਸੰਚਾਰ-III)	2	2	0	2+0	15+0	35+0	50	3+0
		B23-AEC-133	Sanskrit Language and Communication-3 (संस्कृत भाषा एवं संप्रेषण-3)	2	2	0	2+0	15+0	35+0	50	3+0

**REVISED POOL OF COURSES TO BE INCLUDE IN SCHEME A & C
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4	AEC-4	B23-AEC-4	English Language and Communication Skills: Level 4	2	2	0	2+0	15+0	35+0	50	3+0
		B23-PNB-AEC-441	Punjabi Language and Communication-IV (ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਅਤੇ ਸੰਚਾਰ-IV)	2	2	0	2+0	15+0	35+0	50	3+0
		B23-AEC-134	Sanskrit Language and Communication-4 (संस्कृत भाषा एवं संप्रेषण-1)	2	2	0	2+0	15+0	35+0	50	3+0
		B23-HIN-421	Purposeful Hindi (प्रयोजनपरक हिंदी)	2	2	0	2+0	15+0	35+0	50	3+0



**REVISED POOL OF COURSES TO BE INCLUDE IN SCHEME A & C
AS PER NEP 2020 CURRICULUM FRAMEWORK FOR UNDERGRADUATE PROGRAMMES**

Chaudhary Ranbir Singh University Jind
Subject: Chemistry

Semester	Course Type	Course Code	Nomenclature of paper	Credits	Credits		Contact hours	Internal Assessment Marks	End term Examination Marks	Total Marks	Examination hours
					Theory	Practical/ Tutorial					
1 st	VAC-1	B-21-VAC-101	Human Values and Ethics	2	2	0	2+0	15+0	35+0	50	3+0
2 nd	VAC-2	B-23-VAC-201	Environmental Studies	2	2	0	2+0	15+0	35+0	50	3+0
3 rd	VAC-3	B-23-VAC-301	Environment and Society	2	2	0	2+0	15+0	35+0	50	3+0
4 th	VAC-4	B-23-VAC-401	Chemistry In everyday life	2	2	0	2+0	15+0	35+0	50	3+0

• FOR SCHEME B, C ONLY

SEC

Session: 2023-24

Part A – Introduction

SEC

Session: 2023-24			
Part A – Introduction			
Subject	Chemistry		
Semester	II		
Name of the Course	Chemistry of fats, oils, paints & detergents		
Course Code	B-23-SEC-205		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	SEC		
Level of the course (As per Annexure-I)	0-99		
Pre-requisite for the course (if any)	Higher Secondary other than science disciplines		
Course Learning Outcomes (CLO):	1. To know about important techniques for refining of crude vegetable oils. 2. To understand about the treatment of effluent from refining plant 3. To understand the preparation and action mechanism of Paint and detergent 1. *To get knowledge about estimation/preparation of daily used dyes, oils and fats		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	30	30	60
Max. Marks: 50+25*= 75 Internal Assessment Marks: 15+5*= 20 End Term Exam Marks: 35+20*=55		Time: Theory: 3 Hours Practicum: 3 Hours	
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u>			
Note: The examiner is requested to set nine questions in all, selecting two questions from each SECTION and one question (Question No.1) based on entire syllabus will consist of short answer type. All questions carry equal marks. The candidate is required to attempt five questions in all one from each SECTION. Question No.1 is compulsory.			

