PERIYAR UNIVERSITY
PERIYAR PALKALAINAGAR
SALEM-636011

DEGREE OF MASTER OF SCIENCE

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR M.Sc. NUTRITION&DIETETICS

FOR THE STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2023-2024 ONWARDS

(*TAMILNADU STATE COUNCIL FOR HIGHER EDUCATION*)

M.Sc. NUTRITION & DIETETICS

REGULATIONS ANDS YLLABUS

(With effect from the academic year2023-2024onwards)

Preamble

The postgraduate program in Nutrition and Dietetics has been designed to provide students a vast cope ranging from alleviation of malnutrition preventive, primitive and therapeutic care in hospitals, in food industries as well as food service managers in various establishments. The specialists in Nutrition and Dietetics play a vital role in promoting the quality of life of individuals and communities, which contributes significantly to the economic and overall development of the nation.

Program objectives

1. To impart knowledge and develop capacities of the students through state of the art higher education in the area of Nutrition and Dietetics
2. Toprovidepractical,fieldlevelexperienceinhospitalsandfoodserviceestablishments
3. To provide professionally competent manpower for academic and research institutions; hospitals and food industries; nutrition and health programs; food safety and quality control; consultancy and entrepreneurship

Eligibility for admission

An under graduate degree in Food and Nutrition/ Nutrition and Dietetics/ Food science and Nutrition/ Clinical nutrition and Dietetics/ Nutrition, Food service management and Dietetics/ Home Science.

Duration of the program

Two academic years consisting of 4 semesters

Highlights of the Revamped Curriculum

- The curriculum focuses on meeting the demands of the Food industry, Entrepreneurs, Public health sector, Hospitality industries, Healthcare and social welfare sectors.
- This student centric programme ensures knowledge and skill development by providing hands on training, on-the-job internships, projects, lab practices, experiential activities, exposure to entrepreneurial skills and training for competitive examinations.
- The course content is comparable to world class curriculum.
- The courses are updated to include recent developments in the field of Nutrition and Dietetics.
- References are updated and web resources are cited.
- Each course in the curriculum carries either a practical/activity or experiential learning component to ensure skill development along with acquiring knowledge in the subject.
- Potential for employability has been enhanced through mandatory internships.
- Digital literacy and competency is ensured using ICT enabled learning environment.

TANSCHEREGULATIONSONLEARNINGOUTCOMES-BASEDCURRICULUMFRAMEWORK FOR POSTGRADUATE EDUCATION

PROGRAMME OUTCOMES -M.Sc NUTRITION AND DIETETICS	
PO1	**Disciplinary knowledge and skills:**Possesses sound knowledge on the principles of Food science nutrition and the relationship between diet and health;acquires skill in Applying knowledge gained to prevent and manage disease conditions, promote health And be a productive member in the food processing and health sector.
PO2	**Skilled communicator:** Acquires the ability to translate evidence-based scientific Information into practical applications for health promotion; Develops skills necessary To be an effective dietitian/nutritionist.
PO3	**Critical thinker and problem solver:** Develops analytical skills and capabilities to resolvetheproblems.Efficientlytocatertotheneedsofaclient,customer, an individual, family and society. Either independently or with the support of concerned authorities.
PO4	**Senseofinquiry:**Develops capability to probe the factors affecting the diet disease Relationship and arrive at diet modifications and recommendations to enhance health And to manage disase efficiently.
PO5	**Teamplayer/worker:**Displaysability to be a good team player either as a dietitian in the health care industry or as an employee in the food industry.
PO6	**Skilled project manager:** Demonstrates managerial skills required to be an Entrepreneur or serve in various capacities in the food service industry, hospitals and Fitness centres.
PO7	**Digitally Efficient :**Acquires the ability to utilize ICT for professional purposes in The hospital or in the food processing industry.
PO8	**Ethical awareness/reasoning:** Remains committed to ethical regulations while Practicing as nutritionists, dieticians, food service managers and hospital administrators.
PO9	**National and international perspective:** Values and appreciates societal, environmental, health, safety, and cultural issues related to food within local and Global contexts.
PO10	**Lifelong learners:** Motivated to be updated at all times in order to achieve personal And professional goals and contribute significantly towards the health and well-being of the family, community and society at large.

PROGRAMMESPECFICOUTCOMES	
PSO1	Attain enhanced knowledge of the recent advancements and trends in Nutrition, Dietetics and its Allied Sciences
PSO2	Acquire scientific temper leading to critical thinking and research motivation In Nutrition, Dietetics and its Allied Sciences
PSO3	Design and communicate scientific concepts, experimental results & analytical Arguments and develop solutions for challenging problems of the society
PSO4	Demonstrate the commitment to the discipline of Personalized and Public Health Nutrition to uphold ethical principles in their career and contribute to societal health, safety and legal issues; and practice their responsibilities as a Nutritionist/Dietitian and other professionals
PSO5	Acquire essential skills in different lab techniques and interpret experimental data, applicable for innovative methods and advanced researches to draw logical conclusions.
PSO6	Comprehend the principles and applications of Nutrition and Dietetics and its Allied Sciences and apply them to enhance our lifestyle

TEACHING METHODOLOGIES

Teaching methods: Chalk and Board, Experiential learning, Student centric learning and Small projects and Practical assignments; Virtual Classroom, LCD projector, Smart Class, Video Conference and Guest Lectures by eminent people.

Training students to engage in self-study without relying on faculty (for example – library and internet search, manual and handbook usage, etc.)

Library, Net Surfing, Manuals, NPTEL, Naan Mudhalvan Courses Other university websites.

CREDIT DISTRIBUTION FOR PG PROGRAMME

Semester–I	**Credit**	**Hours**	**Semester-II**	**Credit**	**Hours**	**Semester-III**	**Credit**	**Hours**	**Semester–IV**	**Credit**	**Hours**
1.1.Core-I	5	7	2.1.Core-IV	5	5	3.1.Core-VII	5	6	4.1.Core-XI	5	6
1.2Core- II	5	7	2.2Core-V	5	6	3.2Core-VIII	5	6	4.2Core-XII	5	6
1.3Core–III	4	6	2.3Core–VI	4	6	3.3Core–IX	5	6	4.3 Project with viva-voce	7	10
1.4 Discipline Centric Elective-I	3	5	2.4 Discipline Centric Elective – III	3	4	3.4Core–X	4	5	4.4Elective - VI(Industry/ Entrepreneurship) 20%Theory 80% Practical	3	4
1.5 Generic Elective-II:	3	5	2.5 Generic Elective-IV:	3	4	3.5 Discipline Centric Elective - V	3	4	4.5 Skill Enhancement course / Professional Competency Skill	2	4
			2.6NMEI	2	3	3.6NME II	2	3	4.6Extension Activity	1	
			2.7 Human Rights	1	2	3.7 Internship/ Industrial Activity	2	-			
	20	**30**		**23**	**30**		**26**	**30**		**23**	**30**
TotalCreditPoints-93											

M.Sc., NUTRITION & DIETETICS

SEMESTER-I

Course status	Course Title	Hours	Credits
1.1 Core-I	Nutritional Biochemistry	7	5
1.2 Core- II	Macronutrients	7	5
1.3 Core– III	Nutritional Biochemistry Practical	6	4
1.4 Elective-I	Advanced Food Science	5	3
1.5 Elective- II	Advanced Human Physiology	5	3
	Total	**30**	**20**

SEMESTER–I

List of Courses	Course Code	Course Title	Hrs/ Week	Credits	University Examination			Exam Hrs
					Internal	External	Total	
Core–I Theory	23PND01	Nutritional Biochemistry	7	5	25	75	100	3
Core–II Theory	23PND02	Macronutrients	7	5	25	75	100	3
Core–III Practical I	23PNDP 01	Nutritional Biochemistry Practical	6	4	40	60	100	3
Elective–I Theory	23PNDE01	Food Science	5	3	25	75	100	3
Elective–II Theory	23PNDE02	Physiological Aspects of Nutrition	5	3	25	75	100	3
		Total	**30**	**20**	**140**	**360**	**500**	

SEMESTER-II

Course status	Course Title	Hours	Credits
2.1.Core- IV	Nutritional Through Lifecycle	5	5
2.2Core- V	Micronutrients	6	5
2.3Core– VI	Food Analysis Practical	6	4
2.4 Elective– III	Food Microbiology	4	3
2.5 Elective- IV	Research Methodology and Biostatistics	4	3
2.6 NME I	Principal of Menu planning (offered to other departments)	3	2
2.7 Human Rights	Human Rights	2	1
	Total	**30**	**23**

SEMESTER–II

List of Courses	Course Code	Course Title	Hrs/ Week	Credits	University Examination			Exam Hrs
					Internal	External	Total	
Core–IV Theory	23PND03	Nutritional Through Lifecycle	5	5	25	75	100	3
Core–V Theory	23PND04	Micronutrients	6	5	25	75	100	3
Core–VI Practical II	23PNDP 02	Food Analysis Practical	6	4	40	60	100	3
Elective–III Theory	23PNDE03	Food Microbiology	4	3	25	75	100	3
Elective–IV Theory	23PNDE04	Research Methodology and Biostatistics	4	3	25	75	100	3
NME I	23PNDN01	Principal of Menu planning (offered to other departments)	3	2	25	75	100	3
		Human Rights	2	1	25	75	100	3
		Total	**30**	**23**	**190**	**510**	**700**	

SEMESTER-III

Course status	Course Title	Hours	Credits
3.1Core- VII	Clinical Dietetics I	6	5
3.2 Core- VIII	Clinical Dietetics II	6	5
3.3 Core– IX	Clinical Dietetics Practical	6	5
3.4 Core– X	Functional Foods and Nutraceuticals	5	4
3.5 Elective - V	Food Processing and Preservation	4	3
3.6 NME II	Nutrition for Fitness (offered to other departments)	3	2
3.7 Internship/ Industrial Activity	Internship	-	2
	Total	**30**	**26**

SEMESTER–III

List of Courses	Course Code	Course Title	Hrs/ Week	Credits	University Examination			Exam Hrs
					Internal	External	Total	
Core–VII Theory	23PND05	Clinical Dietetics I	6	5	25	75	100	3
Core–VIII Theory	23PND06	Clinical Dietetics II	6	5	25	75	100	3
Core–IX Practical III	23PNDP 03	Clinical Dietetics Practical	6	5	40	60	100	3
Core–X	23PND07	Functional Foods and Nutraceuticals	5	4	25	75	100	3
Elective–V Theory	23PNDE05	Food Processing and Preservation	4	3	25	75	100	3
NME II	23PNDN02	Nutrition for Fitness	3	2	25	75	100	3
Internship/ Industrial Activity		Internship	-	2				
		Total	**30**	**26**	**165**	**435**	**600**	

SEMESTER-IV

Course status	Course Title	Hours	Credits
4.1.Core-XI	Community Nutrition	6	5
4.2Core-XII	Food safety and Quality Control	6	5
4.3 Project with viva voce	Project	10	7
4.4Elective - VI(Industry/ Entrepreneurs hip) 20%Theory80% Practical	Food Processing and Food Product Development Practical	4	3
4.5 Skill Enhancement course / Professional Competency Skill	Dietetic Techniques and Patient Counselling	4	2
4.6Extension Activity		-	1
		30	**23**

SEMESTER–IV

Listof Courses	Course Code	Course Title	Hrs/ Week	Credits	University Examination			Exam Hrs
					Internal	External	Total	
4.1.Core-XI	23PND08	Community Nutrition	6	5	25	75	100	3
4.2Core-XII	23PND09	Food safety and Quality Control	6	5	25	75	100	3
4.3 Project with viva voce	23PNDPR1	Project	10	7	25	75	100	3
4.4Elective- VI(Industry/ Entrepreneurship) 20%Theory 80%Practical		Food Processing and Food Product Development Practical	4	3	40	60	100	3
4.5 Skill Enhancement course / Professional Competency Skill		Dietetic Techniques and Patient Counselling	4	2	25	75	100	3
4.6Extension Activity		Extension Activity		1				
			30	**23**	**140**	**360**	**500**	

LEARNINGANDTEACHING ACTIVITIES

Work Load:

The information below is provided as a guide to assist students in engaging appropriately with the course requirements.

Activity	Quantity	Workload periods
Lectures	60	60
Tutorials	15	15
Assignments	5	5
Cycle Test or similar	2	4
Model Test or similar	1	3
University Exam Preparation	1	3
	Total	90 Periods

1. Tutorial Activities

2. Laboratory Activities

3. Field Study Activities

4. Assessment Activities

Assessment Principles:

Assessment for this course is based on the following principles

1. Assessment must encourage and reinforce learning.
2. Assessment must measure achievement of the stated learning objectives.
3. Assessment must enable robust and fair judgments about student performance.
4. Assessmentpracticemustbefairandequitabletostudentsandgivethemtheopportunitytodemonstratewhat they learned.
5. Assessment must maintain academic standards.

