Estd. 1962
"A++" Accredited by NAAC (2021)
With CGPA 3.52

SHIVAJI UNIVERSITY, KOLHAPUR - 416004, MAHARASHTRA
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शिवाजी विद्यापीठ, कोल्हापूर -४१६००४,महाराष्ट्र
दूरध्वनी-ईपीएबीएक्स -२६०९०००, अभ्यासमंडळे विभाग दुरध्वनी ०२३१—२६०९०९४
०२३१—२६०९४८७

Ref.No.SU/BOS/Science/149 **Date: 26/05/2026**

The Principal,
All Concerned Affiliated Colleges/Institutions
Shivaji University, Kolhapur

The Head/Co-ordinator/Director
All Concerned Department (Science)
Shivaji University, Kolhapur.

Subject: Regarding Structure and syllabus of **B.Sc. Part II** under the Faculty of Science and Technology as per **Apprenticeship Embedded Degree Programme (AEDP).**

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the structure and syllabi, nature of question paper of **B.Sc. Part II** under the Faculty of Science & Technology as per **Apprenticeship Embedded Degree Programme (AEDP).**

B.Sc. Part-II (Sem. III & IV) as per AEDP			
1.	Physics	4.	Chemistry
2.	Microbiology	5.	Food Science
3.	B.Sc.-M.Sc. AI & ML	6.	Food Technology and Management

This structure and syllabi shall be implemented from the academic year 2026- 2027 onwards. A soft copy containing structure and syllabus is attached herewith and it is also available on university website **www.unishivaji.ac.in>Syllabus>Syllabus as per NEP2020.** This programme is introduce subject to approval of university authority for converted.

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,

Dy Registrar

Encl: as above

for information and necessary action

Copy to:

1	Dean, Faculty of Science & Technology	6	Appointment Section A & B
2	Director, Board of Examinations and Evaluation	7	I.T.Cell /Computer Centre
3	Chairman, Respective Board of Studies	8	Eligibility Section
4	B.Sc.-M.Sc. Exam Section	9	Affiliation Section (T.1) (T.2)
5	Internal Quality Assurance Cell (IQAC Cell)	10	P.G. Seminar Section

SHIVAJI UNIVERSITY, KOLHAPUR

Established: 1962

"A++ Grade" Accredited by NAAC (2021) with CGPA 3.52

Structure and Syllabus in Accordance with

Apprenticeship Embedded Degree Programme

National Education Policy – 2020

With Multiple Entry and Multiple Exit

Syllabus for

B. Sc. Part – II

Food Technology & Management

(Faculty of Science and Technology)

Semester III and IV

(To be implemented from Academic Year 2026-27)

SYLLABUS OF B.Sc. (FOOD TECHNOLOGY AND MANAGEMENT) II

(AEDP-NEP 2020)

❖ **Year of Implementation:** To be implemented from June 2026 onwards

- Guidelines shall be as per B. Sc. Regular Program.
- Rules and Regulations in accordance with National Education Policy with effect from Academic Year 2026-27.

❖ Apprenticeship Embedded Degree Programme (AEDP):

Programme enabling a student admitted to an undergraduate programme of the Higher Educational Institution, recognized as per the UGC Act, 1956, to pursue apprenticeship training as an integrated component of the degree programme in compliance with these guidelines. Training in an industry or establishment under a contract of apprenticeship, which consists of a basic training component and on-the-job training (OJT)/practical training at the workplace. Further, as per the Apprentices Act of 1961, Apprenticeship training means a course of training in any industry or establishment undergone in pursuance of a contract of apprenticeship and under prescribed terms and conditions, which may be different for different categories of apprentices.

❖ **Objectives of AEDP:**

i. To enhance the employability of students pursuing Undergraduate level degree programmes.
ii. To focus on outcome-based learning in all degree programmes to achieve graduate attributes and desired proficiency levels.
iii. To promote active linkage between higher educational institutions and industries/establishments.
iv. To bridge the skill gap in the industries by effectively implementing AEDP in partnership with higher educational institutions and/or Board of Apprenticeship Training (BOAT)/ Board of Practical Training (BOPT).

❖ Preamble:

The Bachelor of Science in Food Technology and Management program combines

food science with essential management skills, preparing students for leadership roles in the growing food industry. The curriculum covers food safety, processing, product development, and business management, addressing challenges like sustainability, nutrition, and food security. Students gain hands-on experience in food processing, quality assurance, supply chain management, and marketing, while also developing critical business skills. Emphasizing ethical practices, regulatory standards, and sustainability, the program equips graduates to make informed decisions and excel in diverse roles across the food sector.

❖ Program Outcomes:

1. Understanding of Food Science Principles: A comprehensive understanding of the scientific principles underlying food production, processing, preservation, and safety.

2. Food Product Development Skills: Design, develop, and innovate new food products that meet consumer needs and regulatory standards.

3. Knowledge of Food Safety and Quality Control: Knowledge and skills required to implement food safety and quality assurance practices throughout the food supply chain.

4. Food Processing and Engineering Expertise: Understanding of food processing techniques, including thermal and non-thermal methods, and the ability to apply engineering principles to optimize these processes.

5. Sustainability in Food Production: Importance of sustainability in food production, focusing on resource management, waste reduction, and environmentally friendly practices in food manufacturing.

6. Food Business Management: Skills to manage food-related businesses, including planning, marketing, budgeting, and financial management within the food industry.

