

**SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV  
COLLEGE FOR WOMEN (AUTONOMOUS)**

**CHENNAI - 600044.**

**Re accredited with A+ Grade by NAAC**

**MASTER OF SCIENCE**

**HOME SCIENCE-FOOD SCIENCE NUTRITION AND  
DIETETICS**

**(Shift –II)**

**Under the faculty of Arts/Science/Commerce**

**Department of Home Science**



**CHOICE BASED CREDIT SYSTEM (CBCS) OUTCOME  
BASED EDUCATION (OBE)**

**(Effective from the Academic Year 2020-21)**

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# **RULES AND REGULATIONS**

## **DEPARTMENT OF HOME SCIENCE**

### **M.Sc. HOME SCIENCE - FOOD SCIENCE NUTRITION AND DIETETICS**

#### **Revised Syllabus of 2020- 2021**

#### **OBJECTIVES OF THE COURSE:**

- To hone their critical intelligence, professional behavior and strive towards creative endeavor.
- To augment research and entrepreneurial skills supplemented with rich skills of communication, teamwork and leadership to excel in their profession.
- To imbibe a deep sense of rationality and in depth knowledge of the various contemporary issues that would elevate their comprehension in the global context.

#### **PG REGULATIONS**

##### **1. ELIGIBILITY FOR ADMISSION :**

Pass in Bachelor's degree in B.Sc., Clinical Nutrition and Dietetics/B.Sc., Nutrition and Dietetics/B.Sc., Nutrition Food service management and Dietetics/B.Sc., Home Science, B.Sc. Food Technology of the University of Madras or any other related allied degree in Nutrition science, Food Science of other Universities.

##### **2. ELIGIBILITY FOR THE AWARD OF DEGREE :**

A candidate shall be eligible for the award of the Degree only if she has undergone the prescribed course of study in a College affiliated to the University for a period of not less than two academic years, passed the examinations all the four-Semesters prescribed earning a minimum of 91 Credits (in Parts-I & II)

### **3. DURATION:**

- a. Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters and the second academic year the third and fourth semesters.
- b. The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall be not less than 90 working days for each semester.

### **4. COURSE OF STUDY:**

The main Subject of Study for Master Degree Courses shall consist of the following

PART – I      CORE SUBJECTS, PROJECT/ELECTIVES

PART – II      SOFT SKILLS & INTERNSHIP

1. Skill based subjects (Four) -
  - a) Teaching Skills
  - b) Research Skills
  - c) Soft Skill – SWAYAM COURSE (MOOC)
  - d) Soft Skill – SWAYAM COURSE (MOOC)

Recommended Credits Distribution: (Total should not be less than 91 Credits)

<b>Course Type</b>	<b>No. of Papers</b>	<b>Credits / Paper</b>	<b>Credits</b>
Core (Theory)	10	4	40
Core (Practical)	4	4	16
Core (Project)	1	4	4
Elective	5	3	15
Internship	4	2	2
Skill based courses	2	3	6
Swayam Courses	2	4	8
<b>Total</b>			<b>91</b>

## **5. ATTENDANCE**

### CATEGORY-A: ATTENDANCE REQUIREMENT

All candidates must put in 75% and above of attendance for Arts, Science, Commerce courses both UG/PG including MBA/MCA Degree courses for appearing the University Examination. (Theory/Practical)

### CATEGORY –B: CONDONATION OF SHORTAGE OF ATTENDANCE

If a candidate fails to put in the minimum attendance (Percentage stipulated), the Principals shall condone the shortage of attendance up to a maximum limit of 10% (i.e. between 65% and above and less than 75%) for all UG/PG courses. (i.e. Arts Science, Commerce, MBA and MCA) after collecting

the prescribed fee of RS.250/-each for Theory/Practical examination separately, (Theory Rs.250/- Per semester/Per Candidate: Practical Rs.250/- Per semester/ Per Candidate) towards the condonation of shortage of attendance.

CATEGORY-C: NOT ELIGIBLE FOR CONDONATION OF SHORTAGE OF ATTENDANCE

Candidates who have secured less than 65% but more than 50% of attendance are NOT ELIGIBLE for condonation of shortage of attendance and such candidates will not be permitted to appear for the regular examination, but will be allowed to proceed to the next year/next semester of the course and they may be permitted to take next University examination by paying the prescribed condonation fee of Rs.250/- each for Theory/Practical separately. Names of such candidates should be forwarded along with their attendance details in the prescribed format mentioning the category(3copies). Degree Wise/Year wise/Branch wise/semester wise/together with the fees collected from them. So as to enable them to get permission from the University and to attend the Theory/Practical examination subsequently without any difficulty.

CATEGORY-D: DETAINED STUDENTS FOR WANT OF ATTENDANCE

Candidate who have put in less than 50% of attendance have to repeat the course (by re-joining) for which they lack attendance without proceeding for II/III year as the case may be. Until they re-join the course and earn the required attendance for that particular semester/year, no candidates shall be permitted to proceed to the next year/next semester of the course under any circumstances. They have to obtain prior permission from the University to re-join the course.

Provided in case of candidates who are admitted form the academic year 2003 -2004 earning less than 50% of attendance in any one of the semesters due

to any extraordinary circumstances such as medical ground, such candidates shall produce Medical Certificate issued by the authorized, Medical Attendant (AMA), duly certified by the Principal of the college shall be permitted to proceed to the next semester and to complete the course of study. Such candidates shall have to repeat the semester, which they have missed by re-joining after completion of final semester of the course, by paying the fee for the break of study as prescribed by the University from time to time.

#### CATEGORY-E: CONDONATION OF SHORTAGE OF ATTENDANCE FRP MARRIED WOMEN STUDENTS

In respect of married women students undergoing UG/PG course, the minimum attendance for condonation (Theory/Practical) shall be relaxed and prescribed as 55% instead of 65% if they conceive during their academic career. Medical certificate from the Doctor attached to the Government Hospital (D.G.O) and the prescribed fee of Rs.250/- therefor together with the attendance details shall be forwarded to this office to consider the condonation of attendance mentioning the category.

#### 0% Attendance

The candidates who have earned 0% of attendance, have to repeat the course (by re-joining) without proceeding to succeeding semester and they have to obtain prior permission from the University to re-join the course immediately for which applications issued for the academic year.

### **6. BREAK IN STUDY**

After enrolling into any of the courses offered by the college a student is allowed to be absent continuously for period of FIVE years (Max. Condonable period- from the day of enrolment) after which she forfeits her admission.

A student who wants to continue her study within the condonable break period can rejoin in the same semester in the EXISTING VACANCY after getting the



permission from the Principal and subsequently from University of Madras. Such students should also get a letter from the respective Head of the Department stating that she is not repeating any paper which she has already completed in other semesters.

## **7. TRANSFER OF STUDENTS AND CREDITS:**

Transfer from other Autonomous or Non-Autonomous college or from other University is allowed for the same program with same nomenclature provided there is a vacancy in the respective program of study and the student has passed all the examinations under the previous system. **Students with standing arrears are NOT eligible for transfer.**

The marks obtained in the previous system will be converted and grades will be assigned as per the University norms.

Such students **are eligible** for classification.

Such student is NOT eligible for ranking, prizing and medals on qualifying the PG degree.

## **8. REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTERS**

- 1) Candidate shall register their names for the First Semester Examination after the admission in the M.Sc. Food Science, Nutrition and Dietetics Course.
- 2) Candidates shall be permitted to proceed from the first semester up to the final Semester irrespective of their failure in any of the Semester Examinations subject to the condition that the candidate should register for all arrear subjects of earlier semesters along with current (subject) semester subjects.
- 3) Candidates shall be eligible to proceed to the subsequent semester, only if they earn sufficient attendance as prescribed by the University/College.

## **9. PASSING REQUIREMENTS**

1. There shall be no passing minimum for Internal. But 0 also should not be awarded. In case a student absents herself for all the CIA exams and ends in getting 0 in internal in a particular subject, she will be awarded 1 or 2 marks for attendance.
2. For all subjects (Theory/Practical/Project) the passing requirement is as follows: i) candidate should secure not less than 50% of marks in End Semester Examination (ESE) and not less than 50% in aggregate of the total internal and external marks.
3. A candidate who passes in all subjects earning 91 credits within the maximum period of four years reckoned from the date of admission to the course shall be declared to have qualified for the degree.
4. A student who fails in either Project work or Viva-voce shall be permitted to redo the project work for evaluation and re-appear for the Viva-voce on a subsequent occasion, if so recommended by the examiners.
5. Grading shall be based on overall marks obtained (Internal + External)

## **10. MEDIUM OF INSTRUCTION AND EXAMINATIONS**

The medium of instruction and examinations for the papers of Part I & II shall be the language concerned. For part I subjects other than modern languages, the medium of instruction shall be either Tamil or English and the medium of examinations is in English/Tamil irrespective of the medium of instruction. For modern languages, the medium of instruction and examination will be in the languages concerned.

## **11. SUBMISSION OF RECORD NOTE BOOKS FOR PRACTICAL EXAMINATIONS**

Candidates appearing for practical examinations should submit Bonafide Record

Note Books prescribed for practical examinations, otherwise the candidates will not be permitted to appear for the practical examinations.

## **12. CLASSIFICATION OF SUCCESSFUL CANDIDATES**

1. A Candidate who qualifies for the Degree and secures CGPA between 9.0 – 10.0 shall be declared to have passed the examination in FIRST CLASS - EXEMPLARY provided she has passed the examination in every subject she has registered as well as in the project work in the first appearance.

2. A Candidate who qualifies for the Degree and secures CGPA between 7.5 – 8.9 shall be declared to have passed the examination in FIRST CLASS WITH DISTINCTION provided she has passed the examination in every subject he/she has registered as well as in the project work in the first appearance.

3. A candidate who qualifies for the degree as per the regulations for passing requirements and secures CGPA between 6.0 – 7.4 shall be declared to have passed the examination in FIRST CLASS

4. A candidate who qualifies for the degree as per the regulations for passing requirements and secures CGPA between 5.0 – 5.9 shall be declared to have passed the examination in SECOND CLASS

5. Only those candidates who have passed all the papers including practical and project work in the first appearance shall be considered for the purpose of RANKING.

## **13. RANKING**

1. Candidates who pass all the examinations prescribed for the course in the first appearance itself alone are eligible for Ranking / Distinction.

2. Provided in the case of candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to lack of attendance are only eligible for classification.

## 14. GRADING SYSTEM

The term grading system indicates a SEVEN (7) point scale of evaluation of the performance of students in terms of marks obtained in the Internal and External Examination, Grade points and letter grade.

Minimum Credits to be earned:

For TWO year PG Programme: Best 91 Credits (Part I: Major/Elective, Part –II: Soft skills)

Conversion of Marks to Grade Points and Letter Grade  
(Performance in a Course / Paper)

RANGE OF MARKS	GRADE POINTS	LETTER GRADE	DESCRIPTION
90-100	9.0-10.0	O	Outstanding
80-89	8.0-8.9	D+	Excellent
75-79	7.5-7.9	D	Distinction
70-74	7.0-7.4	A+	Very Good
60-69	6.0-6.9	A	Good
50-59	5.0-5.9	B	Average
40-49	4.0-4.9	U	Re-appear
ABSENT	0.0	AAA	ABSENT

## 15. CLASSIFICATION & CALCULATION OF GPA AND CGPA

For a Semester:

### GRADE POINT AVERAGE [GPA]

Sum of the multiplication of grade points by the credits of the courses

$$\text{GPA} = \frac{\text{Sum of the multiplication of grade points by the credits of the courses}}{\text{Sum of the credits of the courses in a semester}}$$

For the entire programme:

### CUMULATIVE GRADE POINT AVERAGE [CGPA]

Sum of the multiplication of grade points by the credits of the courses

$$\text{CGPA} = \frac{\text{Sum of the multiplication of grade points by the credits of the courses}}{\text{Sum of the credits of the courses of the entire programme}}$$

CGPA	GRADE	CLASSIFICATION OF FINAL RESULT
9.5-10.0	O+	First Class - Exemplary*
9.0 and above but below 9.5	O	
8.5 and above but below 9.0	D++	First Class with Distinction*
8.0 and above but below 8.5	D+	
7.5 and above but below 8.0	D	
7.0 and above but below 7.5	A++	First Class
6.5 and above but below 7.0	A+	
6.0 and above but below 6.5	A	
5.5 and above but below 6.0	B+	Second Class
5.0 and above but below 5.5	B	
0.0 and above but below 5.0	U	Re-appear

\* The candidates who have passed in the first appearance and within the prescribed semester of the PG Programme (Major, Elective/Project and Non-Major Elective courses alone) / M.Phil. are eligible.

## **16. ESE REVALUATION**

A student is eligible to appeal for revaluation of the paper only **if she secures a minimum of 10 in the internal tests (CAT) of that paper** if the internal maximum marks is 25 and **a minimum of 6 in the internal tests (CAT) of that paper** if the internal marks is 15. This has to be done within 10 days from the publication of results. She also has to pay the prescribed fee. The revaluation will be done by an external examiner appointed by the Principal.

## **17. ARREAR / REPEAT EXAMINATIONS**

1. A candidate having arrear paper(s) shall have the option to appear along with the regular semester papers.
2. Candidates who fail in any of the papers in Part I & II of PG degree examinations shall complete the paper concerned within **four** years from the date of admission to the said course.

## **18. SUPPLEMENTARY / INSTANT EXAMINATION**

1. Final year students (PG – II year 4<sup>th</sup> semester) are **only** eligible to apply for Supplementary / Instant Examination.
2. Students who have only one paper as arrear in the final semester are allowed to take up supplementary / instant examination.
3. Supplementary / Instant Examination will not be conducted for practical papers and projects.

## **19. CONCESSIONS FOR DIFFERENTLY - ABLED STUDENTS**

1. Students who are mentally disabled, learning disability and mental retardation, who are slow learners, who are mentally impaired having learning disorder and seizure disorder and students who are spastic and cerebral palsy the following concessions shall be granted obtaining prior permission from the University

- a. One-third of the time of paper may be given as extra time in the examination.
  - b. Leniency in overlooking spelling mistakes
2. Students who are visually challenged
- a. Exempted from paying examination fees.
  - b. A scribe shall be arranged by the college and the scribe be paid as per the college decision.

## **20. MALPRACTICE**

The College views malpractice of any kind very seriously. The college has a Malpractice committee consisting of four senior staff members. Students found to be directly or indirectly involved in malpractice of any kind during examinations will be subject to penalty of very high proportions.

## **21. MAXIMUM PERIOD FOR COMPLETION OF THE PROGRAMME TO QUALIFY FOR A DEGREE:**

1. A student who for whatever reasons is not able to complete the programme within the normal period (N) or minimum duration prescribed for the programme, may be allowed **TWO** year period beyond the normal period to clear the backlog to be qualified for the degree. (Time span is N + 2 years for completion of the programme)

2. In exceptional cases like major accidents and child birth, an extension of **ONE** year be considered beyond maximum span of time that is **N + 2 + 1**. Students qualifying during the extension period are **NOT** eligible for ranking.

## **22. REGULATORY BODIES**

Under autonomy, the college is free to frame its curriculum and conduct examinations. These functions are monitored by the **Board of Studies, Board of Examiners and the Academic Council.**

### **Board of Studies**

Separate Board of studies are constituted for each programme offered by a department. Each Board of Studies will meet at least once a year to design courses, modify syllabi / examination pattern and recommend the same to the Academic Council.

The Board of Studies is composed of:

- ◆ Head of the Department (Chair Person)
- ◆ A nominee of the University of Madras
- ◆ Two subject experts from other teaching institutions
- ◆ One representative from the Industry / Corporate sector / allied area relating to placement
  - ◆ One meritorious alumnus
  - ◆ The faculty of the department

The tenure of the external experts is for TWO years.

### **Board of Examiners**

A list of board of examiners is obtained by circulating the details of courses offered by the college to other colleges and through the list provided by the departments. Single valuation is done for UG courses and double valuation, one Internal and one External, for PG courses.

### **Academic Council**



The Academic Council is composed of:

- ◆ The Principal (Chairman)
- ◆ All heads of the department in the college
- ◆ Four senior teachers of the college representing different categories of teaching
- ◆ Four representatives from the Industry / Corporate sector / allied area relating to placement / Commerce / Law / Education / Medicine / Engineering nominated by the Governing Body
  - ◆ Three nominees of the University of Madras
  - ◆ A faculty member nominated by the principal (Member Secretary)

The term of the nominated members shall be TWO years.

### **23. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)**

PEO1: To hone their critical intelligence, professional behavior and strive towards creative endeavor.

PEO2: To augment research and entrepreneurial skills supplemented with rich skills of communication, teamwork and leadership to excel in their profession

PEO3: To imbibe a deep sense of rationality and in depth knowledge of the various contemporary issues that would elevate their comprehension in the global context.

### **24. PROGRAMME OUTCOMES (POs)**

PO1: Identify and analyze the complex problems reaching substantiated conclusions using domain knowledge.

PO2: Apply investigative research, specialize in problem identification,

formulate research design, utilize analytical tools, draw valid inferences and provide suggestions leading to nation building initiatives

PO3: Strengthen professional ethics and career planning with systematic building of intrapersonal and interpersonal skills to participate in the intellectual diasporas

PO4: Establish oneself as a self-reliant, empowered individual to have an inclusive, healthy and compassionate understanding towards life and society.

PO5: Equipped with technical / managerial expertise to innovate and critically analyse various attributes which constitute pivotal issues in a multidisciplinary scenario.

PO6: Emerge as innovators and pioneers to create new avenues of employment catering to the global trends as well as demands

## **25. PROGRAMME SPECIFIC OUTCOMES (PSOs)**

PSO1: Attain enhanced knowledge of the recent advancements and trends in Foods & Nutrition and its Allied Sciences

PSO2: Acquire scientific temper leading to critical thinking and research motivation in Foods & Nutrition 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 Foods & Nutrition and its Allied Sciences and apply them to enhance our life style.

## 26. QUESTION PAPER PATTERN:

### QUESTION PAPER PATTERN FOR OBE

(2020-21 onwards)

#### Theory

#### PG –Question paper Pattern- conventional on- paper mode

Bloom's Category Level	Sections	Marks	Word limit	Total	Meaning of K's
K1, K2	Multiple Choice Questions 15 questions 2 Marks (No choice)	30	Correct choice	75	K 1 & K2 - Understanding Level K 3 - Apply Level K 4 - Analyze Level K 5 - Evaluate Level K 6 - Create Level
K3, K4	Section B 5 Questions out of 7 questions *5 Marks	25	Short answers {approx. 500 Words)		
K4, K5, K6	Section C 1 out of 3 Questions *10 Marks + Compulsory Question 10 Marks	20	Elaborate answers (approx. 1000 Words)		

\* 75 marks to be converted as 60 marks.