Assessment Details:

Assessment Item	Distributed Due Date	Weightage	Cumulative Weightage
Assignment1	3rdweek	2%	2%
Assignment2	6thWeek	2%	4%
Cycle Test –I	7thWeek	6%	10%
Assignment3	8thWeek	2%	12%
Assignment4	11thWeek	2%	14%
Cycle Test –II	12thWeek	6%	20%
Assignment5	14thWeek	2%	22%
Model Exam	15thWeek	13%	35%
Attendance	All weeks as per the Academic Calendar	5%	40%
University Exam	17thWeek	60%	100%

CREDIT DISTRIBUTION FOR M.Sc NUTRITION AND DIETETICS

First Year

Semester-I

	Courses	Credit	Hours per Week(L/T/P)
Part A	CoreCourses3 (CC1,CC2, CC3)	14	20
	ElectiveCourses2(Generic/Discipline Specific)EC1, EC2	6	10
		20	**30**

Semester-II

	Courses	Credit	Hours per Week(L/T/P)
Part A	CoreCourses3 (CC4,CC5, CC6)	14	17
	ElectiveCourse2(Generic /Discipline Specific)EC3, EC4	6	9
Part B	NME-I& Human Rights	3	4
		23	**30**

Second Year

Semester-III

	Courses	Credit	Hours per Week(L/T/P)
Part A	CoreCourses3 (CC7,CC8, CC9)	15	18
	ElectiveCourse3 (Generic/ Discipline Specific) EC5	3	3
	Core Industry Module(CC10)	4	6
Part B	NME-II	2	3
	Internship	2	
		26	**30**

Semester-IV

Part	Courses	Credit	Hours per Week(L/T/P)
Part A	CoreCourses3(CC11, CC12)	10	12
	ElectiveCourse1 (Generic/ Discipline Specific) EC6	3	4
	Project with Viva-voce (CC13)	7	10
Part B	Skill Enhancement Course	2	4
Part C	Extension Activity (Can be carried out from Sem.II to Sem.IV)	1	
		23	**30**

Testing Pattern (25+75)

Internal Assessment

Theory Course: For theory courses there shall be three tests conducted by the faculty concerned and the average of the best two can be taken as the Continuous Internal Assessment (CIA)for a maximum of 25marks.Thedurationofeachtestshallbeone/ one and a half hour.

Computer Laboratory Courses: For Computer Laboratory oriented Courses, there shall be two tests in Theory part and two tests in Laboratory part. Choose one best from Theory part and other best from the two Laboratory part. The average of the best two can be treated as the CIA for a maximum of 25marks.The duration of each test shall be one/one and a half hour. There is no improvement for CIA of both theory and laboratory, and, also for University End Semester Examination.

WRITTEN EXAMINATION: THEORY PAPER (BLOOM'S TAXONOMY BASED) QUESTION PAPER MODEL

Intended Learning Skills	**Maximum75Marks** **PassingMinimum:50%** **Duration: Three Hours**
Memory Recall / Example/ Counter Example/Knowledge about the Concepts/ Understanding	**Part–A(15x1 = 15 Marks)**
Descriptions/Application (problems)	**Part–B(2x5=10Marks)**
Analysis/Synthesis/ Evaluation	**Part-C (5x 10 = 50 Marks)**

a). **Theory Papers:**

The candidate shall be declared to have passed the examination if the candidate secures not less than 50marks in total (CIA mark + Theory Exam mark)with minimum of 38 marks in the Theory Exam conducted by the University. The Continuous Internal Assessment (CIA) Mark 25 is distributed to four components viz., Tests, Assignment, Seminar and Attendance as 10, 05, 05 and 05 marks, respectively.

b). **Practical paper:**

A minimum of 50 marks out of 100 marks in the University examination and the recordnotebooktakentogetherisnecessaryforapass.Thereisnopassingminimum fortherecordnotebook.Howeversubmissionofrecordnotebookisamust.Practical examination

Scheme for **internal marks** (40marks)

Good laboratory practices-10marks

Performance evaluation based on observation note and record- 15marks

Internal tests (Averageofbest2 out of 3 tests) -10marks

Attendance -5marks

Scheme for **external marks (**60marks)

Record -10 marks

Practical -50marks

c). **Project Work/Dissertation and Viva-Voce:**

A candidate should secure 50% of the marks for pass. The candidate should attend viva-voce examination to secure a pass in that paper.

Candidatewhodoesnotobaintherequiredminimummarksforapassina Paper/ Practical/ Project/Dissertation shall be declared Re-Appear (RA) and he / she has to appear and pass the same at a subsequent appearance.

Dissertation

Internal evaluation (25 marks)
Innovative idea -05marks
Performance evaluation -05 marks
Report preparation -15marks
External evaluation (75 marks)
Report and presentation - 50 marks
Oral presentation - 15 marks
Viva voce - 10 marks

CLASSIFICATIONOFSUCCESSFUL CANDIDATES:

Candidates who secure not less than 60% of the aggregate marks in the whole examination shall be declared to have passed the examination in First Class. All other successful candidate shall be declared to have passed in the Second Class. Candidates who obtain75%ofthemarksintheaggregateshallbedeemedtohavepassedtheexaminationin the First Class with Distinction provided they pass all the examinations prescribed for the course at the first appearance. Candidates who pass all the examinations prescribed for the course in the first instance and within a period of two academic years from the year of admission to the course only are eligible for University Ranking.

MAXIMUMDURATIONFORTHE COMPLETIONOFTHE PGPROGRAMME:

ThemaximumdurationforcompletionofthePGProgrammeshallnotexceedFour Years from the year of admission.

TRANSITORYPROVISION:

Candidates who were admitted to the PG course of study before 2023-2024 shall be permittedtoappearfortheexaminationsunderthoseregulationsforaperiodofthree years, that is, up to end inclusive of the examination of April / May2024. Thereafter, they will be permitted to appear for the examination only under the regulations then in force.

SYLLABUS FOR M.Sc NUTRITIONAND DIETETICS

<table>
<tr><td>Title of the Course</td><td colspan="7">Nutritional Biochemistry</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core I</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">5</td><td rowspan="2">Course Code</td><td rowspan="2">23PNDCT01</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>6</td><td>1</td><td colspan="2">-</td><td colspan="2">7</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic concepts of Nutritional Biochemistry</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">Enable students to
1. Learn the novel concepts of Enzymes and its application in various field.
2. Upgrade the study of nutritional principles, biochemical metabolic pathways of proteins, carbohydrates, lipids, vitamins and minerals as related to human health and disease.</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT1
Water & electrolytes: Fluid components, distribution, water Intake & output, water balance, Composition of electrolytes in fluid compartments, buffer system, acid base balance-blood Kidney imbalance disorders-dehydration & edema. Enzymes–Classification and Role of Enzymes.
UNITII
Carbohydrate metabolism: Classification, Review of digestion and absorption. Oxidation of glucose – glycolysis, oxidative decarboxylation, citric acid cycle. Pentosephosphate pathway. Glycogen Glycogenesis, Glycogenolysis. Gluconeogenesis. In born errors of metabolism. Glycogen storage diseases.
UNITIII
Protein metabolism: Classification of protein, Review of digestion and absorption. Deamination, transamination, trans-deamination, decarboxyalation, deamidation, Urea cycle, in bornerrors ofamino acid metabolism.
UNITIV
Nucleic acid metabolism: Classification, Biological oxidation, Electron transport chain, nucleic acid metabolism, structure of DNA & RNA, genetic code, DNA replication, biosynthesis of protein.

UNITV
Lipid metabolism: Classification, Oxidation of fatty acid- α , β, & ω. Bio synthesis of fatty acid& TGL, Cholesterol synthesis & synthesis of bile acids & bile pigments, ketosis, ketone bodies, acidosis & fatty liver.</td></tr>
<tr><td>Extended Professional Component(is a part of internal component only, Not to be included in the external examination question paper)</td><td colspan="7">Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC –CSIR/TNPSC/etc.</td></tr>
</table>

Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1.Deb.A.C.,FundamentalofBiochemistry,NewCenturyBookAgency (P)Ltd,Reprint2004. 2. Ambika Shanmugam,Fundamentals of biochemistry for Medical students, Karthikprinters, 7th edition, 1992. 3. U.Sathyanarayana and U.Chakrabani, Biochemistry,ThirdEdition, Uppala-Author Publishers, 2007. 4. Mahtab. S.Bamji, Kamala Krishnaswamy and G.N.V Brahmam, Text Book of Human Nutrition, Oxford and IBH Publishing Company, Third Edition.2009
Reference Books	1. Marshall, W. J., Lapsley, M., Day, A., & Ayling, R. (2014). Clinical Biochemistry E-Book: Metabolic and Clinical Aspects. Elsevier Health Sciences. 2. Bender, D. A. (2003). Nutritional biochemistry of the vitamins. Cambridge university press. 3. Albanese, A. (Ed.). (2012). Newer methods of nutritional biochemistry V3: With applications and interpretations. Elsevier. 4. Champe, P. C., Harvey, R. A., & Ferrier, D. R. (2005). Biochemistry. Lippincott Williams & Wilkins. 5. Lieberman, M., & Ricer, R. E. (2009). Lippincott's Illustrated Q&A Review of Biochemistry. Lippincott Williams & Wilkins.
Web site and e-learning source	https://www.pdfdrive.com/nutritional-biochemistry-second-edition-e158739127.html https://www.pdfdrive.com/introduction-to-nutrition-and-metabolism-fourth-edition-e167789063.html https://www.pdfdrive.com/advanced-nutrition-and-human-metabolism-e186446303.html https://www.pdfdrive.com/biochemistry-e187234482.html .https://www.pdfdrive.com/lehninger-principles-of-biochemistry-e158386180.html

COURSEOUTCOME

On completion f this course, students will be able to

CO No.	Course Statement
CO1	Recall the biochemistry knowledge at the postgraduate level
CO2	Apply the knowledge to Insight the interrelationships Between various metabolic pathways
CO3	Understand the basics of genetic material and their metabolism
CO4	Assess an elaborate knowledge on Acid-Base regulation
CO5	Integrate their ideas on the application of enzyme in Various fields

MAPPING(CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Power point presentations, Assignments and Discussions

<table>
<tr><td>Title of the Course</td><td colspan="7">Macronutrients</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core II</td></tr>
<tr><td>Category</td><td>Core</td><td>Year
Semester</td><td>I
I</td><td>Credits</td><td>5</td><td>Course Code</td><td>23PNDCT02</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>6</td><td>1</td><td colspan="2">-</td><td colspan="2">7</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic concepts of Macronutrients</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">Enable students to
1.To understand the structure and functions of macronutrients in human body
2.To underst and the effects of deficiency and excess of macronutrients in human body</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNITI
Carbohydrates – Introduction, Classification - Basis of degree of polymerization, based on digestive fat of carbohydrates. Functions, Food sources, Requirements. Digestion, absorption and metabolic utilization of carbohydrates, Regulation of blood glucose concentration. Glycemic index-Factors affecting GI of foods.
Dietary fibre -Introduction, Types, Properties, RDA and Components of dietary fibre. Role of fibre in human nutrition.
UNITII
Lipid-Introduction,Classification,Function,Foodsources,Requirements,
RDA, digestion, absorption, transport and storage. Lipids and gene expression. Dietary fat and coronary heart disease. Fatty acid-Types, Functions, Requirements, food sources and deficiency.
Omega fatty acids – Classification, role in good health, daily values, food sources, fortification of omega fatty acids.

UNITIII
Proteins-Introduction, Classification, Functions, Requirements and RDA, Food sources, Digestion, absorption and metabolic utilization of protein, Quality of proteins.
Amino acid - Types, functions, food sources, requirements, deficiency. Therapeutic applications of specific amino acids. Peptides of physiological significance. Proteins, amino acids and gene expression.
UNITIV
Energy – Introduction, Units, determination of energy value of food, physiologicalfuelvalue,Benedict'sOxy-calorimeter,relationbetween</td></tr>
</table>

	Oxygen required and calorimeter value. Basal Metabolicrate– Introduction, measurement of basal metabolism determination of basal metabolic rate by calculation energy equirement, during work, Thermic effect of food, Total energy requirement – Meaning, Measuring total energy requirement. Factors affecting physical activity, basal metabolic rate and thermic effect of food, Dietary source, RDA. **UNITV** **Water and electrolytes** – Introduction, water, electrolytes and body composition, body water distribution, body electrolyte content:Distribution and exchangeable fractions, Intra cellular water and the body cellmassconcept,regulationofbodywatercompartments,metaboliclinks: glucose, water and sodium. Body water compartments in chronicstarvation, Impact to acute pathological conditions on the ICW, Body water in acute illness, water and electrolyte metabolism during feeding, Implications of water and sodium metabolism in nutrition therapy for specific clinical condition.
Extended Professional Component(is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC–CSIR/TNPSC/etc.
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Michael.J.Gibneyetal; Clinical Nutrition, Black well Science,2005. 2. Shubhangini.A. Joshi; Nutrition and Dietetics III edition, McGrawHill Education (India) private limited 3. Srilakshmi.B; Nutrition Science,15thedition, NewAgeInternational(P) Limited, Publishers, 2016. 4. Swaminathan.M; Advanced Text-Book on Food and Nutrition,Volume I2ndedition. The Bangalore Printing and Publishing Co., LTD, Reprint 2015. 5. SunetraRoday;FoodScienceandNutrition,2ndedition,Oxford UniversityPrerss,2013

	6.CarolByrd–Bredbenner;Wardlaw'sperspectivesinNutrition,9th edition MC Graw–Hill International Edition 2013
Reference Books	1. Satyanarayana, U., & Chakrapani, U. (2013). Biochemistry, Book and Allied Pvt. *Ltd., Kolkata*. 2. Wardlaw, G. M., Byrd-Bredbenner, C., Moe, G., Berning, J. R., &Kelley, D. S. (2013). *Wardlaw's perspectives in nutrition*. McGraw-Hill. 3. Williams, S. R. (2004). Nutrition and diet therapy. *Nutrition and diet therapy.* 4. Sizer, F., Whitney, E., & Webb, F. (2003). Nutrition Concepts and Controversy, Thomas Wadsworth, Australia. 9th edition. 5. .Shils,M.E.,Olson,J.A.,&Shike,M.(2000).Modern nutrition in health and disease. Modern Nutrition in Health and Disease .Vol I and II. Lea &Febiger Philadelphia, A Waverly Company. Eighth edition. 6. Mahan,L.K.,&Stump,S.E.(2002).Krause'sFoodNutritionandDiet Therapy. W.B. Saunder's company, Philadelphia. 10th edition
Website and e-learning source	1. http//www.nutritionfoundationindia.res.in 2. nhp.gov.in/healthyliving/ healthydiet 3. http//www.nin.res.in

COURSEOUTCOME

On completion of this course, students will be able to

COs	Course Outcome
CO1	Understand the role of energy in various physiological conditions of the body
CO2	Know the nutritional significance and health benefits of macronutrients.
CO3	Explore the role of dietary fibre, aminoacids and Fatty acids in human nutrition and disease.
CO4	Acquire skills to evaluate protein quality
CO5	Comprehend on thewater balance and assessment of Hydration status

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Power point presentations, Assignments and Discussions

Title of the Course	Nutritional Biochemistry practical						
Paper No.	Core III						
Category	Core	Year	I	Credits	4	Course Code	23PNDCP01
		Semester	I				
Instructional hours per week	Lecture	Tutorial	Lab Practice			Total	
	-	-	6			6	

Learning Objectives:

Enable students to

1. To enable students to understand the role of nutrients in the body.
2. To understand the different biochemical parameters

I. Analysis of Blood/Serum

1. Blood Glucose
2. Serum Iron
3. Serum Cholesterol
4. Serum Protein
5. Blood Haemoglobin

II. Analysis of urine

1. Creatinine
2. Urea
3. Total Nitrogen
4. Calcium
5. Phosphorus

III. Qualitative Analysis

A. **Qualitative analysis of sugars**

1. Reactions of Monosaccharide (Glucose,fructose, Galactose, Mannose and Ribose
2. Reactions of Disaccharides (Maltose and Lactose)
3. Reactions of Polysaccharides (Starch and Dextrin)
4. Analysis of Unknown Sugar

B. **Qualitative analysis of amino acids**

1. Reactions of individual Amino acids(Tyrosine, tryptophan, Arginine, Histidine, Cystine and Methionine)
2. Analysis of unknown Amino acids

REFERENCE

1. Raghuramulu N.,Madhavan Nair K.,Kalyanasundaram S.(2003).A Manual of Laboratory Techniques. Hyderabad: National Institute of Nutrition.