7. Regulatory and Ethical Standards in Food: National and international food laws, regulations, and ethical standards that govern the food industry.

8. Supply Chain Management in the Food Industry: Manage and optimize food supply chains, from raw material sourcing to distribution, ensuring efficiency and compliance with food safety standards.

9. Analytical and Laboratory Skills: Proficiency in using laboratory techniques and tools to

analyse food products, assess their nutritional content, and test for quality and safety.

10. Consumer Behaviour and Market Trends: Analyse consumer behaviour and market trends to make informed decisions about food product development and marketing strategies.

11. Innovation and Problem-Solving in Food Technology: Ability to critically analyse challenges in the food industry and develop innovative solutions to improve processes, products, and consumer experiences.

12. Communication and Teamwork Skills: Strong communication, collaboration, and leadership skills, enabling them to work effectively in interdisciplinary teams within the food industry.

❖ Objectives of Programme:

1. Understanding Food Science and Processing:

- To provide a strong foundation with the principles of food science, including food chemistry, microbiology, and processing & preservation techniques for development of food products.

2. Ensuring Food Safety and Quality:

- To train students in food safety regulations, quality control measures, and hygiene practices to ensure the production of safe and high-quality food products by implementing food safety management systems.

3. Developing Management and Entrepreneurial Skills:

- To impart knowledge of food industry management, including production planning, marketing, and distribution including fostering an entrepreneurial mindset to encourage innovation and the development of new food products and businesses.

4. Promoting Nutritional Awareness:

- To educate students on the nutritional value of foods and the impact of processing on nutrient content.

5. Fostering Industry Relevance and Practical Skills:

- To provide students with practical experience through laboratory work, industrial training, and projects helping them to bridge the gap between theoretical knowledge and industry practices and preparing them for successful careers in the food sector.

❖ **Duration of Programme:**

3 years B. Sc. Programme or

4 years B.Sc. Programme (Honours Degree) or

4 years B. Sc. Programme (Honours with Research Degree)

❖ **Medium of instruction:** English

❖ **Eligibility for admission:**

The eligibility of students taking admission at B. Sc. Part-I [Level 4.5] (initial entry) and the eligibility of students making lateral entry (Multiple entry-ME) admission at Level 5.0/ Level 5.5/ Level 6.0 are required to be scrutinized (with stipulated procedure) on the basis of following criteria:

(A) Eligibility requirements for admission to B. Sc. Part-I (Level 4.5):

i) The students passing the Higher Secondary School Certificate Examination with Science stream or Vocational subjects with science stream conducted by the Maharashtra State Board of Higher Secondary Education shall be allowed to enter upon the B. Sc. Part-I (or Undergraduate Certificate in Science).

OR

ii) An Examination of any other Statutory Board or an examining Body recognized as equivalent thereto.

OR

iii) Completed 2nd year of the 3-year diploma after 10th

(B) Eligibility requirements for admission to B. Sc. Part-II (Level 5.0):

i) The students passing or ATKT the B. Sc. Part-I (or Undergraduate Certificate in Science) shall be allowed to enter upon the B. Sc. Part-II (or Undergraduate Diploma in Science).

OR

ii) An Examination of any other Statutory University or an examining Body recognized as equivalent there to.

OR

iii) Completed 3-year diploma course with subjects allied / related to the subject at B.Sc. Part I

OR

iv) Completed first year of B.E./B. Tech. with subjects allied / related to the subject at B.Sc. Part I

(C) Eligibility requirements for admission to B. Sc. Part-III (Level 5.5):

i) The students passing (pass/ ATKT) the B. Sc. Part-II (or Undergraduate Diploma in Science) and successfully completed level 5 shall be allowed to enter upon the B.Sc. Part-III (or Three Year Undergraduate Degree in Science).

OR

ii) An Examination of any other Statutory University or an examining Body recognized as equivalent thereto.

OR

iii) Completed second year of B.E./B. Tech. with subjects allied / related to the subject at B.Sc. Part II

(D) Eligibility requirements for admission to B. Sc. Part-IV (Level 6.0):

i) The students passing the B. Sc. Part-III (or Three-Year Undergraduate Degree in Science) with 7.5 CGPA or 75% marks in Three-Year Undergraduate Degree in Science shall be allowed to enter upon the B. Sc. Part-IV (or Four-Year Undergraduate Degree in Science with Honours/ Honours with Research).

OR

ii) An Examination of any other Statutory University or an examining Body recognized as equivalent thereto.

Eligibility Application requirement:

(a) Students who are seeking admission for Level 4.5 need to apply for eligibility.

(b) Students who are not taking any exit from the programme at any level and students re-entering after taking exit, need not

apply for eligibility at Level 5.0, 5.5 and 6.0.

(c) However, students from other university who wish to seek admission for any level of undergraduate degree need to apply for eligibility.

Rules for Multiple Exits:

a) If a student wishes to exit after completion of Level 4.5, he/she has to complete additional four credit skill course/ internship.

b) If a student wishes to exit after completion of Level 5.0, he/she has to complete additional four credit skill course/ internship.

c) If a student wishes to exit after completion of Level 5.5, he/she need not require completing any additional skill course/ internship.