Unit	Topics	Contact Hours
I	Basics of Oils & Fats: Oils, fats, waxes, mineral oils, essential oils, their sources, composition and structures. Constituents of natural fats Glycerides and fatty acids, their nomenclature, classification and principle sources; theories of glyceride structure. Physical properties of fatty acids and their esters. Polymorphism and crystal structure, solubility, refractivity, optical activity, spectroscopic properties	8 Hrs
II	Chemical analysis of oils: Acid value, saponification value, Acetyl and hydroxyl value, peroxide and anisidine value, iodine value, Colour tests for identification of adulteration of edible oils, Bellier Turbidity Temperature Test, dilatometry, micro penetration tests.	7 Hrs
III	Natural dyes: name of plants of natural dyes, occurrence and extraction of dyes. Paints, Varnishes and Inks: Composition, examples of preparation and applications. Surface Coatings: Objectives of surfacecoatings, preliminary treatment of surface, classification of surface coatings. Paints and pigments-formulation, composition and related properties. Oil paint, Vehicle, modified oils, Pigments, toners and lakespigments, Fillers, Thinners, Enamels, emulsifying agents. Special paints (Heat retardant, Fire retardant, Eco-friendly paint, Plastic paint), Dyes, Wax polishing, Water and Oil paints, additives, Metallic coatings (electrolytic and electrodeless).	8 Hrs
IV	Detergents: Introduction to soap, Types of soap (Toilet soap, Transparent soap, Shaving soap, Neem soap, Liquid soap) Manufacturing of soap (Batch process, Continuous process) Recovery of glycerine from spent lye. Introduction to detergents. Principal group of synthetic detergents Biodegradability of surfactants Classification of surface active agents Anionic detergents (Manufacture of anionic detergents (i) Oxo Process (ii) Alfol Process (iii) Welsh Process) Cationic detergents (Manufacture process) Non Ionic detergents (Manufacture by batch process) Amphoteric detergents Manufacture of shampoo.	7 Hrs
V*	1. Analysis of oils and fats (iodine value, saponification value, acid value). 2. Determination of aldehyde content in the given oil sample 3. Preparation of Malachite Green. 4. Preparation of Methyl Orange. Note: Any other preparation/analysis related to the content of SEC-2 as per availability.	30 Hrs
Suggested Evaluation Methods Short Answer and MCQ Type QUESTIONS		

Internal Assessment: 15+5* ➤ Theory 15 ● Class Participation: 04 ● Seminar/presentation/assignment/quiz/class test etc.: 04 ● Mid-Term Exam: 07 ➤ Practicum: 05 ● Class Participation: NA ● Seminar/Demonstration/Viva-voce/Lab records etc.: 05 ● Mid-Term Exam: NA	End Term Examination: 35+20*
Part C-Learning Resources	
Recommended Books/e-resources/LMS: 1. O. P. Vermani, A. K. Narula: Industrial Chemistry, Galgotia Publications Pvt. Ltd., New Delhi. 2. S. C. Bhatia: Chemical Process Industries, Vol. I & II, CBS Publishers, New Delhi. 3. P. C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi. 4. Kent: Riehels Industries Chemistry. 5. M Ash & I Ash: A formulary of paints & other coatings. 6. R. Gopalan, D. Venkappayya, S. Nagarajan: Engineering Chemistry, Vikas Publications, New Delhi. 7. B. K. Sharma: Engineering Chemistry, Goel Publishing House, Meerut. 8. J. A. Kent: Riegel's <i>Handbook of Industrial Chemistry</i>, CBS Publishers, New Delhi. 9. P. C. Jain, M. Jain: <i>Engineering Chemistry</i>, Dhanpat Rai & Sons, Delhi.	

*Applicable for courses having practical component.



SEC

Session: 2023-24

Part A – Introduction

SEC

Session: 2023-24			
Part A – Introduction			
Subject	Chemistry		
Semester	II		
Name of the Course	Chemistry Lab-Maintenance and Handling		
Course Code	B-23-SEC-219		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	SEC		
Level of the course (As perAnnexure-I	0-99		
Pre-requisite for the course (if any)	Higher Secondary other than science disciplines		
Course Learning Outcomes (CLO):	2. Aware about lab handling and handling of hazardous chemicals. 3. Determine percentage purity and knowledge to prepare buffer solutions. 4. To Know preparation of complexometric titration and purification techniques. 5. To get operating knowledge of different instruments. 6. *To get practical knowledge about complexometric titrations and paper chromatography. Also, determination some physical properties of some compounds/ solutions.		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	30	30	60
Max. Marks: 50+25*= 75 Internal Assessment Marks: 15+5*= 20 End Term Exam Marks: 35+20*=55		Time: Theory: 3 Hours Practicum: 3 Hours	
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u>			
Note: The examiner is requested to set nine questions in all, selecting twoquestions from each SECTION and one question (Question No.1) based on entire syllabus will consist of short answer type. All questions carry equalmarks. The candidate is required to attempt five questions in all one from each SECTION. Question No.1 is compulsory.			