COURSEOUTCOME

On completion of this course, students will be able to

COs	**Course Outcome**
CO1	Acquire skills to analyse various blood parameters Using different methods
CO2	Ability to relate the theoretical knowledge with the biomarkers for CVD &diabetes.
CO3	Ability to relate the theoretical knowledge with the biomarkers for liver & kidney functions
CO4	Apply the techniques to estimate the urine for various parameters
CO5	Understand and examine the urine by qualitative methods

MAPPING(CO/PSO):

CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

<table>
<tr><td>Title of the Course</td><td colspan="7">Advanced Food Science</td></tr>
<tr><td>Paper No.</td><td colspan="7">ELECTIVE 01</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Elective</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">3</td><td rowspan="2">Course Code</td><td rowspan="2">23PNDE01</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>4</td><td>1</td><td colspan="2">-</td><td colspan="2">5</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic concepts of Advanced Food Science</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">Enable students to
1. Understand the composition and nutritive value of cereals, pulses, milk and milk products, vegetables, fruits, fats, oils, nuts and spices.
2. Understand the changes that are taking place in cereals, pulses and milk during cooking</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNITI
Definition of Food Science, Food, Colloids–Types and Properties; Sols–Properties; Gels –Properties and factors influencing gel formation; Emulsion– Types, formation, properties ands tability of emulsions; Foams–formation, Stability and anti-foaming agents.
Cereals: General structure, composition, Nutritive value of rice, wheat, maize, oats and jowar. Cereal cookery: Cereal protein- Gluten formation and factors affecting; Cereal starch, effect of moist heat – Gelatinisation, factors affecting gelatinization Changes in cooked starches- Gel formation, Retrogradation and syneresis; Effect of dry heat-Dextrinisation; Effect of cooking on nutritive value.
Millets: Composition, Nutritive value and uses of pearl millet, finger millet, prosomillet.
UNITII
Pulses: Composition and nutritive value, Digestibility of pulses and factors affecting the digestibility of pulse proteins, Toxic constituents in pulses and their elimination; commonly used pulses. Pulse cookery: Effect of cooking, Factors affecting cooking quality.
Milk and Milk products: Composition of milk, Nutritive value of milk and milk products, Physical and chemical properties of milk,Types of milk available in the market.
UNIT-III
Meat: Classes of meat, structure, composition and nutritive value; post-</td></tr>
</table>

	Mortem changes in meat, ageing, tenderizing, curing; cuts and grades of meat. Meat cookery: Factors affecting cooking quality, changes in meat on cooking, tenderness and juiciness of meat. **Fish:** Classification, Composition and nutritive value, selection. Fish cookery: Principles and methods. **Poultry:** Classification, composition and nutritive value, processing and cooking. **Egg:** Structure, composition and nutritive value, quality of egg–factors determining and evaluation. Egg cookery: value, effect of heat on egg protein, factors affecting coagulation of egg proteins, effect of other ingredients on egg proteins. **UNIT-IV** **Vegetables:** Classification, Composition and nutritive value, pigments, organic acids, enzymes, flavor compounds, bitter compounds, selection of vegetables. Vegetables cookery: Changes during cooking, loss of nutrients during cooking, effect of cooking on pigments. **Fruits:**Classification, composition and nutritive value,pigments,cellulose and pectic substances, changes during cooking, flavour constituents, polyphenols, bitterness, post-harvest changes and ripening. Browning: Types and prevention. **UNIT-V** **Nuts and Oilseeds:** Classification, composition and nutritive value, toxins present in nuts, role in cookery. Fats and oils: Nutritional importance of fats and oils, functions of oils and fats in foods, flavor changes – Rancidity– types and prevention, reversion. **Sugar:** Sources, properties, types, forms, liquid sweeteners, reactions of sugar Crystallisation: Factors affecting, role of sugar in cookery, stages of sugar cookery, crystalline and non-crystalline candies. **Spices:** Classification, general functions, commonly used spices and herbs, role of spices in cookery. **Aromatics** – Composition and uses. **Beverages:** Classification and points to be considered while preparing beverages.
Extended Professional Component(is a part of internal	Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC –CSIR/TNPSC/etc.

component only, Not to be included in the external examination question paper)	
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Srilakshmi.B;FoodScience,6theditionNewAgeInternational(p)Limited Publishers2015. 2. ShakunthalamanayN;Shadaksharaswamy.M;FoodsFactsandPrinciples, Third edition, New Age International (p) Limited Publishers, 2014. 3. LillianHoaglandmeyer,Foodchemistry,CBSPublishersand distributors,2004. 4. ArindamRamaswamy,ElementsofFoodScience,Oxfordbookcompany, 2010. 5. NormanN.Potter,JosephH.Hotehkiss,andfoodscience,fifthedition,CBS publishers anddistributors, 1996. 6. B.Sivasankar,FoodProcessingandPreservation,PHILearningPrivate Limited,2011.
Reference Books	1. GerardL.Hasenhuettl,RichardW.Hartel.(2019).FoodEmulsifiers and Their Applications.Springer publications. 3rdedition. 2. Vickie.A.Vaciavik.(2021).EssentialsofFoodscience.Springer publications. 5th edition. 3. Dr.M.Swaminathan.(2015).AdvancedtextbookofFoodand Nutrition. volume-2.Bapco publications. 4. Eskein.(2012). Biochemistryof Food.Elsievierpublications. 5. LynObrienNabors.(2001).AlternativeSweetners.TaylorandFrancis publications. 6. JanetD.WardandLarryWard.(2006).PrinciplesofFoodScience. Stem Publishers. 4th Edition.
Website and e-learning source	www.foodrisk.org.http://www.fsis.usda.gov/ https://www.fda.gov/food

COURSEOUTCOME

On completion of this course, students will be able to

COs	Course Outcome
CO1	Distinguish and relate the characteristics and properties of foods
CO2	Comprehend the know ledge gained on characteristics and Properties of foods during cooking
CO3	Apply the properties of food in various food processing and preparations
CO4	Analyze the factors affecting cooking quality of foods
CO5	Develop appropriate food preparation and processing Methods to ensure quality standards

MAPPING(CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, PowerPoint presentations, Assignments and

Discussions

<table>
<tr><td>Title of the Course</td><td colspan="7">Physiological Aspects of Nutrition</td></tr>
<tr><td>Paper No.</td><td colspan="7">ELECTIVE02</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Elective</td><td>Year</td><td>I</td><td>Credits</td><td>3</td><td>Course Code</td><td>23PNDE02</td></tr>
<tr><td>Semester</td><td>I</td><td colspan="4"></td></tr>
<tr><td rowspan="2">Instructional Hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>4</td><td>1</td><td colspan="3">-</td><td colspan="2">5</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic concepts of Physiological Aspects of Nutrition</td></tr>
<tr><td>Objectivesof the course</td><td colspan="7">1.Advancetheir understanding of some of the relevant issues and topics of human physiology.
2.Understand the integrated functions of all systems and the grounding of nutritional science in Physiology</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT-I

Digestive system: Structure and functions of gastro intestinal tract and gastrointestinal secretions.Role of enzymes in digestion and role of prebiotics and probiotics in the maintenance of health of digestive system. Regulation of food intake–hunger, appetite and satiety.
Liver:Structure and functions of liver.
UNIT-II

Respiratory system: Structure of lungs and gaseous exchange (transport of oxygen andcarbon-di-oxide).
Nervous system: Structure and functions of brain (briefly) and spinal cord; structure and functions of neuron; conduction of nerve impulse, role of neuro transmitters; blood brain barriers, CSF, hypothalamus and its rolein various body functions.
Musculoskeletalsystem: Structure and functions of bone; physiology of muscle contraction.

UNIT-III
Cardio vascular system: Blood composition and functions, structure and functionofheartandbloodvessels,regulationofcardiacoutputandblood pressure, heart failure and hypertension.

Excretory system: Structure and functions of kidney, structure of nephron, physiology of urine formation, micturition.
UNIT-IV

Endocrine system: Structure, function, role of hormones, regulation of hormone secretion and disorders–pituitary, thyroid, adrenal, pancreas and parathyroid glands. Functions and deficiency of insulin.
UNIT-V

Reproductive system: Ovaries-Structure of ovaries, functions of oestrogens and progesterone. Function of Uterus, Hormonal control of</td></tr>
</table>

	menstrual cycle,physiological changes in pregnancy,parturition, lactation and menopause**Testes**: Structure of Testes, functions of testosterone, deficiencyof testosterone.
Extended Professional Component(is a part of internal component only,Nottobe includedinthe external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC –CSIR/TNPSC/etc.
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. K.Sembulingam&PremaSembulingam(2019),EssentialsofMedical Physiology. Jaypee publications. Eighth edition 2. WaughA,RossandWilson(2018).AnatomyandPhysiologyinHealth and Illness. Elsevier publications. 13ed. 3. CCChatterjee(2020). HumanPhysiology.CBSpublishers.13ed.
Reference Books	1. Ganongs.W.F;Reviewofmedical physiology,1985. 2. Campbell.E.Jetal;Clinicalandapplied physiology,1984. 3. GuytonACandHallJB;Textbookofmedicalphysiology,1996. 4. GuytonAC;Functionsofhumanbody,1985. 5. WilsonKJWandWaughA;RossandWilson.AnatomyandPhysiology in health and illness, 8th edition, 2003. 6. JudithE.Brown.,NutritionNew,2nd edition,West/Wadswrothwest/Wads worth, An International Thomson publishing company, 1998.
Websiteand e-learning source	https://youtu.be/MZDy0RvA52Y-Osmosishttps://youtu.be/TgcyiVQnVBs-https://youtu.be/44B0ms3XPKU- nervous system

COURSEOUTCOME

On completion of this course, students will be able to

COs	**Course Outcome**
CO1	Understand the basic tenets of human physiology
CO2	Comprehend the role and secretion of digestive juices and hormones
CO3	Enumerate the process of gaseous exchange and urine formation
CO4	Understand the structure and functions of nervous and cardiovascular system
CO5	Applyknowledgegainedin physiologyto nutrition and health

MAPPING (CO/PSO):

CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing , Power point presentations, Assignments And Discussions

SEMESTER II

<table>
<tr><td>Title of the Course</td><td colspan="8">Nutrition through life cycle</td></tr>
<tr><td>Paper No.</td><td colspan="8">Core</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Part A</td><td>Year</td><td>I</td><td>Credits</td><td>5</td><td>Course Code</td><td colspan="2">23PND03</td></tr>
<tr><td>Semester</td><td>II</td><td colspan="5"></td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="3">Total</td></tr>
<tr><td>4</td><td>1</td><td colspan="3">-</td><td colspan="3">5</td></tr>
<tr><td>Prerequisites</td><td colspan="8">Understand all concepts of nutrition through life cycle</td></tr>
<tr><td>Objectives of the course</td><td colspan="8">Enable students to
1. Understand the Computation of allowances.
2. Understand the importance of nutrition during lifespan</td></tr>
<tr><td>Course Outline</td><td colspan="8">UNIT I
Nutrition during Pregnancy: Prenatal growth and development, Nutritional requirements, RDA, Weight gain during pregnancy, Relationship between maternal and foetal nutrition, Teenage pregnancy and diet, General gastrointestinal problems, complications of pregnancy.

UNIT II
Nutrition during Lactation: Physiological process of lactation, Nutritional requirements, RDA, Breast feeding-Colostrums and mature milk. Advantages of breast feeding-Nutritional benefit,
Hormones and growth, immunological benefits, psychological and economic, environmental benefits, infant and child morbidity. Barriers to breastfeeding, Low milk production.

