

**E.M.G. YADAVA WOMEN'S COLLEGE , MADURAI – 625 014.**

*(An Autonomous Institution – Affiliated to Madurai Kamaraj University)*

Re-accredited (**3<sup>rd</sup> Cycle**) with Grade **A+ & CGPA 3.51** by NAAC

## **DEPARTMENT OF NUTRITION & DIETETICS**



**CBCS With OBE**

**BACHELOR OF SCIENCE**

**PROGRAMME CODE - N**

**COURSE STRUCTURE**

(w.e.f. 2022 – 2023 Batch onwards)

**E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI -14.**

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)

(Re –accredited (3<sup>rd</sup> cycle) with Grade A<sup>+</sup> and CGPA 3.51 by NAAC)**DEPARTMENT OF NUTRITION AND DIETETICS – UG**  
(with Allied Chemistry)**CBCS with OBE**  
**COURSE STRUCTURE**  
(w.e.f. 2022 – 2023 Batch onwards)

| Semester | Part | Course Code  | Title of the Course   | Teaching hrs<br>(per week) | Duration of<br>Exam (hrs.) | Marks Allotted |    |       | Credits |
|----------|------|--------------|---|----------------------------|----------------------------|----------------|----|-------|---------|
|          |      |              |   |                            |                            | CIA            | SE | Total |         |
| III      | I    | 22OU1TA3     | Part I : Tamil  | 6                          | 3                          | 25             | 75 | 100   | 3       |
|          | II   | 22OU2EN3     | Part II : English   | 6                          | 3                          | 25             | 75 | 100   | 3       |
|          | III  | 22OUND31     | Core : Fundamentals of Nutrition                                | 4                          | 3                          | 25             | 75 | 100   | 4       |
|          | III  |              | Core : Lab – in –<br>Nutritional Biochemistry                   | 2                          | -                          | -              | -  | -     | -       |
|          | III  | 22OUNDGEND3  | GEC : Bakery  | 6                          | 3                          | 25             | 75 | 100   | 4       |
|          | III  | 22OUNDGECH3  | GEC : Chemistry – I<br>Bio Chemistry                            | 4                          | 3                          | 25             | 75 | 100   | 4       |
|          | III  |              | GEC : Chemistry Practical – I Inorganic<br>Qualitative Analysis | 2                          | -                          | -              | -  | -     | -       |
|          |      |              |   |                            |                            |                |    |       |         |
| IV       | I    | 22OU1TA4     | Part I : Tamil  | 6                          | 3                          | 25             | 75 | 100   | 3       |
|          | II   | 22OU2EN4     | Part II : English   | 6                          | 3                          | 25             | 75 | 100   | 3       |
|          | III  | 22OUND41     | Core : Nutritional Biochemistry                                 | 4                          | 3                          | 25             | 75 | 100   | 4       |
|          | III  | 22OUND4P     | Core : Lab – in -Nutritional Biochemistry                       | 2                          | 3                          | 40             | 60 | 100   | 2       |
|          | III  | 22OUNDGEND4  | GEC : Food Preservation   | 4                          | 3                          | 25             | 75 | 100   | 4       |
|          | III  | 22OUNDGEND4P | GEC I : Practical - I<br>Bakery and Food Preservation           | 2                          | 3                          | 40             | 60 | 100   | 1       |
|          | III  | 22OUNDGECH4  | GEC : Chemistry – II<br>Environmental and Organic Chemistry     | 4                          | 3                          | 25             | 75 | 100   | 4       |
|          | III  | 22OUNDGECH4P | GEC : Chemistry Practical - I<br>Inorganic Qualitative Analysis | 2                          | 3                          | 40             | 60 | 100   | 1       |

**GEC** : Generic Elective Course

**SEC** : Skill Enhancement Course

**DSEC** : Discipline Specific Elective Course

**AECC**: Ability Enhancement Compulsory Course

**IDC** : Inter Disciplinary Course

**DSEC: Discipline Specific Elective Course:**

**Semester - V (DSEC– I & II – Choose any one)**

1. Food Service Management – 22OUNDDSE5A
2. Functional Foods and Nutraceuticals – 22OUNDDSE5B

**Semester – VI DSEC – II (Choose any one)**

1. Food Safety and Quality control –22OUNDDSE6A
2. Post Harvest Technology –22OUNDDSE6B

**Semester – VI DSEC– III**

Dietetic Internship Project – **22OUNDDSEPR6**

**NOTE: The students are permitted to obtain additional credits (Optional)**

1. MOOCs / SWAYAM / NPTEL Courses (Online)

| Department of N&D |          |             |  | Class : II N&D |                      |     |    |       |
|-------------------|----------|-------------|--|----------------|----------------------|-----|----|-------|
| Sem               | Category | Course Code | Course Title                           | Credits        | Contact Hours / Week | CIA | SE | Total |
| III               | Core     | 22OUND31    | Core :<br>Fundamentals<br>of Nutrition | 4              | 4                    | 25  | 75 | 100   |

| Nature of the Course         |                        |                           |
|------------------------------|------------------------|---------------------------|
| Knowledge and Skill Oriented | Employability Oriented | Entrepreneurship oriented |
| ✓                            |                        |                           |

### Course Objectives

#### Objectives:

1. Acquire knowledge on the structure of basic terminology and several aspects of nutrition and the functions of food in healthy life sustenance.
2. Familiarize with the nutrient classification, nutrition during deficiency conditions.
3. Understanding of modern aspects of nutritional science.