**UG/PG QUESTION PAPER PATTERN FOR OBE ONLINE  
ASSESSMENT (2020 - 2021)**

<b>Bloom's Category Level</b>	<b>Sections</b>	<b>Marks</b>	<b>Description of answer</b>	<b>Total</b>	<b>Meaning of K's</b>		
<b>INTERNAL SETTING</b>							
K1,K2,K3	<b>Section A</b> Multiple Choice Questions 25 Questions*1 Marks (No Choice)	25X1=25	Choose the write option.	50	K 1 & K2 - Understanding Level K 3 - Apply Level K 4 - Analyze Level K 5 – Evaluate Level K 6 – Create Level		
<b>EXTERNAL SETTING</b>							
K2,k3,K4,K5,K6	<b>Section B</b> 5 out of 7 Questions *5 Marks	25	Short answers/500 Words				

**\* 50 marks to be converted as 60 marks.**

**BLOOM'S CATEGORY LEVEL (ANNEXURE chart)**

<b>S. N o</b>	<b>K compone nt scale</b>	<b>Verbs for question</b>
1.	<b>K 1&amp; K2 Verbs</b>	Verbs to be used for questioning are “choose, find, identify, indicate, match, name, state, what, when, where, which, who, cite, label, reproduce. define, list, quote, revise, explain, show, sketch, illustrate, interpret, describe, substitute, convert, give example, rephrase
2.	<b>K2 &amp; k3</b>	The questions may contain the verbs such as explain, show, sketch, illustrate, interpret, describe, substitute, convert, exam, rephrase, apply, relate, solve, classify, predict, compute, prepare
3.	<b>K4</b>	The questions may contain verbs - Apply, relate, solve, classify, predict, compute, prepare.
4.	<b>K5</b>	The questions may contain any of the following verbs : Ascertain, diagnose, distinguish, infer, associate, examine, differentiate, reduce, discriminate, dissect, determine, justify, organize, recommend, solve.
5	<b>K6</b>	The questions may contain any of the following verbs: Appraise, conclude, critique, judge, assess, contrast, deduce, weigh. Compare, criticize, evaluate.

**Question paper pattern for Continuous Assessment Test (CAT)**

**(The online assessment pattern)**

**U.G/P.G PROGRAMME**

**SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV**

**COLLEGE FOR WOMEN**

**B.Sc/M.Sc/B.A/M.A/B.Com/M.com DEGREE EXAMINATION,**

**....., 2020.**

**..... YEAR ..... SEMESTER**

**CAT – I/II/III**

**Sub Title:**

**Max. Marks: 50**

**Sub Code:**

**Date:**

**Time: 2hrs.**

**Question paper Pattern-Two Components: (Max marks=50) - 2hrs**

**I. Multiple Choice Questions (MCQ) - 20 marks (10x2=20)**

**II. Google Class Room (GCR) - 30 marks (Structured)**

**A. Section A: 5 out of 6 – each carries 2 marks (5x2=10)**

**B. Section B: 4 out of 5 – each carries 5 marks (4x5=20)**

- The answers for the questions for QP uploaded in GCR will be as uploads (images of hand written answer sheets converted to .pdf) in Google Class Room.

- The duration for each GCR session (answering and uploading) would be 3 hours (maximum).
- The structured component (30 marks) SHOULD be conducted in GCR as per the CAT schedule. MCQ (10X2=20) CAN be conducted out of schedule also, but should be completed during the CAT examination scheduled.

Note: The GCR question paper and MCQ assessment links to be shared with the COE office for approval and validity on or before the respective allotted dates.

## PROGRAMME PROFILE

### M.Sc. HOME SCIENCE - FOOD SCIENCE NUTRITION AND DIETETICS

**TOTAL CREDITS: 91**

PART	COURSE	TITLE OF THE PAPER	SUB CODE	L	T	H	C
<b>I SEMESTER</b>							
I	CORE T I	Advanced Food Science	20PNDCT 1001	4	2	6	4
I	CORE T II	Advanced Human Physiology	20PNDCT1002	4	2	6	4
I	CORE T III	Macro Nutrients	20PNDCT1003	4	2	6	4
I	CORE P I	Advanced Food Science Practical	20PNDCT1001	5	1	6	4
I	ELECTIVE I	Food Processing and Technology	20PNDCE1001	2	2	4	3
II	SKILL BASED ELECTIVE	Teaching Skills	18PSSTS1001	-	-	-	3
<b>II SEMESTER</b>							
I	CORE T IV	Research Methods in Nutrition	20PNDCT2004	4	2	6	4
I	CORE T V	Advanced Dietetics	20PNDCT2005	4	2	6	4
I	CORE T VI	Nutritional Biochemistry	20PNDCT2006	4	2	6	4
I	CORE P II	Advanced Dietetics -Practical	20PNDCT2002	5	1	6	4
I	ELECTIVE II	Perspectives of Home Science	20PNDCE2002	2	2	4	3
II	SOFT SKILLS	Swayam (MOOC)	18MOOC2002	-	-	-	4

<b>III SEMESTER</b>							
<b>I</b>	CORE T VII	Micro Nutrients	20PNDCT3007	4	2	6	<b>4</b>
<b>I</b>	CORE T VIII	Performance Nutrition	20PNDCT3008	4	2	6	<b>4</b>
<b>I</b>	CORE T IX	Food Microbiology	20PNDCT3009	<b>4</b>	<b>2</b>	<b>6</b>	<b>4</b>
<b>I</b>	CORE PIII	Techniques in Food Analysis	20PNDCP3003	<b>5</b>	<b>1</b>	<b>6</b>	<b>4</b>
<b>I</b>	ELECTIVE III	Food Product Development	20PNDDET3003	2	2	4	<b>3</b>
<b>II</b>	SKILL BASED ELECTIVE	Research Skills	18PSSRS3003	-	-	<b>4</b>	<b>3</b>
<b>II</b>	INTERN SHIP	Internship	18PNDIP3001	-	-	-	<b>2</b>
<b>IV SEMESTER</b>							
<b>I</b>	CORE T X	Public Health Nutrition	20PNDCT4010	4	2	6	<b>4</b>
<b>I</b>	CORE P IV	Food Microbiology -Practical	20PNDCT4011	5	1	6	<b>4</b>
<b>I</b>	CORE T XI	Dissertation	20PNDCP4004	-	-	<b>6</b>	<b>4</b>
<b>I</b>	ELECTIVE IV	Advanced Food Service Management	20PNDET4004	<b>2</b>	<b>2</b>	<b>4</b>	<b>3</b>
<b>I</b>	ELECTIVE V	Food Safety and Quality Control	20PNDET4005	2	2	3	<b>3</b>
<b>II</b>	EXTRA DISCIPLINARY	Swayam –(MOOC)	18MOOC4004	-	-	-	<b>4</b>

**L=Lecture Hrs; T=Tutorial Hrs; H= Hrs per week; C =Credits**



### RUBRICS FOR CONTINUOUS ASSESSMENT

S.No	Assessment Component	Marks	Weighted %
<b>A.</b>	<b>Theory</b>		
1	<b>INTERNAL ASSESSMENTS</b>		
	Continuous Assessment Test(best two out of three)	2 x 50 = 100	15
2	Quiz/Group Discussion/Seminar/Assignment/Role Play/ Case Study/ Open Book/ snap Test/ Video Presentation/ Review (any three to be considered)	3 x 10 = 30	15
3	MCQ (one test to be conducted online during the semester)	20	10
	Total Internal assessment		40
<b>B</b>	<b>Practical</b>		
1	<b>INTERNAL ASSESSMENTS</b>		
	Continuous Assessment Test(best two out of three)	2 x 50 = 100	15
2	Record + Observation	10 +10 = 20	15
3	MCQ (one test to be conducted online during the semester)	20	10

	Total Internal assessment		40
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**Assessment Model (from 2020 – 21 onwards)**  
**Postgraduation programme**  
**40% Internal 60% External**

S.No	Assessment Component	Marks	Weighted %
<b>A.</b>	<b>Theory</b>		
1	<b>INTERNAL ASSESSMENTS</b>		
	Continuous Assessment 333Test(best two out of three)	2 x 50 = 100	15
2	Quiz/Group Discussion/Seminar/Assignment/Role Play/ Case Study/ Open Book/ snap Test/ Video Presentation/ Review (any three to be considered)	3 x 10 = 30	15
3	MCQ (one test to be conducted online during the semester)	20	10
4	<b>EXTERNAL ASSESSMENT</b>		
	End semester examinations	75	60
	Grand Total		<b>100</b>
<b>B</b>	<b>Practical</b>		
1	<b>INTERNAL ASSESSMENTS</b>		
	Continuous Assessment Test(best two out of three)	2 x 50 = 100	15
2	Record + Observation	10 +10 = 20	15
3	MCQ (one test to be conducted online during the semester)	20	10
4	<b>EXTERNAL ASSESSMENT</b>		
	End semester Examinations	60	60
	Grand Total		<b>100</b>



**DEPARTMENT OF HOME SCIENCE**  
**SDNB VAISHNAV COLLEGE FOR WOMEN (AUTONOMOUS)**  
**CHENNAI-600044**

**(M. Sc. HOME SCIENCE - FOOD SCIENCE NUTRITION AND  
DIETETICS)**

**COURSE FRAME WORK**

**SEMESTER I**

SEM	COURSE CODE	COURSE TITLE	TITLE OF THE PAPER	HRS	CREDITS	CA	SE	T
I	20PNDCT1001	CORE T I	Advanced Food Science	6	4	40	60	100
I	20PNDCT1002	CORE T II	Advanced Human Physiology	6	4	40	60	100
I	20PNDCT1003	CORE T III	Macro Nutrients	6	4	40	60	100
I	20PNDCP1001	CORE P I	Advanced Food Science Practical	6	4	40	60	100
I	20PNDCE1001	ELECTIVE I	Food Processing and Technology	4	3	40	60	100
I	18PSSTS1001	SKILL BASED ELECTIVE	Teaching Skills	-	3	50	-	100
			<b>TOTAL</b>	<b>28</b>	<b>22</b>			

**CORE T-I**

**ADVANCED FOOD SCIENCE**

**TOTAL HOURS: 75**

**SUB CODE: 20PNDCT1001**

**CREDIT: 4**

**L-T-P: 4 2 0**

**COURSE OBJECTIVES:**

- To enable the students
- Gain knowledge on source and properties of food
- Familiarize students with changes occurring in various foodstuffs as a result of processing and cooking.
- Enable students to use the theoretical knowledge in various applications and food preparations.

**COURSE OUTCOME:**

On successful completion of the course the students will be able to

<b>CO No.</b>	<b>CO Statement</b>
CO1	Overview the relationship between the chemical structure and the properties of the main components in food like starch, protein and lipids.
CO2	Understand the Composition and characteristics of various food commodities.
CO3	Explain the cooking quality of foods and apply food science knowledge in food industries
CO4	Identify and understand the nutrients and functions of foods in maintaining health
CO5	Analyze the proper use of food colors and food additives in safe food preparation.

**UNIT I**

**15hrs**

Properties of food- Food nutrients, solids, solutions and colloids, Solutions-

Physical properties of solutions, classification of foods based on viscosity characteristics. Solutes-chemical properties, Food dispersion: Colloids- Types of colloid and properties of colloids and rheology of food dispersions; Structure, formation and stability of gels, sols, emulsion and foams.

Starch - Sources, Structure and composition of starch; Properties and characteristics of food starches; Modified food starches-Structure and composition, Effect of heat on food starch properties, gluten formation in wheat flour, influencing factors[gluten], gelatinization, gelation and retrogradation, dextrinization and factors affecting gelatinization.

## **UNIT II**

**15hrs**

Proteins-Structure and composition, Classification and properties of proteins; Effect of heat on physio-chemical properties of proteins; Role of proteins in food products; Texturized vegetable protein, protein concentrates.

Enzymes: Classification and its nature; Mechanism of action; Factors influencing enzyme activity; Role of enzymes in food products; Immobilized enzymes and its application in food industries.

## **UNIT III**

**15hrs**

Fats and oil -Structure, composition and properties of fats and oil; storage of fat, characteristics [shortening, plasticity, flavor, retention of moisture, melting point, optical activity, color, specific gravity], Hydrogenation, winterization, flavor reversion, smoking point, Rancidity-

Types, Mechanism and prevention; Role of fat/oil in food products; Fat substitutes.

Sugar and sugar products-Types of sugar, Types of granulated sugar, Physical and chemical properties, Sugar products -Types of honey, Jaggery, corn syrup, various forms of sugar used in cookery and Crystallization of sugar.

## **UNIT IV**

**15hrs**

Milk components- water, carbohydrate, milk fat, milk protein, minerals and other components in milk, Physiochemical properties of milk, Effect of physical and chemical factors on milk components [Effect of heat, protein, factors affecting coagulation, casein coagulation, minerals, Non-enzymatic browning], [Effects of acid], Effects of enzymes-renin, fermented and non-fermented milk products

Egg-proteins in Egg, microscopic structure of egg, characteristics [color, size], Nutritional qualities, quality check, functional properties- foaming, factors affecting foam formation.

## UNIT V

15hrs

Food additives- Definition, different food additives and Need for food additives. Flavour compounds in vegetables, fruits and spices; Effect of processing on food flavours; Role of colours and flavours in food products. Sweetners- Properties, Artificial and Natural sweetners and role of sweetners in food industry.

### TEXT BOOKS:

Srilakshmi B. (2015). Food Science. New Age International (P) Ltd. Publishers.

S.M. Reddy (2015). Basic Food science and technology. New Age International publishers.

Avantina Sharma (2017). Text book of food science and Technology. CBS Publishers and distributes ltd. 3<sup>rd</sup> Edition.

Swaminathan A. (2018). Handbook of Food and Nutrition, Bangalore press.

Serpil Sahin and Servet Gulum Sumnu. (2006). Physical properties of Foods. Springer publications

### REFERENCES:

[Gerard L. Hasenhuettl](#) , [Richard W. Hartel](#). (2019). Food Emulsifiers and Their Applications. Springer publications. 3<sup>rd</sup> edition.

Vickie.A. Vaciavik. (2021). Essentials of Food science. Springer publications. 5<sup>th</sup> edition.

Dr.M.Swaminathan.(2015). Advanced text book of Food and Nutrition. volume-2. Bapco publications.

Eskein.(2012). Biochemistry of Food. Elsevier publications.

Lyn O brien Nabors.(2001). Alternative Sweetners. Taylor and Francis publications.

Janet D. Ward and Larry Ward.(2006). Principles of Food Science. Stem Publishers. 4<sup>th</sup> Edition.

### ELEARNING RESOURCES:

[www.fao.org](http://www.fao.org)

[www.wfp.org](http://www.wfp.org)

[www.foodrisk.org](http://www.foodrisk.org)

<http://www.fsis.usda.gov/>

<https://www.fda.gov/food>



### Mapping of Co with PSO:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	2
CO2	3	3	3	2	1	2
CO3	3	3	3	3	3	2
CO4	2	3	3	2	1	3
CO5	3	3	3	2	2	3
Average	2.8	3	2.8	2.2	2	2.4

### PEDAGOGY:

Lecture, Case study, journal reviewing, Assignments, Group discussion, Power point presentations

### QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION [CONVENTIONAL MODE]

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K1,K2	A-Multiple choice questions 15x2=30	Correct choice	30	75	Fill in the blanks or choose the best answer
K3, K4	B-5/7 5x5=25marks	Not exceeding 500 words	25		Short answers: Classify Artificial sweeteners
K4,K5,K6	C-1/3 1x10=10marks <b>Compulsory Question</b> 1x10=10marks	Not exceeding 1000 words	20		Elaborate answers: Determine the role of immobilized enzymes in

					food industry.
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**\* 75 marks to be converted as 60 marks.**

**QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION  
[ONLINE MODE]**

<b>Knowledge Level</b>	<b>Section</b>	<b>Word Limit</b>	<b>Marks</b>	<b>Total</b>	<b>Special Instructions if any</b>
<b>INTERNAL SETTING</b>					
K1,K2,K3	A-Multiple choice questions [No choice] 25x1=25marks	Choose the best option	25	<b>50</b>	Choose the best answer
<b>EXTERNAL SETTING</b>					

K3, K4,K5,K6	B-5/7 5x5=25marks	Not exceedin g 500 words	25		Short answers: Illustrate the different forms of sugar
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**\* 50 marks to be converted as 60 marks.**

**CORE T II  
ADVANCED HUMAN PHYSIOLOGY**

**TOTAL HOURS: 75**

**SUBJECT CODE:20PNDCT1002**

**CREDITS: 4**

**L-T-P: 4 2 0**

**Objectives:**

This course will enable students to:

- Advance their understanding of some of the relevant issues and topics of human physiology.
- Enable the students to understand the integrated function of the system Understand alterations of structure and function in various organs and systems in disease conditions.

**COURSE OUTCOME:**

On successful completion of the course the student will be able to-

<b>CO No.</b>	<b>CO STATEMENT</b>
<b>CO 1</b>	Develop insight of normal functioning of all the organ systems of the body and their interaction. Understand the current state of knowledge about the functional organization of Human Cell and Histology.
<b>CO 2</b>	Understand the structural and functional organization of Blood and Cardiac System
<b>CO 3</b>	Understand the structural and functional organization of Respiration, Immunity and Endocrine GIT and Urinary System
<b>CO 4</b>	Comprehend the structural and functional organization Digestive System and Reproductive System
<b>CO 5</b>	Understand the structural and functional organization of Skin, Nervous and Excretory system

**UNIT I  
Cell**

**(15 HRS)**

- Structure and Function.
- Transportation across cell membrane.
- Cell theory and Cycle. Difference between Meiotic and Mitotic cell.
- Stem cells- types and functions.

**Tissue**

- Structure and Function.

**UNIT II**

**(15 HRS)**

**Blood**

- Composition & Functions
- Blood Group – ABO System & Rh factor.
- Blood Coagulation.

**Heart**

- Structure & Function of Heart and Blood Vessels.
- Systemic & Pulmonary circulation
- Cardiac cycle and Conduction.
- Heart rate and Cardiac output. ECG.
- Blood pressure & their regulations.

**UNIT III**

**(15 HRS)**

**Respiratory System**

- Structure and function.
- Gas Laws pertaining to Gas Exchange (Meaning only)-Henry's Law of Partial Pressure, Boyle - Mariotte's Law of Volume and Pressure, Dalton's Law of Partial Pressure, Charles's Law of Ideal Gas Equation and Fick's Law of Diffusion.
- Mechanism of respiration.
- Circulation and Exchange of respiratory gases. Internal and External Respiration. Chloride shift.
- Definitions of Lung volumes and Lung capacities
- Ventilation and Artificial Respiration.