UNIT III
Nutrition during Infancy: Infant growth and Physiological development, Nutritional requirements for growth, RDA, Artificial feeding. Low birth weight and Preterm baby-Nutritional requirements, feeding the preterm baby, feeding problems. Weaning-Need for weaning, types of supplementary foods, problems in weaning. Nutrition in Preschool children: Growth and development, nutritional requirements, RDA, feeding dental problems and decay. Nutrition related problems of preschool children–Protein energy malnutrition-Types,</td></tr>
</table>

	symptoms, nutritional requirements and treatment. **UNIT IV** Nutrition in School children: Nutritional requirements, RDA, Feeding problems, Packed lunches, Supplementary foods. Nutrition in Adolescents: Growth and development, Nutritional requirements, RDA, Nutritional problems-Obesity, eating disorders, predisposition to Osteoporosis, Anaemia, Under nutrition, pre-menstrual syndrome, malnutrition due to early marriage. **UNIT V** Nutrition in Adults: Growth and development, Nutritional requirements, RDA. Nutrition in Old age**:** General physiological changes. Theories on the causes of aging, Nutritional requirements, Nutrition related problems of old age, Degenerative diseases. Alzheimer's disease-Cause, physical effects and nutrition consideration. Guidelines for promoting healthful eating in old age, Exercise in old age.
Extended Professiona Component(is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC –CSIR/TNPSC/etc
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Gordon. M. Wardlawet.al; Contemporary Nutrition,2nd edition,Publishing byMosby,2004. 2. Srilakshmi.B; Dietetics,7th edition, New Age International(P)LimitedPublishers,2014. 3. William's; Nix; Basic Nutrition and Diettherapy,14th edition, Publishing by Mosby, 2013. 4. MahtabS.Bamji,PrasadRao,N.VinodiniReddy;TextbookofHumanNutrition,SecondEditionOxford and IBH Publishing Co. Pvt .Ltd,2003. 5. Nutrient Requirement and Recommend Dietary Allowances for Indians by Indian council of Medical research, National Institute of nutrition, Hyderabad. 6. Judith E.Brown., Nutrition New, 2nd edition, West/Wads wroth west/ Wadsworth, An International Thomson publishing company, 1998.

Reference Books	❖ JacalynJ.McComb,ReidNorman,etal.,TheActiveFemale:HealthIssuesThroughouttheLifespan2010,Humanpress. ❖ AletaL. Meyer and Thomas P. Gullotta., Physical Activity Across theLifespan:PreventionandTreatmentforHealthandWell-Being(IssuesinChildren'sandFamilies'Lives),2012, Springer. ❖ Antia, F.P., 1992, Clinical Dietetics and Nutrition Oxford University Press, NewDelhi. ❖ Corinne,R.H.,1996,Normalandtherapeuticnutrition,McmallianCo.,NewYork. ❖ Davidson, S.R. and Passmore J.F., 1989, Human Nutrition and Dietetics, ELBSLondon. ❖ Mahan,K.L.,andStump,S.E.,1996,KrausesFood,NutritionandDiettherapyM.B.SaundersCo., USA. ❖ Balasubramanianetal.,1998,Dietaryguidelinesfor Indians,ICMR,NewDelhi. ❖ Passmore, AH and Adams, A.A., 1990, Clinical assessment of nutritional status – Aworkingmanual,WillandWilsonPublishing,London. ❖ Bamji et al(1996), Textbook of Human Nutrition Oxford and IBH Publishing co. Pvt.Ltd.Delhi. ❖ Shils.E.M,Shike.M,Ross.A.C,Cabellero.BandCousins.R.J(2011) ModernNutrition in Health and Disease, Eleventh Edition, Lippincott Williams and Wilkins,Philadelphia. ❖ Mahan, K.L., and Stump, S.E., 1996, Krauses Food, Nutrition and Diet therapy M.B.SaundersCo., USA.
Website and e-learning source	❖ www.four-h.purdue.edu ❖ www.ingenta.connect.com ❖ nal.usda.gov/fnic/lifecycle ❖ www.fda.gov/search.html

COURSE OUTCOME

On completion of this course, students will be able to

COs	Course Outcome
CO1	Understand and apply nutritional assessment techniques
CO2	Understand growth and development and nutritional requirement during pregnancy and lactation to promote healthy living in the community
CO3	Know about growth and development and nutritional requirement of school going children and adolescents
CO4	Acquire the knowledge on growth and development and nutritional requirement during infancy and preschool age
CO5	Know the nutritional needs of adults and elderly

MAPPING(CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, PowerPoint presentations, Assignments and Discussions

<table>
<tr><td>Title of the Course</td><td colspan="7">Micronutrients</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core</td></tr>
<tr><td>Category</td><td>Part A</td><td>Year
Semester</td><td>I
II</td><td>Credits</td><td>5</td><td>Course Code</td><td>23PND04</td></tr>
<tr><td>Instructional hours per week</td><td>Lecture
5</td><td>Tutorial
1</td><td colspan="3">Lab Practice
-</td><td>Total
6</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Understand all concepts of micronutrients</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">Enable students to
1.To understand the role of nutrient in the maintenance of good health and acquire knowledge onfunctions of nutrients
2.To study nutrition deficiencies and their prevention and understand the principles of nutrition, understand the relationship between food, nutrition and health</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT I
FAT SOLUBLE VITAMINS
Nomenclature, units and measurements of vitamins and factors influencing the utilization of vitamins. Vitamins A,D,E,K–Chemistry Functions, Physiological action, Digestion, Absorption, Utilization, Transport, Storage, Excretion, Source, RDA, Deficiency, Diagnosis of deficiency, Toxicity, Interaction off at soluble vitamins with other nutrients. Hypo and hyper vitaminosis.
UNIT II
WATER SOLUBLE VITAMINS
Thiamine,Riboflavin,B_{12}, Folic acid, Pyridoxine, Pantothenic acid, Niacin, Biotin, Ascorbic acid – Chemistry, Functions, Physiological action, Digestion, Absorption, Utilization, Transport, Storage, Excretion, Source, RDA, Deficiency, Diagnosis of deficiency, Toxicity, Interaction of water soluble vitamins with other nutrients.
UNIT III
MACROMINERALS
Calcium - Distribution in the body digestion, Absorption, Utilization , Transport, Excretion Balance, Deficiency, Toxicity, Sources, RDA, Regulation of calcium concentration, Calcium interaction with other nutrients.
Phosphorus- Distribution, Concentration in the body, Digestion, Absorption, Utilization, Transport, Storage, Excretion, Deficiency,</td></tr>
</table>

	Sources, Calcium, Phosphorus ratio. Magnesium, Sulphur, Chlorine, Sodium and Potassium- Distribution, Concentration in the body, Digestion, Absorption, Utilization, Transport, Storage, Excretion, Deficiency, Sources and RDA. **UNIT I** **MICRO AND TRACE ELEMENTS** Micro minerals: Iron, Copper, Iodine, Fluoride, Zinc and Selenium, Chromium Trace elements: Molybdenum, Manganese, Nickel, Chromium and Cadmium - Distribution in the human body, Physiological functions, deficiency, Toxicity and Sources and RDA. **UNIT V** **HOMEOSTASIS MAINTENANCE** Homeostasis- Definition, concepts and mechanism Electrolytes- Electrolyte content of fluid compartments, Functions of electrolyte, Sodium, Potassium and chloride, Absorption, Transport and Electrolyte imbalance, Factors affecting electrolyte balance, Maintaining electrolytes, Hydrogen ion balance, Distribution of water, Functions of water and Water balance.
Extended Professional Component(is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC –CSIR/TNPSC/etc
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Swaminathan,M. Advanced Textbook on FoodScience and Nutrition, Vol:2, Second edition, Reprinted, Bangalore Printing and publishing CoInc, Bangalore, 2012. 2. Gopalan,C Ramasastry, B.V. and Balasubramanian, S.Nutritive Value of Indian Foods, National Institute of Nutrition, Hyderabad,2012 3. Swaminathan,M. Essentials of Foods and Nutrition, Volume I and II Ganesh and Co., Madras, 2013. 4. Mahan,Kathleen L.Krause's Food,Nutrition and DietTherapy,W.B.Saunder's,11th Edition 2010 5. Srilakshmi.E. Nutrition Science,New Age International Publishers,2018. 6. Recommended dietary intakes for Indian–Indian Council of Medical Research, NewDelhi,2012.

Reference Books	❖ JacalynJ.McComb,ReidNorman,etal.,TheActiveFemale:HealthIssuesThroughouttheLifespan2010,Humanpress. ❖ AletaL. Meyer and Thomas P. Gullotta., Physical Activity Across theLifespan:PreventionandTreatmentforHealthandWell-Being(IssuesinChildren'sandFamilies'Lives),2012, Springer. ❖ Antia, F.P., 1992, Clinical Dietetics and Nutrition Oxford University Press, NewDelhi. ❖ Corinne,R.H.,1996,NormalandtherapeuticnutritionMcmallianCo.,NewYork. ❖ Davidson, S.R. and Passmore J.F., 1989, Human Nutrition and Dietetics, ELBSLondon. ❖ Mahan,K.L.,andStump,S.E.,1996,KrausesFood,NutritionandDiettherapyM.B.SaundersCo., USA. ❖ Balasubramanianetal.,1998,Dietaryguidelinesfor Indians,ICMR,NewDelhi. ❖ Passmore, AH and Adams, A.A., 1990, Clinical assessment of nutritionalstatusAworkingmanual,WillandWilsonPublishing,London. ❖ Bamji et al(1996), Textbook of Human Nutrition Oxford and IBH Publishing co. Pvt.Ltd.Delhi. ❖ Shils.E.M,Shike.M,Ross.A.C,Cabellero.BandCousins.R.J(2011)ModernNutrition in Health and Disease, Eleventh Edition, Lippincott Williams and Wilkins,Philadelphia. ❖ Mahan, K.L., and Stump, S.E., 1996, Krauses Food, Nutrition and Diet therapy M.B.SaundersCo., USA.
Website and e-learning source	❖ www.four-h.purdue.edu ❖ www.ingenta.connect.com ❖ nal.usda.gov/fnic/lifecycle ❖ www.fda.gov/search.html Indian Journal of Nutrition and Dietetics ❖ American Journal of Clinical Nutrition,The American Society for Clinical Nutrition, Inc., USA. ❖ Annual Reports, National Institute of Nutrition, Hyderabad. ❖ British Journal of Nutrition, Cambridge University Press, London.

COURSE OUTCOME

On completion of this course, students will be able to

COs	Course Outcome
CO1	Gain in depth knowledge on the physiological and metabolic role of Vitamins and minerals
CO2	Outline the role of vitamins in health and disease
CO3	Assess the physiological action of vitamins and minerals
CO4	Acquire in depth knowledge of macro and micro minerals and the role in human health and diseases.
CO5	Enable to understand the interrelationship between vitamins and minerals.

MAPPING(CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, PowerPoint presentations, Assignments and Discussions

<table>
<tr><td>Title of the Course</td><td colspan="8">Food Analysis Practical</td></tr>
<tr><td>Paper No.</td><td colspan="8">Core</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Part A</td><td>Year</td><td>I</td><td>Credits</td><td>4</td><td>Course Code</td><td colspan="2">23PNDP02</td></tr>
<tr><td>Semester</td><td>II</td><td colspan="4"></td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="3">Total</td></tr>
<tr><td>-</td><td>1</td><td colspan="3">5</td><td colspan="3">6</td></tr>
<tr><td>Prerequisites</td><td colspan="8">Basics of Chemistry and Life Science</td></tr>
<tr><td>Objectives of the course</td><td colspan="8">Enable students to
1. Learn the techniques of estimating the quantity of different nutrients present in food.
2. Enable the students to get practical experience in the laboratory and develop the skills to undertake research work</td></tr>
<tr><td>Course Outline</td><td colspan="8">I. Quantitative Analysis
1. Protein by Lowry's method
2. Nitrogen by Kjeldahl method
3. Iodine Number of oil
4. Saponification/Acid number of oil
5. Fat by Soxhlet method
6. Ash content
7. Iron
8. Phosphorus
9. Calcium
10. Vitamin –C
11. Crude fibre
12. Moisture by hot air oven method
13. Energy value by Bomb calorimeter (Demo)
Industrial visit- R&D Laboratory, Research Institutions</td></tr>
<tr><td>Recommended Text</td><td colspan="8">1. S. Suzanne Nielsen (2017). Food Analysis Laboratory Manual. Springer Internation Publishing. Third Edition.
2. S. Suzanne Nielsen (2017). Food Analysis. Springer International Publishing. Fifth Edition.
3. Otles, S. (2005). “Methods of Analsis of Food Components and Additives” CRC Press, USA.
4. Ranganna, S. (2001). “Handbook of Analysis and Quality Control for Fruit and Vegetable Products”. Tata-McGraw- Hill, India. 2nd edition.
5. Sadasivam, S and Manickam, A (1997). “Biochemical Methods”. New Age International Publishers, New Delhi. 2nd Edition.
6. Jayaram, I, (1996), “Laboratory Manual in Biochemistry”, New Age International Publishers, New Delhi. Fifth ed.
7. Raghuramulu, N, Nair K.M &Kalayanasundaram, S.A, (1983), “Manual of Laborat Techniques”, National Institute of Nutrition, ICMR.</td></tr>
</table>

Reference Books	❖ Ignacio Arana (2016) Physical Properties of Foods: Novel Measurement Techniquesand Applications, CRC Press ❖ Food Analysis: Theory and Practice. Y. Pomeranz and C.E. Meloan, Chapman andHall ❖ Food Analysis: Principles and Techniques. D.W. Gruenwedel and J.R. Whitaker,Marcel Dekker Professional
Website and e-learning source	❖ https://onlinelibrary.wiley.com/doi/pdf/10.1002/9781118846315.ch3 ❖ https://www.intechopen.com/chapters/39943 ❖ https://www.iciq.org/research/research-support-area/chromatography ❖ https://separationtechniques.chemistryconferences.org/events-list/separation- techniques-in-food-chemistry

COURSE OUTCOME

On completion of this course, students will be able to

COs	Course Outcome
CO1	Understand safety rules for the laboratory and demonstrate various instruments used for food analysis.
CO2	Acquire skills to prepare and standardize various solutions to conduct experiments for food analysis.
CO3	Acquire skills in ash of foods and prepare ash solution to analyse mineral contents in food.
CO4	Demonstrate quantitative analysis of various nutrients in foods i.e. crude fibre, moisture, Vit -C, calcium, phosphorus, iron, etc.
CO5	Demonstrate experiments to check estimation of protein, fat content