#### Unit -I

**Nutrition and Health:** Definition, relation of food to health, RDA, factors affecting RDA, reference man and woman.

**Energy:** Units of energy, determination of energy content of foods – bomb calorimeter, determination of energy requirements, basal metabolic rate, factors affecting BMR, SDA of foods, deficiency conditions of energy.

#### Unit – II

**Carbohydrates:** classification, sources, functions, digestion, absorption, deficiency conditions of carbohydrates.

**Dietary fibre:** classification, sources, role of dietary fibre, deficiency conditions of dietary fibre.

**Water: functions,** types, distribution, dehydration

#### Unit - III

**Protein:** Nutritional Classification, functions, digestion, absorption, protein quality (BV, PER, NPU), types of amino acids, deficiency conditions of protein.

#### Unit - IV

**Lipids:** Classification, functions, digestion, absorption, deficiency conditions of lipids.

**Fatty acids:** Classification-saturated, unsaturated, monounsaturated and polyunsaturated, sources, deficiency conditions of lipids.

## Unit - V

**Vitamins:** Fat soluble –A,D,E and K ,water soluble –B<sub>1</sub>,B<sub>2</sub>, B<sub>3</sub>,B<sub>6</sub>,B<sub>12</sub>, foliacid,Biotin and vitamin C functions, sources, deficiency.

**Minerals:** Classification, functions, sources and deficiencies - calcium, phosphorus, iron, iodine, zinc, sodium, Potassium and magnesium.

### Books for Study:

- 1.Gajalakshmi.R ,*Nutrition Science* (1<sup>st</sup> edn) CBS Publisher &Distributers Pvt Ltd New Delhi,2014
2. Srilakshmi. B, *Nutriton Science* (5<sup>th</sup> edn.), New Age International Publications, New Delhi, 2017.
3. Sunetra Roday, *Food Science & Nutrition*, (2<sup>nd</sup> edn.), Macmillan publishing co., New Delhi, 2012.

### Books for Reference:

- 1.Raneena Begum.M, *Foods,Nutrition &Dietetics*(3<sup>rd</sup> edn),Sterling Publishing Privat Limited, New Delhi ,2013.
2. Shrinandan Bansal, *Food and Nutrition* (3<sup>rd</sup> edn), AITBS Publisher,India ,2012.
3. Shubhangini A Joshi, *Nutrition and Dietetics with Indian Case Studies* (4<sup>th</sup> edition.), Tata McGraw Hill Education Pvt Ltd 2011.
4. Srilakshmi. B, *Human Nutriton( For B.Sc Nursing Student )* (2<sup>nd</sup> edn.), New Age International Publications, New Delhi, 2011.
5. Swaminathan, M. *Advanced Text Book on Food and Nutrition*, Vol. I & Vol. II (22<sup>nd</sup> edn.), Published by The Bangalore Printing and Publishing Co.Ltd, 2010.

### Web Resources / E.Books:

- 1.[https://www.vidyawarta.com > uploads > 2019/09](https://www.vidyawarta.com/uploads/2019/09)
2. [https://open.umn.edu > opentextbooks > textbooks](https://open.umn.edu/opentextbooks/textbooks)
- 3.[https://books.google.com > Medical > Nutrition](https://books.google.com/Medical/Nutrition)
- 4,[https://books.google.com > ... > Nursing > Nutrition](https://books.google.com/.../Nursing/Nutrition)
- 5.[https://cuils.cuchd.in > cgi-bin > koha > opac-search](https://cuils.cuchd.in/cgi-bin/koha/opac-search)

**Pedagogy:**

Chalk and Talk, PPT, group discussion, OHP presentations, quiz, on the spot test and Virtual Labs.

**Rationale for nature of Course:****Knowledge and Skill:**

To gain knowledge regarding the nutrients and health.

To know about the nutritional functions, digestion and deficiency conditions.

**Activities to be given:**

Innovation recipes. Assignment, ppt, Quiz, Group discussion.

**Course learning Outcomes (CLO's):**

| CLO  | Course Outcomes Statement   | Knowledge<br>(According to Bloom's<br>Taxonomy) |
|------|---|---|
| CLO1 | Define the units and concept of energy.   | K1 to K3  |
| CLO2 | Classify carbohydrate and dietary fibre.  | K1 to K3  |
| CLO3 | Describe functions, deficiency and excess of various nutrients.                               | K1 to K4  |
| CLO4 | Classify the different micronutrients and interpret its functions, metabolism and deficiency. | K1 to K3  |
| CLO5 | Analyze the importance of vitamins and minerals in maintaining optimum health.                | K1 to K4  |

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)**

|             | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|-------------|-----|-----|-----|-----|-----|-----|
| <b>CLO1</b> | 1   | 2   | 3   | 1   | 2   | 3   |
| <b>CLO2</b> | 2   | 2   | 2   | 3   | 2   | 3   |
| <b>CLO3</b> | 1   | 3   | 3   | 3   | 2   | 3   |
| <b>CLO4</b> | 3   | 2   | 2   | 3   | 2   | 2   |
| <b>CLO5</b> | 2   | 3   | 3   | 3   | 2   | 2   |