**Immunity**

- Definition and types Innate and Acquire immunity.

**Endocrine System**

- Hormones and its type.
- Syndromes resulting from hypo and hyperactivity of Pituitary, Thyroid, Adrenals and Pancreas.

## UNIT IV

(15 HRS)

### **Gastrointestinal System**

- Structure and function of GI tract and its accessory organs.
- Digestion and absorption of Carbohydrates, Proteins and Fats.

### **Reproductive System**

- Roll of hormones in reproduction and Lactation.
- Menstrual Cycle and Menopause.
- Invitro (I V) fertilization
- Spermatogenesis.

## UNIT V

(15 HRS)

### **NERVOUS SYSTEM**

- Structure and Function of Neuron. Afferent and Efferent Nerves.
- Conduction of Nerve Impulse- Synapses, Neurotransmitters, Summation and Action Potential.
- Sympathetic and Parasympathetic nervous System.
- Cerebrospinal fluid (CSF) – composition and function.
- Blood-brain barrier (BBB).
- Electroencephalogram (EEG)

### **EXCRETORY SYSTEMS**

#### **Renal system**

- Organs in the Urinary System.
- Structure and functions of Nephron.
- Juxtaglomerular Cell.
- Mechanism of formation of urine,
- Role of kidney to regulate Blood pressure, Water, Electrolytes and Acid Base Balance.

#### **Skin**

- Structure and function.
- Regulation of temperature of the body.

### **TEXT BOOKS**

- K. Sembulingam&PremaSembulingam (2019), Essentials of Medical Physiology. Jaypee publications. Eighth edition.
- Waugh A, Ross and Wilson (2018). Anatomy and Physiology in Health and Illness. Elsevier publications. 13ed.
- CC Chatterjee (2020). Human Physiology. CBS publishers. 13 ed.
- Indu Khurana (2020). Medical Physiology for Undergraduate Students. Elsevier Publication. 2 Edition.

- GK Pal (2019). Textbook of human physiology, Elsevier publications. 3edition.

**REFERENCES:**

- Guyton, A.G. and Hall, J.B. (2005): Text Book of Medical Physiology. W.B.Sanders Company, Prism Books (Pvt.) Ltd., Bangalore. 9th Edition.
- Wilson, K.J.W and Waugh, A. (2003): Ross and Wilson Anatomy and Physiology in Health and Illness. Churchill Livingstone. 8th Edition.
- Jain, A.K.: Textbook of Physiology. Avichal Publishing Co., New Delhi. Vol.I and II.
- McArdle, W.D., Katch, F.I. and Katch V.L(2001): Exercise Physiology. Energy, Nutrition and Human Performance. Williams and Wilkins, Baltimore. 4th Edition.
- Ganong, W.F. (1985): Review of Medical Physiology. Lange Medical Publication. , 12th Edition.
- Moran Campbell E.J., Dickinson, C.J., Slater, J.D., Edwards. C.R.W. and Sikora, K. (1984): Clinical Physiology. ELBS, Blackwell Scientific Publications. , 5th Edition.
- McArdle, W.D., Katch, F.I. and Katch, V.L. (1996): Exercise Physiology. Energy, Nutrition and Human Performance, Williams and Wilkins, Baltimore. 4th Edition.
- Jain, A.K.: Textbook of Physiology. Avichal Publishing Co., New Delhi. Vol. I and II.
- Winword. Sear’s Anatomy and Physiology for nurses. London, Edward Arnell.
- Chatterjee ChandiCharan : Text Book of Medical Physiology, London W.B.

**E LEARNING CONTENT**

- <https://youtu.be/MZDy0RvA52Y>-Osmosis
- <https://youtu.be/TgeyiVQnVBs>- Respiratory system
- <https://youtu.be/44B0ms3XPku>- nervous system

**Mapping: (CO/PSO)**

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	1	3	3	2	3
CO2	3	1	3	3	2	3
CO3	3	1	3	3	2	3
CO4	3	1	3	3	2	3
CO5	3	1	3	3	2	3

## PEDAGOGY

Lecture, Power Point Presentation, Demonstration, Group Discussion, Assignment, Library Visits, Seminars and Oral & Written Revision.

### QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION [CONVENTIONAL MODE]

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K1,K2	A-Multiple choice questions 15x2=30	Correct choice	30	75*	Fill in the blanks or choose the best answer
K3, K4	B-5/7 5x5=25 marks	Not exceeding 500 words	25		Short answers:
K4,K5,K6	C-1/3 1x10=10 marks <b>Compulsory Question</b> 1x10=10 marks	Not exceeding 1000 words	20		Elaborate answers:

\*75 marks to be converted as 60 marks.

**QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION  
[ONLINE MODE]**

<b>Knowledge Level</b>	<b>Section</b>	<b>Word Limit</b>	<b>Marks</b>	<b>Total</b>	<b>Special Instructions if any</b>
<b>INTERNAL SETTING</b>					
K1, K2, K3	A-Multiple choice questions [No choice] 25x1=25marks	Choose the best option	25	<b>50*</b>	Choose the best answer
<b>EXTERNAL SETTING</b>					
K3, K4, K5, K6	B-5/7 5x5=25marks	Not exceeding 500 words	25		Short answers:

**\* 50 marks to be converted as 60 marks.**



**CORE: T III**  
**MACRO NUTRIENTS**

**TOTAL HOURS: 75**  
**CREDITS:4**

**SUBJECTCODE:20PNDCT1003**  
**L-T-P: 4 2 0**

**OBJECTIVE:**

To enable the students

- To understand the relationship between lipid, carbohydrate, protein and mineral metabolism.
- To learn about the therapeutic uses of carbohydrates protein and fat in prevention of non-communicable disease.
- To get insights in the inborn errors of metabolism

**COURSE OUTCOMES:**

After studying this paper, the students would know

<b>CO No.</b>	<b>CO STATEMENT</b>
CO1	The essentials of nutrients in growth and development of humans
CO2	The importance of major nutrients in maintaining human health and leading active lifestyle
CO3	The enhancement of nutritional quality of the diet.
CO4	Identify the various types & sources of food borne illness and methods of prevention.
CO5	The role of nutrients in health and diseases.

**UNIT I:**

**15 Hours**

**ENERGY-** Energy content of foods, physiological fuel value, – current research studies.

Estimation of total energy requirements (BMR, REE and physical cost of activities)

TEE, Energy balance, Basal metabolic rate, total energy requirements, BMR & RMR, Factors affecting BMR, Thermic effect of food. Changes in body weight and body composition with the changing energy balance, Regulation of food intake- role of hunger and satiety centers. Energy balance and obesity.

**UNIT II: 15 Hours**

**CARBOHYDRATES** – Adaptive effects of dietary carbohydrates on intestinal disaccharides activity in man. Therapeutic uses of carbohydrates – sugars in parenteral nutrition (glucose, fructose and xylitol). Glycemic index of foods and its uses. Toxic effects of fructose, xylitol and galactose. Sugar alternatives, Role of dietary fiber in health and disease.

Role of carbohydrates in dental caries, obesity, CVD's and Diabetes Mellitus and current research studies.

**UNIT III: 15 Hours**

**PROTEIN** – Historical review of protein metabolism, amino acid patterns in protein & of animals and vegetable origin, critical study of methods of assessment of protein quality. Physiological functions of proteins. Essential amino acids, amino acid balance and imbalance, requirement of individual amino acid. Role of protein in health and disease. Supplementation of individual amino acid.

**UNIT IV: 15 Hours**

**LIPIDS** – Concepts of visible and invisible fats, EFA, SFA, MUFA, PUFA, omega-6 to omega-3 ratios. – sources and physiological functions and their role in health and disease. Adipose tissue – Lipogenesis and Lipolysis, lipoproteins – types and health implication.

Storage of body fat, effects of deficiency and excess of fat. Fat substitutes, Hypocholesterolaemic foods – garlic, fiber and plant proteins.

**UNIT V: 15 Hours**

**WATER** – Distribution of water in the body, exchange of water in the body. Water imbalance – dehydration- water intoxication, water and electrolyte mechanism - ADH, vasopressin.

**TEXT 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. 9<sup>th</sup> 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’s Food Nutrition and Diet Therapy. W.B. Saunder’s company, Philadelphia. 10<sup>th</sup> edition.

**REFERENCES:**

- Guthire, H.A., (2001). Introductory Nutrition. C.V. Mosby Company, St. Louis. Tenth edition.
- Bogert, J.G.V., Briggs, D.H., & Calloway, (2000). Nutrition and physical fitness. W.B. Saunders Co., Philadelphia, London, Toronto. 11<sup>th</sup> edition.
- Brown, J.E., (2002). Nutrition Now. Wadsworth Thomson Learning New York. 3<sup>rd</sup> edition.
- Toteja, G. S. (2004). *Micronutrient profile of Indian population*. Indian Council of Medical Research Publication, New Delhi.
- Swaminathan, M., (2002). Principles of Nutrition and Dietetics. BAPPCO, 88, Mysore Road. Bangalore – 560 018.
- Jain, J.L., Jain, S., & Jain, N., (2005). Fundamentals of Biochemistry. S. CHAND & COMPANY Ltd. Ram nagar, New Delhi-110 055. 6<sup>th</sup> revised edition.

**E- LEARNING RESOURCES:**

[www.nutrition.gov](http://www.nutrition.gov) – Service of National agricultural library, USDA  
[www.nal.usdfa.gov/fnic](http://www.nal.usdfa.gov/fnic) - Food and nutrition information center  
[www.fantaproject.org](http://www.fantaproject.org)- Fanta technical assistance for nutrition  
<http://dietary-supplements.info.nih.gov> – Officer of dietary supplements, national institute of health.

**MAPPING (CO/PSO):**

<b>CO/PS O</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>	<b>PSO 6</b>
<b>CO1</b>	3	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3	3
<b>CO4</b>	2	2	3	3	3	3
<b>CO5</b>	2	2	2	3	3	2
<b>Average</b>	<b>2.6</b>	<b>2.6</b>	<b>2.8</b>	<b>3</b>	<b>3</b>	<b>2.8</b>

**PEDAGOGY:**

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

**QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION  
[CONVENTIONAL MODE]**

<b>Knowledge Level</b>	<b>Section</b>	<b>Word Limit</b>	<b>Marks</b>	<b>Total</b>	<b>Special Instructions if any</b>
K1,K2	A-Multiple choice questions 30x1=30	Correct choice	30	<b>75</b>	Fill in the blanks or choose the best answer
K3, K4	B-5/7 5x5=25marks	Not exceeding 500 words	25		Short answers
K4,K5,K6	C-1/3 1x10=10marks <b>Compulsory Question</b> 1x10=10marks	Not exceeding 1000 words	20		Elaborate answers

**\* 75 marks to be converted as 60 marks.**

**QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION  
[ONLINE MODE]**

<b>Knowledge Level</b>	<b>Section</b>	<b>Word Limit</b>	<b>Marks</b>	<b>Total</b>	<b>Special Instructions if any</b>
<b>INTERNAL SETTING</b>					
K1, K2, K3	A-Multiple choice questions [No choice] 25x1=25marks	Choose the best option	25	<b>50</b>	Choose the best answer
<b>EXTERNAL SETTING</b>					
K3, K4, K5, K6	B-5/7 5x5=25marks	Not exceeding 500 words	25		Short answers

**\* 50 marks to be converted as 60 marks.**

**CORE P I**  
**ADVANCED FOOD SCIENCE PRACTICAL**

**TOTALHOURS: 75**  
**CREDIT: 4**

**SUB CODE: 20PNDCP1001**  
**L-T-P: 5 1 6**

**COURSE OBJECTIVES:**

To enable the students

Comprehend the knowledge gained on characteristics and properties of foods during cooking

Apply the properties of food in various food processing and preparations

Analyse the factors affecting cooking quality of foods

Create appropriate food preparation and processing methods to ensure quality standards.

**COURSE OUTCOME:**

On successful completion of the course the students will be able to

<b>CO No.</b>	<b>CO Statement</b>
CO1	Gain knowledge on sensory analysis and cereal cookery concept
CO2	Understand the properties of various food.
CO3	Analyze the cooking quality of foods and apply knowledge in food industries.
CO4	Identify and understand the Physical characteristics.
CO5	Revise appropriate food preparation and processing methods to ensure standards in food industry.

**UNIT -1****15 HRS**

1. Sensory method –  
Analysis of taste sensitivity-Threshold test  
Duo –Trio test  
Multiple sample difference
2. Starch  
Microscopic structure and gelatinization.  
Factors affecting gelatinization –sag test.  
Gluten formation

**UNIT -2****15 HRS**

1. PULSE  
Factors affecting cooking quality
2. FRUIT  
Enzymatic browning  
Pectin test  
Firmness of gel

**UNIT -3****15 HRS**

1. VEGETABLE  
Various method of cooking fat soluble and water-soluble pigment.
2. MILK  
Detecting the presence of starch, soda, starch, urea in milk sample.  
pH of milk sample.  
Effect of acid on milk  
Maillard reaction.

**UNIT -4****15 HRS**

1. SUGAR  
Relative sweetness of sugar- sucrose, maltose, lactose, fructose, dextrose, glucose, artificial sweeteners  
Stages of sugar cookery  
Effect of dextrose, jaggery, honey and cream of tartar on sucrose.
2. FATS AND OIL  
Smoking point – Groundnut oil, coconut oil, Gingelly oil, Olive oil, Vanaspati, Ghee, Refined Sunflower oil, Rice bran oil.  
Cooking temperature and fat absorption- – Groundnut oil, coconut oil, Gingelly oil, Refined Sunflower oil, Rice bran oil.

## UNIT -5

15 HRS

1. PHYSICAL PROPERTIES
  - a. Thousand grain weight
  - b. Thousand grain volume
  - c. Hydration capacity
  - d. Hydration index
  - e. Swelling capacity
  - f. Specific gravity
  - g. Seed displacement test
  - h. Viscosity - Line spread test, Viscometer.
2. Adulteration

### TEXT BOOKS:

Srilakshmi B. (2015). Food Science, New Age International (P) Ltd. Publishers.

Potter N. and Hotchkiss J.H. (1996). Food Science, Fifth ed., CBS Publishers and Distributors, New Delhi

Avantinasharma (2017). Text book of food science and Technology. CBS Publisheres and distributes ltd. 3rd Edition.

Reddy S M. (2015). Basic Food science and technology. New Age International publishers. 2<sup>ND</sup> edition.

### REFERENCES:

Swaminathan A (1979) . Food Science And Experimental Foods, Ganesh And Company Madras. 3<sup>rd</sup> edition.

Bennion, Marion and O. Hughes (2001). Introductory Foods. Edi: mac millian N. Y. 1<sup>st</sup> edition.

Eskein . (2012). Biochemistry of Food. Elsievier publications

Desrosier, N.W. and James N. (2007). Technology of food preservation. AVI Publishers.

Manay, S. and Shadaksharamasamy, (2004) .Food: Facts and Principles, New Age International Publishers, New Delhi. 1<sup>st</sup> edition.

### ELEARNING RESOURCES

<http://www.fao.org/3/V5030E/V5030E00.htm>

<https://fmtmagazine.in/fruits-vegetables-processing-technologies/>



[www.fao.org](http://www.fao.org)

[www.wfp.org](http://www.wfp.org)

[Learn Microbiology with Online Courses and Classes | edX](#)

### Mapping of CO with PSO:

CO/PSO	PSO1	PSO2	PSO3	PSO 4	PSO 5	PSO 6
CO1	3	3	2	3	3	2
CO2	3	3	3	2	3	3
CO3	3	2	3	3	3	3
CO4	3	3	3	2	2	3
CO5	3	3	2	3	3	2
Average	3	2.8	2.6	2.8	2.8	2.6

### PEDAGOGY

Experiments, Planning recipes , Group Discussion, Assignments, .

### ELECTIVE I FOOD PROCESSING AND TECHNOLOGY

**TOTAL HOURS: 75**  
**CREDIT: 3**

**SUB CODE: 20PNDCE1001**  
**L-T-P: 2 2 0**

### COURSE OBJECTIVES:

To enable the students:

1. Understand the science behind processing of foods and its impact on nutritive value of food stuffs.
2. Acquire in-depth knowledge on production of processed food products and the waste utilization techniques.
3. Understand the changes in physicochemical properties of foods due to processing condition.
4. Understand the various parameters related to post-harvest technology.

### COURSE OUTCOME:

On successful completion of the course the students will be able to

CO No.	CO Statement
CO1	The concepts and principles of food processing.

CO2	The various processed food products from plant and animal sources.
CO3	The by-products utilization from food processing.
CO4	The systematic knowledge of basic and applied aspects in food processing and technology.
CO5	The various post-harvest technologies for different food products

### UNIT-I

**15 Hours**

Processing of foods: Primary, secondary and tertiary processing, historical perspective, traditional technologies used in food processing. Effects of processing on components, properties and nutritional value of foods.

Enzymes in Food Processing: Enzyme- Review of classification, enzyme inhibitors, enzymatic browning.

### UNIT-II

**15 Hours**

#### **Cereal Processing and Technology:**

Rice: parboiling, milling and pearling; Processing and milling of wheat, maize, barley, oats and rye.

Millets: processing of millets;

Cereal Products: Flours and its quality; Processed products of rice, wheat and maize; By products utilization; breakfast cereals and extrusion; Effect of processing on nutritive value of cereals; changes in physiochemical properties of cereal starch and protein due to processing.

Milling process: Complete milling process, break rolls, reduction rolls, milled products and their nutritive value and applications

#### **Pulse Processing and Technology:**

Dals, flours, protein concentrates, isolates and hydrolysates; Byproducts utilization; Effect of processing on nutritive value and physiochemical properties of pulses.

#### **Nuts and Oil Seeds Processing and Technology:**

Nuts Processing methods, Oil seeds processing: Oil extraction methods and refining process; byproducts utilization; Effect of processing on nutritive value and physiochemical properties of vegetable oils.

### UNIT-III

**15 Hours**

#### **Vegetables Processing and Technology:**

Pigments: Classification, effects on processing of vegetables; Preliminary processing of vegetables;

Vegetable products: Fermented and nonfermented and its shelf life; Vegetable waste utilization; Effect of processing on nutritive value and physiochemical properties of vegetables.

### **Fruits Processing and Technology:**

Concept of maturity, ripening and senescence; Methods of fruit processing technologies: traditional and new methods.