MAPPING(CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Demonstration, Experiments, Activities as assignment, Group Discussion, Observation and Interpretation

<table>
<tr><td>Title of the Course</td><td colspan="7">Food Microbiology</td></tr>
<tr><td>Paper No.</td><td colspan="7">Elective</td></tr>
<tr><td>Category</td><td>Part A</td><td>Year
Semester</td><td>I
II</td><td>Credits</td><td>3</td><td>Course Code</td><td>23PNDE03</td></tr>
<tr><td>Instructional hours per week</td><td>Lecture
3</td><td>Tutorial
1</td><td colspan="3">Lab Practice
-</td><td>Total
4</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Understand all concepts of microbiology</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">Enable students to
1. Learn about the morphology of different microorganisms
2. Study various types of food spoilage, poisoning and infection caused by microorganism caused by microorganism</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT-I
Microorganisms- Types and Classification of microorganism, and important microorganisms in foods, morphology of yeast, mould, bacteria, virus, algae and protozoa.
UNIT-II
Microorganisms and food: Their primary sources in foods, cultural characteristics and biochemical activities. Airborne bacteria, fungi Microorganisms found in soil Normal flora of skin, nose, throat, GI tract.
UNIT-III
Food in relation to disease - food borne diseases, food infection, intoxication, microbial toxins -types, bacterial poisoning and infection-causative agents and sources, symptoms and prevention of Staphylococcal food poisoning, botulism, salmonella, bacillus infection, E.coli, food poisoning of fungal origin-ergotism, aflatoxin.
UNIT-IV
Control of microorganism - Principles of preservation, General principles underlying spoilage of foods. Preservation by high and low temperature, chemical preservatives, salt, sugar as preservative, new trends in preservation.
UNIT-V
Sterilization by Physical agents - Heat, moist heat, fractional sterilization, pasteurization, other types of sterilization, chemical sterilization. Microbiology of water, typical organisms in water, types of bacterial examination for water, water treatment.</td></tr>
</table>

Extended Professiona Component(is a part of internal component only, No to be included in the external examinatio question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC –CSIR/TNPSC/etc
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Frazier W.C and WesthoffD.C.(2013), Food Microbiology, Tata McGraw Hill Publishing Co., Ltd. New Delhi. 2. Annak.Joshua, (2001). Microbiology, Popular Book Depot.Chennai-15. 3. Ray, B. (2001) Fundamenta Food Microbiology, 2nd Ed, CRC press, Boca ratonF. .JoshiVK&Pandey(2004).Biotechnology:food,fermentation,microbiology,bioch emistryand technology,vol I &II,Educational publishers and distributors,New Delhi. 4. Crueger W and Crueger A (2003) Biotechnology: A textbook of Industrial Microbiology 2nd Edition,Panima Publishing Corpoartion,New Delhi.
Reference Books	❖ Guttierrez-Lopez GF and Barbosa-Canovas GV (Eds) (2003) Food Science and Food Biotechmolgy CRC press,USA. ❖ Halford NG (2003) 'Genetically Modified Crops' Imperial College Press, UK Modern Food Micro-Biology by James M. Jay, (2000), 6th edition, An Aspen Publication,Maryland, USA ❖ MichealPelczar MJ, Chan ECS, Krieg N. (2001) Microbiology. 5th ed. Tata McGraw-Hill Publishing Co. Ltd. Prescott LM, Harley JP, Klein DA.(2008) Microbiology. 6th ed. WMC Brown
Website and e-learning source	❖ Top Microbiology Courses - Learn Microbiology Online | CourseraLearn Microbiology with Online Courses and Classes | edX ❖ 72 Online studies in Microbiology - DistanceLearningPortal.comMicrobiology Free Online Courses and MOOCs | MOOC List (mooc-list.com) ❖ Virtual Microbiology Classroom: 8-week micro course from Science Prof Online

COURSE OUTCOME

On completion of this course, students will be able to

COs	Course Outcome
CO1	Understand the general morphology and the growth inhibiting and promoting factors for microorganisms.
CO2	Categorize the sources, contamination and type of spoilage
CO3	Enumerate food poisoning food born hazards and food intoxication of microbial origin to ensure food safety.
CO4	Learn about the Principles of preservation by high and low temperature and new trends in preservation
CO5	Gain knowledge in Sterilization by Physical agents, types of sterilization. Microbiology of water, bacterial examination for water and water treatment

MAPPING(CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, PowerPoint presentations, Assignments and Discussions

<table>
<tr><td>Title of the Course</td><td colspan="7">Research Methodology and Biostatistics</td></tr>
<tr><td>Paper No.</td><td colspan="7">Elective</td></tr>
<tr><td>Category</td><td>Part A</td><td>Year
Semester</td><td>I
II</td><td>Credits</td><td>3</td><td>Course Code</td><td>23PNDE04</td></tr>
<tr><td>Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td>Total</td></tr>
<tr><td></td><td>3</td><td>1</td><td colspan="3">-</td><td>4</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Understand all concepts of research methodology and biostatistics</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">Enable students to
1. Understand the methods of researches that can be applied in the field of food and nutrition.
2. Understand the application of statistical calculations in the interpretation of results of research problems.</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT I
Research methodology: An introduction- Meaning, Objectives, Motivation, Types and Significance of research, Research methods versus methodology, Research and scientific method, Research process. Defining the research problem-Selecting, Necessity, Technique and Illustration in defining the problem. Research design-Meaning, Need, Features, Important concepts and different research designs. Sampling design- Census, Sample survey, Steps, Characteristics and Types of sampling design.
UNIT II
Methods of collecting primary data- Questionnaire, preparation of schedules, Interview method, case- study method, Experimentation method, Data Collection – Primary and secondary data, Sources of secondary data, precautions while using secondary data. Editing and coding the data, organization of data-Classification–meaning and objectives, types of classification, formation of discrete and continuous frequency distribution, Tabulation – Role, parts of a table, general rules of tabulation.
UNIT III
Representation of data – Diagrammatic and graphical representation , Significance of diagrams and graphs, General rules for constructing diagrams, Types of diagrams, graphs of Time series, graphs of frequency distribution. Interpretation and Report writing-Meaning of</td></tr>
</table>

	interpretation technique, precautions, Format of research report, types, steps and stages, mechanism and style, precautions and essential for good report, footnotes and bibliographical citations. **UNIT IV** Measures of central Tendency – Mean, Median, Mode, their relative advantages and disadvantages, Measures of dispersion-Mean deviation, standard deviation, quartile deviation. Co-efficient of variation, percentile and percentile ranks. Association of attributes, contingency tables, correlation, coefficient of correlation and its interpretation, rank – correlation, regression equations and predictions. Scales of measurement and the appropriate statistical techniques. **UNIT V** Probability - Rules of probability and its applications. Distribution - Normal, binomial, their properties, importance of these distributions in statistical studies. Tests of significance, large and small samples, "t" and F test, tests for independence using chi-square test. Analysis of variance-One – way and two way classification.
Extended Professiona Component(is a part of internal component only, No to be included in the external examinatio question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC –CSIR/TNPSC/etc
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Kothari,C.R;ResearchMethodology,2nd edition,NewAge International Publishers, 2004. Gupta, S.P; Statistical Methods, 31st revised edition, Sultana Chandand Sons 2. Devadas.R.P;AHandbookonMethodologyofResearch,SriRamakrishnaVidhyala ya Coimbatore, 1989. 3. Donald, H.M.C. Burney; Research Methods, fifth edition, Thomson and Wads worth Publications, 2002. 4. Pillai,R.S.NandBagavathi,V,Statistics, Chandand company limited,2001.
Reference Books	❖ Ranjit Kumar (2011). Research Methodology: a step-by-step guide for beginners, SAGE Publications. 3rd edition. ❖ Anderson, David R and et.al.(2013) : Statistics for Business and Economics. Delhi, Cengage Learning India Pvt Ltd. 11th Ed. ❖ Bandarkar, P.L. and Wilkinson T.S. (2000): Methodology and Techniques of Social Research. Himalaya Publishing House, Mumbai. ❖ Bell, Judith (2005): Doing your Research Project – A guide for first time researchers in education, health and social science. England, Open University Press. 4th Ed. ❖ Danial, Wayne W and Chad L Cross (2017): Biostatistics – Basic Concepts and Methodology For the Health Sciences – International Student Version. New Delhi, ArEmmInternatonal, 10th Ed.

Website and e-learning source	❖ https://explorable.com/research-methodology ❖ https://www.mbaknol.com/research-methodology/the-basic-types-of-research

COURSE OUTCOME

On completion of this course, students will be able to

COs	Course Outcome
CO1	Design the tools for collection, identification and interpretation of data with the use of tables and pictorial representations
CO2	Illustrate the statistical techniques to research data for analyzing and interpreting data
CO3	Explain the types of research, with research process and research designs
CO4	Assess the appropriate sampling techniques for research work
CO5	Summarize the sampling process for data collection

MAPPING(CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, PowerPoint presentations, Assignments and Discussions

<table>
<tr><td>Title of the Course</td><td colspan="7">Principles of Menu Planning(offered to other departments)</td></tr>
<tr><td>Paper No.</td><td colspan="7">NME I</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Part B</td><td>Year</td><td>I</td><td>Credits</td><td>2</td><td>Course Code</td><td>23PNDN01</td></tr>
<tr><td>Semester</td><td>II</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>3</td><td>-</td><td colspan="3">-</td><td colspan="2">3</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Understand all concepts of nutritional needs</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">Enable students to
1. Learn about the recommended dietary allowances
2. Understand the growth and development of all age groups</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT-I:
RDA for Indian basis for requirement, computation of allowance based on energy expenditure, components of energy expenditure. General concepts about growth and development through different stages of life.
UNIT-II
Preschool -, Food habits and nutrient intake of preschool children. Dietary allowances and supplementary foods.
School going age -, Nutritional status of school children, school lunch program, factors to be considered in planning a menu, food habits and nutritional requirement, packed lunch.
UNIT-III
Adolescence: Changes of growth characteristics of adolescents. Nutritional needs of the adolescents. Adults: Nutrition for adults, requirement, Nutrition and work efficiency.
UNIT-IV:
ICMR Nutrient allowances, Dietary guidelines. Common nutrition related problem of pregnancy and Lactation..\
UNIT-V
Geriatric -Nutrition allowances - Dietary Guidelines -- psycho social and economical factors affecting eating behavior.
Infant -Rate of growth, weight as the indicator, Nutrition allowances for the infants. Breast feeding. Weaning foods suitable for infants. Premature infant and their feeding infant formulas</td></tr>
</table>

Extended Professiona Component(is a part of internal component only, No to be included in the external examinatio question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC –CSIR/TNPSC/etc
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Balasubramanian et al., 1998, Dietary guidelines for Indians, ICMR, New Delhi. 2. Passmore, AH and Adams, A.A., 1990, Clinical assessment of nutritional status – A working manual, Will and Wilson Publishing, London. 3. Bamji et al(1996), Textbook of Human Nutrition Oxford and IBH Publishing co. Pvt. Ltd. Delhi. 4. Davidson, S.R. and Passmore J.F., 1989, Human Nutrition and Dietetics, ELBS London. 5. Mahan, K.L., and Stump, S.E., 1996, Krauses Food, Nutrition and Diet therapy M.B. Saunders Co., USA.
Reference Books	❖ Nix .S 2016, Williams' Basic Nutrition & Diet Therapy, Fifteenth Edition, Elsevier. ❖ Simon Langley-Evans, 2015 Nutrition, Health and Disease: A Lifespan Approach 2nd Edition, Wiley Blackwell. ❖ Jacalyn J. McComb, Reid Norman, et al.,The Active Female: Health Issues Throughout the Lifespan 2010, Human press. ❖ Aleta L. Meyer and Thomas P. Gullotta., Physical Activity Across the Lifespan: Prevention and Treatment for Health and Well-Being (Issues in Children's and Families' Lives), 2012, Springer.
Website and e-learning source	❖ www.four-h.purdue.edu ❖ www.ingenta.connect.com ❖ nal.usda.gov/fnic/lifecycle

COURSE OUTCOME

On completion of this course, students will be able to

COs	**Course Outcome**
CO1	Recall infant growth and development. Understand the foetal origins
CO2	Recall the definition of adolescent. Understand the growth and development of adolescent
CO3	State the food and nutrient requirements during adulthood and old age.
CO4	Recall the food and nutrient requirements and understand the physiological changes during pregnancy and lactation
CO5	Understand the recommended dietary allowance

MAPPING(CO/PSO):

CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, PowerPoint presentations, Assignments and Discussions

SEMESTER III

<table>
<tr><td>Title of the Course</td><td colspan="7">Clinical Dietetics I</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core</td></tr>
<tr><td>Category</td><td>Part A</td><td>Year
Semester</td><td>II
III</td><td>Credits</td><td>5</td><td>Course Code</td><td>23PND05</td></tr>
<tr><td>Instructional hours per week</td><td>Lecture
5</td><td>Tutorial
1</td><td colspan="3">Lab Practice
-</td><td>Total
6</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Understand all concepts of diet therapy</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">Enable students to
1. Acquire Knowledge regarding the effect of various diseases on nutritional status and nutrient requirement
2. Understand the modifications in nutrients and dietary requirements for therapeutic condition.
3. Learn recent concepts in dietary management of different diseases</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT I
Nutritional Management for Infections, Fevers, Covid- 19 and Burns
Nutritional management for infections and fevers – meaning, etiology, nutrition and infection – metabolic changes during infection. Febrile conditions- classification, etiology, symptoms, dietary management, treatment- fever, typhoid, tuberculosis, malaria. Covid- 19 etiology Signs, symptoms, causes dietary management and treatment. Nutritional management for burns – classification, complication, dietary management, mode of feeding, support, non-dietary treatment for burns
UNIT II
Nutritional Care in Weight Management and Gastrointestinal tract diseases and disorders
Obesity and underweight- Types, predisposing factors, diagnosis, Nutritional care in weight management, treatment and prevention. Gastro-intestinal tract disorders and diseases: types, etiology, clinical symptoms, Dietary Management, treatment – Dyspepsia, Diarrhoea, Dysentry, Constipation, Hiatal Hernia, Diverticular disease, Peptic ulcer, Gastritis, GERD, Inflammatory bowel syndrome, Short bowel syndrome, Ulcerative colitis.
UNIT III</td></tr>
</table>