Unit	Topics	Contact Hours
I	Laboratory practices-I: Familiarization with chemical labeling, Handling of hazardous chemicals, Handling of glassware. Sodium metal disposal, Familiarization with chemical concepts related to solution preparation and standardization: Equivalent mass, molar mass, specific gravity, concentration (Normality, Molarity, Molality, %w/v, %w/w, %v/v, ppm, ppb solutions), Basicity and acidity.	8 Hrs
II	Laboratory practices-II: Determination of concentration and percentage purity. Standardization of solutions, Knowledge about primary and secondary standards. Knowledge about indicators and preparation of indicator solutions, Knowledge about buffers and preparation of buffer solutions.	7 Hrs
III	Laboratory practices-III: Preparation of complexometric solutions (e.g. EDTA solutions) and titrations, Management of chemical waste. Purification of chemicals through distillation, crystallization, sublimation etc.	8 Hrs
IV	Instrument Handling: Knowledge about different electrodes (e.g. Ag, Pt, SCE, Ag/AgCl) and their upkeep, Operating knowledge including calibration and maintenance of pH-meters and glass electrode, Operating knowledge including calibration, handling and maintenance of Potentiometers and conductometer.	7 Hrs
V*	Complexometric titrations: Determination of Zn^{2+} by EDTA. Paper Chromatography: Qualitative Analysis of any two of the following Inorganic cations and anions by paper chromatography (Pb^{2+}, Cu^{2+}, Ca^{2+}, Ni^{2+}, Cl^-, Br^-, I^- and PO_4^{3-} and NO_3^-). - To determine the viscosity of given liquid using Ostwald's Viscometer. - To determine the specific refractivity of at least three liquids by Refractometer. - Preparation of 2,4-DNP derivative of Benzophenone. - Separation of mixture of two Organic Compounds by TLC.	30 Hrs
Suggested Evaluation Methods Short Answer and MCQ Type QUESTIONS		
Internal Assessment: 15+5* > Theory 15 - Class Participation: 04 - Seminar/presentation/assignment/quiz/class test etc.: 04 - Mid-Term Exam: 07 > Practicum: 05 - Class Participation: NA - Seminar/Demonstration/Viva-voce/Lab records etc.: 05 - Mid-Term Exam: NA		End Term Examination: 35+20*
Part C-Learning Resources		

Recommended Books/e-resources/LMS:

1. Khosla, B.D.; Garg, V.C.; Gulati, A. (2015), Senior Practical Physical Chemistry, R. Chand & Co, New Delhi.
2. Jeffery, G.H.; Bassett, J.; Mendham, J.; Denney, R.C. (1989), Vogel's Textbook of Quantitative Chemical Analysis, John Wiley and Sons.

*Applicable for courses having practical component.

SEC - II

Session: 2023-24

Part A – Introduction

Session: 2023-24			
Part A – Introduction			
Subject	Chemistry		
Semester	II		
Name of the Course	Chemistry of food flavours and colorants		
Course Code	B23-SEC-205(A)		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	SEC		
Level of the course (As per Annexure-I	100-199		
Pre-requisite for the course (if any)	4.0		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: 1 Know about basic food components; 2 Analyse the food flavors and pigments; 3 Think about the food additives; 4 Understand about food colorants. 5*. Analyse the extraction & reactions of food components.		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	30	30	60
Max. Marks: 50+25*= 75 Internal Assessment Marks: 15+5*= 20 End Term Exam Marks: 35+20*=55		Time: Theory: 3 Hours Practicum: 3 Hours	
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u> Note: The examiner is requested to set nine questions in all, selecting two questions from each SECTION and one question (Question No.1 based on			