**1-Basic Level**

**2- Intermediate Level**

**3- Advanced Level**

**LESSON PLAN : TOTAL HOURS(60 HRS)**

| Unit | Description   | Hrs | Mode  |
|------|---|-----|---|
| 1    | <b>Unit – I Nutrition and Health:</b> Definition, relation of food to health, RDA, factors affecting RDA, reference man and woman.<br><b>Energy:</b> Units of energy, determination of energy content of foods – bomb calorimeter, determination of energy requirements, basal metabolic rate, factors affecting BMR, SDA of foods.                           | 12  | Chalk and talk, Group Discussions, Quiz           |
| 2    | <b>Unit – II. Carbohydrates:</b> classification, sources, functions, digestion, absorption.<br><b>Dietary fibre</b> :classification, sources, role of dietary fibre.<br><b>Water:</b> functions, types, distribution, dehydration   | 9   | Chalk and talk, Quiz                              |
| 3    | <b>Unit – III Protein:</b> Nutritional Classification, functions, digestion, absorption, protein quality (BV, PER, NPU), types of amino acids   | 15  | Chalk and talk, PPT, On the spot Test             |
| 4    | <b>Unit –IV Lipids:</b> Classification, functions, digestion, absorption.<br><b>Fattyacids:</b> Classification-saturated,unsaturated, monounsaturated and polyunsaturated, sources.   | 9   | Chalk and talk, PPT, On the spot Test             |
| 5    | <b>Unit –V Vitamins:</b> Fat soluble –A,D,E and K ,water soluble –B <sub>1</sub> ,B <sub>2</sub> ,B <sub>3</sub> ,B <sub>6</sub> ,B <sub>12</sub> , folicacid,biotin and C functions, sources, deficiency.<br><b>Minerals:</b> Classification, functions, sources and deficiencies - calcium, phosphorus, iron, iodine, zinc,sodium,potassium, and magnesium. | 15  | Chalk and talk, PPT, On the spot Test, Assignment |

**Course Designers:****(MRS)P.TAMILARASI****(MRS) B. RUBARANI**

| Department of N&D |                         |             |              | Class : II N&D |                      |     |    |       |
|-------------------|-------------------------|-------------|--------------|----------------|----------------------|-----|----|-------|
| Sem               | Category                | Course Code | Course Title | Credits        | Contact Hours / Week | CIA | SE | Total |
| III               | Generic Elective Course | 22OUNDGEND3 | GEC : Bakery | 4              | 6                    | 25  | 75 | 100   |

| Nature of the Course         |                        |                           |
|------------------------------|------------------------|---------------------------|
| Knowledge and Skill Oriented | Employability Oriented | Entrepreneurship oriented |
| ✓                            |                        |                           |

### Objectives:

To enable the students to

1. Understand the basic concepts of bakery and food preservation.
2. Familiarize with baking processes and operations.
3. Develop skills and techniques in baking.

### Unit - I

**Bakery principles:** Introduction to bakery, baking principles, role of wheat flour in bakery products, types of flour, composition of flour, characteristics of good quality flour, flour test.

### Unit - II

**Functions of ingredients in baking:** yeast, eggs, sugar, fats, milk products, emulsifiers, enzymes, cream and leavening agents, water, salt, flavouring and colouring materials.

### Unit - III

**Bread making methods:** Commercial bread making methods- sponge, straight dough, ferment dough.

**Baking process:** Flying fermentation, mixing, bulk fermentation, knock back, dividing and rounding, intermediate proofing, moulding and panning, final proofing, depanning, cooling, slicing, packing.

### Unit – IV

**Pastry making:** principles of pastry making, types – puff, flaky, philo and vegetables.

**Cakes:** types-sponge, plain cake, cake faults and their remedies, types of icings-butter and royal.

### Unit – V

**Chocolate and confectionaries:** Types of chocolate-white, ruby, milk and dark chocolate, candies, fondant and fudge.

**Books for Study:**

- 1.Srilakshmi, B. *Food Science*, New Age International (P) Ltd, Publishers, 2006.
- 2.Yogambal Sivalingam, *Theory of Bakery and Confectionery* Visaga Publication, 2005.

**Books for Reference:**

- 1.Dubey S. *Bakery*, Wheat Associates of India, 1979.
- 2.Malik ,R.K.and Dhingra,K.C. *Technology of Bakery products*, Modern Bakery industries, Small Industry Research Institute, New Delhi, 1981.
- 3.Matz, S.A *Bakery Technology*, Packaging, Nutrition, Product Development and Quality Assurance, Elsevier, Science publisher Limited, New York, USA, 1989.
- 4.Thangam E. Philip *Modern Cookery* (Vols I and II), Orient Long Man, Mumbai, 1999.
- 5.Wade, P. *Biscuits, cookies and cracker*, Vol. 1., Elsevier Applied science publishers Ltd., New York, USA, 1988.