❖ **Pattern of B.Sc. Programme:**

The pattern of program will be of semester type. (A) Weightage: There shall be Undergraduate certificate in science program credits. There shall be Undergraduate diploma in science with 92 credits. There shall be Three Year B.Sc. Programme with 132 credits. The with 48 candidate wishes to attempt for Four-Year B.Sc.(Hon./Research) may opt for 4thyear which will have additional 44 credits, hence, Four Year B.Sc. Programme will require 176 credits.(Please refer the university regulations and structure of the programme for details).

❖ Credit distribution chart for B. Sc. Programme:

a) For 3 year B. Sc. Programme:

Course Name		**Total Credits**	**% of total credits**
Major			
Major Mandatory(MM)	MM	52	
Major Elective(ME)	ME	08	
Vocational Skill Courses(VSC)	VSC	06	
On Job Training(OJT)	OJT	04	**57.58**
Field Project(FP)	FP	02	
Indian Knowledge System	IKS	02	
Community Engagement Programme	CEP	02	
Major Total Credits		**76**	

Minor	MIN	24	18.18
Open Elective (OE)/ Generic Elective(GE)Courses	OE	10	7.58
Ability Enhancement Courses	AEC	08	10.60
Indian Knowledge System(Generic)	IKS	02	6.06%
Value Education Courses	VEC	04	
Skill Enhancement Courses	SEC	06	
Co-Curricular Courses(NSS/NCC/Sports/Cultural Activities)	CC	02	
TOTAL		**132**	**100%**

a)For 4year B.Sc. Programme (Honours Degree)

Course Name		Total Credits	% of total credits
Major			65.91
Major Mandatory	MM	80	
Major Elective	ME	16	
Vocational Skill Courses	VSC	06	
On Job Training	OJT	08	
Field Project	FP	02	
Research Projects*	RP	00	
Indian Knowledge System	IKS	02	
Community Engagement Programme	CEP	02	
Major Total Credits		**116**	
Minor	MIN	24	15.91
Research Methodology	RM	04	
Open Elective/Generic Elective Courses	OE	10	5.68
Indian Knowledge System(Generic)	IKS	02	
Value Education Courses	VEC	04	
Skill Enhancement Courses	SEC	06	4.55
Co-Curricular Courses(NSS/NCC/Sports/Cultural Activities)	CC	02	
TOTAL		**176**	**100%**

a) For 4 year B. Sc. Programme (Honours with Research Degree):

Course Name		Total Credits	% of total credits
Major			
Major Mandatory	MM	72	
Major Elective	ME	16	
Vocational Skill Courses	VSC	06	
On Job Training	OJT	04	
Field Project	FP	02	
Research Projects*	RP	12	
Indian Knowledge System	IKS	02	
Community Engagement Programme	CEP	02	
Major Total Credits		116	
Minor	MIN	24	
Research Methodology	RM	04	
Open Elective/Generic Elective Courses	OE/GE	10	
Ability Enhancement Courses	AEC	08	
Indian Knowledge System(Generic)	IKS	02	
Value Education Courses	VEC	04	
Skill Enhancement Courses	SEC	06	
Co-Curricular Courses(NSS/NCC/Sports /Cultural Activities)	CC	02	
TOTAL		**176**	**100%**

*For honours degree with research, research project is applicable and for honours degree, courses related to major are incorporated.

❖ **Scheme of Teaching and Examination pattern (Theory/Practical/Internal):**

❖ **Structure in Accordance with National Education Policy - 2020 With Multiple Entry and Multiple Exit Options (AEDP)**

- **B.Sc. Part – I (Level-4.5) Semester I**

Course Code	Teaching Scheme			Examination Scheme					
	Theory and Practical			University Assessment (UA)			Internal Assessment (IA)		
	Lectures + Tutorial/ (Hours/ week)	Practical (Hours/ week)	Credit	Maximum Marks	Minimum Marks	Exam. Hours	Maximum Marks	Minimum Marks	Exam. Hours
Food Preservation I	2	0	2	30	12	1.5	20	8	1
Food Chemistry I	2	0	2	30	12	1.5	20	8	1
Laboratory Course I	0	4	2	30	12	4	20	8	1
Food Microbiology I	2	0	2	30	12	1.5	20	8	1
Human Physiology I	2	0	2	30	12	1.5	20	8	1
Laboratory Course II	0	4	2	30	12	4	20	8	1
Dairy Technology I	2	0	2	30	12	1.5	20	8	1
Human Nutrition I	2	0	2	30	12	1.5	20	8	1
Laboratory Course III	0	4	2	30	12	4	20	8	1
OE-1 Will be selected from Basket (T)	2	0	2	30	12	1.5	20	8	1
IKS-1	2	0	2	30	12	1.5	20	8	1
TOTAL			**22**	**330**			**220**		

B.Sc. Part – I (Level-4.5) Semester II

Course Code	Teaching Scheme			Examination Scheme					
	Theory and Practical			University Assessment (UA)			Internal Assessment (IA)		
	Lectures (Hours / week)	Practical (Hours/ week)	Credit	Maximum Marks	Minimum Marks	Exam. Hours	Maximum Marks	Minimum Marks	Exam. Hours
Food Preservation II	2	0	2	30	12	1.5	20	8	1
Food Chemistry II	2	0	2	30	12	1.5	20	8	1
Laboratory Course IV	0	4	2	30	12	4	20	8	1
Food Microbiology II	2	0	2	30	12	1.5	20	8	1
Human Physiology II	2	0	2	30	12	1.5	20	8	1
Laboratory Course V	0	4	2	30	12	4	20	8	1
Dairy Technology II	2	0	2	30	12	1.5	20	8	1
Human Nutrition II	2	0	2	30	12	1.5	20	8	1
Laboratory Course VI	0	4	2	30	12	4	20	8	1
OE-2 Will be selected from Basket (T)	2	0	2	30	12	1.5	20	8	1
VEC-1	2	0	2	30	12	1.5	20	8	1
TOTAL			**22**	**330**			**220**		
Cum. Total Sem I &II			**44**	**660**			**440**		