Fruit products: fermented and nonfermented; Effect of processing on nutritive value and physiochemical properties of fruits;

Browning reactions: types and mechanism; prevention methods; Fruit waste utilization.

### **Milk Processing and Technology:**

Milk types, composition, physiochemical properties; Milk processing- Separation, centrifugal process, natural creaming, pasteurization, sterilization, homogenization. Milk storage; Effects of processing on nutritive value and physiochemical properties of milk;

## **UNIT-IV**

**15 Hours**

### **Egg Processing and Technology:**

Egg processing and storage; Effect of processing on nutritive value and physiochemical properties of eggs; changes in egg quality during storage and preservation methods.

### **Meat Processing and Technology:**

Meat processing and storage; Factors influencing meat quality; Ageing and tenderization of meat.

Poultry: Processing and storage of poultry meat; Preservation methods for poultry.

Fish: Processing and storage; Preservation methods for fish. Effect of processing on nutritive value and physiochemical properties of meat, poultry and fish.

## **UNIT-V**

**15 Hours**

### **Introduction of post-harvest technology**

Introduction to post-harvest technology of agricultural produce; Status of Production, Losses, Need, Scope and Importance.

Post-Harvest Loss- Definition, Factors contributing to Post-harvest Loss; and Technologies and Practices to reduce Post-harvest Losses.

## **TEXTBOOKS**

Shakuntala Manay N ShadakCheraswamyM . (2004) Food Facts and Principles. New age publisher . 2<sup>nd</sup> edition.

Roday S. (2011) .Food Science. Oxford publication . 1<sup>st</sup> edition.

B Srilakshmi (2015)Food science. New Age Publishers. 6<sup>th</sup> edition.

Fellows P.(2000). Food Processing Technology, 2nd Edition.

Woodhead Publishing Limited and CRC Press LLC. 1<sup>st</sup> edition.

Avantina Sharma. (2017).Text book of food science and Technology. CBS Publisheres and distributes ltd. 3<sup>rd</sup> edition.

## REFERENCES

Raocg . (2006 ).Essentials of food process engineering . PHI learning private ltd.

Janet D Ward and Larry Ward.(2006). Principles of Food Science . Stem Publishers. 4<sup>th</sup> edition.

Srivastava R P and Kumar S. (2006 ) Fruits and Vegetables Preservation- Principles and Practices. International Book Distributing Co. 3<sup>rd</sup> edition.

W B Crusess.(2004). Commercial Unit and Vegetable Products. W.V. Special Indian Edition, PubAgrobios India . 2<sup>nd</sup> edition.

Forsythe S J and Hayes P R (1998). Food Hygiene, Microbiology and HACCP. GaitersburgMaryland Aspen.

Eskein .(2012). Biochemistry of Food. Elsievier publications. 1<sup>st</sup> edition.

## ELEARNING RESOURCES:

<http://www.fao.org/3/V5030E/V5030E00.htm>

<https://fmtmagazine.in/fruits-vegetables-processing-technologies/>

[https://www.actioncontrelafaim.org/wp-content/uploads/2018/01/technical\\_paper\\_phl.pdf](https://www.actioncontrelafaim.org/wp-content/uploads/2018/01/technical_paper_phl.pdf)

<https://www.nutsforlife.com.au/resource/nuts-and-processing/>

<https://www.fssai.gov.in/>

## MAPPING (CO/PSO):

CO/PO	PSO 1	PSO2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	2	2	2
CO2	3	3	2	2	3	2
CO3	2	3	2	1	2	2
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	2.8	3	2.6	2.2	2.6	2.4

## PEDAGOGY:

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

**QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION  
[CONVENTIONAL MODE]**

<b>Knowledge Level</b>	<b>Section</b>	<b>Word Limit</b>	<b>Marks</b>	<b>Total</b>	<b>Special Instructions if any</b>
K1,K2	A-Multiple choice questions 15x2=30	Correct choice	30	75	-
K3, K4	B-5/7 5x5=25marks	Not exceeding 500 words	25		-
K4,K5,K6	C-1/3 1x10=10marks <b>Compulsory Question</b> 1x10=10marks	Not exceeding 1000 words	20		-

**\* 75 marks to be converted as 60 marks.**

**QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION  
[ONLINE MODE]**

<b>Knowledge Level</b>	<b>Section</b>	<b>Word Limit</b>	<b>Marks</b>	<b>Total</b>	<b>Special Instructions if Any</b>
<b>INTERNAL SETTING</b>					

K1,K2,K3	A-Multiple choice questions[No choice] 25x1=25marks	Choose the best option	25	50	-
<b>EXTERNAL SETTING</b>					
K3, K4,K5,K6	B-5/7 5x5=25marks	Not exceeding 500 words	25		-

**\* 50 marks to be converted as 60 marks.**

## SEMESTER II

SEM	COURSE CODE	COURSE TITLE	TITLE OF THE PAPER	HRS	CREDITS	CA	SE	T
II	20PNDCT2004	CORE T IV	Research Methods in Nutrition	6	4	40	60	100
II	20PNDCT2005	CORE T V	Advanced Dietetics	6	4	40	60	100
II	20PNDCT2006	CORE T VI	Nutritional Biochemistry	6	4	40	60	100
II	20PNDCP2002	CORE P II	Advanced Dietetics -Practical	6	4	40	60	100
II	20PNDCE2002	ELECTIVE II	Perspectives of Home Science	4	3	40	60	100
II	18MOOC2002	SOFT SKILLS	Swayam (MOOC)	-	4	50	-	100
			<b>TOTAL</b>	<b>28</b>	<b>23</b>			

**SEMESTER II**  
**CORE: T IV**  
**RESEARCH METHODS IN NUTRITION**

**TOTAL HOURS: 75**  
**CREDIT: 4**

**SUB CODE: 20PNDCT2004**  
**L-T-P: 4 2 0**

**OBJECTIVES:**

To provide students understandings about the basic concepts, approaches and methods in conducting research thereby enabling them to appreciate and critique the nuances of designing a research study as well the ethical dimensions of conducting researches.

To explain the importance of research in food science and nutrition.

To make students understand the types of tools applicable to research problem and develop skills of preparing out line of research work and construct common data collection tools.

**COURSE OUTCOME:**

On successful completion of the course the student will be able to

<b>CO No.</b>	<b>CO STATEMENT</b>
<b>CO 1</b>	Demonstrate knowledge of the scientific method, purpose and approaches to research and Become a qualified researcher.
<b>CO 2</b>	Identify and selection of the research sampling and scales of measurement
<b>CO 3</b>	Understand the types of tools applicable to research problem and develop skills of preparing out line of research work and construct common data collection tools
<b>CO 4</b>	Assess the numerical data for providing statistical evidences to support the research results and interpretation of data with the use of tables and pictorial representations
<b>CO 5</b>	Present research data in a scientific manner and Understand the key elements of a research report and various applications of computer in Nutrition research

**Unit 1: Foundation of Nutrition Research**

**(15 HRS)**



1. Meaning, Objectives and Classification of Research Designs –**Exploratory, Descriptive** – Longitudinal and Cross sectional, Observation-Participant and Non-participant, Epidemiological Surveillance, Retrospective, IN VIVO, IN VITRO and **Experimental** – Pre-Experimental, Quasi Experimental, True Experimental and Statistical Experimental designs.

2. Need of Research in Food Science and Nutrition

3. Research Process-

- Selection and Formulation of Research Problem
- Objectives of Research: Explanation, Control and Prediction
- Hypothesis: Definition, Importance, Types and Errors - I & II
- Deciding Variables

## **Unit 2: Sampling and Sample Design**

**(15 HRS)**

1. Sampling Process and Characteristics of good Sampling
2. Classification of Sampling Techniques - Probability and Non Probability Sampling
3. Preparation of Laboratory Food Samples
4. Sampling and Non- Sampling Errors

### **Measurements and Scaling -**

#### **1. Fundamental and Comparative Scales – Meaning and types**

- Nominal Scale
- Ordinal Scale
- Interval Scale
- Ratio Scale

#### **2. Non comparative Scales– Meaning and types**

1. Continuous Rating Scale
2. Itemized Rating Scale
  - Likert Scale
  - Semantic Differential Scale
  - Stapel Scale

## **Unit 3: Data Collection and Preparation**

**(15 HRS)**

### **1. Data Collection – Tools –**

#### **o Primary Data**

1. Interviews -structured and unstructured 2. Case studies 3. Questionnaire

4. Surveys – Pilot & KAP5. Laboratory Experiments

#### **o Secondary Data**

1. Published Sources

2. Unpublished Sources

2. **Reliability and Validity** of Tools– Meaning

3. **Data Preparation Process –**

- Editing
- Coding
- Classification
- Tabulation

**Unit 4: Statistical Methods**

**(15 HRS)**

1. **Parametric and Non-Parametric tests –** Difference and Applications

2. **Data Analysis Process-**

1. **Descriptive Analysis-**

- Graphical and Diagrammatic Presentations
- Central Tendency – Mean, Median & Mode
- Dispersion -Standard Deviation

2. **Statistical Inference – Tests of Hypothesis**

- t – test
- ANOVA – One Way & Two Way
- Chi- square test – Goodness of Fit & Test of Independence

**Unit 5: Reporting the Findings and Computer Applications (15 HRS)**

1. **Report Writing –**

- Importance
- Types
- Mechanics
- Guidelines and Precautions
- End Notes- Bibliography, Appendices, Footnotes and Glossary of

terms

2. **Computer Applications in Nutrition Research- importance and Uses**

3. **Applicable Statistical Analysis Software-**

- **Literature Searching**-PubMed
- **Data Analysis**- Micro Soft Excel, SPSS, Minitab
- **Plagiarism Checker** – Turnitin, Scribbr
- **Reference Manager** - Mendeley

**TEXTBOOKS**

● Kothari C R (2004). Research Methodology – Methods & Methodology. Delhi, New Age International Pvt Ltd. 2<sup>nd</sup> Ed.

- Chawla, Deepak and Neena Sondhi (2018): Research Methodology - Concepts and Cases. Noida, Vikas Publishing House Pvt Ltd. 2<sup>nd</sup> Ed.
- Gupta, S P (2019). Statistical Methods. New Delhi. S Chand & Sons. 45<sup>th</sup> Ed.
- Copper, H.M. (2002). Intergrating Research : A guide for literature reviews. California: Sage, 2<sup>nd</sup> Edition.
- Kerlinger, Foundation of Educational Research Ingle P.O. Scientific Report Writing. Nagpur, Sarla P. Ingle.

## REFERENCES

- Ranjit Kumar (2011). Research Methodology: a step-by-step guide for beginners, SAGE Publications. 3<sup>rd</sup> edition.
- Anderson, David R and et.al.(2013) : Statistics for Business and Economics. Delhi, Cengage Learning India Pvt Ltd. 11<sup>th</sup> 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. 4<sup>th</sup> Ed.
- Danial, Wayne W and Chad L Cross (2017): Biostatistics – Basic Concepts and Methodology For the Health Sciences – International Student Version. New Delhi, ArEmmInternatnal, 10<sup>th</sup> Ed.

## Mapping: (CO/PSO)

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO6
CO1	1	3	2	2	3	2
CO2	1	1	1	0	2	1
CO3	3	3	3	3	3	2
CO4	1	3	3	0	3	1
CO5	3	2	3	0	0	1
<b>Average</b>	<b>1.8</b>	<b>2.4</b>	<b>2.4</b>	<b>1</b>	<b>2.2</b>	<b>1.4</b>

## PEDAGOGY

Lecture, Power Point Presentation, Demonstration, Group Discussion, Assignment, Seminars and Oral & Written Revision

**QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION  
[CONVENTIONAL MODE]**

<b>Knowledge Level</b>	<b>Section</b>	<b>Word Limit</b>	<b>Marks</b>	<b>Total</b>	<b>Special Instructions if any</b>
K1, K2	A-Multiple choice questions 30x1=30	Correct choice	30	75	Fill in the blanks or choose the best answer
K3, K4	B-5/7 5x5=25marks	Not exceeding 500 words	25		Short answers:
K4, K5, K6	C-1/3 1x10=10marks <b>Compulsory Question</b> 1x10=10marks	Not exceeding 1000 words	20		Elaborate answers:

**\* 75 marks to be converted as 60 marks.**

**QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION  
[ONLINE MODE]**

<b>Knowledge Level</b>	<b>Section</b>	<b>Word Limit</b>	<b>Marks</b>	<b>Total</b>	<b>Special Instructions if</b>
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					<b>any</b>	
<b>INTERNAL SETTING</b>						
K1, K2, K3	A-Multiple choice questions [No choice] 25x1=25marks	Choose the best option	25	<b>50</b>	Choose the best answer	
<b>EXTERNAL SETTING</b>						
K3, K4, K5, K6.	B-5/7 5x5=25marks	Not exceeding 500 words	25		Short answers:	

**\* 50 marks to be converted as 60 marks.**

### CORE T V ADVANCED DIETETICS

**TOTAL HOURS: 75**  
**CREDIT: 4**

**SUB CODE: 20PNDCP2005**  
**L-T-P: 4 2 0**

**COURSE OBJECTIVES:**

- To acquire Knowledge regarding the effect of various diseases on nutritional status and nutrient requirement
- To understand the modifications in nutrients and dietary requirements for therapeutic condition.
- To Learn recent concepts in dietary management of different diseases.

**COURSE OUTCOME:**

On successful completion of the course the students will be able to

CO No.	CO Statement
<b>CO1</b>	Critique the Nutritional screening technique
<b>CO2</b>	Comprehend the current concepts of therapeutic diets and critically ill
<b>CO3</b>	Implement the dietary principles on various disorders.

<b>CO4</b>	Acquire the knowledge of diet counseling skills.
<b>CO5</b>	Apply the dietary principles to manage the lifestyle disorders in the society

### **UNITI**

**15hrs**

Nutritional screening, Nutritional care process, Nutritional Assessment, Nutritional diagnosis, Nutritional Intervention, Monitoring and evaluation.

Basic concepts of diet therapy – Therapeutic adaptations of Normal diet, Principles and classification of therapeutic diets. Routine Hospital diets – Regular, soft, fluid diet

Nutritional Management in critical care -Nutritional screening and nutritional Status assessment of critically ill, Nutritional requirement according to the critical condition

Nutritional support systems: Enteral and parenteral nutrition support- Types, composition and complications.

### **UNITII**

**15hrs**

#### **Medical Nutrition therapy for gastrointestinal and liver disorders**

UpperGastrointestinal tract Diseases – Nutritional care and diet therapy in Diseases of oesophagus - Oesophagitis, Gastro esophageal refluxdisease[GERD] and Hiatus hernia.

Disorders of stomach: Indigestion, Gastritis, Gastric and duodenal ulcers, and dumping syndrome

Lower gastrointestinal tract Diseases/Disorders-Common Symptoms of Intestinal dysfunction - Flatulence, constipation, haemorrhoids, diarrhoea, steatorrhoea, Diseases of the large intestine-Diverticular disease, Irritable bowel syndrome, inflammatory bowel disease

Diseases of Small intestine-Celiac disease, tropical sprue, intestinal brush border enzyme deficiencies.

Diseases of the Liver- hepatitis, hepatic coma, cirrhosis, cholecystitis, cholelithiasis and pancreatitis, Zollinger Ellison syndrome and Biliary dyskinesia.

### **UNITIII**

**15hrs**

Medical Nutrition therapy for Pulmonary disease-Effect of Malnutrition on pulmonary system, effect of pulmonary disease on nutritional status, chronic pulmonary diseases- Asthma, cystic fibrosis, chronic obstructive pulmonary disease and Pneumonia- Pathophysiology and dietary management.

Medical Nutrition therapy for Rheumatic disease- Etiology, Pathophysiology of Inflammation of Rheumatic diseases, Rheumatoid Arthritis, Osteoarthritis and Sjogren syndrome.

Nutritional management of physiological stress- Classification, Complications, Metabolic changes in protein and electrolytes and Dietary management of burns, dietary management of trauma and stress.

#### **UNITIV**

**15hrs**

Nutritional Management on Weight imbalance -Regulation of food intake and pathogenesis of obesity and malnutrition and starvation; Weight Imbalance: prevalence and classification.

Underweight -Etiology and Dietary management; Obesity-Etiology, classification, Energy balance, dietary modifications and Bariatric surgery- types and dietary modifications of pre and post bariatricsurgery.

Nutritional Management in metabolic disorders- Prevalence, Etiology, risk factors, complications and dietary modifications of diabetes mellitus.

#### **UNITV**

**15hrs**

Nutritional management of cardiovascular diseases-etiology, risk factors, clinical features and dietary modifications of Dyslipidemias, Atherosclerosis, Hypertension, Ischemic heart disease, Congestive cardiac failure.

Nutrition Management of Renal Disease -Etiology, Clinical and metabolic manifestations, Diagnostic tests, Types-Glomerulonephritis, Nephrotic syndrome, Renal Failure: Acute and chronic, ESRD, Nephrolithiasis and Dietary modifications.

Nutritional management in cancer- Pathogenesis and progression of cancer, types, Symptoms and Dietary management.

#### **TEXT BOOKS:**

Mahan L.K., Sylvia Escott-Stump.(2000).Krause's Food Nutrition and Diet Therapy.W.B. Saunders Company London. 10<sup>th</sup> edition.

B. Srilakshmi. (2007).Dietetics. K.K. Gupta For New age International Pvt. Ltd. New Delhi Publisher.

Antia F.P. And Philip Abraham.(2001).Clinical Nutrition and Dietetics.Oxford Publishing Company.

Passmore P. And M.A. East Wood.(Digitised in 2010).Human Nutrition And Dietetics.Churchill Living Stone.

S.R.Mudambi.M.K.Rajagopal.(2009).Fundamentals, Food Nutrition and Diet therapy.New Age Publishers. 5<sup>th</sup> edition.

Robinson Ch., M.B. Lawlea, W.L., Chenoweth, And A.E., Carwick.(1990).Basic Nutrition and Diet therapy, Macmillan Publishing Company.

**REFERENCES:**

- Garrow JS, James WPT, Ralph A.(2000). Human Nutrition and Dietetics.Churchill Livingstone, NY. 10<sup>th</sup> edition.
- Groff L James, Gropper S Sareen.(2000). Advanced Nutrition and Human Metabolism.West / Wadsworth, UK. 3<sup>rd</sup> edition.
- Sue Rodwell Williams. (1993).Nutrition, Diet Therapy.W.B. Saunders Company London. 7<sup>th</sup> edition.
- Whitney, E. N. and C. B..Cataldo.(1983). Understanding Normal and Clinical Nutrition. West Pub. S1. Paul.