entire syllabus will consist of short answer type. All questions carry equal marks. The candidate is required to attempt five questions in all selecting one from each SECTION. Question No.1 is compulsory.		
Unit	Topics	Contact Hours
I	Biological molecules in food Water: Physical properties: specific heat, latent heat, vapor pressure, boiling point, water as dispersing medium, states of water, Water in food preparation and preservation Starch: Structure, functional properties - Gelatinization, pasting, syneresis, retrogradation, dextrinization. Factors affecting gelatinization and gelation, c) Gums – Functions, sources, applications. d) Pectic substances, pectin gels	8 Hrs
II	Enzymes: a) Biocatalysts, enzyme specificity b) Use of exogenous enzymes in foods – amylases, lipases, proteases c) Endogenous enzymes – phenol oxidases, peroxidases, oxidoreductases, lipoxygenases d) Factors affecting enzyme activity	8 Hrs
III	Flavours & Pigments Flavours: a) Molecular mechanism of flavor perception (sweet, bitter, salty, sour, umami, kokumi, pungent, cooling and astringent) b) Flavours from vegetables, fruits, spices, fats and oils, milk and meat products Pigments: a) Pigments in Animal and Plant tissues (Haeme compounds, Chlorophyll, Carotenoids, Anthocyanins, Betalins) b) Synthetic Food Colors (toxicity and regulatory aspects)	7 Hrs
IV	Food Additives Additives: a) Buffer systems, and salts, chelating agents b) Antioxidants c) Antimicrobials d) Fat replacers, sweeteners e) Masticatory substances f) Emulsifiers g) Clarifying agents, bleaching agents h) Flour improvers, anti-caking agents, i) Gases and propellants. Color – Natural and synthetic food colors, their chemical structure, shades imparted, stability, permitted list of colors, usage levels and food application. Food colorants: sunset yellow, orange-B, citrus red No2, yellow No5, green No3.	7 Hrs
V*	1. Gelatinization of starch granules; 2. To study hydrolysis of starch through salivary amylase 3. To study hydrolysis of fatty acids 4. Extraction of chlorophyll from different leaves;	30 Hrs
Suggested Evaluation Methods Short Answer and MCQ Type QUESTIONS		

3m. 2hr

Internal Assessment: 15 ^{15*} ➤ Theory ¹⁵ • Class Participation: 04 • Seminar/presentation/assignment/quiz/class test etc.: 04 • Mid-Term Exam: 07 ➤ Practicum: 05 • Class Participation: 02 • Seminar/Demonstration/Viva-voce/Lab records etc.: 03 • Mid-Term Exam: NIL	End Term Examination: 35+20*
Part C-Learning Resources	
Recommended Books/e-resources/LMS: ✓ Bright Siaw Afriyie, Introduction to Computer fundamentals. ✓ Vacklavick, V. and Christian, E. (2003). Essentials of Food Science. New York: Kluwer Academic/ Plenu Publisher. ✓ Damodaran S., Parkin KL. and Fennema OR. Fennema's Food Chemistry (4th Edition), Florida: CRC Press ✓ Rick Parker (2003), Introduction to Food Science, New York: Delmar Thomson Learning ✓ Borvers, J. (1992). ✓ Food Theory and Application (2ndEd), New York: Maxwell MacMillan International Edition. ✓ Manay, N. S. and Sharaswamy, S. M. (1997). Foods: Facts and Principles New Delhi: New Age International Publishers. ✓ McWilliams, M (2007). Foods: Experimental Perspectives 5th Ed, New Jersey: Macmillar Publishing Co. Potter, ✓ N. N. and Hutchkiss, J. H. (1997). Food Science, 5th Ed, New Delhi: CBS Publishers and Distributors. ✓ Scottsmith and Hui Y.H (Editors) (2004) Food Processing – Principles and Applications London Blackwell ✓ Carmen Socaciu, "Food Colorants Chemical and functional properties", CRC Press,2007 ✓ Dr. Geetha Swaminathan & Mrs. Mary George, Laboratory chemical methods in food analysis, Margham Publishers, 2002.	

*Applicable for courses having practical component.

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SEC-II

Session: 2023-24

Part A – Introduction

Session: 2023-24			
Part A -- Introduction			
Subject	Chemistry		
Semester	II		
Name of the Course	Analytical Chemistry		
Course Code	B23-SEC-219(A)		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VA C)	SEC		
Level of the course (As per Annexure-I)	0-99		
Pre-requisite for the course (if any)	4.0		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: 1. Analyse concepts about chromatography & its types; 2. Understand about soil analysis; 3. Learn water purification methods; 4. Perform food processing analysis. 5*. Practically analyse the soil composition.		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	30	30	45
Max. Marks: 50+25*= 75 Internal Assessment Marks: 15+5*= 20 End Term Exam Marks: 35+20*=55		Time: Theory: 3 Hours Practicum: 3 Hours	
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u> Note: The examiner is requested to set nine questions in all, selecting two questions from each SECTION and one question (Question No.1 based on			

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entire syllabus will consist of short answer type. All questions carry equal marks. The candidate is required to attempt five questions in all selecting one from each SECTION. Question No.1 is compulsory.