**Web Resources / E.Books:**

1. <https://www.niir.org> > blog > baking-science-with-for...
2. <https://www.sanfoundry.com> > best-reference-books-f...
3. <https://books.google.com> > ... > Food Industry
4. <https://www.pearsonhighered.com> > preface
5. <https://uou.ac.in> > sites > default > files > slm

**Pedagogy:**

Chalk and Talk,PPT, group discussion , OHP presentations, quiz, on the spot test and Virtual Labs.

**Rationale for nature of Course:****Knowledge and Skill:**

- To gain knowledge regarding the baking principles,flour types and quality of flours.
- To know about the baking process, Pastry making and chocolate and confectionaries.

**Activities to be given:**

Innovation recipes. Assignment, ppt, Quiz, Group discussion, collect different cereals and pulses.

**Course learning Outcomes (CLO's):**

| CLO  | Course Outcomes Statement  | Knowledge<br>(According to Bloom's<br>Taxonomy) |
|------|--|---|
| CLO1 | Explain the composition of wheat and wheat products                                  | K1 to K3  |
| CLO2 | Describe the functions of the basic ingredients used in bakery goods.                | K1 to K3  |
| CLO3 | Explain the different mixing techniques in baking processes and fermentation methods | K1 to K4  |
| CLO4 | Demonstrate the principles of pastry, cakes and icing techniques                     | K1 to K3  |
| CLO5 | Identify and explain various types of chocolate and confectionaries                  | K1 to K4  |

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)**

|             | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|-------------|-----|-----|-----|-----|-----|-----|
| <b>CLO1</b> | 1   | 2   | 3   | 1   | 3   | 2   |
| <b>CLO2</b> | 1   | 3   | 2   | 2   | 1   | 2   |
| <b>CLO3</b> | 2   | 2   | 1   | 3   | 3   | 2   |
| <b>CLO4</b> | 3   | 3   | 2   | 2   | 2   | 2   |
| <b>CLO5</b> | 2   | 2   | 3   | 3   | 2   | 2   |

**1-Basic Level    2- Intermediate Level    3- Advanced Level**

**LESSON PLAN : TOTAL HOURS(60 HRS)**

| Unit | Description  | Hrs | Mode  |
|------|--|-----|---|
| 1    | <b>Unit – I</b> Introduction to bakery, baking principles, role of wheat flour in bakery products, types of flour, composition of flour, characteristics of good quality flour, flour test.  | 12  | Chalk and talk, Group Discussions, Quiz           |
| 2    | <b>Unit – II.</b> Functions of ingredients in baking-yeast, eggs, sugar, fats, milk products, emulsifiers, enzymes, cream and leavening agents, water, salt, flavouring and colouring materials  | 9   | Chalk and talk, Quiz                              |
| 3    | <b>Unit – III</b> Commercial bread making methods- sponge, straight dough, ferment dough.<br><b>Baking process:</b> Flying fermentation, mixing, bulk fermentation, knock back, dividing and rounding, intermediate proofing, moulding and panning, final proofing, depanning, cooling, slicing, packing | 15  | Chalk and talk, PPT, On the spot Test             |
| 4    | <b>Unit –IV Pastry making</b> - principles of pastry making, types – puff, flaky, philo and vegetables.<br><b>Cakes</b> – types-sponge, plain cake, cake faults and their remedies, types of icings-butter and royal.  | 9   | Chalk and talk, PPT, On the spot Test             |
| 5    | <b>Unit-V chocolate and confectionaries:</b> Types of chocolate-white, ruby, milk and dark chocolate, sugar confectionaries.   | 15  | Chalk and talk, PPT, On the spot Test, Assignment |

**Course Designers:****(MRS). B. RUBARANI**

| Department of N&D |          |             |                                       | Class : II N&D |                      |     |    |       |
|-------------------|----------|-------------|---------------------------------------|----------------|----------------------|-----|----|-------|
| Sem               | Category | Course Code | Course Title                          | Credits        | Contact Hours / Week | CIA | SE | Total |
| III               | Core     | 22OUND41    | Core :<br>Nutritional<br>Biochemistry | 4              | 4                    | 25  | 75 | 100   |

| Nature of the Course         |                        |                           |
|------------------------------|------------------------|---------------------------|
| Knowledge and Skill Oriented | Employability Oriented | Entrepreneurship oriented |
| ✓                            |                        |                           |

### Objectives :

To enable the students to

1. Study the basic concepts of metabolism of proximate principles .
2. To Learn the metabolic pathways of nutritional significance.

### Unit - I

#### Carbohydrates

Properties of Carbohydrates, Structure– glucose,fructose,galactose,maltose,lactose,sucrose, starch,glycogen,dextrin. Metabolism - glycolysis, glycogenesis, glycogenolysis, gluconeogenesis, Kreb's cycle, HMP shunt, blood sugar regulation.

### Unit - II

#### Protein

Properties of Protein, Proteins- structure, Amino acids – structure and classification  
Nucleic acids -structure and biological functions. Metabolism-General pathway of amino acid, transamination, deamination, decarboxylation, urea cycle.

### Unit - III

#### Lipids

Properties of lipids,Lipids-classification, Fatty acids- types, Metabolism -  $\beta$  oxidation, bio synthesis of fatty acids.

### Unit – IV

**Enzymes and co-enzymes** Enzymes-Definition, classification, mechanism of enzyme action, factors affecting enzyme activity. Co-enzymes –Definition, classification, some common co-enzymes.