	Diet for Liver, Gall bladder and Pancreatic diseases and Diabetes: Liver, Gall bladder and Pancreatic disorders: classification, etiology, Dietary Management, clinical symptoms, treatment - Hepatitis, cirrhosis, hepatic encephalopathy, Cholelithiasis, Cholecystisis Pancreatitis. Diabetes: classification, etiology, factors affecting blood glucose, metabolic aberrations, Hormonal controls & functions of the disorders, symptoms, complications, diagnosis, Nutritional therapy, insulin therapy, prevention. **UNIT IV** **Nutritional management of coronary heart and renal diseases** Cardiovascular diseases: types, risk factors, causes, relation to lipid metabolism, hormonal mechanisms, symptoms, complications, dietary management, treatment and prevention – Hypertension, Atherosclerosis Myocardial Infarction, Congestive Heart failure, Coronary Bypass Surgery. Renal problems: classification, etiology, clinical and metabolic manifestations, clinical symptoms, commonly available commercial formulas for renal patients, dietary Management, treatment - renal calculi, Renal stone, Dialysis glomerulo nephritis, Renal failure. **UNIT V** **Diet for Cancer and disabling disease**: Nutrition & Cancer: Causes, epidemiological factors, treatment, therapeutic problems & Goals, Problems related to cancer treatment, nutritional therapy. Nutrition support in disabling disease: Pre-disposing factors, nutritional therapy-Gout
Extended Professional Component(is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC –CSIR/TNPSC/etc
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text	1. Sri lakshmi (2003) Dietetics, Wiley Eastern publishers. 2. Corrine Robinson (1990) Normal and Therapeutic Nutrition, Oxford and IBH publishers. 3. Swaminathan. M. (2000) Principles of Nutrition and Dietetics, Bappco publishers, Bangalore. 4. Gopalan et al., (2001) Nutritive value of Indian Foods, NIN publication, Hyderabad. 5. Bhavana sabarwal (1999) principles and practices of Dietetics, Ajay verma common wealthpublishers, New Delhi. 6. Davidson Passmore (1989) Human Nutrition and Dietetics, London Churchill and Livingstonpublishers.
Reference Books	❖ Garrow JS, James WPT, Ralph A.(2000). Human Nutrition and Dietetics.Churchill Livingstone, NY. 10th edition. ❖ Groff L James, Gropper S Sareen.(2000). Advanced Nutrition and Human Metabolism.West / Wadsworth, UK. 3rd edition. ❖ Sue Rodwell Williams. (1993).Nutrition, Diet Therapy.W.B. Saunders Company London. 7th edition. ❖ Whitney, E. N. and C. B..Cataldo.(1983). Understanding Normal and Clinical Nutrition. West Pub. S1. Paul.
Website and e-learning source	❖ www.nutrition.gov - Service of National agricultural library, USDA. ❖ www.healthyeating.org. ❖ https://www.globalhealthlearning.org.

COURSE OUTCOME

On completion of this course, students will be able to

COs	Course Outcome
CO1	Understand the basic principles of diet and diet therapy.
CO2	Acquire the knowledge of modifications of normal diet for therapeutic purposes
CO3	Apply the principles of diet for the management of metabolic diseases.
CO4	Use the nutrition care process for special conditions like allergy
CO5	Develop the dietary models for cancer and Covid

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, PowerPoint presentations, Assignments and Discussions

<table>
<tr><td>Title of the Course</td><td colspan="8">Clinical Dietetics II</td></tr>
<tr><td>Paper No.</td><td colspan="8">Core</td></tr>
<tr><td>Category</td><td>Part A</td><td>Year
Semester</td><td>II
III</td><td>Credits</td><td>5</td><td>Course Code</td><td colspan="2">23PND06</td></tr>
<tr><td>Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td></td><td>5</td><td>1</td><td colspan="3">-</td><td colspan="2">6</td></tr>
<tr><td>Prerequisites</td><td colspan="8">Understand all concepts of diet therapy</td></tr>
<tr><td>Objectives of the course</td><td colspan="8">Enable students to
1. Study different tests for various diseases.
2. Know the biochemical composition of blood and different parts of the body.</td></tr>
<tr><td>Course Outline</td><td colspan="8">UNIT I
Changes in Carbohydrate metabolism
Level of blood glucose in normal and abnormal conditions – maintenance of blood glucose level, Inborn errors of carbohydrate metabolism, ketosis, pentosuria, galactosuria, glucosuria, Glycogen storage diseases, Glucose tolerance test, galactose, tolerance test
UNIT II
Changes in Lipids during disorders - Types and level of lipids in blood lipid transport. Plasma lipoprotein metabolism, plasma lipoprotein and atherosclerosis. Primary disorders of lipoproteins hyper and hypocholesteremia Inborn errors of fat metabolism
UNIT III
Changes in protein during disorders - Plasma – functions and inborn errors of amino acid metabolism– phenylketonuria, albinism, alkaptonuria and maple syrup urine disease.
UNIT IV
Tests for liver and gastric function - Bile Salt – functions, formation of bile acids and bile salts, bile pigments from haemoglobin, Test for liver function tests based on excretory, metabolism, capacity for intoxication and enzymes, vitamin and mineral metabolism, Test for gastric function : collection and examination of stomach contents determination of free acidity, fractional test meal – normal and abnormal curves, examination of duodenal contents, Test for malabsorption examination of faeces- determination of fat content of faeces, fat balance study, Xylose absorption and excretion test and vitamin A absorption test.
UNIT V
Tests for renal function- Urine examination – their significance in health and disease: tests for kidney function – urea clearance, insulin clearance, creatinine clearance. concentration test, dye test.</td></tr>
</table>

Extended Professional Component(is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC –CSIR/TNPSC/etc
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Sri lakshmi (2003) Dietetics, Wiley Eastern publishers. 2. Corrine Robinson (1990) Normal and Therapeutic Nutrition, Oxford and IBH publishers. 3. Swaminathan. M. (2000) Principles of Nutrition and Dietetics, Bappco publishers, Bangalore. 4. Gopalan et al., (2001) Nutritive value of Indian Foods, NIN publication, Hyderabad. 5. Bhavana sabarwal (1999) principles and practices of Dietetics, Ajay verma common wealthpublishers, New Delhi. 6. Davidson Passmore (1989) Human Nutrition and Dietetics, London Churchill and Livingstonpublishers.
Reference Books	❖ Garrow JS, James WPT, Ralph A.(2000). Human Nutrition and Dietetics.Churchill Livingstone, NY. 10th edition. ❖ Groff L James, Gropper S Sareen.(2000). Advanced Nutrition and Human Metabolism.West / Wadsworth, UK. 3rd edition. ❖ Sue Rodwell Williams. (1993).Nutrition, Diet Therapy.W.B. Saunders Company London. 7th edition. ❖ Whitney, E. N. and C. B..Cataldo.(1983). Understanding Normal and Clinical Nutrition. West Pub. S1. Paul.
Website and e-learning source	❖ www.nutrition.gov - Service of National agricultural library, USDA. ❖ www.healthyeating.org. ❖ https://www.globalhealthlearning.org.

COURSE OUTCOME

On completion of this course, students will be able to

COs	Course Outcome
CO1	Understand the basic principles of diet and diet therapy.
CO2	Acquire the knowledge of modifications of normal diet for therapeutic purposes
CO3	Apply the principles of diet for the management of metabolic diseases
CO4	Use the nutrition care process for special conditions like liver and gastric function
CO5	Develop the dietary models for renal failure.

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, PowerPoint presentations, Assignments and Discussions

<table>
<tr><td>Title of the Course</td><td colspan="7">Clinical Dietetics Practical</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core</td></tr>
<tr><td>Category</td><td>Part A</td><td>Year
Semester</td><td>II
III</td><td>Credits</td><td>4</td><td>Course Code</td><td>23PNDP03</td></tr>
<tr><td>Instructional hours per week</td><td>Lecture
-</td><td>Tutorial
1</td><td colspan="3">Lab Practice
5</td><td>Total
6</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Learn the disease conditions and diet plan</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">Enable students to
1. Enable students to develop skill in nutritional diagnosis, planning and providing suitable therapeutic diets for various diseases</td></tr>
<tr><td>Course Outline</td><td colspan="7">I. Standardization of common food preparations.

II. Planning, preparation and calculation of nutritive value for the following diets (SOAP Format)
1. Normal diet.
2. Liquid diet
3. Soft diet
4. Enteral formulas
5. High fibre and low caloric diet
6. Diet for Energy imbalance
7. Diet for Diabetes Mellitus
8. Diet for Gastrointestinal diseases
9. Diet for Liver diseases
10. Diet for Infections and fevers.
11. Diet for Renal Diseases- (Nephritis , Nephrosis, Renal Failure, Renal calculi , Dialysis)
12. Pulmonary diseases –TB
13. Asthma
14. Rheumatoid Arthritis
15. Hypo/Hyper tension
16. Atherosclerosis
17. Burns
18. Cancer
19. AIDS and COVID</td></tr>
<tr><td>Recommended Text</td><td colspan="7">1. Stump SE.(2012).Nutrition and diagnosis related care. Lippincott Williams and Wilkins. Canada.7th edition.
2. Width.M&Reinhardt.T. (2018).The Essential Pocket Guide for Clinical Nutrition.Wolters Kluwer Publishers. 2nd edition.
3. Whitney EN and RolfesSR.(2002). Understanding Nutrition, 9th edition, West/Wordsworth.
4. The Nutrition Society Textbook.Wiley Blackwell Publishers.2nd edition. Mitch, W. and Ikizler, Alp.(2010). Handbook of Nutrition and the.Lippincott Williams and Wilkins, New Delhi.6th edition.
5. Kidney Mahan LK, Stump SE and Raymond JL.(2012). Krause's Food and Nutrition Care Process.Elsevier Saunders.Missouri.13th edition.</td></tr>
</table>

Reference Books	❖ Gopalan C., Ram Sastri B.V. And BalSubramaniam S.C. (2006). Nutritive Value of Indian Foods. Hydrabad, National Institute of Nutrition. Indian Council of Medical Research. ❖ Clinical Dietetics Manual.(2018). Indian Dietetic Association. 2nd edition. Peggy
Website and e-learning source	❖ www.nutrition.gov - Service of National agricultural library, USDA. ❖ www.nal.usda.gov/fnic -Food and Nutrition information centre.

COURSE OUTCOME

On completion of this course, students will be able to

COs	**Course Outcome**
CO1	Develop skills in planning therapeutic diets
CO2	Analyze the disease condition and plan appropriate menus
CO3	Calculate nutrient content of diet plans
CO4	Prepare the various types of diets
CO5	Learn techniques in diet tray arrangement and assess patient compliance

MAPPING(CO/PSO):

CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Demonstration, Experiments, Activities as assignment, Group Discussion, Observation and Interpretation

<table>
<tr><td>Title of the Course</td><td colspan="7">Functional Foods and Nutraceutical</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core</td></tr>
<tr><td>Category</td><td>Part A</td><td>Year
Semester</td><td>II
III</td><td>Credits</td><td>4</td><td>Course Code</td><td>23PND07</td></tr>
<tr><td>Instructional hours per week</td><td>Lecture
4</td><td>Tutorial
1</td><td colspan="3">Lab Practice
-</td><td>Total
5</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic knowledge of food science and nutrition.</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">Enable students
1. To recognize the impact of functional foods and nutraceuticals on health and wellness.
2. To compare and contrast the methods of classification, identification, extraction and characterization of functional foods and nutraceuticals.</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT I
Concept of Functional Foods
Background: Historical perspective and evolution of health care and functional foods; Concept and Definition; relationship between functional foods, nutraceuticals, health and disease. Effect of processing on functional food ingredients.
Classification: Dietary Fiber, Fatty Acids, Herbals And Botanicals, Soy Components, Vitamins and Minerals, Phytochemicals,
Probiotics. Prebiotics and Synbiotics
UNIT II
Nutraceuticals as science
Introduction: Definition, Classification of nutraceuticals based on chemical nature, structure; food source; amount of nutraceutical substance and mechanism of action.
Phytochemicals as nutraceuticals: Identification and extraction of bioactive components from microbes, plant and
animal sources.
UNIT III
Functional Foods, Nutraceutical AndHealth
Use of functional foods and nutraceuticals in the treatment of colonic health, cardiovascular health; cancer prevention;weight management.
Use of functional foods and nutraceuticals inthe treatment bone health; mental health; respiratory health and oral health.
Use of functional foods and nutraceuticals in the treatment women’s health and enhancement of sporting performance.</td></tr>
</table>