- **S#T#–** Subject number Theory paper number
- **S#P#**– Subject number Practical paper number

- Total Marks for B.Sc.-I : **1100**
- Total Credits for B.Sc.-I (Semester I & II): 44

• **OE# (T)** - Open Elective Theory Paper number • **OE# (P)** - Open Elective Practical Paper number • **IKS-1**– Indian Knowledge System Theory Paper 1 (Generic) • **VEC-1**–Value Education Course (Democracy) Theory	• **Requirement for Exit after Level 4.5:** • **Award of UG Certificate with 44 Credits and an additional 4 credits core NSQF course/Internship.**

❖ **Scheme of Teaching and Examination pattern (Theory/Practical/Internal):**

❖ **Structure in Accordance with National Education Policy - 2020 With Multiple Entry and Multiple Exit Options (AEDP)**

- **B.Sc. Part – II (Level-5.0) Semester III**

Course Code	Teaching Scheme			Examination Scheme					
	Theory and Practical			University Assessment (UA)			Internal Assessment (IA)		
	Lectures + Tutorial/ (Hours/ week)	Practical (Hours/ week)	Credit	Maximum Marks	Minimum Marks	Exam. Hours	Maximum Marks	Minimum Marks	Exam. Hours
Major V Cereals Processing Technology	2	0	2	30	12	1.5	20	8	1
Major VI Fruits and Vegetables Processing Technology I	2	0	2	30	12	1.5	20	8	1
Major P-III Laboratory Course VII (Based on Major V & Major VI)	0	4	2	30	12	4	20	8	1
Minor V Food Packaging	2	0	2	30	12	1.5	20	8	1
Minor VI Food Biochemistry	2	0	2	30	12	1.5	20	8	1
Minor P-III Laboratory Course VIII (Based on Minor V & Minor VI)	0	4	2	30	12	4	20	8	1
OE-3 Will be selected from OE Basket (T)	2	0	2	30	12	1.5	20	8	1
VSC I Vocational Skill Course in Fruit Preserve Products Manufacturing Laboratory Course IX (P)	0	4	2	30	12	1.5	20	8	1

SEC I Design & Development of New Products (T)	2	0	2	30	12	1.5	20	8	1
AEC I English	2	0	2	30	12	1.5	20	8	1
CC – I NSS/Sports	-	-	2	40			10		
Total			**22**	**340**			**210**		

B.Sc. Part – II (Level-5.0) Semester IV

Course Code	Teaching Scheme			Examination Scheme					
	Theory and Practical			University Assessment (UA)			Internal Assessment (IA)		
	Lectures (Hours / week)	Practical (Hours/ week)	Credit	Maximum Marks	Minimum Marks	Exam. Hours	Maximum Marks	Minimum Marks	Exam. Hours
Major VII Legumes and Oilseeds Processing Technology	2	0	2	30	12	1.5	20	8	1
Major VIII Fruits and Vegetables Processing Technology II	2	0	2	30	12	1.5	20	8	1
Major P-IV Laboratory Course X (Based on Major VII & Major VIII)	0	4	2	30	12	4	20	8	1
Minor-VII Diet Therapy	2	0	2	30	12	1.5	20	8	1
Minor-VIII Food Quality Control	2	0	2	30	12	1.5	20	8	1
Minor P-IV Laboratory Course XI (Based on Minor VII & Minor VIII)	0	4	2	30	12	4	20	8	1
OE-4 Will be selected from Basket (T)	2	0	2	30	12	1.5	20	8	1
SEC II Design & Development of New Products (P) Laboratory Course XII	0	4	2	30	12	4	20	8	1

AEC II English	2	0	2	30	12	1.5	20	8	1
VEC-II Environmental Studies	2	0	2	30	12	1.5	20	8	1
CEP-I			2	10			40		
TOTAL			**22**	**310**			**240**		
Cum. Total Sem I &II			**44**	**650**			**450**		

- **S#T#–** Subject number Theory paper number
- **S#P#**– Subject number Practical paper number
- **OE# (T)** - Open Elective Theory Paper number
- **OE# (P)** - Open Elective Practical Paper number
- **IKS-1**– Indian Knowledge System Theory Paper 1 (Generic)
- **VEC-1**–Value Education Course (Democracy) Theory

- Total Marks for B.Sc.-II : **1100**
- Total Credits for B.Sc.-II (Semester III & IV): 44
- **Requirement for Exit after Level 4.5:**
- **Award of UG Certificate with 44 Credits and an additional 4 credits core NSQF course/Internship.**

❖ **Examination Scheme:** Total marks shall be 50 for 2 credit courses.

1. The question paper in each semester end examination for each theory course (paper) for B.Sc. (all Semesters) shall be of 30 marks for 2 credits.

Total marks for each course shall be based on continuous assessments and semester- end examination. The division of internal assessment and semester–end examination for B. Sc. will be as follows:

Particulars	2 Credit Course	Duration
Semester-end Examination	30 Marks	1.5 Hrs
Internal Assessment	20 Marks	--
Total marks for each course	50 Marks	--

2. The Examination for practical course will be of 50 marks at end of each semester. The rule for practical examination shall be as per the circular/ letter issued by respective board of studies.