### Unit – V

#### Hormones

Biological role - pituitary, adrenal cortex and medulla, thyroid, parathyroid and pancreas

Hormone disorder- menopause, addison's disease and cushing's disease.

#### Text Books :

- 1.AmbigaShanmugam, *Fundamentals of Biochemistry for Medical Students*,Karthick offset printers, Chennai, 2015.
- 2.Arumugam N et al., *Biochemistry*, Saras Publication, Nagerkoil, 2014.
- 3.Veerakumar L, *Biochemistry*,MJPPublisher,Chennai, 2010.

#### Reference Books :

- 1.Chopra H.K et.al, TM, *Food chemistry* (1<sup>st</sup>edn), Narosa Publishing House, New Delhi, 2015.
2. Lajja Das,*Clinical Biochemistry*(1<sup>st</sup>edn), Venu Books Publishers &Distributors,New Delhi, 2014.
- 3.PatriciaTrueman, *Nutritional Biochemistry*(1<sup>st</sup>edn), MJP Publishers Chennai 2012.
- 4.Rastogi S C *Biochemistry*(3<sup>rd</sup>edn), Tata McGraw Hill Education Private Limited, New Delhi,2013.
- 5.Satyanarayan.S et.al*Fundamentals of Biochemistry*,(1<sup>st</sup>edn),Books and Allied (P) Ltd, Kolkata,2011.

#### Web Resources / E.Books:

[https://en.wikipedia.org/wiki/Carbohydrate\\_metabolism](https://en.wikipedia.org/wiki/Carbohydrate_metabolism)

<https://courses.lumenlearning.com/suny-ap2/chapter/protein-metabolism/>

<https://courses.lumenlearning.com/suny-ap2/chapter/lipid-metabolism/>

<https://byjus.com/biology/enzymes/>

<https://www.news-medical.net/health/What-are-Hormones.aspx>

**Pedagogy:**

Chalk and Talk, PPT, group discussion , OHP presentations, quiz, on the spot test and Virtual Labs.

**Rationale for nature of Course:****Knowledge and Skill:**

To gain knowledge regarding the biochemical changes in nutrient metabolism.

To know about the biological role of hormones.

**Activities to be given:**

Assignment, ppt, Quiz, Group discussion.

**Course learning Outcomes (CLO's):**

| CLO  | Course Outcomes Statement   | Knowledge<br>(According to Bloom's<br>Taxonomy) |
|------|---|---|
| CLO1 | Explain metabolism and regulation of carbohydrate, lipids and proteins. | K1 to K3  |
| CLO2 | Analyze the integration of protein metabolism.                          | K1 to K3  |
| CLO3 | Discuss about the metabolism and regulation of lipids.                  | K1 to K4  |
| CLO4 | Describe the role of enzymes and co enzymes in biological oxidation.    | K1 to K3  |
| CLO5 | Analyze the biological role of hormones.                                | K1 to K4  |

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)**

|             | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|-------------|-----|-----|-----|-----|-----|-----|
| <b>CLO1</b> | 3   | 2   | 2   | 2   | 2   | 2   |
| <b>CLO2</b> | 3   | 2   | 2   | 2   | 2   | 2   |
| <b>CLO3</b> | 3   | 3   | 1   | 2   | 2   | 2   |
| <b>CLO4</b> | 3   | 2   | 2   | 2   | 2   | 2   |
| <b>CLO5</b> | 3   | 2   | 2   | 2   | 2   | 2   |

**1-Basic Level    2- Intermediate Level    3- Advanced Level**

**LESSON PLAN: TOTAL HOURS (60 HRS)**

| Unit | Description   | Hrs | Mode  |
|------|---|-----|---|
| 1    | <b>Unit - I</b><br><b>Carbohydrates</b><br>Properties of Carbohydrates Structure -glucose, fructose, galactose , maltose, lactose, sucrose, starch, glycogen, dextrin. Metabolism - glycolysis, glycogenesis, glycogenolysis, gluconeogenesis, Kreb's cycle, HMP shunt, blood sugar regulation. | 12  | Chalk and talk, Group Discussions, Quiz           |
| 2    | <b>Unit - II</b><br><b>Protein</b><br>Properties of Protein, Proteins- structure Amino acids – structure and classification Nucleic acids -structure and biological functions. Metabolism-General pathway of amino acid, transamination, deamination, decarboxylation, urea cycle.              | 15  | Chalk and talk, Quiz                              |
| 3    | <b>Unit - III</b><br><b>Lipids</b><br>Properties of lipids, Lipids-classification, Fatty acids-types, Metabolism - $\beta$ oxidation, bio synthesis of fatty acids.   | 15  | Chalk and talk, PPT, On the spot Test             |
| 4    | <b>Unit – IV</b><br><b>Enzymes and co-enzymes</b><br>Enzymes-Definition,classification,mechanism of enzyme action,factors affecting enzyme activity.<br>Co-enzymes –Definition, classification, some common co-enzymes.   | 9   | Chalk and talk, PPT, On the spot Test             |
| 5    | <b>Unit – V</b><br><b>Hormones</b><br>Biological role -pituitary, adrenal cortex and medulla, thyroid, parathyroid and pancreas .<br>Hormone disorder- menopause, addison's disease and cushing's disease.  | 9   | Chalk and talk, PPT, On the spot Test, Assignment |