Unit	Topics	Contact Hours
I	Chromatography: Definition, general introduction on principles of chromatography, Column chromatography, paper chromatography, TLC & , ion-exchange chromatography.	8 Hrs
II	Analysis of soil: Composition of soil, Concept of pH and pH measurement, Complexometric titrations, Chelation, Chelating agents, use of indicators.	7 Hrs
III	Analysis of water: Definition of pure water, sources responsible for contaminating water, water sampling methods, water purification methods.	8 Hrs
IV	Analysis of food products: Nutritional value of foods, idea about food processing and food preservations and adulteration.	7 Hrs
V*	1. Paper chromatographic separation of mixture of metal ion (Fe^{3+} and Al^{3+}). 2. To compare samples of dyes/paints by TLC method. 3. Identification of adulterants in some common food items like coffee powder, asafoetida, chilli powder, turmeric powder, coriander powder and pulses, etc. 4. Determination of pH of soil samples. 5. Estimation of Calcium and Magnesium ions as Calcium carbonate by complexometric titration. 6. Determination of pH, acidity and alkalinity of a water	30 Hrs
Suggested Evaluation Methods Short Answer and MCQ Type QUESTIONS		
Internal Assessment: 15 + 05* > Theory: 15 • Class Participation: 04 • Seminar/presentation/assignment/quiz/class test etc.: 04 • Mid-Term Exam: 07 > Practicum: 05 • Class Participation: 02 • Seminar/Demonstration/Viva-voce/Lab records etc.: 03 • Mid-Term Exam: NIL		End Term Examination: 35+20*
Part C-Learning Resources		

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Recommended Books/e-resources/LMS:

- E. Stocchi: *Industrial Chemistry*. Vol -I. Ellis Horwood Ltd. UK.
- ✓ Willard, H.H., Merritt, L.L., Dean, J. & Settee, F.A. *Instrumental Methods of Analysis*. 7th Ed. Wadsworth Publishing Co. Ltd., Belmont, California, USA, 1988.
 - ✓ Skoog, D.A. Holler F.J. & Nieman, T.A. *Principles of Instrumental Analysis*, Cengage Learning India Ed.
 - ✓ Skoog, D.A.; West, D.M. & Holler, F.J. *Fundamentals of Analytical Chemistry* 6th Ed., Saunders College Publishing, Fort Worth (1992).
 - ✓ Harris, D. C. *Quantitative Chemical Analysis*, W. H. Freeman.
 - ✓ Dean, J. A. *Analytical Chemistry Notebook*, McGraw Hill.
 - ✓ Day, R. A. & Underwood, A. L. *Quantitative Analysis*, Prentice Hall of India.
 - ✓ Freifelder, D. *Physical Biochemistry* 2nd Ed., W.H. Freeman and Co., N.Y. USA (1982).
 - ✓ Cooper, T.G. *The Tools of Biochemistry*, John Wiley and Sons, N.Y. USA. 16 (1977).
 - ✓ Vogel, A. I. *Vogel's Qualitative Inorganic Analysis* 7th Ed., Prentice Hall.
 - ✓ Vogel, A. I. *Vogel's Quantitative Chemical Analysis* 6th Ed., Prentice Hall.
 - ✓ Robinson, J.W. *Undergraduate Instrumental Analysis* 5th Ed., Marcel Dekker, Inc., New York (1995).

*Applicable for courses having practical component.

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SEC-III

Session: 2024-25			
Part A – Introduction			
Subject	Chemistry		
Semester	III		
Name of the Course	Food Adulteration Testing		
Course Code	B23-SEC-308		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	SEC		
Level of the course (As per Annexure-I	100-199		
Pre-requisite for the course (if any)	--		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: 1 Know about common food adulterants 2 Learn methods of detection of adulterants in food 3 Get aware about laws related with adulteration 4 Understand the role of several agencies. 5*. Practically detect adulteration in foods.		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	30	30	60
Max. Marks: 50+25* Internal Assessment Marks: 15+5*=20 End Term Exam Marks: 35+20* =55		Time: Theory: 3 Hours Practicum: 3 Hours	
Part B- Contents of the Course			
Instructions for Paper- Setter			
Note: The examiner is requested to set nine questions in all, selecting two questions from each SECTION and one question (Question No.1 based on			