3. The examination pattern for Co-Curricular Activities (CC), Field Project (FP), On Job Training (OJT), Community Engagement Program (CEP) and Research Project (RP) as per the University guidelines.

Internal Assessment Process shall be as follows:

(a) The internal assessment should be conducted after completing 50% of syllabus of the course/s.

(b) In case a student has failed to attend internal assessment on scheduled date, it shall be deemed that the student has dropped the test. However, in case of student who could not take the test on scheduled date due to genuine reasons, such a candidate may appeal to the Programme coordinator /Principal /Head of the Department. The Programme coordinator /Principal /Head of the Department in consultation with the concerned teacher shall decide about the genuineness of the case and decide to conduct special test to such candidate on the date fixed by the concerned teacher but before commencement of the concerned semester-end examination. The outline for continuous internal assessment activities shall be as under:

RULES FOR 60:40 EVALUATION PATTERN

To be implemented from June 2025

Nature of question paper and scheme of marking:

a) Theory (Semester exam) for each Theory paper: Maximum marks – 30

Modality of Assessment

Students appearing for B.Sc. will be evaluated as per the 60:40 scheme where in the term end examination will be of 30 marks, while 20 marks will be through internal evaluation for each paper.

A. Theory Examination

- ✓ Equal weightage shall be given to all units of the theory paper
- ✓ Total number of questions – 03
- ✓ Question No. 1 will be of an objective type. 10 objective questions will carry-10 Marks.
- ✓ Question No. 2 will be descriptive. One question to be attempted out of two and will carry 10 Marks.
- ✓ Question No. 3 will be short answer type. Two questions are to be attempted out of three questions and will carry 10 Marks, 05 Marks each.
- ✓ **Nature of questions** - Multiple choice, Descriptive and Short answer type.
- ✓ All these questions will be answered in the same answer book.

Semester End Theory Assessment 30 marks

- The duration of this exam will be of 1 and half Hrs (90 minutes)
- From each unit there will be at least one question asked.
- All questions shall be compulsory with internal choice within the questions

Nature of question paper (for 2 Credit Course)

Total Marks: 30 **Time:** 1 and half Hrs (90 minutes)

Instructions:

1. All questions are compulsory.
2. Figures to the **RIGHT** indicate **FULL MARKS.**

Q.1 Select Correct Answer (Multiple choice questions) ---------- 10 marks

a)

b)

:

:

j)

Q.2 Attempt any **ONE** of the following.

(Essay type / Broad answer questions) ---------- 10 marks

a)

b)

Q.3 Attempt any **TWO** of the following ---------- 10 marks

a)

b)

c)

b) Theory (Semester exam) for each Theory paper: Maximum marks – 60

Modality of Assessment

Students appearing for the B.Sc. will be evaluated as per the 60:40 scheme where in the term end examination will be of 60 marks each paper, while 40 marks will be through internal evaluation for each paper.

B. Theory Examination

- ✓ Equal weightage shall be given to all units of the theory paper
- ✓ Total number of questions – 04
- ✓ Question No. 1 will be of an objective type. 8 objectives will carry- 8 Marks.
- ✓ Question No. 2 will be short notes. Two questions to be attempted out of two and will carry 4 Marks.(2 marks for each question)
- ✓ Question No. 3 will be of descriptive answer type. 4 questions are to be attempted out of 6 questions and will carry 16 Marks.(04 Marks for each question)
- ✓ Question No. 4 will be of descriptive answer type. 4 questions are to be attempted out of 6 questions and will carry 32 Marks.(08 Marks for each question)
- ✓ **Nature of questions** - Multiple choice, Short answer type and Descriptive type.
- ✓ All these questions will be answered in the same answer book.

Semester End Theory Assessment 60 marks

- The duration of this exam will be of 2 Hrs
- From each unit there will be at least one question asked.
- All questions shall be compulsory with internal choice within the questions

Nature of question paper (for 4 Credit Course)

All Questions are compulsory

Time duration (2 hours) **Total Marks: 60**

Q. 1. Select the correct answers: MCQ **1 x 8 = 8**

i) ii)
iii) iv)
v) vi)
vii) viii)

Q. 2. Write short notes on: **2 x 2 = 4**

a) b)

Q. 3. Answer any four of the following: **4 x 4 = 16**

a)
b)
c)

d)
e)
f)

Q.4. Answer any four of the following: **8 x 4 = 32**

a)
b)
c)
d)
e)
f)

Nature of Practical question paper (for 2 Credit Course)

Day and Date: **Total Marks: 30**
Time:
Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labeled diagram wherever necessary.