**E-LEARNING RESOURCES:**

- [www.nutrition.gov](http://www.nutrition.gov) - Service of National agricultural library, USDA.
- [www.nal.usda.gov/fnic](http://www.nal.usda.gov/fnic) -Food and Nutrition information centre.
- [www.healthyeating.org](http://www.healthyeating.org).
- [www.eatrightpro.org](http://www.eatrightpro.org).
- <https://www.globalhealthlearning.org>.

**Mapping of Co with PSO:**

CO/PSO	PSO 1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	1	2
CO2	2	3	3	3	1	2
CO3	3	3	3	3	1	3
CO4	2	3	3	3	1	2
CO5	3	3	3	3	1	3
<b>Average</b>	2.6	3	2.8	3	1	2.4

**PEDAGOGY**

Lecture, journal reviewing, Assignments, Power point presentations, video presentations.

**QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION  
[CONVENTIONAL MODE]**



Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K1,K2	A-Multiple choice questions 15x2=30	Correct choice	30	75	Fill in the blanks or choose the best answer
K3, K4	B-5/7 5x5=25marks	Not exceeding 500 words	25		Short answers: Classify Hypertension
K4,K5,K6	C-1/3 1x10=10marks <b>Compulsory Question</b> 1x10=10marks	Not exceeding 1000 words	20		Elaborate answers: Determine the role of medical nutrition therapy in cancer

\* 75 marks to be converted as 60 marks.

**QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION  
[ONLINE MODE]**

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
<b>INTERNAL SETTING</b>					
K1,K2,K3	A-Multiple choice questions[No choice] 25x1=25marks	Choose the best option	25	50	Choose the best answer

EXTERNAL SETTING					
K3, K4,K5,K6	B-5/7 5x5=25marks	Not exceeding 500 words	25		Short answers: Illustrate the different types of hospital diet

**\* 50 marks to be converted as 60 marks.**

**CORE TVI**  
**NUTRITIONAL BIOCHEMISTRY**

**TOTALHOURS:75**

**SUBCODE: 20PNDCT2006**

**CREDIT:4**

**L-T-P: 4-2-0**

**COURSE OBJECTIVES**

1. Understand the need for the study of biochemistry as the basis for nutritional sciences.
2. Make students aware of metabolism of proximate principles and others.
3. A basic understanding of the functions of biological systems in relation to Nutritional biochemistry.

**COURSE OUTCOME:**

On completion of the course the students will be able to...

<b>CO No.</b>	<b>CO Statement</b>
<b>CO1</b>	Understand the role of enzymes and co enzymes in biological oxidation.
<b>CO2</b>	Gain knowledge on metabolism and regulation of carbohydrate.
<b>CO3</b>	Understand the concept of metabolism and bioenergetics of lipids.
<b>CO4</b>	Discuss the classification, structure, organization and metabolic pathway of protein.
<b>CO5</b>	Comprehend the biological metabolism and functions of nucleic acid and understand recent concepts in biochemistry.

**UNIT I**

15hrs

Biological oxidation and enzymes

Biological oxidation, Electron transport chain and Oxidative Phosphorylation.

Enzymes – Definition, Types , mechanism of action, factors affecting enzyme activity, coenzyme, role of b vitamin as coenzyme.

Free radicals – definition, formation in biological systems. Antioxidants – definition, Role of antioxidants in prevention of degenerative disorders

**UNIT 2**

15hrs

Metabolism of Carbohydrates: Glycolysis, The Citric Acid Cycle, glycogenesis, glycogenolysis, gluconeogenesis, The Hexose Monophosphate Shunt and bioenergetics.

Hormonal regulations of blood glucose homeostasis

**UNIT 3**

15hrs

Protein and amino acid metabolism

Classification of amino acids, Oxidative Deamination, decarboxylation, transamination and transmethylation of amino acids, urea cycle, biosynthesis of non-essential amino acids, catabolism of essential amino acids. Protein biosynthesis.

**UNIT 4**

15hrs

Metabolism of Lipids:

Classification of fatty acid, Biosynthesis of fatty acids, beta oxidation of fatty acids and ketone bodies. Essential fatty acids – types and functions. Metabolism of phospholipids, and cholesterol. Lipo proteins – classification and function.

**UNIT 5**

15hrs

Overview of intermediary metabolism of carbohydrates, protein and lipid.

Hormonal regulation of carbohydrate protein and fat metabolism

Structural components and functions of nucleic acid, Structure of DNA, DNA Replication, RNA synthesis – types and functions and metabolism, translation.

Recombinant DNA technology, Metabolism of Xenobiotics, Nutrigenomics

**TEXT BOOKS**

1. Jain, J.L., Jain, S., & Jain, N., (2005). Fundamentals of Biochemistry. S. CHAND & COMPANY Ltd. Ram nagar, New Delhi-110 055. 6<sup>th</sup> revised edition.
2. Bettelheim, F. A., Brown, W. H., Campbell, M. K., & Farrell, S. O. (2009). *General, Organic & Biochemistry*. Brooks/Cole Cengage Learning.
3. Champe, P. C., Harvey, R. A., & Ferrier, D. R. (2005). *Biochemistry*. Lippincott Williams & Wilkins, 6<sup>th</sup> Edition, Wolters Kluwer, London.
4. Talwar, G. P., & Srivastava, L. M. (2002). *Textbook of biochemistry and human biology*. PHI Learning Pvt. Ltd..
5. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2000): 25th Ed. Harpers Biochemistry. Macmillan worth publishers.

#### REFERENCE BOOK

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.

#### E-LEARNING RESOURCES:

<https://www.udemy.com/share/1027yA/>

<https://www.classcentral.com/course/swayam-biochemistry-5229>

<https://www.classcentral.com/course/edx-biochemistry-biomolecules-methods-and-mechanisms-12585>

<https://www.classcentral.com/course/swayam-experimental-biochemistry-12909>

<https://youtu.be/y6YGZfcAegw>

**Mapping of CO with PSO:**

CO/PSO	PSO 1	PSO 2	PSO 3	PSO4	PSO 5	PSO 6
CO1	3	3	2	1	1	3
CO2	3	3	2	1	1	3
CO3	3	3	2	1	1	3
CO4	3	3	2	1	1	3
CO5	3	3	3	1	1	3
Average	3	3	2.2	1	1	3

**PEDAGOGY (TEACHING METHODOLOGY):**

Group Discussion, Case study, seminar, journal reviewing, Assignments, Power point presentations.

**QUESTION PAPER PATTERN END SEMESTER EXAMINATION  
(PAPER MODE)**

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if Any
K1, K2	Section A (Answer any five question)	Correct choice	10X1= 30	75*	-
K3, K4	Section B (Answer any five question out of 7 Question)	Short answers {approx. 500 Words)	5X5 = 25		
K4, K5, K6	Section C 1 out of 3 Questions *10 Marks	Elaborate answers (approx.	2X10 = 10		

	+ Compulsory Question 10 Marks	1000 Words)			
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**\* 75 marks to be converted as 60 marks.**

**UG/PG QUESTION PAPER PATTERN FOR OBE ONLINE  
ASSESSMENT (2020 – 2021)**

<b>Knowledge Level</b>	<b>Section</b>	<b>Word Limit</b>	<b>Marks</b>	<b>Total</b>	<b>Special Instructions if Any</b>
<b>INTERNAL SETTING</b>					
K1,K2,K3	<b>Section A</b> Multiple Choice Questions 25 Questions *1 Marks (No Choice)	Choose the write option	25X1=25	50	-

EXTERNAL SETTING					
K2,K3,K4,K5 ,K6	Section B 5 out of 7 Questions *5 Marks	Short answers/500 Words	5x5 = 25		
	Section C				

**\*50 marks to be converted as 60 marks.**

**CORE P II  
ADVANCED DIETETICS PRACTICALS**

**TOTALHOURS: 75  
CREDIT: 4**

**SUB CODE:20PNDCP2002  
L-T-P: 5 1 6**

**COURSE OBJECTIVES:**

To acquire Knowledge in planning diets for various disorders  
To gain knowledge in diet counselling and educating patients.  
To understand the therapeutic modifications of diet.

**COURSE OUTCOME:**



On successful completion of the course the students will be able to

CO No.	CO Statement
CO1	Evaluate various therapeutic diets
CO2	Identify the requirements for disease conditions and critically ill patients.
CO3	Assess and plan the diets for various disease conditions.
CO4	Create Knowledge in nutrient calculations and dietary principles.
CO5	Design the personalized diets for different individuals in the society

1. Routine hospital diet : Regular diet, Clear liquid, Soft diet, Full liquid diet and Planning and preparing Enteral feed plan [8hrs].
2. Assessing requirements and planning diet for obese and underweight individual[6hrs]
3. Planning and preparing diet for Diabetes Mellitus[IDDM and NIDDM] [6hrs].
4. Planning and preparation of diet for Atherosclerosis with hypertension[6hrs]
5. Assessing and planning diets for the following conditions[13hrs]
  - a. Celiac disease
  - b. Lactose intolerance.
  - c. GERD
  - d. Peptic ulcer
  - e. Hepatitis
  - f. Cirrhosis
6. Planning and preparing diet for Pneumonia [6hrs]
7. Planning and preparing diet for Rheumatic arthritis[6hrs]
8. Planning and preparation of diet for Glomerulonephritis[6hrs]
9. Planning and preparation of diet for cancer according to the condition.[6hr]
10. Planning and Preparing diet for pre and post Bariatric surgery patients.[6hrs]
11. Assessment and planning diet for post burn condition[6hrs].

**TEXTBOOKS:**

- Stump SE.(2012).Nutrition and diagnosis related care. Lippincott Williams and Wilkins. Canada.7<sup>th</sup> edition.
- Width.M&Reinhardt.T. (2018).The Essential Pocket Guide for Clinical Nutrition.Wolters Kluwer Publishers. 2<sup>nd</sup> edition.
- Whitney EN and RolfesSR.(2002). Understanding Nutrition, 9th edition, West/Wordsworth.
- Guthrie H.(2002). Introductory Nutrition. CV Mosby Co.St. Louis.
- Elia M, Ljungqvist O, Stratton RJ, Lanham SA.(2013). Clinical Nutrition. The Nutrition Society Textbook.Wiley Blackwell Publishers.2<sup>nd</sup> edition.
- Mitch, W. and Ikizler, Alp.(2010). Handbook of Nutrition and the Kidney.Lippincott Williams and Wilkins, New Delhi.6<sup>th</sup> edition.
- Mahan LK, Stump SE and Raymond JL.(2012). Krause's Food and Nutrition Care Process.Elsevier Saunders.Missouri.13<sup>th</sup> edition.

**REFERENCES:**

- Gopalan C., Ram Sastri B.V. And BalSubramaniam S.C. (2006). Nutritive Value of Indian Foods. Hyderabad, National Institute of Nutrition. Indian Council of Medical Research.
- Clinical Dietetics Manual.(2018). Indian Dietetic Association. 2<sup>nd</sup> edition.
- Peggy Stanfield.Y.H.Hui.(2010). Nutrition and Diet therapy. Jones and Bartlett publishers.
- William's. (2012).Basic Nutrition and Diet therapy.14<sup>th</sup> Edition.

**E-LEARNING RESOURCES:**

- [www.nutrition.gov](http://www.nutrition.gov) - Service of National agricultural library, USDA.
- [www.nal.usda.gov/fnic](http://www.nal.usda.gov/fnic) -Food and Nutrition information centre.
- [www.healthyeating.org](http://www.healthyeating.org).
- [www.eatrightpro.org](http://www.eatrightpro.org).
- <https://www.globalhealthlearning.org>.

**Mapping: (CO/PSO)**

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO 5	PSO6
CO1	2	3	3	3	1	2
CO2	3	3	3	3	1	3
CO3	3	2	3	3	2	3
CO4	3	2	3	3	3	2

<b>CO5</b>	3	3	3	3	3	3
<b>Average</b>	<b>2.8</b>	<b>2.6</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2.6</b>

**PEDAGOGY**

Group Discussion, Case study, Assignments, Planning menus in charts.

**ELECTIVE II  
PERSPECTIVES OF HOME SCIENCE**

**TOTALHOURS: 75  
CREDIT: 3**

**SUB CODE:20PNDCE2002  
L-T-P: 2 2 0**

## OBJECTIVES:

To enable students to have a sound knowledge in various branches of Home Science for strengthening the extension and research base.

## SPECIFIC OBJECTIVES OF LEARNING:

On successful completion of these units, students are expected :

- To describe the importance of each branch of Home Science
- To understand the essence of each subject
- To prepare them for UGC NET, SLET and ASRB

## COURSE OUTCOME:

On successful completion of the course the student will be able to-

CO No.	CO STATEMENT
CO 1	Understand the concept of Extension Education and its importance
CO 2	Comprehend the key aspects of human growth and development and realize the importance of mastering developmental tasks of each life span stage
CO 3	Understand the basic concepts of Textile and Clothing
CO 4	List personal goals and values, set living standards
CO 5	Understand the meaning of Guidance and Counselling and Career perspectives in Home Science

### UNIT – I Extension Education (15 HRS)

- Meaning, Definition, objectives, characteristics, principles
- Extension teaching methods- types and methods
- Qualities of a good Extension Worker
- Communication, Innovation and Social change

### UNIT – II Human Development (15 HRS)

- Growth, Development, Maturation and Learning
- Principles and Developmental stages & Task
- Parental Disciplinary Techniques – merits and demerits
- Early Childhood Education – Objectives. Types of Nursery Schools.
- Exceptional children – Deaf, Blindness, Physical Impairment, Mental Retarded and Giftedness . Rehabilitation.

### UNIT – III Textiles and Clothing (15 HRS)

- Classification and General properties textile fibres.
- Processing and manufacture of Cotton, Silk, Wool and Rayon fibres.

- c. Yarn: Classification.
- d. Fabric construction - woven, non-woven and knitted fabric
- e. Clothing: selection for the family.

**UNIT – IV Family Resource Management (15 HRS)**

- a. Home Management – Meaning, objectives and process
- b. Resources - Classification and characteristics
- c. Time, Money and Energy management
- d. Decision making - Steps and Methods of resolving conflicts
- e. Work simplification - Importance of work simplification. Mundel’s classes of Change
- f. Principles and Elements of Interior design, Various colours and colour schemes.

**UNIT – V-Guidance and Counselling (15 HRS)**

- a. Meaning, nature, types and scope of guidance and counselling
- b. Various steps and techniques of Guidance and counselling
- c. Need and importance of educational guidance.

**TEXTBOOKS:**

1. Jha, J.K. (2002). Encyclopaedia of Teaching of Home Science, Vol.I,II and III . New Delhi: Anmol Publications.
2. Suriakanthi.A., (2002). Child Development - An Introduction Gandhigram: Kavitha Publications.
3. Srilakshmi.B. (2015). Food Science. New Delhi. New Age International Pvt.Ltd.  
PremlataMullick (2016), 4<sup>TH</sup> edition, Kalyani Publishers.

**REFERENCES:**

1. Serene and Ahlawat Santos Shekhar (2013), Textbook of Home Science Extension Education.
2. Tami James Moore and Sylvia M.Asay (2008), Family Resource Management, Sage Publications.
3. Diane E. Papalia (2004), 9<sup>th</sup> edition, Human Development, McGraw Hill India.
4. Rani K. Sudha and Srivastava Sushila, Textbook of Human Development: A lifespan development approach, S. Chand & Co Ltd.

**Mapping: (CO/PSO)**

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	1	3	3	1	3
CO2	3	2	3	3	2	3
CO3	3	2	3	3	1	3
CO4	3	2	3	3	1	3
CO5	3	1	3	3	1	3
<b>Average</b>	<b>3</b>	<b>1.6</b>	<b>3</b>	<b>3</b>	<b>1.2</b>	<b>3</b>

### PEDAGOGY

Lecture, Power Point Presentation, Demonstration, Group Discussion, Assignment, Library Visits, Seminars and Oral & Written Revision.

### QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION [CONVENTIONAL MODE]

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if Any
K1, K2	A-Multiple choice questions 30x1=30	Correct choice	30	75	Fill in the blanks or choose the best answer
K3, K4	B-5/7 5x5=25marks	Not exceeding 500 words	25		Short answers:
K4, K5, K6	C-1/3 1x10=10marks <b>Compulsory Question</b> 1x10=10marks	Not exceeding 1000 words	20		Elaborate answers:

**\* 75 marks to be converted as 60 marks.**

**QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION  
[ONLINE MODE]**

<b>Knowledge Level</b>	<b>Section</b>	<b>Word Limit</b>	<b>Marks</b>	<b>Total</b>	<b>Special Instructions if any</b>	
<b>INTERNAL SETTING</b>						
K1, K2, K3	A-Multiple choice questions[No choice] 25x1=25marks	Choose the best option	25	<b>50</b>	Choose the best answer	
<b>EXTERNAL SETTING</b>						
K3, K4, K5, K6	B-5/7 5x5=25marks	Not exceeding 500 words	25		Short answers:	

**\* 50 marks to be converted as 60 marks.**

### SEMESTER III

SEM	COURSE CODE	COURSE TITLE	TITLE OF THE PAPER	HRS	CREDITS	CA	SE	T
III	20PNDCT3007	CORE T VII	Micro Nutrients	6	4	40	60	100
III	20PNDCT3008	CORE T VIII	Performance Nutrition	6	4	40	60	100
III	20PNDCT3009	CORE T IX	Food Microbiology	6	4	40	60	100
III	20PNDCP3003	CORE PIII	Techniques in Food Analysis	6	4	40	60	100
III	20PNDET3003	ELECTIV E III	Food Product Development	4	3	40	60	100
III	18PSSRS3003	SKILL BASED ELECTIV E	Research Skills	-	3	50	-	100
III	18PNDIP3001	INTERNSHIP	Internship	-	2	50	-	50
			<b>TOTAL</b>	<b>28</b>	<b>24</b>			



**CORE T VII**  
**MICRONUTRIENTS**

**TOTAL HOURS:75**

**SUBCODE: 20PNDCT3007**

**CREDIT: 4**

**L-T-P: 4-2-0**

**COURSE OBJECTIVES**

1. To enables the students to learn the functions, deficiency symptoms, food sources and requirements of the different micro nutrients.
2. To Gain knowledge of nutrients requirement and management of micronutrients during various stages of life and disease
3. To gain insight about recent concept and findings in field of nutrition and application of the same to prevent disease

**COURSE OUTCOMES:**

On completion of the course the students will be able to...