	UNIT IV **Efficacy, Safety and Toxic Interactions** Efficacy and Safety: Metabolism and bioavailability of nutraceuticals; Meta-analyses; and systematic reviews of nutraceutical clinical trials, Safety and beneficial interactions Nutraceutical interactions:Toxiccontamination of nutraceuticals and food ingredient, interactions between nutraceuticals/nutrients and therapeuticdrugs, herb and drug interactions
	UNIT V **Regulations Governing Functional Foods And Nutraceuticals Health Claims** Nutraceuticals and Functional Foods FSSAI regulations-Food Safety and Standards (HealthSupplements, Nutraceuticals, Food for Special Dietary Use, Food for Special Medical Purpose, Functional Food, and Novel Food) Regulations, 2016 and Amendments. DISHA, Foods with Nutritional Function Claims (FNFC)
Extended Professional Component(is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC –CSIR/TNPSC/etc
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Aguilar, C.N., & Haghi, A.K. (Eds.). (2021). Functional Foods and Nutraceuticals forHuman Health: Advancements in Natural Wellness and Disease Prevention (1st ed.). Apple Academic Press. https://doi.org/10.1201/9781003097358. 2. Brian Lockwood,(2007) Nutraceuticals A guide for healthcare professionals, Secondedition, Pharmaceutical Press. 3. Gupta, R. C. (2016). Nutraceuticals: Efficacy, safety and toxicity. London : AcademicPress. 4. Johnson I. and Williamson G. ed.(2003) Phytochemical functional foods, CRC Press,Boca Raton Boston New York Washington, DC. 5. Ram B. Singh (2021) Functional Foods and Nutraceuticals in Metabolic and Non-communicable Diseases 1 Academic Press. https://doi.org/10.1016/C2019-0-00254-3
Reference Books	❖ Arnoldi, A. (2004) Functional foods, cardiovascular diseases and diabetes. Woodheadpublishing limited and CRC press LLC. ❖ Chukwuebuka Egbuna, Genevieve Dable Tupas (2020) Functional Foods and Nutraceuticals: Bioactive Components, Formulations and Innovations 1st ed. SpringerInternational Publishing http://doi.org/10.1007/978-3030-42319-3 ❖ Eskin, N. A. M., & Tamir, S. (2006). Dictionary of nutraceuticals and functionalfoods. Boca Raton, FL: Taylor & Francis Group/CRC Press. ❖ Salminen, S., Lee, Y.K (2009) Handbook of Probiotics and Prebiotics. John Wiley &Sons. Inc. NewJersey. ❖ Shannon Brown (2009) Functional Foods and Beverages in the U.S. 4th Edition

Website and e-learning source	❖ https://onlinecourses.swayam2.ac.in/cec22_ag02/preview ❖ https://rb.gy/3azl33 ❖ https://bit.ly/34QLp4U

COURSE OUTCOME

On completion of this course, students will be able

COs	**Course Outcome**
CO1	To identify and describe the meaning, classification, properties, structure and potential applications of functional foods andnutraceuticals.
CO2	To illustrate the classification, efficacy, therapeutic applications and product formulations using bioactive substances.
CO3	To examine the regulatory compliance, technical feasibility, safety andadverse effects of nutraceuticals and dietary supplements.
CO4	To assess the efficacy of functional foods and nutraceuticals in normal health and therapeutic conditions.
CO5	To summarize the methods of identification, characterization, extraction, safety evaluation and regulations concerning phytochemicals and zoochemicals and its impact on lowering risk factors of chronic diseases.

MAPPING (CO/PSO):

CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, PowerPoint presentations, Assignments and Discussions

<table>
<tr><td>Title of the Course</td><td colspan="7">Food Processing and Preservation</td></tr>
<tr><td>Paper No.</td><td colspan="7">Elective</td></tr>
<tr><td>Category</td><td>Part A</td><td>Year
Semester</td><td>II
III</td><td>Credits</td><td>3</td><td>Course Code</td><td>23PNDE05</td></tr>
<tr><td>Instructional hours per week</td><td>Lecture
3</td><td>Tutorial
1</td><td colspan="3">Lab Practice
-</td><td>Total
4</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic knowledge of food processing and preservation</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">Enable students to
1. Impart systematic knowledge of basic and applied aspects of food processing and technology.
2. Provide the necessary knowledge of basic principles and procedures in the production of importantfood products</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT I
Scope and importance of food processing. Cereal – processing of raw and parboiled rice and rice products- Puffing and flaking. Wheat and corn processing, Potato processing– potato chip, flakes and powder.
Decortications processing of legumes, effect of processing of legumes.
UNIT II
Processing of oil seeds, packing and storage of fats and oils, change during storage of oils. Oil specialty products-margarine, mayonnaise, salad dressing and fat substitutes, Nutritional food mixes from oilseeds – processing oilseeds for food use, protein enriched foods
Processing of fruits and vegetables juice concentrates and powders. Canning process of fruits and vegetables
UNIT III
Processing of milk, manufacture of butter, paneer and cheese.
Fish processing – canning, freezing, drying, salting, smoking and curing, uses of by-products.
Meat processing –curing and smoking.
Poultry and egg powder– processing and storage.
UNIT IV
Preservation by addition of sugar - General Principles and methods of preparation of jams, jellies and Marmalades, theory of gel formation.
Failure to jelly and jam to set. Preparation of squashes & syrups.
Preservation by addition of salt - Pickling and curing of meat.
Preservation by Use of High Temperature: Principle of dehydration-</td></tr>
</table>

	heat and mass transfer. Pasteurization, Sterilization and their types. Types of driers- advantages, disadvantages. **UNIT V** Preservation by use of Low Temperature - Types - Common types of cold storage, refrigeration-requirement of refrigerated storage, characteristic of refrigerant, refrigeration during transport, defects in cold storage. Freezing–types, Principles and methods of freezing, Freeze drying. Advantages and Disadvantages of freezing. Mechanism of microbial inhibition, mechanism and action of preservatives in processed food: Inorganic & Organic preservatives– Antibiotics. Antioxidants and its role.
Extended Professional Component(is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC –CSIR/TNPSC/etc
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Rao, Chandra Gopala (2006). Essentials of food process engineering. B.S.Publications. 2. Khatkar, Bhupendra Singh ed (2007). Food science and technology. Daya PublishingHouse. 3. Singh, N.P (2007). Fruit and vegetable preservation. Oxford BookCompany. 4. Ahlluwalia, Vikas (2007). Food processing. Paragon InternationalPublishers. 5. Sivasankar,B (2005). Food processing and preservation. Prentice - Hall ofIndia 6. Paul, Meenakshi (2007). Effects of food processing on bioactive compounds.Gene-Tech Books.
Reference Books	❖ Rahman, Shafiur : (2007). 2nd Edn Handbook of food preservation. CRCpress. ❖ Arthey, David . (2005). 2nd ed Fruit processing.Springer, ❖ Fellows.P (2005). 2nd edn Food processing technology. woodhead publishingcompany. ❖ Lewis Michael (2000). Continuous Thermal Processing Of Foods.Aspen. ❖ Koutchma, Tatiana (2007). Ultraviolet light in food technology , CRCPress
Website and e-learning source	❖ www.newfoodmagazine.com ❖ www.nzifst.org.nz ❖ www.itrhd.comJournals ❖ https://www.pdfdrive.com/food-microbiology-an-introduction-e166783912.html

COURSE OUTCOME

On completion of this course, students will be able to

COs	Course Outcome
CO1	Define food processing and understand the basic knowledge of food processing
CO2	Apply the knowledge in processing of foods by laboratory and household measures
CO3	Gain the practical knowledge on principles and methods of processing
CO4	Recognize the principles of food preservation and explain the different types ofpreservation techniques
CO5	Practice the skills in methods of food preservation

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, PowerPoint presentations, Assignments and Discussions

<table>
<tr><td>Title of the Course</td><td colspan="7">Nutrition for Fitness</td></tr>
<tr><td>Paper No.</td><td colspan="7">NME II</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Part B</td><td>Year</td><td>II</td><td>Credits</td><td>2</td><td>Course Code</td><td>23PNDN02</td></tr>
<tr><td>Semester</td><td>III</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>3</td><td>-</td><td colspan="3">-</td><td colspan="2">3</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic knowledge of Nutrition for fitness</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">Enable students to
1. Understand the components of health and fitness and the role of nutrition.
2. Develop ability to evaluate fitness and well - being</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT I
Definition, components and assessment criteria of age: Specific fitness and health status.Holistic approach to the management of fitness and health, Energy input and output Diet and Exercise. Effect of specific nutrition on work performance andphysical fitness, nutrition, exercise, physical fitness and health inter-relationship.
UNIT II
Different energy systems for endurance and power activity: Fuels and nutrients to support physical activity, Shifts in carbohydrate and fat metabolism, mobilization of fat stores during exercise. Nutrition in Sports: Sports specific requirement. Diet manipulation, Pre- game and post game meals. Assessment of different nutragenic aids and commercial supplements. Diets for persons with high energy requirements, stress, fracture and injury.
UNIT III
Significance of physical fitness and nutrition in the prevention and management of weight control,fat reduction and obesity. Exercise and Weight control - fundamentals of aerobics, Nutrition guidance on balanced eating and nutritional advice to clients for obesity, skin nourishment, hair treatment.
UNIT IV
Yoga- Meaning, Aims, Objectives, significance, Systems of Yoga - Eight limbs of yoga.
UNIT V
Asanas - Classification, difference between physical exercise and yogic exercise, Guidelines for practicingAsanas. Meditation - Meaning, types, benefits.</td></tr>
</table>

Extended Professional Component(is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC –CSIR/TNPSC/etc
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. B.K.S. Iyengar, Light on yoga, London University, in paperback, 1989. 2. Yogeshwar, Text Book of Yoga, Madras Yoga Centre. 3. K. Chandrasekaran, "Sound health through Yoga" PremKalyanPublication, Sedapatti, 1999. 4. Ira Wolinsky 1998 .Nutrition in Exercise and sports , 3rd edition, CRC Press. 5. Sizer, F.& Whitney , E(2000) Nutrition - Concepts & Controversies, 8thEdition , Wadsworth Thomson Learning.
Reference Books	❖ Wardlaw, Smith (2012) Contemporary Nutrition: A Functional Approach. ❖ Williams Melvin (2004). Nutrition for health, fitness and sports. Mc Graw Hill. ❖ Joshi AS (2010) Nutrition and Dietetics Tata Mc Graw Hill. 2nd edition, ❖ ICMR (2010). Nutrient Requirements and Recommended Dietary Allowances for Indian ❖ Martin Eastwood (2003)Principles of Human Nutrition, II Edition, Blackwell PublishingCompany
Website and e-learning source	❖ https://www.frontiersin.org/journals/nutrition https://www.journalofexerciseandnutrition.com ❖ https://www.foodandnutritionjournal.org ❖ https://www.fao.org/nutrition/education/healthy-eating-resources/en/

COURSE OUTCOME

On completion of this course, students will be able to

COs	Course Outcome
CO1	Identify the major muscle groups of the body that are used with cycling.
CO2	Students will acquire knowledge and demonstrate skills to safely engage in physical activity.
CO3	Students will understand the principles of lifetime fitness
CO4	Students will use basic principles of health and wellness to develop an informed, personal approachto mental and physical health.
CO5	Students will demonstrate and value knowledge of psychological and sociological concepts

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, PowerPoint presentations, Assignments and Discussions

INTERNSHIP TRAINING IN HOSPITALS

(Carried out in Summer Vacation at the end of I year)

- The Dietetic Internship is to provide a high quality education and a variety of supervised practice experiences to prepare interns to be effective entry-level dietitian nutritionists.
- A summary of the Internship shall be submitted to the department and viva voce shall be conducted for student individually.

COURSE OUTCOME

CO: 1 Analyze the internship training in the hospital

CO: 2 Experience in the hospitals has the opportunity to observe in action

CO: 3 Internships can speed up the process of moving towards the career goals.

CO: 4 Students will develop professional aptitude, strengthen personal character, and provide a Greater door to opportunity

CO:5 Understand about the internships are way to show commitment to professionalism, self improvement, and excellence

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SEMESTER IV

<table>
<tr><td>Title of the Course</td><td colspan="8">Community Nutrition</td></tr>
<tr><td>Paper No.</td><td colspan="8">Core</td></tr>
<tr><td>Category</td><td>Part A</td><td>Year</td><td>II</td><td>Credits</td><td>5</td><td>Course Code</td><td colspan="2">23PND08</td></tr>
<tr><td></td><td></td><td>Semester</td><td>IV</td><td colspan="4"></td></tr>
<tr><td>Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td></td><td>5</td><td>1</td><td colspan="3">-</td><td colspan="2">6</td></tr>
<tr><td>Prerequisites</td><td colspan="8">Basic knowledge of Community nutrition</td></tr>
<tr><td>Objectives of the course</td><td colspan="8">Enable students to
1. Understand role of Community Nutrition to maintain the health status
2. Understand nutrition problems existing in the community</td></tr>
<tr><td>Course Outline</td><td colspan="8">UNIT - I
Nutrition and Health in National Development. Concept of Community, Types of Community, Factors affecting the health of community. Malnutrition - Etiology, symptoms, Prevalence of malnutrition, factors contributing to malnutrition - Under nutrition and Over nutrition, balance between food and population growth.
UNIT - II
Nutritional problems confronting our country - PEM - Prevalence, classification - Kwashiorkor and Marasmus - etiology, symptoms, pathological changes, biochemical changes. Prevalence, etiology, symptoms, prophylaxis programmes - Anaemia, IDD and Vitamin A deficiency.
UNIT - III
Methods of assessment of Nutritional status - sampling techniques - identification of risk group. Direct methods- anthropometry, biochemical estimation, clinical, and diet survey. Indirect methods- Food balance sheet, , Ecological parameter and vital statistics, use of growth chart.
UNIT - IV
Nutrition policy and programmes - National Nutrition policy - need for nutrition policy, policy strategies and their implementation - ICDS, Noon Meal Programme, FAO, WHO, UNICEF, CARE, ICMR, ICAR, CSIR, NIN, CFTRI,NGOs, National Nutrition surveillance system, National prophylaxis programmes for IDA,VAD and IDD.</td></tr>
</table>

