

**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 |

Ranbir Singh

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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 | To be decided | To be decided | 3 | 2 | 1 | 2+2 | 15+5 | 35+20 | 75 | 3+3 |
| | | | | | | | | | | | |

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SEC - II

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: <ol style="list-style-type: none"> 1 Know about basic food components; 2 Analyse the food flavors and pigments; 3 Think about the food additives; 4 Understand about food colorants. <hr/> 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 | | | | | | | |

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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 | Biological molecules in food preservation 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 | | |

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| <p>Internal Assessment: 15</p> <ul style="list-style-type: none"> ➤ Theory <ul style="list-style-type: none"> ● Class Participation: 04 ● Seminar/presentation/assignment/quiz/class test etc.: 04 ● Mid-Term Exam: 07 ➤ Practicum: 05 <ul style="list-style-type: none"> ● Class Participation: 02 ● Seminar/Demonstration/Viva-voce/Lab records etc.: 03 ● Mid-Term Exam: NIL | <p>End Term Examination: 35+20*</p> |
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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

| | | | |
|---|--|---|-------|
| 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): | <p>After completing this course, the learner will be able to:</p> <ol style="list-style-type: none"> 1. Analyse concepts about chromatography & its types; 2. Understand about soil analysis; 3. Learn water purification methods; 4. Perform food processing analysis. <hr/> <p>5*. Practically analyse the soil composition.</p> | | |
| 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> | | | |
| <p>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</p> | | | |

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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* | <ol style="list-style-type: none"> 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 > Theory <ul style="list-style-type: none"> ● Class Participation: 04 ● Seminar/presentation/assignment/quiz/class test etc.: 04 ● Mid-Term Exam: 07 > Practicum: 05 <ul style="list-style-type: none"> ● 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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