Q1.) Perform the major experiment arranged on table. [15]

Q2.) Perform the minor experiment arranged on table. [10]

Q3.) Write Principle/ Spotting [05]

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B. Internal Assessment 40%

Level	Semester	Activities Per Semester	4 credits	2 credits
4.5 (First year)	I & II	1 Home Assignment	10 marks	5 marks
		2 Class Assignment (Tutorial type)	10 marks	5 marks
		3 Quiz	10 marks	5 marks
		4 Unit Test *	10 marks	5 marks
5.0 (Second Year)	III & IV	1 Oral Examination	10 marks	5 marks
		2 Group Discussion	10 marks	5 marks
		3 Seminar	10 marks	5 marks
		4 Unit Test*	10 marks	5 marks
5.5 (Third Year)	V & VI	1 Case Study / Problem solving	10 marks	5 marks
		2 Field Work / Seminar	10 marks	5 marks
		3 Book Review / Poster Presentation	10 marks	5 marks
		4 Unit Test*	10 marks	5 marks
6.0 (Fourth Year)	VII & VIII	1 Seminar	10 marks	5 marks
		2 Case Study/ Problem Solving	10 marks	5 marks
		3 Book Review / Poster Presentation	10 marks	5 marks
		4 Unit Test*	10 marks	5 marks

Note:

1. For two credit course, unit test of 10 marks shall be conducted and it is converted into 5 marks.
2. For four credit course, unit test of 10 marks shall be conducted.
3. Book Review (Any relevant Reference Book)

PRACTICAL EXAMINATION

- There will be semester wise practical examination to be conducted at the end of each semester. The question paper along with marking scheme and skeleton / Question paper will be given by respective BOS before practical examination.
- Practical examination will be evaluated by two internal examiners.
- Internal examiners are from respective college fulltime regular faculty. If fulltime regular faculty is not available in college, then principal of the college shall invite internal examiner from fulltime regular faculty appointed in nearby college.
- Duration of Practical Examination shall be decided by respective BOS.

Internal Examination Pattern for Practical Course as follows:

Sr. No.	Activity	Internal Evaluation	
		4 credits	2 credits
1	Assessment of Journal	10 marks	5 marks
2	Assessment of Regular Notebook	10 marks	5 marks
3	Attendance for every Practical	10 marks	5 marks
4	Test Based on Practical work (Conduct at least Two Test in Each Semester)	10 marks	5 marks
	Total	40 marks	20 marks

- **Ordinances regarding the examination:** O. B.Sc.2,3 and 4 shall prevail.
- **Equivalence of papers and chances for the students in previous-Semester pattern:** Two additional chances in subsequent semesters shall be provided for the repeater students of old three-year B.Sc. program. In such case the scores obtained by the students in NEP 1.0/CBCS scheme should be converted into equivalent credits in NEP 2.0. After that the students concerned shall have to appear for the examination as per this revised pattern. If a student fails in two consecutive chances, she has to take admission for the respective course in NEP 2.0 (AEDP). In such cases his/her previous performance of incomplete academic years (B. Sc. I, B. Sc. II or B. Sc. III) will be cancelled.

❖ **Equivalence of papers: (Old B. Sc. FTM II & New B. Sc. FTM II)**

	Old Course	**Equivalent Course**	
Sem No.	**Title of Old Course & Credits**	**Title of New Course & Credits**	**Remark/s**
III	Cereals, Legumes & Oilseeds Technology I (02)	Cereals Processing Technology (02)	Change in subject name and accordingly modification in syllabus. Legumes & oilseeds processing part included in Semester II
III	Fruits and Vegetables Processing Technology- I (02)	Fruits and Vegetables Processing Technology- I (02)	Slight modification in syllabus as per industry suggestions
III	Food Packaging-I (02)	Food Packaging (02)	Slight modification in syllabus as per industry suggestions. Merged the contents of FP I & FP II (Old)
III	Food Biochemistry-I (02)	Food Biochemistry (02)	Slight modification in syllabus, merged the contents of FB I & FB II (Old)
III	VSC-I (02) Vocational Skill Course in Jam, Jelly & Ketchup Processing Laboratory Course IX	VSC-I (02) Vocational Skill Course in Fruit Preserve Products Manufacturing Laboratory Course IX	Change in the course title. Slight modification in syllabus
III	SEC -I (02) Food Quality & Safety (T)	SEC- I (02) -	FQS Course renamed as Food Quality Control and shifted as Minor VIII subject to Semester IV
III	-	SEC – I (02) Design & Development of New products	Newly added subject
III	AEC I English (02)	AEC I English (02)	No changes in the syllabus
III	Laboratory Course VII (02) Laboratory Course VIII (02) Laboratory Course IX (02)	Laboratory Course VII (02) Laboratory Course VIII (02) Laboratory Course IX (02)	No. of practicals changed as per credits & contact hours in the syllabus

IV	Cereals, Legumes & Oilseeds Technology I (02)	Legumes & Oilseeds Processing Technology (02)	Change in subject name and accordingly modification in syllabus.
IV	Fruits and Vegetables Processing Technology- I (02)	Fruits and Vegetables Processing Technology- I (02)	Slight modification in syllabus as per industry suggestions
IV	Food Packaging-I (02)	-	Contents of FP I shifted to Food packaging in semester III
IV	Food Biochemistry -II (02)	Food Quality Control (02)	Contents of FB II merged with Food Biochemistry Course in Semester III. Added FQC course as Minor VIII
IV	SEC-II (02) Food Quality & Safety II (T)	-	Contents of FQS II merged with Food Quality Control Course in Semester IV
IV	-	Diet Therapy	Newly added subject
IV	-	Design & Development of New Products (02) (P) Laboratory Course XII	Newly added as SEC-II (P) i.e. Laboratory Course XII
IV	AEC II English (02)	AEC II English (02)	No changes in the syllabus
IV	VEC II Environmental Studies (02)	VEC II Environmental Studies (02)	No changes in the syllabus
IV	Laboratory Course X (02) Laboratory Course XI (02) Laboratory Course XII (02)	Laboratory Course X (02) Laboratory Course XI (02) Laboratory Course XII (02)	Change in syllabus as per theory courses, Addition of new practicals as per industry requirements. No. of practicals changed as per credits & contact hours in the syllabus