**Course Designers:****(MRS). K. GOWSALYA**

| Department of N&D |          |             |   | Class : II N&D |                      |      |    |       |
|-------------------|----------|-------------|---|----------------|----------------------|------|----|-------|
| Sem               | Category | Course Code | Course Title                              | Credits        | Contact Hours / Week | CI A | SE | Total |
| II                | Core     | 22OUND4P    | Core :Lab – in - Nutritional Biochemistry | 2              | 2                    | 40   | 60 | 100   |

| Nature of the Course         |                        |                           |
|------------------------------|------------------------|---------------------------|
| Knowledge and Skill Oriented | Employability Oriented | Entrepreneurship oriented |
| ✓                            |                        |                           |

### Course Contents:

**Unit - I** Qualitative tests for sugars-glucose, fructose, lactose, maltose and glucose.

**Unit - II** Qualitative analysis of minerals.

**Unit -III** Quantitative estimation of reducing sugars in foods (glucose, lactose by Benedicts method).

**Unit - IV** Quantitative estimation of ascorbic acid content of foods by titrimetric method.

**Unit - V** Quantitative estimation of lactose content of foods by titrimetric method.

**Text Books :**

- 1.AmbigaShanmugam, *Fundamentals of Biochemistry for Medical Students*, Karthick offset printers, Chennai, 2015.
- 2.Arumugam N et al., *Biochemistry*, Saras Publication, Nagercoil, 2014.
- 3.Geetha swaminathan et al., *Laboratory chemical methods in food analysis*, Chennai 2002.
- 4.Veerakumar L, *Biochemistry*, MJPPublisher, Chennai, 2010.

**Reference Books :**

- 1.Chopra H.K et.al, TM, *Food chemistry* (1<sup>st</sup>edn), Narosa Publishing House, New Delhi, 2015.
2. Lajja Das, *Clinical Biochemistry* (1<sup>st</sup>edn), Venu Books Publishers&Distributors New Delhi 2014.
3. PatriciaTrueman, *Nutritional Biochemistry*(1<sup>st</sup>edn), MJP Publishers Chennai 2007.
4. Rastogi S C *Biochemistry*(3<sup>rd</sup>edn), Tata McGraw Hill Education Private Limite New Delhi,2010.
5. Satyanarayan.S et.al *Fundamentals of Biochemistry*, (1<sup>st</sup>edn), Books and Allied(P)Ltd, Kolkata,2012.

**Web Resources:**

<https://byjus.com/chemistry/benedicts-test/#:>

<https://microbiologyinfo.com/benedicts-test-principle-composition-preparation-procedure-and-result-interpretation>.

**Pedagogy**

Articulate, Demo, Titrimetric method

**LESSON PLAN: TOTAL HOURS (30 HRS)**

| Unit | Description  | Hrs | Mode          |
|------|--|-----|---------------|
| 1    | <b>Unit - I</b> Qualitative tests for sugars-glucose, fructose, lactose, maltose and glucose.                | 10  | Demonstration |
| 2    | <b>Unit - II</b> Qualitative analysis of minerals.   | 4   | Demonstration |
| 3    | <b>Unit -III</b> Quantitative estimation of reducing sugars in foods (glucose, lactose by Benedicts method). | 6   | Demonstration |
| 4    | <b>Unit - IV</b> Quantitative estimation of ascorbic acid content of foods by titrimetric method.            | 4   | Demonstration |
| 5    | <b>Unit - V</b> Quantitative estimation of lactose content of foods by titrimetric method.                   | 6   | Demonstration |

**Course Designers:****(MRS). K. GOWSALYA**

**EVALUATION (PRACTICAL)**

Internal (Formative):40marks

External (Summative):60 marks

**Question paper pattern for Internal Practical Examination: 40Marks**

| <b>S.No</b> | <b>Components</b>     | <b>Marks</b> |
|-------------|-----------------------|--------------|
| 1           | Experiment Theory     | 10           |
| 2           | Experiment Lab        | 10           |
| 3           | Calculation           | 5            |
| 4           | Observation note book | 5            |
| 5           | Model Exam            | 10           |
|             | <b>Total</b>          | <b>40</b>    |

**Question paper pattern for External Practical Examination: 60 Marks**

| <b>S.No</b> | <b>Components</b>     | <b>Marks</b> |
|-------------|-----------------------|--------------|
| 1           | Experiment Theory     | 10           |
| 2           | Experiment Lab        | 10           |
| 3           | Calculation           | 15           |
| 4           | Observation note book | 10           |
| 5           | Model Exam            | 15           |
|             | <b>Total</b>          | <b>60</b>    |

| Department of N&D |                         |             |                         | Class : II N&D |                      |     |    |       |
|-------------------|-------------------------|-------------|-------------------------|----------------|----------------------|-----|----|-------|
| Sem               | Category                | Course Code | Course Title            | Credits        | Contact Hours / Week | CIA | SE | Total |
| III               | Generic Elective Course | 22OUNDGEND4 | GEC : Food Preservation | 4              | 6                    | 25  | 75 | 100   |

| Nature of the Course         |                        |                           |
|------------------------------|------------------------|---------------------------|
| Knowledge and Skill Oriented | Employability Oriented | Entrepreneurship oriented |
| ✓                            |                        |                           |

### Course Objectives

#### Objectives:

To enable the students to

1. Gain knowledge on principles of food preservation of foods.
2. Understand the techniques used in processing foods to preserve their shelf life.
3. Apply skills learnt to develop preserved food product.