entire syllabus will consist of short answer type. All questions carry equal marks. The candidate is required to attempt five questions in all selecting one from each SECTION. Question No.1 is compulsory.		
Unit	Topics	
I	Common Foods and Adulteration Common Foods subjected to Adulteration - Adulteration Definition – Types; Poisonous substances. Foreign matter, Cheap substitutes, Spoiled parts. Adulteration through Food Additives – Intentional and incidental. General Impact on Human Health.	8 Hrs
II	Adulteration of Common Foods and Methods of Detection Means of Adulteration, Methods of Detection Adulterants in the following Foods; Milk, Oil, Grain, Sugar, Spices, Processed food, Fruits and vegetables. Additives and Sweetening agents (at least three methods of detection for each food item).	8 Hrs
III	Present Laws and Procedures on Adulteration Highlights of Food Safety and Standards Act 2006 (FSSA) –Food Safety and Standards Authority of India–Rules and Procedures of Local Authorities.	7 Hrs
IV	Role of voluntary agencies such as, Agmark, I.S.I. Quality control laboratories of companies, Private testing laboratories, Quality control laboratories of consumer co-operatives. Consumer education, Consumer's problems rights and responsibilities, COPRA 2019 - Offenses and Penalties – Procedures to Complain – Compensation to Victims.	7 Hrs
V*	1. Determination of urea & starch in milk. 2. Determination of starch in Khoa products. 3. Determination of Margarine in Ghee. 4. Determination of Metanil yellow colour in Jaggery. 5. Determination of colored saw dust in turmeric powder.	30 Hrs
Suggested Evaluation Methods Short Answer and MCQ Type QUESTIONS		
Internal Assessment: 15 > Theory • Class Participation: 04 • Seminar/presentation/assignment/quiz/class test etc.: 04 • Mid-Term Exam: 07 > Practicum: 05 • Class Participation: 02 • Seminar/Demonstration/Viva-voce/Lab records etc.: 03 • Mid-Term Exam: NIL		End Term Examination: 35+20*

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- ✓ Bright Siaw Afriyie, Introduction to Computer fundamentals.
- ✓ First course in Food Analysis – A.Y. Sathe, New Age International(P)Ltd.,1999
- ✓ Food Safety, case studies – Ramesh. V. Bhat, NIN, 1992
- ✓ https://old.fssai.gov.in/Portals/0/Pdf/Draft_Manuals/Beverages and confectionary.pdf
- ✓ <https://cbseportal.com/project/Download-CBSE-XII-Chemistry-Project-Food-Adulteration#gsc.tab=0>
- ✓ <https://www.fssai.gov.in/>
- ✓ <https://indianlegalsolution.com/laws-on-food-adulteration/>
- ✓ <https://fssai.gov.in/dart/>
- ✓ <https://byjus.com/biology/food-adulteration/>
- ✓ Wikipedia

*Applicable for courses having practical component.



SEC-III

Session: 2024-25			
Part A - Introduction			
Subject	Chemistry		
Semester	III		
Name of the Course	Waste Management Techniques		
Course Code	B23-SEC-307		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	SEC		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. Identify various types of wastes and their sources 2. Understand the sanitary landfill and other disposal method for solid waste. 3. Understand the treatment methods for waste water. 4. Examine the role of biotechnology in reduction of different waste. 5*. To compare the different waste treatment techniques and suggest for better environment.		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours (per week)	30	30	60

Max. Marks: 50+25*=75 Internal Assessment Marks: 15+5*=20 End Term Exam Marks: 35+20*=55	Time Theory: 3 Hours Practicum: 3 Hours
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Part B- Contents of the Course

Instructions for Paper- Setter

For final theory exam time allowed will be of 2 hours and nine questions will be set. Question No.1 (objective/short answer type) covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit-wise with two questions from each Unit. The candidates will be required to attempt Q.No.1 and any four, selecting one question from each unit. All the questions will carry equal marks.

Unit	Topics
I	Waste: Classification, generations and characterization. Basic aspects of Solid waste management generation; on-site handling, storage and processing; collection of solid wastes; transfer and transport; processing techniques; ultimate disposal. Hazardous waste –Definition, sources, effects, disposal and management techniques. Physical, chemical, physico- chemical treatment, and thermal treatment;-Solidification, chemical fixation, encapsulation, pyrolysis and incineration. Biomedical wastes – Definition, categories, and management, E-waste: Sources and management
II	Disposal of Solid waste: sanitary land filling – site selection, design and operation of sanitary landfills – Leachate collection & treatment. Secure land filling. Incineration: Mass burn, Rotatory Kiln, Fluidized Bed incinerator, liquid injection incinerator, Waste gas flare incinerator, fixed grate incinerators, Plasma Pyrolysis. Composting, vermicomposting.
III	Principles of Industrial waste treatment - sources of pollution physical chemical, organic and biological properties. Manufacturing processes, flow sheets, characteristics and composition of wastes including waste reduction, treatment and disposal methods for Food Industries: Sugar, Fermentation, Material Industries: Paper, Steel - Metal - plating and petroleum refineries.