Apprenticeship Embedded Degree Programme

Bachelor of Food Technology and Management (B. Sc. FTM)-Course Structure (As per AEDP)

Credit Framework

First Year

SEM (Level)	COURSE			OE	VSC/ SEC	AEC/ VEC/ IKS	OJT/FP/ CEP/CC/RP	Total Credits	Degree/Cum. Cr. MEME
	Course -1	**Course -2**	**Course - 3**						
SEM I (4.5)	**DSC-I** Food Preservation I (2) **DSC-II** Food Chemistry I (2) **DSC Pract-I** Laboratory Course I (Based on DSC I & DSC II) (2)	**DSC-I** Food Microbiology I (2) **DSC-II** Human Physiology I (2) **DSC Pract-I** Laboratory Course II (Based on DSC I & DSC II) (2)	**DSC- I** Dairy Technology I (2) **DSC- II** Human Nutrition I (2) **DSC Pract-**I Laboratory Course III (Based on DSC I & DSC II) (2)	**OE I-** Will be selected from OE Basket (Th) (2)		**IKS -I** Introduction to IKS (2)	-	**22**	UG Certificate **44**
SEM II (4.5)	**DSC- III** Food Preservation II (2) **DSC-IV** Food Chemistry II (2) **DSC Pract-II** Laboratory Course IV (Based on DSC III & DSC IV) (2)	**DSC-III** Food Microbiology II (2) **DSC-IV** Human Physiology II (2) **DSC -Pract-II** Laboratory Course V (Based on DSC III & DSC IV) (2)	**DSC-III** Dairy Technology II (2) **DSC-IV** Human Nutrition II (2) **DSC-Pract-II** Laboratory Course VI (Based on DSC III & DSC IV) (2)	**OE- II-** Will be selected from OE Basket (Th) (2)		**VEC-I** Democracy, Election & Constitution (2)	-	**22**	
Credits	**8 (T) + 4 (P) = 12**	**8 (T) + 4 (P) = 12**	**8 (T) + 4 (P) = 12**	**2+2=4**	**-**	**2+2=4**	**-**	**44**	**Exit option: 4 Credits NSQF/Internship/ Skill Courses**

College of Non-Conventional Vocational Courses for Women, Kolhapur
Bachelor of Food Technology and Management-Course Structure (As per AEDP)
Credit Framework
Second Year

SEM Level	COURSES			OE	VSC/SEC	AEC/ VEC/ IKS	OJT/ FP/ CEP/ CC/ RP	Total Credits	Degree/ Cum. Cr. MEME
	Major		**Minor**						
SEM III (5.0)	**Major-V** Cereals Processing Technology (2) **Major-VI** Fruits and Vegetables Processing Technology I (2) **Major P-III** Laboratory Course VII (Based on Major V & Major VI) (2)	-	**Minor-V** Food Packaging (2) **Minor-VI** Food Biochemistry (2) **Minor P-III** - Laboratory Course VIII (Based on Minor V & Minor VI) (2)	OE-3 Will be selected from OE Basket (T) (2)	**VSC I (P)** Vocational Skill Course in Fruit Preserve Products Manufacturing Laboratory Course IX (2) **SEC I (T)** Design & Development of New products (2)	**AEC I** English (2)	CC- I (2) NSS/Sports	22	**UG Diploma 88**
SEM IV (5.0)	**Major-VII** Legumes & Oilseeds Processing Technology (2) **Major-VIII** Fruits and Vegetables Processing Technology II (2) **Major P-IV** Laboratory Course X (Based on Major VII & Major VIII) (2)	-	**Minor-VII** Diet Therapy (2) **Minor-VIII** Food Quality Control (2) **Minor P-IV** Laboratory Course XI (Based on Minor VII & Minor VIII) (2)	OE-4 Will be selected from OE Basket (T) (2)	**SEC II (P)** Design & Development of New products Laboratory Course XII (2)	**AEC II** English (2) **VEC II** Environmental Studies (2)	CEP- I (2)	22	

Credits	**8 (T)+4 (P)=12**	**-**	**8 (T) +4 (P) =12**	**2 +2=4(T)**	**4 (T) + 2 (P) =6**	**2+4=6**	**2+2=4**	**44**	**Exit Option: 4 credits NSQF/ Internship/ Skill Courses**

College of Non-Conventional Vocational Courses for Women, Kolhapur
Bachelor of Food Technology and Management-Course Structure (As per AEDP)
Credit Framework Third Year

SEM Level	COURSES			OE	VSC/SEC	AEC/ VEC/ IKS	AEDP	Total Credits	Degree/ Cum. Cr. MEME
	Major		Minor						
SE M V (5.5)	**Major-IX** Bakery and Confectionery Technology (2) **Major-X** Meat, Fish & Poultry Processing Technology (2) **Major P-V** Laboratory Course XII (Based on Major IX & Major X) (4)	**Major Program Elective I** 1. Food Additives (2) 2. Beverage Technology (2) 3. Therapeutic Nutrition (2) **Major P-I** - Laboratory Course XIII (Based on Major Program Elective I) (2)	-	OE-5 (T) Will be selected from OE Basket (2)	**VSC II (P)** Vocational Skill Course in Bakery Products Manufacturing Laboratory Course XIV (4)	**AEC III** English (4) **IKS II (Specific)** (2)	-	22	**UG Degree 132**
SEM VI (5.5)	-				**SEC III (T)** Food Industry Economics & Management Skills (2)	-	Apprenticeship (6 months) (20)	22	
Credits	**4 (T)+4 (P)=8**	**2 (T) +2 (P) =4**	**-**	**2 (T/P)**	**2 (T) + 2 (P) =4**	**4+2=6**	**20**	**44**	
Total Credits	**40+20=60**		**24**	**10**	**12**	**16**	**10**	**132**	**Exit Option**