#### Unit - I

**Food Preservation** -meaning and needs, principles of preservation. Food Preservatives - meaning, types –class I and class II preservatives. Uses of HACCP in food preservation.

#### Unit-II

**Preservation by use of Low Temperature** - types – refrigeration, Slow, quick, dehydro freezing, effect of freezing on nutritive value.

**Preservation by use of High Temperature** - principles, types of pasteurization, steam sterilization, canning – process, types of Spoilage in canned Foods.

#### Unit – III

**Preservation by dehydration** - principles, treatment, methods – freeze, sun, spray, foam mat and drying by smoking.

#### Unit-IV

**Preservation of food by high concentration sugar and salt –**

preparation-jam, jelly, sauces, squashes, crushes, marmalades. types of pickles- tomato, lime and green chillies.

**Unit – V**

**Preservation of food by irradiation-** meaning, uses, effect of nutritive value. **Fermented beverages-**wine, beer, rum and vinegar, Toddy & Fenny.

**Text Books:**

1. B.Sivasankar Food Processing and preservation, PHI Pub, New Delhi, 2015.
2. B.Srilakshmi, Food Science, New Age International (P) Ltd, Publishers,. New Delhi, 2022

**Reference Books:**

1. Mohini Sethi & Eran S. Rao food science – experiments and applications. CBS publishers, New Delhi, 2015.
2. Shakuntala Manay & Shada Sharaswamy Food; Facts and Principles, Wiley Eastern Co, New Delhi, 2015.
3. Srilakshmi. B Food Science-Laboratory manual, Scitech Pub Pvt Ltd, Chennai, 2020.
4. Usha Chandrasekaran Food Science and its application to Indian Cookery, Phoenix Pub, New Delhi, 2013.

**Web Resources / E.Books:**

<https://bvjus.com/biology/food-preservation-methods-food-poisoning/>  
[https://www.brainkart.com/article/Preservation-of-Foods-with-Low-Temperature\\_33478/](https://www.brainkart.com/article/Preservation-of-Foods-with-Low-Temperature_33478/)  
<http://ecoursesonline.iasri.res.in/mod/page/view.php?id=111436>  
<https://www.healthline.com/nutrition/dehydrated-food>  
<https://www.betterhealth.vic.gov.au/health/healthyliving/food-irradiation>

**Pedagogy:**

Chalk and Talk, PPT, group discussion, OHP presentations, quiz, on the spot test and Virtual Labs.

**Rationale for nature of Course:****Knowledge and Skill:**

To gain knowledge regarding preservation methods.  
 To know about the principles of food preservation.

**Activities to be given:**

Assignment, ppt, Quiz, Group discussion

**Course learning Outcomes (CLO's):**

| CLO  | Course Outcomes Statement  | Knowledge<br>(According to Bloom's<br>Taxonomy) |
|------|--|---|
| CLO1 | Define and explain the principles of food preservation.  | K1 to K3  |
| CLO2 | Apply the various techniques of food preservation to preserve different foods to increase the shelf life of foods. | K1 to K3  |
| CLO3 | Compare the principles and techniques of various food preservation methods.  | K1 to K4  |
| CLO4 | Explain the preparation techniques of preserved food items.  | K1 to K3  |
| CLO5 | Analyze the fermented beverages.   | K1 to K4  |

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)**

|             | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|-------------|-----|-----|-----|-----|-----|-----|
| <b>CLO1</b> | 2   | 2   | 2   | 1   | 1   | 1   |
| <b>CLO2</b> | 3   | 2   | 3   | 1   | 3   | 1   |
| <b>CLO3</b> | 2   | 2   | 2   | 2   | 2   | 1   |
| <b>CLO4</b> | 3   | 3   | 3   | 2   | 1   | 1   |
| <b>CLO5</b> | 3   | 3   | 3   | 3   | 1   | 1   |

**1-Basic Level      2- Intermediate Level      3- Advanced Level**

**LESSON PLAN: TOTAL HOURS(60 HRS)**

| Unit | Description  | Hrs | Mode                                    |
|------|--|-----|---|
| 1    | <b>Unit - I</b><br><b>Food Preservation</b> -meaning and needs, principles of preservation.Food Preservatives - meaning, types – class I and class II preservatives. Uses of HACCP in food preservation.   | 12  | Chalk and talk, Group Discussions, Quiz |
| 2    | <b>Unit-II</b><br><b>Preservation by use of Low Temperature</b> - types – refrigeration, Slow, quick, dehydro freezing, effect of freezing on nutritive value.<br><b>Preservation by use of High Temperature</b> - principles, types of pasteurization, steam sterilization,canning– process, types of Spoilage in canned Foods. | 9   | Chalkand talk, Quiz                     |
| 3    | <b>Unit – III</b><br><b>Preservation by dehydration</b> - principles , treatment, methods – freeze, sun, spray, foam mat and drying by smoking.  | 15  | Chalk and talk, PPT                     |
| 4    | <b>Unit-IV</b><br><b>Preservation of food by high concentration sugar and salt</b> –preparation-jam, jelly, sauces, squashes,crushes, marmalades. Types of pickles- tomato, lime and green chillies.   | 9   | Chalk and talk, PPT                     |
| 5    | <b>Unit – V</b><br><b>Preservation of food by irradiation-</b> meaning, uses, effect of nutritive value . <b>Fermented beverages</b> -wine, beer, rum and vinegar, Toddy & Fenny.  | 15  | Chalk and talk, PPT, Assignment         |