<b>CO No.</b>	<b>CO Statement</b>
CO1	Evaluate the specific role of functional foods and nutraceuticals in prevention of degenerative disease.
CO2	Understand the importance of micronutrients in growth and development of humans.
CO3	Analyse the importance of diet in maintaining human health to combat nutrient deficiency in the community
CO4	Gain in-depth knowledge of the physiological and metabolic functions of vitamins and minerals and their implications
CO5	Analyse the recent advances in the field of micronutrient and research for the welfare of the community

**UNIT I:**

**15 hours**

Distribution in the body; functions, effects of deficiency, food sources, requirement and recent research of macro minerals - Calcium, Phosphorous, Magnesium, Potassium, Sodium and Chloride.

**UNIT – II****15 hours**

Distribution in the body, functions, food sources, requirement deficiency, toxicity and recent research of micro minerals and trace minerals. Micro minerals - iron, zinc, fluoride, copper, iodine and manganese. Trace Minerals -Selenium, cobalt, chromium, silicon, boron and nickel  
Selenium and Vitamin E relationship, Chromium and glucose tolerance factor.

**UNIT III:****15 hours**

Distribution in the body, functions, food sources, requirement deficiency, toxicity and recent research of Fat Soluble Vitamins A,D,E and K

**UNIT IV:****15 hours**

Distribution in the body, functions, food sources, requirement deficiency, toxicity and recent research of Water soluble vitamins – Water soluble vitamins: vitamin C, thiamine, riboflavin, niacin, pantothenic acid, biotin, folic acid, vitamin B12, vitamin B 6, choline and inositol.

**UNIT V:****15 hours****RECENT CONCEPTS IN NUTRITION:**

Immunonutrients and Antioxidants

Definition, classification and function of functional food and nutraceuticals.

Antinutrients present in various food groups – Cereals , legumes and nuts and oilseeds

Food and drug interaction.

**TEXT BOOKS**

1. Guthrie, H.A. (2001) – “Introductory Nutrition”, Tenth edition, C.V. Mosby Company, St. Louis.
2. Bogert, J.G.V., Briggs,D.H, Calloway, (2000). “ Nutrition and physical fitness”, 11<sup>th</sup> edition W.B. Saunders Co., Philadelphia, London, Toronto.
3. Wardlaw, G.M and Kessel, M, (2002) “ Pererspective in Nutrition”, 5<sup>th</sup>edition, Mc Graw Hill, New York, New Delhi.
4. Willium, S. R. (2000), “ Nutrition and Diet Therapy”, Mosby Co., St. Louis.
5. Sizer, F.S and Whitney E. R. (2003), “ Nutrition , Concepts and Controversies” 9<sup>th</sup> edition, Thomas Wadsworth, Australia.

## REFERENCE BOOK

1. Brown, J.E. (2002), “Nutrition Now”, 3<sup>rd</sup> edition, Wadsworth Thomson Learning New York.
2. Maurice, E. Shils, James A. Olson, Moshe Shike, (2000), “ Modern Nutrition in Health and Disease”, 8<sup>th</sup> Edition, Vol I and II, Lea &Febiger Philadelphia, A Waverly Company.
3. Mahan L.K. and Stamp, S.E (2000), “Krause’s Food Nutrition and Diet Therapy”, 11<sup>th</sup> edition, W.B. saunder’s Company, Philadelphia.
4. Toteja, G.S and Singh P (2004), “ Micronutrient Profile of Indian Population”, ICMR Publication, New Delhi.
5. D. M. Swaminathan (2002), “ Principles of Nutrition and Dietetics”, BAPPCO, 88, Mysore RoadBangalore – 560 018.

## E-LEARNINGRESOURCES:

<https://www.udemy.com/share/1027yA/>

[WHO | The e-learning platform Nutrition Knowledge Hub launch](#)

[WFP Nutrition's Learning Platform - UN World Food Programme](#)

[Nutrition Online Courses | Coursera](#)

[E-Learning Programs \(nestlenutrition-institute.org\)](#)

[WFP Nutrition's Learning Platform | Humanitarian Library](#)

## Mapping: (CO/PSO)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	2	3
CO2	3	3	3	3	2	3
CO3	3	3	3	3	2	3
CO4	3	3	3	3	2	3
CO5	3	3	3	3	2	3
Average	3	3	3	3	2	3

## PEDAGOGY (TEACHING METHODOLOGY):

Group Discussion, Case study, seminar, journal reviewing, Assignments, Power point presentations.

**QUESTION PAPER PATTERN END SEMESTER EXAMINATION  
(PAPER MODE)**

<b>Knowledge Level</b>	<b>Section</b>	<b>Word Limit</b>	<b>Marks</b>	<b>Total</b>	<b>Special Instructions if any</b>
K1, K2	Section A (Answer any five question)	Correct any choice	10X1= 30	75	-
K3, K4	Section B (Answer any five question out of 7 Question)	Short answers {approx. 500 Words)	5X5 = 25		
K4, K5,k6	Section C 1 out of 3 Questions *10 Marks + Compulsory Question 10 Marks	Elaborate answers (approx. 1000 Words)	2X10= 10		

**\* 75 marks to be converted as 60 marks.**

**UG/PG QUESTION PAPER PATTERN FOR OBE ONLINE  
ASSESSMENT (2020 – 2021)**

<b>Knowledge Level</b>	<b>Section</b>	<b>Word Limit</b>	<b>Marks</b>	<b>Total</b>	<b>Special Instructions if any</b>
<b>INTERNAL SETTING</b>					
K1,K2,K3	<b>Section A</b> Multiple Choice Questions 25 Questions *1 Marks (No Choice)	Choose the write option	25X1=25	50	-
<b>EXTERNAL SETTING</b>					
K2,K3,K4, K5,K6	<b>Section B</b> 5 out of 7 Questions *5 Marks	Short answers/500 Words	5x5 = 25		

**\*50 marks to be converted as 60 marks.**

**CORE T VIII**  
**PERFORMANCE NUTRITION**

**TOTAL HOURS: 75**  
**CREDIT: 4**

**SUB CODE: 20PNDCT3008**  
**L-T-P: 4 2 0**

**COURSE OBJECTIVES:**

To enable the students to

Learn about the role of nutrients in enhancing Sports Performance.

Understand the fundamentals of planning diet for different sports.

Know about the different types of sports supplements and nutrition for special athletes.

**COURSE OUTCOME:**

On successful completion of the course the students will be able to

<b>CO No.</b>	<b>CO Statement</b>
CO1	Analyze and assess the body composition of athlete.
CO2	Comprehend the role of Macro and micronutrients towards athletic performance
CO3	Emphasize the role of nutrition in competitive performance and for special needs.
CO4	Retrieving the various sports supplements and Ergogenic aids for the athletes.
CO5	Apply personalized nutrition guidance in the area of sports nutrition.

**UNIT I**

**15hrs**

Nutritional assessment for athletes-assessment of body composition, techniques of measuring body composition, surface anthropometry, Biochemical, clinical and dietary

assessment, Body composition and sports performance.

Energy requirements for optimal athletic performance- Energy production, Energy metabolism in Athletes, Fatigue and exercise, energy requirements of athletes, factors affecting energy requirements of athletes.

#### **UNITII**

**15hrs**

Carbohydrates in sports performance- Carbohydrate types, Glycaemic index and Glycaemic load, carbohydrate utilization during exercise, carbohydrate loading, fuelling before during and after exercise, carbohydrate requirements for athletes.

Protein and fat requirement for sports performance -protein and exercise, requirements of protein and fat for athletes, factors affecting protein requirements, protein needs and vegetarian athletes.

#### **UNITIII**

**15hrs**

Micronutrients in sports- vitamins and mineral requirements in athletes, sports anaemia, antioxidants and exercise induced free radicals.

Hydration for athletes- Fluid balance and thermoregulation, fluid and electrolyte requirements for athletes, Effects of dehydration, factors affecting fluid intake, gastric emptying and fluid delivery to working muscles, Fluid intake before, during and after exercise.

#### **UNITIV**

**15hrs**

Nutrition for competition performance-Nutrient timing, pre-competition nutritional guidelines, nutrition during exercise and nutrition after exercise, nutrition plan for specific sports events.

Ergogenic aids- Categories of Ergogenic aids and Ergolytics.

Sports foods-sports drinks, sports gels, Sports energy bars and sports gels.

#### **UNITV**

**15hrs**

Nutrition for athletes with special dietary needs- Nutrition for special population like children, young and older athlete, Female athlete triad, weight loss and weight gain in athletes, vegetarian athlete, diabetic athlete, athletes with disabilities, factors affecting nutritional needs for travel athlete, GI stress and athletes.

#### **TEXT BOOK:**

Deakin, Burke.(2006). Clinical Sports Nutrition.McGraw-Hill Australia.3<sup>rd</sup> edition.

Bean, Anit. (2010).The complete guide to Sports Nutrition.A&C.Black. London.6<sup>th</sup> edition.

Bourns, Fred.(2002).Essentials of Sports Nutrition. John and Wiley. 2<sup>nd</sup> edition.

B.Srilakshmi, Suganthi.v, C.Kalaivani Ashok.(2017). Exercise physiology fitness and sports Nutrition, New age publishers. 1<sup>st</sup> edition.

Benardot, Dan. (2000).Advanced Sports Nutrition. Human Kinetics.

#### **REFERENCES:**

Burke, Louise. (2007).Practical Sports Nutrition.Human Kinetics.

Gleeson, Jeukendrup.(2004).Sports Nutrition: An Introduction to Energy Production and Performance.Human Kinetics.  
 Suzanne Girard Eberle.(2000).Endurance Sports Nutrition.Human Kinetics.  
 Natalie DigateMuth.(2015).Sports Nutrition for health professionals.QuincyMcdonald.  
 D. Enette Larson-Meyer.(1963).Vegetarian sports nutrition.Human kinetics.

**E-LEARNING RESOURCES:**

<http://ijpnpa.biomedcentral.com>

www.acsm.org

www.ausport.govt.au

www.sportsci.org

www.gssiweb.com

**Mapping of Co with PSO:**

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	3	3	1	2
CO2	2	2	2	3	1	2
CO3	2	3	3	3	1	1
CO4	3	3	3	3	1	1
CO5	2	2	3	3	2	3
<b>Average</b>	<b>2.2</b>	<b>2.6</b>	<b>2.8</b>	<b>3</b>	<b>1.2</b>	<b>1.8</b>

**PEDAGOGY**

Lecture, Case study, journal reviewing, Assignments, Group discussion, Power point presentations.

**QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION  
 [CONVENTIONAL MODE]**

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if Any
K1,K2	A-Multiple choice questions 15x2=30	Correct choice	30	75	Choose the best answer
K3, K4	B-5/7 5x5=25marks	Not exceeding 500 words	25		Short answers: Describe the weight gain



					and weight loss for athletes
K4,K5,K6	<b>C-1/3</b> 1x10=10marks <b>Compulsory Question</b> 1x10=10marks	Not exceeding 1000 words	20		Elaborate answers: Recommend the nutrition guidelines for diabetic and disabled athletes

**\* 75 marks to be converted as 60 marks.**

**QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION  
[ONLINE MODE]**

<b>Knowledge Level</b>	<b>Section</b>	<b>Word Limit</b>	<b>Marks</b>	<b>Total</b>	<b>Special Instructions if any</b>
<b>INTERNAL SETTING</b>					
K1,K2,K3	A-Multiple choice questions[No choice] 25x1=25marks	Choose the best option		<b>50*</b>	Choose the best answer
<b>EXTERNAL SETTING</b>					
K3, K4,K5,K6	<b>5/7</b> 5=25marks	Not exceeding 500 words			Short answers: Relate the Energy production and metabolism with performance

					of the athletes.
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**\* 50 marks to be converted as 60 marks.**

**CORE T IX  
FOOD MICROBIOLOGY**

**TOTAL HOURS: 75**

**SUBCODE: 20PNDCT3009**

**CREDIT: 4**

**L-T-P: 4-2-0**

**COURSE OBJECTIVES**

- To understand the nature of microorganisms involved in food spoilage, food infections and food fermentation
- To gain knowledge of principles of various techniques used in the prevention and control of the microorganisms in foods (food preservation).
- To understand the advanced concept of microorganism and factors affecting the growth of the same.

**COURSE OUTCOMES:**

On completion of the course the students will be able to...

CO No.	CO Statement
CO1	Acquire the knowledge on the advanced concepts of microbial spoilage of various foods and its intoxication.

CO2	Relate the theoretical knowledge with sampling and various microscopic observation methods.
CO3	Understand the various concepts related to microorganism in human welfare.
CO4	Apply knowledge in field of food preservation and its recent advances.
CO5	Comprehend the knowledge gained on the concepts of food borne diseases and to assess the microbiological quality of food

### **UNIT I**

**15 hours**

Definition and classification of microorganism. General morphology of microorganism – bacteria, fungi, algae, yeast and virus. Microbial growth –growth curve, factors affecting growth: intrinsic factors, nutrient content, pH, redox potential, antimicrobial barrier and water activity; extrinsic factors: relative humidity, temperature and gaseous atmosphere.

Economic importance of yeast, mold and bacteria.

Normal microbiological quality of foods and its significance.

### **UNIT II:**

**15 hours**

Sampling, sample collection, transport and storage, sample preparation for analysis. Microscopic and culture dependent method- Direct microscopic observation, culture, enumeration and isolation methods.

### **BENEFICIAL USE OF MICROORGANISAM IN FOOD**

Definition of fermentation, Microbiology of fermented foods, types of starter cultures used for food fermentation.

Cereal,pulse, milk, fruit and vegetable based fermented products of India/Asian countries.

Concept of probiotics,prebiotics, synbiotics, single cell protein and psychobiotics

### **UNIT III**

**15 hours**

Food spoilage: Definition of food spoilage and classification of food on ease of spoilage,contamination and spoilage of different groups of foods - Cereal and cereal products, vegetables and fruits, meat poultry and sea foods, milk and milk products and canned food

## UNIT IV

15 hours

Principles of food preservation. Physical methods and chemical methods – high temperature, Principles and techniques of canning, low temperature, chemical and natural preservatives, dehydration, food irradiation, hurdle technology.

Food biopreservatives of microbial origin.

Application of microbial enzymes in food industry.

## UNIT V

15 hours

Food borne diseases: Definition, Bacterial food borne diseases (Staphylococcal intoxication, Botulism, Salmonellosis, Shigellosis, Escherichia Coli, Clostridium Perfringens gastroenteritis, Bacillus cereus Gastroenteritis).

Mycotoxins and Viral gastroenteritis.

## TEXT BOOKS

1. Frazier, W.C and Westhoff, D.C.(2013), Food Microbiology, Tata McGraw Hill Publishing Co., Ltd. New Delhi.
2. Anna K.Joshua, (2001). Microbiology, Popular Book Depot.Chennai-15.
3. Ray, B. (2001) Fundamental Food Microbiology, 2nd Ed, CRC press, Boca Raton.
- Joshi, V. K., & Pandey, A. (Eds.). (1999). *Biotechnology: food fermentation: microbiology, biochemistry, and technology* (Vol. 1). Educational publishers & distributors.
5. Crueger, W., & Crueger, A., (2003). Biotechnology: A textbook of Industrial Microbiology 2nd Edition, Panima Publishing Corporation, New Delhi.

## REFERENCE BOOK

1. Guttierrez-Lopez, G. F., and Barbosa-Canovas, G. V., (2003). Food Science and Food Biotechnology CRC press, USA.
2. Morello, J. A. (2003). *A Laboratory Manual And Workbook in Microbiology*. B
3. 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.
4. Kathleen, T., & Chess, B. (2018). *Foundations in microbiology*.
5. Doyle, M. P., Diez-Gonzalez, F., & Hill, C. (Eds.). (2020). *Food microbiology: fundamentals and frontiers*. John Wiley & Sons.
6. Pelczar, M. J., Chan, E. C. S., & Krieg, N. R. (2006). Microbiology 5th edition.
7. Prescott, L. M., Harley, J.P., & Klein, D.A., (2008). Microbiology. 6th ed. WMC Brown.

**E-LEARNING RESOURCES:**

[Top Microbiology Courses - Learn Microbiology Online | Coursera](#)

[Learn Microbiology with Online Courses and Classes | edX](#)

[72 Online studies in Microbiology - DistanceLearningPortal.com](#)

[Microbiology Free Online Courses and MOOCs | MOOC List \(mooc-list.com\)](#)

[Virtual Microbiology Classroom: 8-week micro course from Science Prof Online](#)

**Mapping: (CO/PSO)**

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	2	1	3
CO2	3	3	2	1	2	3
CO3	3	3	2	1	3	3
CO4	3	3	1	1	3	3
CO5	3	2	3	3	2	3
<b>Average</b>	<b>3</b>	<b>2.8</b>	<b>2.2</b>	<b>1.6</b>	<b>2.2</b>	<b>2.2</b>

**KEY:****PEDAGOGY (TEACHING METHODOLOGY):**

Group Discussion, Case study, seminar, journal reviewing, Assignments, Power point presentations.

**QUESTION PAPER PATTERN END SEMESTER EXAMINATION  
(PAPER MODE)**

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K1, K2	Section A (Answer any five)	Correct choice	10X1=30		

	question)				
K3, K4	Section B (Answer any five question out of 7 Question)	Short answers {approx. 500 Words)	5X5 = 25	75	-
K4, K5,k6	Section C 1 out of 3 Questions *10 Marks + Compulsory Question 10 Marks	Elaborate answers (approx. 1000 Words)	2X10 = 10		

\* 75 marks to be converted as 60 marks.