	UNIT - V Strategies to combat Nutritional problems-fortification, enrichment, supplementation and Immunization programmes. Nutrition Education - Meaning, Scope, Methods - Planning, conduct and evaluation of Nutrition education Programme.
Extended Professional Component(is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC –CSIR/TNPSC/etc
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Park J.E. and park K. Text book of preventive and social medicine, Publications, 2014. 2. B. Srilakshmi, Nutrition Science New Age International (CP) Ltd, New Delhi, 2019. 3. Mahtab, S. Bamji, N. Pralhadrao, Vinodini Reddy, Text book of Human Nutrition, Oxford and IBIT Publishing co Pvt. Ltd, New Delhi, reprint 2009. 4. Dietary guidelines for Indians, ICMR, NIN, Hyderabad 2010. 5. Bamji, M.S, Prahalad Rao N, Reddy V, Textbook of Human Nutrition II Edition, Oxford and PBH publishing Co. Pvt. Ltd, New Delhi 2014. 6. Jelliffe, and Jelliffe D.B: Assessment of Nutritional Status of the community. World Health Organization.1986
Reference Books	❖ MuthuVK (2014). A Short Book of Public Health, Jaypee Brothers Medical Publishers. 2nd edition ❖ Dr. Srridhar Rao B (2018). Principles of Community Medicine, AITBS Publishers India. 6th edition. ❖ Scott M. Smith, Sara R. Zwart and Martina Heer (2014). Human Adaptation to Space Flight: The role of nutrition. NASA Publication. • Owen, A.Y. and Frackle, R.T., (2002). Nutrition in the Community. The Art of Delivering Services. Times Mirror/Mosby. 2nd Edition. ❖ Carolyn D. Berdanier Johanna T. Dwyer David Heber (2014). Handbook of Nutrition and Food, CRC Press, New York. Third Edition.
Website and e-learning source	https://apps.who.int/irishttp://egyankosh.ac.in/bitstream/123456789/33312/1/Unit-18.pdfhttps://www.seafarerswelfare.org/assets/documents/ship/SHIP-HealthyFood_A5_20151209_LR.pdf

COURSE OUTCOME

On completion of this course, students will be able to

COs	Course Outcome
CO1	Understand the role of interventions to enhance wellness in diverse individuals and groups
CO2	Skills to develop an educational program for a target population
CO3	Capable to formulate new food products for a target group
CO4	Evaluate impact of nutritional awareness program on Nutritional and health status
CO5	Assess the concepts of health and epidemiology of communicable diseases

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, PowerPoint presentations, Assignments and Discussions

<table>
<tr><td>Title of the Course</td><td colspan="7">Food safety and Quality Control</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core</td></tr>
<tr><td>Category</td><td>Part A</td><td>Year</td><td>II</td><td>Credits</td><td>5</td><td>Course Code</td><td>23PND09</td></tr>
<tr><td></td><td></td><td>Semester</td><td>IV</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td>Total</td></tr>
<tr><td></td><td>5</td><td>1</td><td colspan="3">-</td><td>6</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Knowledge on Food processing and food quality.</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">Enable students to
1. Study the government regulation in quality control
2. Enable to classify food standards</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT - I

Quality Control: Objectives, Importance, functions of quality control, stages of quality control in food industry. Food Quality Assurance: Design of company quality assurance program, Microbiological concerns. Managing quality in supply chain and marketing of food products.

UNIT - II

Government Regulations In Quality Control: FAO/WHO codex Alimentarious commission, PFA, AGMARK, BIS, FPO, fair average quality (FAQ) specification for food grains, ISO 9000 series. HACCP: Background, current status, structured approach, principles, benefits and limitation. Consumer Protection Act (CPA)

UNIT - III

Food Standards: Cereals and products - bread, biscuits, cakes products. Food Packaging: Food packaging and labelling various methods. Recent trends in Packaging and labelling. Fruits Products: Jam, juices, squashes, ketchup, sauce. Oils and Fats: Coconut oil, groundnut oil, palm oil, sunflower oil, vanaspati. Milk and Products: Skimmed milk powder, partly skimmed milk powder, condensed sweetened milk. Other products - coffee, tea, sugar, honey, toffees.

UNIT - IV

Food Safety: Meaning of food safety. Importance of Food Quality and safety for developing countries. Patent: Definition, requirements,</td></tr>
</table>

	patent law in India, administrator, need for patent system, advantages, precautions to be taken by applicants, patent procedures, non-patentable. **UNIT - V** Food Hazards: Physical, Chemical, Biological hazards associated with food types. Effect of processing and storage on microbial safety. Food Adulterator: Adulteration of food - common adulterants and tests detect common adulterants.
Extended Professional Component(is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC –CSIR/TNPSC/etc
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Sivasankar, B. (2013) Food Processing and preservation 2nd edition, prentice Hall, Pvt, Ltd. 2. Srilakshmi, N., Food Science, New Age International Private Ltd., New Delhi, 2002. 3. Swaminathan, M., Food Science, Chemistry and Experimental Foods, Bappco Publishers, Bangalore, 2014. 4. Chandrasekhar, U, Food Science and Applications in Indian Cookery, Phoenix Publishing House Private Ltd., New Delhi, 2012.. 5. Sommers, C.H. and Xveteng Fan, Food Irradiation Research and Technology, Blackwell Publishing, 2016.
Reference Books	1. Forsythe, S.J. (2010), The Microbiology of Safe Food, 2nd edition, Willey-Blackwell,U.K. 2. Lawley, R., Curtis L. and Davis, J. (2004) The Food Safety Hazard Guidebook RSCpublishing. 3. FSSAI Manual – Current Version. 4.Export/Import policy by Govt of India.
Website and e-learning source	https://www.cdc.gov/foodsafety/cdc-and-food-safety.html https://www.fao.org/food-safety/en/ Websites of FSSAI

COURSE OUTCOME

On completion of this course, students will be able to

COs	Course Outcome
CO1	Understand the specification and standards for different products
CO2	Comprehend the knowledge gained on food laws and food safety regulations at regional and national level
CO3	Monitor and evaluate food laws and standards in food service industry
CO4	Acquire knowledge on food hazards and food adulteration
CO5	Imparting Government Regulations In Quality Control

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, PowerPoint presentations, Assignments and Discussions

Project viva voce

Course Code	23PND PR1
Course Title	PROJECT/SEMESTER IV- Part A
Credits/Hours/week	7/10
Course Objectives **1.** To introduce the purpose and importance of research for future development and sustenance. **2.** To make the students plan and carry out the research work. **3.** To learn the methodology of writing thesis and research articles in journals.	
Prerequisite :	Interest in review writing and research

COURSE OUTCOME

CO: 1 The project gives students the opportunity to experience real research
CO:2 Students will have a greater problem solving skills.
CO:3 Students will gain better understanding of research methods.
CO: 4 Deeper understanding of the discipline of the research
CO: 5 Better understanding of career and education path.

Evaluation of the Project Work:

The Controller of Examination appoints an External Examiner from the Panel of Examiners submitted by the Supervisor through the Head of the Department. Both the Supervisor and External Examiner will conduct the viva voce examination to the candidate and award marks.

Total Marks: 100

Internal (25 marks- awarded by guide)

External(75 marks)

Quality of the Project Work and Dissertation : 50 Marks
Oral Presentation : 15 Marks
Viva-voce : 10Marks

There will be counseling for students regarding facilities available and about the Professors offering guidance. They can choose the topic of the project and the guide at the beginning of III semester. In case the student requires extension of time for submitting the dissertation, University rules will be followed.

<table>
<tr><td>Title of the Course</td><td colspan="7">Food Processing and Food Product Development Practical</td></tr>
<tr><td>Paper No.</td><td colspan="7">Elective</td></tr>
<tr><td>Category</td><td>Part A</td><td>Year
Semester</td><td>II
IV</td><td>Credits</td><td>3</td><td>Course Code</td><td>23PND</td></tr>
<tr><td>Instructional hours per week</td><td>Lecture
-</td><td>Tutorial
-</td><td colspan="2">Lab Practice
4</td><td colspan="2">Total
6</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Knowledge on Food processing and food quality.</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">Enable students to
Course Objectives
1. To recognize taste perceptions and attributes contributing to consumer acceptance ofprocessed foods.
2. To develop processing techniques for convenience and speciality foods on a pilotscale.</td></tr>
<tr><td>Course Outline</td><td colspan="7">Food Processing
1. Estimation of Total soluble solids, acidity, pectin content and percentage Brix in the prepared fruit products.
2. Preparation of sauces and ketch up, examination of physical parameters and viscosity.
3. Traditional and Osmotic dehydration of fruits and vegetables with salt and sugar.
4. Determine the presence of peroxidase, sulphur dioxide in dehydrated fruits and vegetables.
Food Product Development
1. Introduction to the steps in new foodproduct development.
Formulation of different Ready To Cook (RTC) and Ready To Service (RTS) foods – Precooked Cereal, legume based, dairy based, fat basedproducts.
3. Formulation of different Ready To Eat (RTE) foods – Instant snacks, Paneer based products, Mixed rice.
4. Preparation of different premixes –Rice mix, soup mix, cake mix, fortified weaning foods using malts.
5. Formulation of foods with probiotics – Spirulina, fermented products, seaweeds.
6. Formulation of value-added extruded products – Incorporation of fiber/sprouts/vegetable extract.
7. Formulation of cookies and Indian sweets with sugar substitutes – Stevia, Xylitol, Erythritol
8. Formulation of traditional recipes with novel and functional food ingredients – Soy protein, flax and chia seedpowders, FOS, Gels, flower infusions, palm sugar.
Industrial Visit: Visit to a food processing and packaging unit</td></tr>
</table>

Reference Books	1. Carpenter Lyon & Hasdell, "Guidelines for Sensory Analysis in Food Product Development and Quality Control", Springer, 2000 2. Earle, M. D., Earle, R. L., & Anderson, A. M. (2001). Food product development.Boca Raton, Fla: CRC Press. 3. Gordon L Robertson. 2006. Food Packaging: Principles and Practice. 2nd Ed. CRCPress 4. Harper J.M. Extrusion of Foods. Vol. 1 & 2 (1991) CRC Press, Inc.) Boca Raton,Aorida 5. Naik, H.R., & Amin, T. (2021). Food Processing and Preservation (1st ed.). CRCPress. https://doi.org/10.1201/9781003243250 6. V.K.Joshi (2006)Sensory science-Principles and Applications inFood Evaluation,Agrotech Publishing Academy, Udaipur.
Website and e-learning source	https://iastate.pressbooks.pub/foodproductdevelopment

COURSE OUTCOME

On completion of this course, students will be able to

COs	**Course Outcome**
CO1	To identify and recall the basic principles of new product development and its evaluation.
CO2	To calculate the amount of ingredients required to develop a standardized novel food product.
CO3	To develop new products with suitable food processing and preservation technique.
CO4	To evaluate the role of ingredients in product formulation.
CO5	To propose and formulate a novel product with added functional and nutritional value.

MAPPING (CO/PSO):

CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Demonstration, Experiments, Activities as assignment, Group Discussion, Observation and Interpretation

<table>
<tr><td>Title of the Course</td><td colspan="7">Dietetic Techniques and Patient Couselling</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core</td></tr>
<tr><td>Category</td><td>Part A</td><td>Year
Semester</td><td>II
IV</td><td>Credits</td><td>2</td><td>Course Code</td><td></td></tr>
<tr><td>Instructional hours per week</td><td>Lecture
3</td><td>Tutorial
1</td><td colspan="2">Lab Practice
-</td><td colspan="2">Total
4</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Knowledge on Food processing and food quality.</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">Enable students to
1. Create awareness among the communities about the importance of diet and good health
2. Develop diet counseling skills</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT – I
Counseling— Definition, Expectations, goals, scope and limits-Counseling, Characteristics of an effective counselor, the Client-Characteristics, expectations.
UNIT II
The Counseling process- Techniques for obtaining relevant information: (1) Clinical information,(2) Medical History and General Profile, (3) Dietary Diagnosis: Assessing food and nutrient intakes, Lifestyles, physical activity, stress, (4)Nutritional Status, (5) Correlating relevantinformationandidentifyingareasofneed: Stage I: Problem exploration and clarification, StageII: Developing new perspectives and setting goals, Stage III: Implementation follow up and evolution.
UNIT III
Counseling techniques, strategies and communication skills-Rapport building and opening techniques – Questioning listening, reflecting,acceptance,silence,leadingreassurance,non-verbal behaviors, terminating skills.
UNIT IV
Group Counseling- Developing resources and aids for education and counseling and Working with Hospitalized patients (adults, pediatric, elderly, handicapped), adjusting and adopting to individual needs, Out patients (adults, pediatric, elderly, handicapped), patients education ,techniques and modes.
UNIT V
Counseling and educating patient a) Introduction to nutrition counseling b) Determining the role of nutrition counselor) Responsibilities of the nutrition counselor)</td></tr>
</table>

	Practitioner ,Conceptualizing entrepreneur skills and behavior) Communication and negotiation skills.
Extended Professional Component(is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC –CSIR/TNPSC/etc
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Gelso Charles,J. and Fretz Bruce, R. Counselling Psychology, a PRISM Indian editi HarcourtBrace College Publishers, 1995 2. Srilakshmi, B. Dietetics New Age International (P) Ltd, 1997 3. Gable J, Herrmann T, 2016, Counselling Skills for Dietitians, edition,Wiley publishers
Reference Books	1. JudyGable "CounsellingSkillsforDietitians"2nd edition,2007,Black WellPublishingLtd,Oxford,UK. 2. LindaSnetselaar"NutritionCounsellingSkills fortheNutritionCareProcess"4th edition,2021,JaneandBartlettPublishers,London.
Website and e-learning source	https://www.scribd.com

COURSE OUTCOME

On completion of this course, students will be able to

COs	**Course Outcome**
CO1	Understand the principles and procedures of nutrition counseling and the role of the counselor
CO2	Develop an understanding how: (a) lifestyles influence health and well-being; (b) acute and chronic disease affects the emotional and psychological state and the behavior of the individuals.
CO3	Be familiar with various techniques used in counseling
CO4	Be able to use various types and techniques of counseling to motivate patients to achieve well-being.
CO5	Be familiar with various techniques used in counseling

MAPPING (CO/PSO):

CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, PowerPoint presentations, Assignments and Discussions