IV	7 Hrs Role of Biotechnology in waste minimization; Recovery of by- products and raw material from wastewater conversion: waste recovery and reuse, reclamation by ground water recharge, agriculture reuse of effluent; sludge as fertilizer; biomass for energy, metal recovery, bioscrubbing. Biological Treatment Biological methods for waste processing: Biomethanation, Biodeisel, Biohydrogen.
V*	30 Hrs 1. To study about the various sources of solid waste generation in the locality. 2. To study about the categories of hazardous waste. 3. To study about the sanitary land fill management –case study 4. To estimate the BOD ₅ and COD of the waste water. 5. To study about the working of Sewage treatment plant-case study.
Suggested Evaluation Methods	
Internal Assessment: > Theory 15 • Class Participation: 04 marks • Seminar/presentation/assignment/quiz/class test etc.: 04 marks • Mid-Term Exam: 07 marks > Practicum 05 • Class Participation: 02 • Seminar/Demonstration/Viva-voce/Lab records etc.: 03 marks • Mid-Term Exam: NIL	End Term Examination: Theory: 35 marks (Written exam) Practical: 20 marks (Demonstration: 10 Viva- voce :5 Lab records: 5)
Part C-Learning Resources	
Recommended Books/e-resources/LMS: 1. Crites R.W., Reed S.C and Bastion R. (2000). Land Treatment Systems for Municipal & Industrial Wastes. McGraw Hill Companies Inc. 2. Eckenfelder W.W. (1966). Industrial Water Pollution Control. McGraw Hill Publications. 3. Bhatia S.C. (2007). Solid and Hazardous Waste Management, Nice Printing Press, Delhi. 4. Singh, J.S., Singh, S.P and Gupta, S.R. (2015). Ecology, Environment and Resource Conservation, S. Chand Publishing, New Delhi. 5. Sidwick J.M and Holdom R.S. (1987). Biotechnology waste treatment and exploitation, Ellis horwood limited, England.	

*Applicable for courses having practical component.

VAC-3

Session: 2024-25			
Part A – Introduction			
Subject	Chemistry		
Semester	III		
Name of the Course	Environment and society		
Course Code	B23-VAC-301		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VA C)	VAC		
Level of the course (As per Annexure-I	100-199		
Pre-requisite for the course (if any)	4.0		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: 1. Able to explain the relationship between the environment and society 2. Understanding the role played by environment, society and, their interface in shaping environmental decisions 3. Student will able to think critically on environmental issues and different solutions 4*. -NA-		
Credits	Theory	Practical	Total
	2	N. A.	2
Contact Hours	30	N. A.	30
Max. Marks: 50 Internal Assessment Marks: 15 End Term Exam Marks: 35		Time: Three Hours	
Part B- Contents of the Course			

Instructions for Paper- Setter

Note: The examiner is requested to set nine questions in all, selecting two questions from each SECTION and one question (Question No.1 based on

entire syllabus will consist of short answer type. All questions carry equal marks. The candidate is required to attempt five questions in all selecting one from each SECTION. Question No.1 is compulsory.

Unit	Topics	Contact Hours
I	Introduction: Social and cultural construction of 'environment'; environmental thought from historical and contemporary perspective in light of the concepts of Gross Net Happiness and Aldo Leopold's Land Ethic Issues in Environmentalism: Significant global environmental issues such as acid rain, climate change, and resource depletion; historical developments in cultural, social and economic issues related to land, forest, and water management in a global context; interface between environment and society.	8 Hrs
II	Development -Environment Conflict: Developmental issues and related impacts such as ecological degradation; environmental pollution; development-induced displacement, resettlement, and rehabilitation: problems, concerns, and compensative mechanisms; discussion on Project Affected People (PAPs). Urbanization and environment: Production and consumption oriented approaches to environmental issues in Indian as well as global context; impact of industry and technology on environment; urban sprawl, traffic congestion and social-economic problems; conflict between economic and environmental interests.	8 Hrs
III	Environment and Social Inequalities: Inequalities of race, class, gender, region, and nation-state in access to healthy and safe environments; history and politics surrounding environmental, ecological and social justice; environmental ethics, issues and possible solutions. Regulatory Framework: Brief account of Forest Conservation Act 1980 1988; Forest Dwellers Act 2008; Land Acquisition Act 1894, 2007, 2011, 2012; Land Acquisition Rehabilitation and Resettlement Act 2013	8 Hrs