**UG/PG QUESTION PAPER PATTERN FOR OBE  
ONLINE ASSESSEMENT (2020 – 2021)**

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
<b>INTERNAL SETTING</b>					
K1,K2,K3	<b>Section A</b> Multiple Choice Questions 25 Questions	Choose the write option	25X1=25		
				50	

	*1 Marks (No Choice)				
<b>EXTERNAL SETTING</b>					
K2,K3,K4,K5,K6	Section B 5 out of 7 Questions *5 Marks	Short answers/500 Words	5x5 = 25		

**\*50 marks to be converted as 60 marks.**

**CORE: P III  
TECHNIQUES IN FOOD ANALYSIS**

**TOTALHOURS: 75      SUB CODE:20PNDCP3003  
CREDIT: 4              L-T-P: 5 1 6**

**OBJECTIVES:**

To enable students to:

- Learn the techniques of estimating the quantity of different nutrients present in food.
- To enable the students to get practical experience in the laboratory and develop the skills to undertake research work

**COURSE OUTCOME:**

On successful completion of the course the student will be able to-

<b>CO No.</b>	<b>CO STATEMENT</b>
CO 1	Understand safety rules for the laboratory and demonstrate various instruments used for food analysis.
CO 2	Acquire skills to prepare and standardise various solutions to conduct experiments for food analysis.
CO 3	Acquire skills in ashing of foods and prepare ash solution to analyse mineral contents in food.
CO 4	Demonstrate quantitative analysis of various nutrients in foods i.e. crude fibre, moisture, Vit -C, calcium, phosphorus, iron, etc.
CO 5	Demonstrate experiments to check estimation of protein, fat content and Pigment Analysis

**Unit – 1 (15 HRS)****1. Introduction to Laboratory Practices****2. Instrumental Techniques –**

- Autoclave
- Hot Air Oven
- pH Meter
- Electronic Weighing Balance
- Centrifuges
- Hot Plate
- Spectrophotometer
- Water Bath
- Muffle Furnace
- Viscometer
- IR Moisture Analyzer
- Colorimeter

**Unit – 2 (8 HRS)****Preparation and Standardisation of Solution****Unit – 3 (12 HRS)****Ashing of Food (Thermogravimetric Method) and Preparation of Ash Solution****Unit – 4 (25 HRS)**



## Food Analysis Experiments – Estimation of –

- Moisture Content – Thermogravimetric Analysis -Air Oven Method and Infrared Radiation(IR) Moisture Analyzer Method
- Crude Fibre–Gravimetric Method
- Iodine Number of oils – Wij’s Method
- Acid Number of oils - Titrimetric Method
- Peroxide Value of oils - Titrimetric Method
- Ascorbic Acid – 2, 6- Dichloroindophenol Titrimetric Method
- Calcium -Precipitation Titrimetric Method
- Iron – Wong’s Method
- Phosphorus–Colorimetric Method

## Unit – 5

(15 HRS)

### Demonstration Experiments

- Estimation of protein content in food by Kjeldahl method
- Estimation of fat content in food by Soxhlet method
- Pigment Analysis by Paper Chromatography Techniques

### TEXT BOOKS AND REFERENCES:

- S. Suzanne Nielsen (2017). Food Analysis Laboratory Manual. Springer International Publishing. Third Edition.
- S. Suzanne Nielsen (2017). Food Analysis. Springer International Publishing. Fifth Edition.
- Otlés, S. (2005). “Methods of Analysis of Food Components and Additives” CRC Press, USA.
- Ranganna, S. (2001). “Handbook of Analysis and Quality Control for Fruit and Vegetable Products”. Tata-McGraw- Hill, India. 2<sup>nd</sup> edition.
- Sadasivam, S and Manickam, A (1997). “Biochemical Methods”. New Age International Publishers, New Delhi. 2<sup>nd</sup> Edition.
- Jayaram, I, (1996), “Laboratory Manual in Biochemistry”, New Age International Publishers, New Delhi. Fifth ed.
- Raghuramulu, N, Nair K.M & Kalayanasundaram, S.A, (1983), “Manual of Laboratory Techniques”, National Institute of Nutrition, ICMR.

### PEDAGOGY

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

### Mapping: (CO/PSO)

CO/PSO	PSO	PSO	PSO	PSO	PSO	PSO
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	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>CO1</b>	3	2	3	0	3	2
<b>CO2</b>	2	3	3	0	3	1
<b>CO3</b>	2	3	3	0	3	1
<b>CO4</b>	3	3	3	1	3	3
<b>CO5</b>	3	3	3	1	3	3
<b>Average</b>	<b>2.6</b>	<b>2.8</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>

**ELECTIVE III  
FOOD PRODUCT DEVELOPMENT**

**TOTALHOURS: 75**  
**CREDIT: 3**

**SUB CODE: 20PNDET3003**  
**L-T-P: 2 2 0**

**COURSE OBJECTIVES:**

To enable students to:

- Understand the various aspects of food product development
- Develop products that meets consumer requirements and demands

Formulate products that are nutritionally and commercially viable

**COURSE OUTCOME:**

On successful completion of the course the students will be able to

CO No.	CO Statement
CO1	Apply a product development process to generate ideas, design, develop and evaluate new products and their markets.
CO2	Demonstrate skill in the application of standard methods for the measurement and evaluation of sensory differences
CO3	Evaluate and analyze the different food packaging material
CO4	Review the appropriate labelling to adhere to standards
CO5	Gain knowledge on pricing and marketing of food product

**UNIT I: INTRODUCTION TO NEW FOOD PRODUCT DEVELOPMENT (15 HRS)**

Definition, significance of product development, food needs and consumer preferences, market survey and designing a questionnaire to find consumer needs for a product.

Steps involved in product development, formulation of nutritious food products and standardization, Factors that influence new product development success, Intellectual Property Rights and patenting of foods.

**UNIT II: SENSORY EVALUATION OF THE PRODUCT (15 HRS)**

Assessing the sensory characteristics of food - colour, texture, aroma, odor and taste.

Sensory evaluation of foods – Laboratory set up, equipment, panel selection and training, judging quality.

Subjective evaluation techniques – Difference tests: paired comparison test, duo-trio test, triangle test. Rating tests – Ranking single sample, two samples and multiple samples.

Objective tests to assess the sensory properties of foods.

**UNIT III: ESSENTIALS OF FOOD PACKAGING (15 HRS)**

Importance, definition, principles design requirement and basic FSSAI laws governing food packaging.

Selection criteria and types of packaging material – metal, glass, paper, plastic, edible, wooden. Packages with special features – Boil-in-bag package, plastic-shrink package, cryovac film, microwave oven packaging, aseptic packaging and distribution packaging.

#### **UNIT IV: PRODUCT LABELLING AND REGULATIONS (15 HRS)**

Definition, purpose, importance, Function ,Nutritional information and laws governing product labelling.

Types of labelling – smart labels, barcode labels, radioactive labels, antimicrobial labels, security labels and other specialized food labels.

Standards and regulations for nutrition harming and Nutrition claims in food labels.

#### **Unit V: QUALITY CONTROL, PRICING AND MARKETING (15 HRS)**

Analyzing the product stability, evaluation of shelf life, determining the changes in sensory attributes due to environmental conditions.

Pricing a product , Methods of pricing-cost plus pricing, Demand pricing, Competitive pricing ,mark up pricing, Principles of pricing, determining the selling price and profit margin, price bundling, promotional pricing and quantity discounts.

Advertising and marketing strategies- Basic techniques, Food advertising regulations ,Marketing mix “four P’s”

#### **ACTIVITY**

Conduct a market survey and develop a new food product based on the needs of your target audience. Conduct sensory analysis tests for the formulated product. Identify a suitable packaging material and design a label for your product. Determine the selling price and devise any two marketing strategies to promote your product.

#### **TEXTBOOKS:**

Reddy S M. (2003) .Basic food science and technology . New age publisher , 1<sup>st</sup> edition.

Subbulakshmi G and Udipi A Shobha . (2017) .Food processing and preservation .new age publisher . 1st edition.

Manay S And Shadaksharamasamy . (2009) .Food: Facts and Principles. New Age International (P) Publishers New Delhi. 1<sup>st</sup>edition .

AvantinaSharma . (2017) . Text book of food science and Technology.CBSOUPublisheres and distributes ltd. 3<sup>rd</sup>edition .

#### **REFERENCES:**

Lyon D H and Francombe M A and Hasdell T A Lawson . (2002) .Guidelines for Sensory Analysis in Food Products Development and Quality Control . Chapman and Hall London. 1<sup>st</sup> edition.

Fuller G W. (1994). New Food Product Development from Concept to Market Place. RC Press New York. 2<sup>nd</sup>edition .

Man C M D and Jones A A. (1994) . Shelf Life Evaluation of Foods. Blackie Academic and Professional London. 2<sup>nd</sup> edition.

Frewer L And Van TrijpH .(2007). Understanding consumers of food products. Florida USACRC Press.1<sup>st</sup> edition.

#### **E RESOURCES**

<https://www.fssai.gov.in/>

<https://nzifst.org.nz/resources/foodproductdevelopment>  
<https://nzifst.org.nz/resources/foodproductdevelopment/Chapter-3-1-2.htm>  
<https://www.fssai.gov.in/>  
<https://theintactone.com/2019/07/23/im-u3-topic-3-packaging-and-labelling/>

**Mapping: (CO/PSO)**

<b>CO/PSO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>	<b>PSO6</b>
<b>CO1</b>	3	3	3	2	3	3
<b>CO2</b>	3	2	3	3	3	2
<b>CO3</b>	3	3	3	3	3	3
<b>CO4</b>	3	3	2	3	2	3
<b>CO5</b>	3	3	3	2	3	3
<b>Average</b>	<b>3</b>	<b>2.8</b>	<b>2.8</b>	<b>2.6</b>	<b>2.8</b>	<b>2.8</b>

**PEDAGOGY**

Lecture, journal reviewing, Project work, Group discussion, Power point presentations, Field visit.

**QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION  
[CONVENTIONAL MODE]**

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K1,K2	A-Multiple choice questions 15x2=30	Correct choice	30	75	-
K3, K4	B-5/7 5x5=25marks	Not exceeding 500 words	25		-
K4,K5,K6	C-1/3 1x10=10marks <b>Compulsory Question</b> 1x10=10marks	Not exceeding 1000 words	20		-

\* 75 marks to be converted as 60 marks.

**QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION  
[ONLINE MODE]**

<b>Knowledge Level</b>	<b>Section</b>	<b>Word Limit</b>	<b>Marks</b>	<b>Total</b>	<b>Special Instructions if any</b>	
<b>INTERNAL SETTING</b>						
K1,K2,K3	A-Multiple choice questions[No choice] 25x1=25marks	Choose the best option	25	<b>50</b>	-	
<b>EXTERNAL SETTING</b>					-	
K3, K4,K5,K6	B-5/7 5x5=25marks	Not exceeding 500 words	25		-	

**\* 50 marks to be converted as 60 marks.**

### SEMESTER IV

SEM	COURSE CODE	COURSE TITLE	TITLE OF THE PAPER	HRS	CREDITS	CA	SE	T
IV	20PNDCT4010	CORE T X	Public Health Nutrition	6	4	40	60	100
IV	20PNDCT4011	CORE P IV	Food Microbiology -Practical	6	4	40	60	100
IV	20PNDCP4004	CORE T XI	Dissertation	6	4	40	60	100
IV	20PNDET4004	ELECTIVE IV	Advanced Food Service Management	4	3	40	60	100
IV	20PNDET4005	ELECTIVE V	Food Safety and Quality Control	4	3	40	60	100
IV	18MOOC4004	SOFT SKILL	Swayam -(MOOC)	-	4	50	-	100
			<b>TOTAL</b>	<b>26</b>	<b>22</b>			



## CORE T X

### PUBLIC HEALTH NUTRITION

**TOTAL HOURS: 75**

**SUB CODE: 20PNDCT4010**

**CREDIT: 4**

**L-T-P:4 2 0**

#### **COURSE OBJECTIVES:**

- To understand the concept of Public Nutrition.
- To enable students to develop a holistic knowledge base on the importance of understanding the nutrition problems and their prevention.
- To understand the nutritional problems during emergencies / disasters as well as the strategies to tackle them.
- To develop skills in preparation of communication aids and planning nutrition education programme for the community

#### **COURSE OUTCOME:**

On successful completion of the course the students will be able to

<b>CO No.</b>	<b>CO STATEMENT</b>
<b>CO1</b>	Understand the role of nutrition in national development
<b>CO2</b>	Acquire skill in assessment of nutritional status of community.
<b>CO3</b>	Gain depth knowledge on Strategies for Improving nutrition status and health status of the community.
<b>CO4</b>	Evaluate the role organization in combating malnutrition.
<b>CO5</b>	Understand and apply Nutrition education for the community welfare.

#### **UNIT I**

##### **CONCEPT OF PUBLIC NUTRITION**

**(15 HRS)**

- Nutrition and Health in National Development
- Relationship between health and nutrition, National Health Care Delivery System, Determinants of Health Status, Indicators of Health.
- Nutritional deficiency disorders in India -Prevalence, Etiology, Symptoms, Current status and Recent updates- PEM, VADD, IDD, Anemia.
- Nutrition and infection
- Role of public nutritionists in the health care delivery system.

## UNIT II

### ASSESSMENT OF NUTRITIONAL STATUS

(15 HRS)

- **Direct methods:** Direct methods of Nutritional assessment, Nutritional anthropometry, biochemical, clinical and dietary assessment and Growth charts - plotting of growth charts, growth monitoring and promotion (GMP).
- **Indirect methods:** Demography, population dynamics and vital health statistics and their health implications. Food balance sheets, recent nutritional assessment methods- MUST, SGA, SOAP. Indicators of health and nutrition. Causes of Malnutrition- Vicious cycle of malnutrition
- Basic concepts of Nutritional Surveillance- Millennium Development Goals (MDG)

## UNIT III

### STRATEGIES FOR IMPROVING NUTRITION STATUS AND HEALTH STATUS OF THE COMMUNITY

(15 HRS)

**Immunization:** Awareness, types of vaccines, Importance and schedule of Immunization.

#### **Measures to overcome malnutrition in India**

**Food Security** -Concepts, Meaning and significance, Food security act. Food fortification and Food enrichment, Genetic improvement of foods, National nutrition policy and action plan

**Nutrition intervention programmes** - Mid day Meal Programme, Balwadi Feeding Programme. Public Distribution System (PDS), Antyodaya Anna Yojana (AAY), Annapurna Scheme, Food for Work Programme, Special Nutrition Programme,

**Nutrition Intervention Schemes and programmes operating in India-** Control programmes - Vitamin A, Anemia, Goiter, Malnutrition. Environmental sanitation and health

## UNIT IV

### ORGANIZATIONS TO COMBAT MALNUTRITION AND NUTRITION DURING EMERGENCIES AND SPECIAL CONDITIONS (15 HRS)

- **International organizations** concerned with food and nutrition FAO, WHO, UNICEF, CARE, AFPRO, CWS, CRS, World Bank.
- **National organization** – NIN, CFTRI, ICMR, ICAR, CFTRI, CHEB, NIPCCD, DFRL, NGOs.
- **Nutritional deficiency diseases in emergencies-** Major and micro nutrient. Control of communicable diseases in emergencies- Factors responsible for spread of communicable disease, mode of transmission and prevention of chicken pox, malaria, swine flu, tuberculosis, COVID-19 and AIDS.

- **Nutritional requirement for space mission, sea voyage and army.**

## **UNIT V**

### **NUTRITION EDUCATION AND EXTENSION OF BETTER NUTRITION**

**(15 HRS)**

- **Nutrition education for the community** –Objectives, Definition and Importance of nutrition education to the community, Principles of planning, executing and evaluating nutrition education programmes.
- **Development and Use of AV aids in Public Nutrition Education.** -Charts, flip chart, posters, flannel board, models, OHP.

### **ACTIVITY**

1. Planning and evaluation of nutrition education programmes in community. Preparation of communication aids for different groups.
2. Development of low-cost recipes for infants, pre-schoolers, elementary school children, adolescents, pregnant and lactating mothers.
3. Field visits to ongoing national nutrition programmes.

### **TEXTBOOKS**

1. Park, K. (2013). Text Book of Preventive and Social medicine. M/s.BanarsidasBhanot Publishers, Jabalpur. 22<sup>nd</sup> Edition.
2. Suryatapa Das (2020). Textbook of Community Nutrition. Academic Publishers, Kolkata. 4<sup>th</sup> Edition
3. Srilakshmi, B (2017). Nutrition Science. New Age International Publishers. Multi Colour 6<sup>th</sup> Edition.
4. Connolly, M.A. (2005). Communicable Disease Control in Emergencies: WHO, WHO Library Cataloguing-in-Publication Data.
5. WHO (2002). The management of Nutrition in Major Emergencies. Published by AITBS Publishers, New Delhi.

### **REFERENCES**

1. MuthuVK (2014). A Short Book of Public Health, Jaypee Brothers Medical Publishers. 2<sup>nd</sup> edition
2. Dr. Sridhar Rao B (2018). Principles of Community Medicine, AITBS Publishers India. 6<sup>th</sup> edition.
3. Scott M. Smith, Sara R. Zwart and Martina Heer (2014). Human Adaptation to Space Flight: The role of nutrition. NASA Publication.

4. Owen, A.Y. and Frackle, R.T., (2002). Nutrition in the Community. The Art of Delivering Services. Times Mirror/Mosby. 2nd Edition.
5. Carolyn D. Berdanier Johanna T. Dwyer David Heber (2014). Handbook of Nutrition and Food, CRC Press, New York. Third Edition.

**e-LEARNING RESOURCES:**

<https://apps.who.int/iris>

<http://egyankosh.ac.in/bitstream/123456789/33312/1/Unit-18.pdf>

[https://www.seafarerswelfare.org/assets/documents/ship/SHIP-HealthyFood\\_A5\\_20151209\\_LR.pdf](https://www.seafarerswelfare.org/assets/documents/ship/SHIP-HealthyFood_A5_20151209_LR.pdf)

**Mapping(CO/PSO):**

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	3	3
CO2	3	2	3	3	3	3
CO3	2	3	3	3	3	3
CO4	3	3	3	3	2	3
CO5	3	3	3	3	3	3
<b>Average</b>	<b>2.8</b>	<b>2.8</b>	<b>2.8</b>	<b>3</b>	<b>2.8</b>	<b>3</b>

**PEDAGOGY:** Lecture, Case study, Assignments, Group discussion, Power point presentations.

**QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION  
[CONVENTIONAL MODE]**

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
K1,K2	A-Multiple choice questions 30x1=30	Correct choice	30	75	Fill in the blanks or choose the best answer

K3, K4	B-5/7 5x5=25marks	Not exceeding 500 words	25		Short answers
K4,K5,K6	C-1/3 1x10=10marks <b>Compulsory Question</b> 1x10=10marks	Not exceeding 1000 words	20		Elaborate answers

**\* 75 marks to be converted as 60 marks.**

**QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION  
[ONLINEMODE]**

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
<b>INTERNAL SETTING</b>					
K1, K2,K3	A-Multiple choice questions[No choice] 25x1=25marks	Choosethe best option	25	<b>50</b>	Choose the best answer
<b>EXTERNAL SETTING</b>					
K3, K4,K5,K6	B-5/7 5x5=25marks	Notexceedin g 500 words	25		Short answers

**\* 50 marks to be converted as 60 marks.**

**CORE PIV**  
**FOOD MICROBIOLOGY- PRACTICAL**

**TOTAL HOURS: 60**

**SUBCODE: 20PNDCP4004**

**CREDIT: 4**

**L-T-P: 5-1-6**

**COURSE OBJECTIVES**

To understand the practical skill in handling microscope and preparation of culture media

To Gain knowledge of principles of various techniques of isolation and determination of microorganisms in foods

To acquire practical skill in production of fermented foods.