**Course Designers:****(Mrs).K.GOWSALYA****Mrs).P.TAMILARASI**

| Department of N&D |          |              |   | Class : II N&D |                      |      |    |       |
|-------------------|----------|--------------|---|----------------|----------------------|------|----|-------|
| Sem               | Category | Course Code  | Course Title  | Credits        | Contact Hours / Week | CI A | SE | Total |
| II                | Core     | 22OUNDGEND4P | GEC I :<br>Practical - I<br>Bakery and Food<br>Preservation | 2              | 2                    | 40   | 60 | 100   |

| Nature of the Course         |                        |                           |
|------------------------------|------------------------|---------------------------|
| Knowledge and Skill Oriented | Employability Oriented | Entrepreneurship oriented |
| ✓                            |                        |                           |

### Course Contents:

#### Unit – I

Preparation of jams, jellies and squashes using seasonal fruits and vegetables.

#### Unit – II

Preparation of pickles using fruits and vegetables, preparation of sauce and ketchup.

#### Unit – III

Preparation of various types of bread rolls.

#### Unit – IV

Preparation of cakes – plain cake, sponge cake, cupcake, pan cake.

#### Unit – V

Preparation of custard, pudding and doughnuts.

Preparation of cookies and biscuits, pizza.

**Text Books:**

- 1.B.Sivasankar Food Processing and preservation, PHI Pub, New Delhi, 2015 .
- 2.B.Srilakshmi ,Food Science, NewAgeInternational (P) Ltd, Publishers,NewDelhi,2020.
- 3.Yogambal Sivalingam,*Theory of Bakery and Confectionery* Visaga Publication,2015.

**Reference Books:**

- 1.MohiniSethi&EranS.Rao food science – experiments and applications. CBS publishers, New Delhi,2019.
- 2.ShakuntalaManay&ShadaSharaswamy Food; Facts and Principles, Wiley Esatern Co, New Delhi,2015.
- 3.Srilakshmi.B Food Science-Laboratory manual, Scitech Pub PvtLtd,Chennai, 2020.
- 4.UshaChandrasekaran Food Science and its application to Indian Cookery, Phoenix Pub, New Delhi, 2012.

**Web Resources:**

<https://food.unl.edu/jams-jellies-and-preserves>

<https://www.allotment-garden.org/recipe/jam-jellies-marmalade/jam-and-jelly-making-method/>

**Pedagogy**

Articulate, demo, method of cooking and preparation.

**LESSON PLAN : TOTAL HOURS(30 HRS)**

| Unit | Description  | Hrs | Mode                          |
|------|--|-----|-------------------------------|
| 1    | <b>Unit – I</b><br>Preparation of jams, jellies and squashes using seasonal fruits and vegetables.                   | 10  | Demonstration and preparation |
| 2    | <b>Unit – II</b><br>Preparation of pickles using fruits and vegetables, preparation of sauce and ketchup.            | 4   | Demonstration and preparation |
| 3    | <b>Unit – III</b><br>Preparation of various types of bread rolls.  | 6   | Demonstration and preparation |
| 4    | <b>Unit – IV</b><br>Preparation of cakes – plain cake, sponge cake, cupcake, pan cake.                               | 4   | Demonstration and preparation |
| 5    | <b>Unit – V</b><br>Preparation of custard, pudding and doughnuts.<br><br>Preparation of cookies and biscuits, pizza. | 6   | Demonstration and preparation |

**Course Designers:****(Mrs).K.GOWSALYA**

**EVALUATION (PRACTICAL)**

Internal (Formative):40marks

External (Summative):60 marks

**Question paper pattern for Internal Practical Examination: 40Marks**

| <b>S.No</b> | <b>Components</b>     | <b>Marks</b> |
|-------------|-----------------------|--------------|
| 1           | Menu planning         | 5            |
| 2           | Experimental cookery  | 5            |
| 3           | Menu preparation      | 5            |
| 4           | Menu display          | 10           |
| 5           | Observation note book | 5            |
| 6           | Model exam            | 10           |
|             | <b>Total</b>          | <b>40</b>    |

**Question paper pattern for External Practical Examination: 60 Marks**

| <b>S.No</b> | <b>Components</b>     | <b>Marks</b> |
|-------------|-----------------------|--------------|
| 1           | Menu planning         | 10           |
| 2           | Experimental cookery  | 10           |
| 3           | Menu preparation      | 15           |
| 4           | Menu display          | 10           |
| 5           | Observation note book | 10           |
| 6           | Model exam            | 5            |
|             | <b>Total</b>          | <b>60</b>    |