IV	6 Hrs Community Participation: State, corporate, civil society, community, and individual-level initiatives to ensure sustainable development; case studies of environmental movements (Appiko Movement, Chipko Movement, Narmada Bachao Andolan); corporate responsibility movement; appropriate technology movement, citizen groups; role played by NGOs; environmental education and awareness.	
V*	N.A.	
Suggested Evaluation Methods Short Answer and MCQ Type QUESTIONS		
Internal Assessment: ➤ Theory: 15 ● Class Participation: 04 ● Seminar/presentation/assignment/quiz/class test etc.: 04 ● Mid-Term Exam: 07 ➤ Practicum Nil ● Class Participation: ● Seminar/Demonstration/Viva-voce/Lab records etc.: ● Mid-Term Exam:		End Term Examination: 35
Part C-Learning Resources		
Recommended Books/e-resources/LMS: ✓ NCERT Chemistry		

VAC-4

Session: 2023-24

Part A – Introduction

Subject	Chemistry		
Semester	IV		
Name of the Course	Chemistry in everyday life		
Course Code	B-23-VAC-419		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	VAC		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)	4.0		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: 4. Critically think about the presence of chemicals in daily life 5. Understand presence of chemicals used in food 6. Analyse importance of Vitamins and minerals 7. Think about general medicines 5*. -NA-		
Credits	Theory	Practical	Total
	2	N. A.	2
Contact Hours	30	N. A.	30
Max. Marks: 50 Internal Assessment Marks: 15 End Term Exam Marks: 35		Time: Three Hours	
Part B- Contents of the Course			
Instructions for Paper- Setter Note: The examiner is requested to set nine questions in all, selecting two questions from each SECTION and one question (Question No.1 based on			

entire syllabus will consist of short answer type. All questions carry equal marks. The candidate is required to attempt five questions in all selecting one from each SECTION. Question No.1 is compulsory.

Unit	Topics & Contact Hours
I	Soaps and detergents 8 Hrs Cleansing action of soap, Cleansing action of detergents Propellants Solid propellant, liquid propellants, hybrid propellants dyes: Cause of exhibition of color, chromophore, auxochrome, classification of dyes Advanced chemicals Ceramics, Sunscreens
II	Chemicals used in foods 7 Hrs Preservatives, coloring agents, sweetening agents, flavoring agents, antioxidants Chemicals used to grow, protect foods and crops: Fertilizers, Fungicides, Herbicide and Insecticide etc.
III	Vitamins and minerals 7 Hrs Definition, their significance, Fat soluble vitamins Names, daily dietary requirement, natural sources, Deficiency diseases Water soluble vitamins Names, daily dietary requirement, natural sources, Deficiency diseases Minerals Major and Minor nutrients, daily dietary requirement, natural sources, Deficiency diseases
IV	Chemicals in Medicine 8 Hrs Drug - target interaction (enzymes as drug targets and receptors as drug targets), chemical messengers, types of chemical messengers (hormones and neurotransmitters) Chemotherapy antipyretics, analgesics, antidepressants, antiseptics and disinfectants, antiviral drugs, antacids, antimalarial, anesthetics, tranquilizers, hypnotics and sedatives, ant allergic drugs and histamines
Suggested Evaluation Methods Short Answer and MCQ Type QUESTIONS	

Internal Assessment: ➤ Theory: 15 ● Class Participation: 04 ● Seminar/presentation/assignment/quiz/class test etc.: 04 ● Mid-Term Exam: 07 ➤ Practicum Nil ● Class Participation: ● Seminar/Demonstration/Viva-voce/Lab records etc.: ● Mid-Term Exam:	End Term Examination: 35
Part C-Learning Resources	
Recommended Books/e-resources/LMS: ✓ NCERT Chemistry	