**COURSE OUTCOMES:**

On completion of the course the students will be able to...

<b>CO No.</b>	<b>CO Statement</b>
<b>CO1</b>	CO1 - Gain knowledge in handling of microscope and develop basic skill in cultivation of bacteria with different culture media.

<b>CO2</b>	CO2 - Comprehend insight on various techniques of staining and hanging drop method to understand the morphology of microorganism.
<b>CO3</b>	CO3 - Evaluate and isolate microorganism form different sources like air, water and food.
<b>CO4</b>	CO4 - Describe and determine the viable count of microorganism from food samples.
<b>CO5</b>	CO5 - Understand and apply the concept of food fermentation and isolation of organism from fermented food

**Unit – I** **15 hours**

**General microbiology and**

1. Cleaning and sterilization of glass wares.
2. Handling of hot air oven and autoclave.
3. Uses and study of microscopes.

**Unit 2** **15 hours**

**Preparation of culture media and their sterilization.**

Cultivation of bacteria

- i) Pour plate method.
- ii) Spread plate method.
- iii) Streak plate method

**Unit 3** **15 hours**

**Study of Morphology of microorganism**

1. Staining of bacteria
  - i) Simple staining.
  - ii) Gram staining.
2. Microscopic test for bacterial motility by hanging drop method.

**Unit – 4** **15 hours**

**Isolation of micro organisms from different sources**

1. Air (Petri plate exposure method)
2. Microbial testing of water
3. Determination of microbiological quality of milk

## **Unit 5**

**15 hours**

### **Determination of viable count of microorganisms**

1. Introduction to colony counter
2. Total plate count
3. Yeast and mold count

## **ACTIVITY**

### **Production and Microbiological examination of fermented food (Any two)**

1. Fermented fruits and vegetables
2. Fermented dairy product
3. Wine production
4. Pickle fermentation
5. Fermented cereal and legume-based product.
6. Production of edible mushroom

## **TEXT BOOKS**

1. Frazier W.C and Westhoff D.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) Fundamental Food Microbiology, 2nd Ed, CRC press, Boca ratonF.
- 4.Joshi VK&Pandey(2004).Biotechnology:food,fermentation,microbiology,biochemistry and technology,vol I &II,Educational publishers and distributors,New Delhi.
5. Crueger W and Crueger A (2003) Biotechnology: A textbook of Industrial Microbiology 2nd Edition,Panima Publishing Corpoartion,New Delhi.

## **REFERENCE BOOK**

1. Guttierrez-Lopez GF and Barbosa-Canovas GV (Eds) (2003) Food Science and Food Biotechnolgy CRC press,USA.
2. 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.
3. Food Microbiology: Fundamentals and frontiers by M.P. Doyle, L.R. Beuchat



- and Thoma J. Montville, (2001), 2nd edition, ASM press, USA.
4. MichealPelczar MJ, Chan ECS, Krieg N. (2001) Microbiology. 5th ed. Tata McGraw-Hill Publishing Co. Ltd.
  5. Prescott LM, Harley JP, Klein DA.(2008) Microbiology. 6th ed. WMC Brown

**E-LEARNINGRESOURCES:**

[Top Microbiology Courses - Learn Microbiology Online | Coursera](#)

[Learn Microbiology with Online Courses and Classes | edX](#)

[72 Online studies in Microbiology - DistanceLearningPortal.com](#)

[Microbiology Free Online Courses and MOOCs | MOOC List \(mooc-list.com\)](#)

[Virtual Microbiology Classroom: 8-week micro course from Science Prof Online](#)

**Mapping: (CO/PSO)**

<b>CO/PSO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>	<b>PSO6</b>
<b>CO1</b>	3	3	2	1	3	2
<b>CO2</b>	3	3	2	1	3	2
<b>CO3</b>	3	3	2	1	3	2
<b>CO4</b>	3	3	2	1	3	2
<b>CO5</b>	3	3	2	1	3	2
<b>Average</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>2</b>

**KEY:**

**PEDAGOGY (TEACHING METHODOLOGY):**

Group Discussion, Case study, seminar, journal reviewing, Assignments, Power

point presentations.

**ELECTIVE IV  
ADVANCED FOOD SERVICE MANAGEMENT**

**TOTALHOURS: 75**

**SUB CODE: 20PNDET4004**

**CREDIT: 4**

**L-T-P: 2 2 0**

**COURSE OBJECTIVES:**

The course will enable the students:

1. To gain knowledge and develop skills in menu planning, purchasing and storage policies, and quality control in a food service establishment.
2. To acquire knowledge about safety hygiene and sanitation issues of a food service establishment.
3. To make students familiar with standard operating procedures, potential hazards in food production food safety regulations.

**COURSE OUTCOME:**

On successful completion of the course the students will be able to

<b>CO No.</b>	<b>CO Statement</b>
<b>CO1</b>	Overview the food service management and techniques of menu planning
<b>CO2</b>	Acquire skill in purchase storage and food production
<b>CO3</b>	Understand the food management in food service establishment.
<b>CO4</b>	Compile the work safety and laws governing
<b>CO5</b>	Develop skill in starting own food service establishment

**UNIT 1****HISTORY, DEVELOPMENT OF FOOD SERVICE SYSTEM, MENU PLANNING (15 hrs)**

- History and development, recent trends, types of food service establishments, commercial establishments, non-commercial establishments, understanding management, approaches to food service management
  - Menu planning – importance, definition, need use and function
- Knowledge and skills required for planning menu

Types of menu and its applications

Steps in menu planning and its evaluation, construction of menu, characteristics of a good menu, displaying a menu and evaluation of menu.

**UNIT 2****PURCHASE AND STORAGE, QUALITY AND FOOD PRODUCTION (15 hrs)**

- Mode of purchasing, centralized purchasing, group purchasing, methods of purchasing, identifying needs and amounts to buy, minimum stock level, maximum stock level, receiving and inspecting deliveries
- storage space, dry storage, low temperature storage, store room management
- Production control, use of standardized recipes, developing a program for recipe standardization, safeguard in food production, quality control in food preparation and cooking.

**UNIT 3****FOOD MANAGEMENT: DELIVERY AND SERVICE STYLES (15 hrs)**

- Methods of delivery service system- centralized delivery system, decentralized delivery system, conventional food service system, commissary food service system - ready prepared food service system, assembly service system
- Different types of service in food service establishments- table and counter service, self-service, tray service, types of service in a restaurant, silver service, plate service cafeteria service, and buffet service. specialized forms of service, hospital tray service, airline tray service, rail service, home delivery, catering and banquet, floor/room service, lounge service

#### **UNIT 4**

##### **PERSONNEL MANAGEMENT, WORK PLACE SAFETY. (15 hrs)**

- Definition of leadership, components approaches, qualities, leadership styles recruitment, selection and induction ,Employee facilities and benefits , laws governing employees, work productivity improvement measures , Training and development.
- hygiene and sanitary practices, types of accidents , precautions to prevent accidents , Garbage and refuse sanitation- inside and outside storage , Pest control- pests, signs of infestation and Integrated Pest Management (IPM) Laws governing food service establishment.

#### **UNIT 5**

##### **SETTING UP AND PLANNING FOOD SERVICE UNIT (15 hrs)**

Layout and design – Phases of planning layout-developing a prospectus, Determining work centers equipment , Factors influencing layout design, Architectural features, evaluation of plan , Energy and time management .

Planning- steps and types of planning, Preparing a planning guide , Registration of unit , Application for a licence , Rules regarding grading of hotels and restaurants, Loan facilities for start up .

#### **TEXTBOOKS**

Bessie B and West Le Wood (1986) Food Service in Institutions (6th Ed.) Macmillan Publishing Co.

Mohini Sethi, (2008) Institutional Food Management, New age publications, New Delhi

June Payne-Palacio, Monica Theis, (2011) Foodservice Management: Principles and Practices, Prentice Hall

Sudhir Andrews (1997), Food and Beverage Service- Training Manual, 23rd Reprint, Tata McGraw Hill Publishing Co.

Food service management (2017) V Suganthi and C Premakumari.

## REFERENCES

- Mohinder Chand, Managing Hospitality Operations, 2009, 1st Edition, Anmol Publications Pvt. Ltd. New Delhi.
- Goel S.L, Health Care System and Hospital Administration, 2009, Vol.7, Deep and Deep Publications Pvt. Ltd.
- KalkarS.A, Hospital Information Systems, 2010, Published by AsokeK.Ghosh, PHI Learning Pvt. Ltd. Shring Y, P.
- Effective Food Service Management, Anmol publications Pvt Ltd, New Delhi, 2001. 3.
- Stephen, B, , Williams, S, R, “Bill Jardine, and Richard, J, N, Introduction to Catering, Ingredients for Success, Delmar- Thomson learning, 2001.
- Yadav, C, P. Management of Hotel and Catering Industry, Anmol publications Pvt

## E LEARNING RESOURCES

- <https://seafoodacademy.org/pdfs/haccp-training-folder-contents-v2.pdf>
- <https://psu.pb.unizin.org/hmd329/chapter/ch4/>
- <https://www.plantautomation-technology.com/articles/types-of-food-processing-equipment>
- <https://dmi.gov.in/GradesStandard.aspx>
- <https://www.fssai.gov.in/cms/food-safety-and-standards-regulations.php>

## Mapping: (CO/PSO)

CO/PSO	PSO 1	PSO 2	PSO 3	PSO4	PSO5	PSO6
CO1	3	3	2	3	3	3
CO2	3	3	3	3	2	3
CO3	3	3	2	3	3	3
CO4	2	3	3	3	3	3
CO5	3	3	3	3	3	3
<b>Average</b>	<b>2.8</b>	<b>3</b>	<b>2.6</b>	<b>3</b>	<b>2.8</b>	<b>3</b>

**PEDAGOGY:**Lecture, Case study, Assignments, Group discussion, Power point presentations, Field visit

## QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION [CONVENTIONAL MODE]

<b>Knowledge Level</b>	<b>Section</b>	<b>Word Limit</b>	<b>Marks</b>	<b>Total</b>	<b>Special Instructions if Any</b>
K1,K2	A-Multiple choice questions 15x2=30	Correct choice	30	75	-
K3, K4	B-5/7 5x5=25marks	Not exceeding 500 words	25		-
K4,K5,K6	C-1/3 1x10=10marks <b>Compulsory Question</b> 1x10=10marks	Not exceeding 1000 words	20		-

**\* 75 marks to be converted as 60 marks.**

**QUESTION PAPER PATTERN FOR END SEMESTER  
EXAMINATION  
[ONLINE MODE]**

Knowledge Level	Section	Word Limit	Marks	Total	Special Instructions if any
<b>INTERNAL SETTING</b>					
K1,K2,K3	A-Multiple choice questions[No choice] 25x1=25marks	Choose the best option	25	<b>50</b>	-
<b>EXTERNAL SETTING</b>					-
K3, K4,K5,K6	B-5/7 5x5=25marks	Not exceeding 500 words	25		-

**\* 50 marks to be converted as 60 marks.**

**ELECTIVE – V**  
**FOOD SAFETY AND QUALITY CONTROL**

**TOTAL HOURS: 75**

**SUBJECT CODE:20PNDET4005**

**CREDITS: 3**

**L-T-P:3 1 0**

**OBJECTIVES:**

Enable the students:

- ❖ To know the importance of quality assurance in food industry.
- ❖ To know the tests and standards for quality assessment and food safety.
- ❖ To know the laws and standards ensuring food quality and safety

**COURSE OUTCOME:**

After studying this paper, the students would know

<b>CO No.</b>	<b>CO STATEMENT</b>
CO1	The importance and functions of quality control unit in food industries
CO2	The methods used for evaluation of food quality
CO3	The national and international organization enforcing food quality and safety
CO4	The various tests used to detect food adulteration.
CO5	The steps to be considered for successful Quality Control Program.

**UNIT-I**

**15 Hours**

**FOOD SAFETY**

Introduction to concepts of – Food Safety, Food Quality, Food Quality Assurance, Food Quality Management, Food Adulteration and Food Hazards.

Need and Importance of Food Safety in Food Industries, Factors affecting Food Safety, Current challenges to food safety and Nutrition Labelling Regulation (Mandatory and optional nutrients, nutritional descriptions and approved health claims).

Food Adulteration, Nature of adulterants, methods of evaluation of food adulterants and toxic constituents.

**UNIT-II**

**15 Hours**

**FOOD SAFETY MANAGEMENT SYSTEM(FSMS)**

Introduction to Food Safety Management System, Structure and plan of FSMS.



## **FOOD HYGIENE PROGRAMS**

Personal Hygiene, Training Programs, Pest Classification, Pest Control and Prevention. Food Handlers – Importance of personal hygiene of food handlers, education of food handler in handling and serving food.

### **UNIT-III**

**15 Hours**

#### **HAZARD ANALYSIS AND RISK ASSESSMENT**

HACCP – Definition, Principles, System and Uses.

Food Hazards - Physical, Chemical and Biological Hazards, Evaluation of the severity of a hazard, Controlling Food Hazard.

Risk Analysis – Introduction to risk analysis, risk management, risk assessment and risk communication.

### **UNIT-IV**

**15 Hours**

#### **FOOD QUALITY CONTROL**

Testing of Food Quality: Meaning of Quality, need of food quality testing, types of evaluation- subjective and objective. Current concepts and Principles of quality control and assurance.

Needs and Importance of Quality Control Programmes such as quality plan, documentation of records, product standards, product and purchase specifications and process control.

Duties and Responsibilities of Food Quality Controller.

### **UNIT-V**

**15 Hours**

#### **FOOD LAWS AND STANDARDS**

Need and Importance of Food Laws and Standards, National Food Legislation such as FSSAI, Essential Commodities Act, ISI or BIS, AGMARK, FPO, PFA and APEDA (Agricultural and Processed food products Export Development Authority). Food Safety and Standards Act 2006.

International Organization such as FAO, WHO, CODEX Alimentarius, USFDA, ISO standards for Food Quality and Safety (ISO 9000 series, ISO 22000, ISO 15161, ISO 14000).

#### **TEXTBOOKS:**

1. Vickie A. Vaclavik and Elizabeth W. Christian (2014). Essentials of Food Science. Springer Science + Business Media, New York. 4th Edition.
2. Srilakshmi B. (2015). Food Science. New Age International (P) Ltd. Publishers.
3. Avantinasharma (2017). Text book of food science and Technology. CBS Publisheres and distributes ltd. 3<sup>rd</sup> Edition.

4. Manay, S. and Shadaksharamasamy. Food: Facts and Principles. New Age International (P) Publishers, New Delhi.
5. Manual of Food Safety Management System (2006). FSS Act, 2006. FSSAI.
6. Bruno Schiffers, Babacar Samb and Jérémy Knops (2011). Principles of hygiene and food safety management. COLEACP PIP programme.

**REFERENCES:**

1. Early, R. (2005). Guide to Quality Management Systems for the Food Industry. Blackie Academic and professional, London.
2. Gould, W.A and Gould, R.W. (2006). Total Quality Assurance for the Food Industries. CTI Publications Inc. Baltimore.
3. Pomeraz, Y. and MeLoari, C.E. (2006). Food Analysis: Theory and Practice. CBS publishers and Distributor, New Delhi.
4. Bryan, F.L. (2000). Hazard Analysis Critical Control Point Evaluations A Guide to Identifying Hazards and Assessing Risks Associated with Food Preparation and Storage. World Health Organization, Geneva.

**e-LEARNING RESOURCES:**

- FSSAI- [www.fssai.gov.in](http://www.fssai.gov.in)
- FAO – [www.fao.org](http://www.fao.org)
- <https://www.neha.org/eh-topics/food-safety-0/food-safety-online-training-resources>
- <https://www.theaccessgroup.com/digital-learning/elearning-courses/food-safety/>
- [https://onlinecourses.swayam2.ac.in/cec20\\_ag06/preview](https://onlinecourses.swayam2.ac.in/cec20_ag06/preview)

**MAPPING (CO/PSO):**

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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<b>Average</b>	<b>3</b>	<b>2.8</b>	<b>2.4</b>	<b>2.6</b>	<b>2.8</b>	<b>2.8</b>

**PEDAGOGY:**

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

**QUESTION PAPER PATTERN FOR END SEMESTER  
EXAMINATION  
[CONVENTIONAL MODE]**

<b>Knowledge Level</b>	<b>Section</b>	<b>Word Limit</b>	<b>Marks</b>	<b>Total</b>	<b>Special Instructions if any</b>
K1,K2	A-Multiple choice questions 30x1=30	Correct choice	30	<b>75</b>	Fill in the blanks or choose the best answer
K3, K4	B-5/7 5x5=25marks	Not exceeding 500 words	25		Short answers
K4,K5,K6	C-1/3 1x10=10marks <b>Compulsory Question</b> 1x10=10marks	Not exceeding 1000 words	20		Elaborate answers

**\* 75 marks to be converted as 60 marks.**

**QUESTION PAPER PATTERN FOR END SEMESTER EXAMINATION  
[ONLINE MODE]**

<b>Knowledge Level</b>	<b>Section</b>	<b>Word Limit</b>	<b>Marks</b>	<b>Total</b>	<b>Special Instructions if any</b>	
<b>INTERNAL SETTING</b>						
K1, K2, K3	A-Multiple choice questions [No choice] 25x1=25marks	Choose the best option	25	<b>50</b>	Choose the best answer	
<b>EXTERNAL SETTING</b>						
K3, K4, K5, K6	B-5/7 5x5=25marks	Not exceeding 500 words	25		Short answers	

**\* 50 marks to be converted as 60 marks.**

**ShrimathiDevkunvarNanalal Bhatt Vaishnav College for  
Women (Autonomous)  
Re-accredited with “A+” Grade by NAAC**

**Amendments in the regulations from 2020 – 2021 onwards**

**PG  
Changes in Part-II**

**Semester – I**

<b>Title</b>	<b>Internal Marks</b>	<b>External Marks</b>	<b>Credits</b>
Skill based elective-Teaching Skills	50	-	3

**Semester – II**

<b>Title</b>	<b>Internal Marks</b>	<b>External Marks</b>	<b>Credits</b>
Soft Skills – SWAYAM (MOOC)	50	-	4

**Semester – III**

<b>Title</b>	<b>Internal Marks</b>	<b>External Marks</b>	<b>Credits</b>
Skill based elective -Research Skills	50	-	3

**Semester – IV**

<b>Title</b>	<b>Internal Marks</b>	<b>External Marks</b>	<b>Credits</b>
Extra Disciplinary– SWAYAM (MOOC)	50	-	4