❖ **Standard of Passing:** The standard of passing shall be as per shown in the following table:

	Semester End Exam	**Internal Assessment**	**Course Exam (Total)**
Maximum Marks	30	20	50
Minimum Marks required for passing	12	8	20

1. There shall be a separate head of passing for semester end examination and internal examination.
2. Minimum 20 marks out of 50 are required for passing of practical examination of each course.
3. Passing criteria for Co-Curricular Activities (CC), Field Project (FP), On Job Training (OJT), Community Engagement Program (CEP) and Research Project (RP) as per the University guidelines.

❖ **Gradation Chart:**

% of Marks Obtained	**Numerical Grade (Grade Point)**			**Letter Grade**
Absent	--		-	-
0 – 34	0			F (Fail)
35 – 44	5			C
45 – 54	6			B
55 – 64	7			B+
65 – 74	8			A
75 – 84	9			A+
85 – 100	10			O (Outstanding)

Note:

Marks obtained >= 0.5shall be rounded off to next higher natural number.

1. The SGPA &CGPA shall be rounded off to 2 decimal points.

❖ **Calculation of SGPA& CGPA:**

1. Semester Grade Point Average **(SGPA)**

$$SGPA = \frac{\sum(\text{Course credits} \times \text{Grade points obtained}) \text{ of a semester}}{\sum(\text{Course credits}) \text{ of respective semester}}$$

2. Cumulative Grade Point Average **(CGPA)**

$$\text{CGPA} = \frac{\sum(\text{Total credits of a semester} \times \text{SGPA of respective semester}) \text{ of all}}{\sum(\text{Total course credits}) \text{ of all}}$$

❖ **Result -** The result of each semester shall be declared as Pass or Fail with grade/grade points. However, ATKT rules will be followed as per University guidelines.

❖ **Rules for 60:40 Evaluation Pattern**

❖ **Nature of question paper and scheme of marking:**

a) Theory (Semester exam) for each Theory paper: Maximum marks – 30

Modality of Assessment

Students appearing for the NEP (AEDP) B.Sc. I will be evaluated as per the 60:40 scheme wherein the term end exam will be of 30 marks each paper while 20 marks will be through internal evaluation for each paper.

A. Theory Examination

- ✓ Equal weightage shall be given to all units of the theory paper
- ✓ Total number of questions – 03
- ✓ Question one will carry- 10 Marks,
- ✓ Question No. 1 will be of an objective type. 10 objectives will carry- 10 Marks.
- ✓ Question 2 will be descriptive one question to be attempted out of two and will carry 10 Marks)
- ✓ Question 3 will be short answer type. Two questions are to be attempted out of three questions and will carry 10 Marks, 05 Marks each)
- ✓ **Nature of questions** - multiple choice, Descriptive and short answer type.
- ✓ All these questions will be answered in the same answer book

Semester End Theory Assessment 30 marks

- The duration of this exam will be of 1 and half Hrs (90 minutes)
- For each unit there will be at least one question
- All questions shall be compulsory with internal choice within the questions

B. Internal Assessment 40%

Level	Semester	Activities Per Semester	4 credits	2 credits
4.5 (First year)	I & II	1 Home Assignment	10 marks	5 marks
		2 Class Assignment (Tutorial type)	10 marks	5 marks
		3 Quiz	10 marks	5 marks
		4 Midterm Test *	10 marks	5 marks
5.0 (Second Year)	III & IV	1 Oral Examination	10 marks	5 marks
		2 Group Discussion	10 marks	5 marks
		3 Seminar	10 marks	5 marks
		4 Midterm Test*	10 marks	5 marks
5.5 (Third Year)	V & VI	1 Case Study / Problem solving	10 marks	5 marks
		2 Field Work / Seminar	10 marks	5 marks
		3 Book Review / Poster Presentation	10 marks	5 marks
		4 Midterm Test*	10 marks	5 marks
6.0 (Fourth Year)	VII & VIII	1 Seminar	10 marks	5 marks
		2 Case Study/ Problem Solving	10 marks	5 marks
		3 Book Review / Poster Presentation	10 marks	5 marks
		4 Midterm Test*	10 marks	5 marks

Midterm test*: A midterm test shall be conducted after end of each Semester.

Note: 1. For two credit course, unit test of 10 marks shall be conducted and it is converted into 5 marks.

2. For four credit course, unit test of 10 marks shall be conducted.

3. Book Review (Any relevant Reference Book)

PRACTICAL EXAMINATION

- There will be semester wise practical examination to be conducted at the end of each semester.
- The question paper along with marking scheme and skeleton / Question paper will be given by respective BOS before practical examination.
- Practical examination will be evaluated by two internal examiners.
- Internal examiners are from respective college fulltime regular faculty. If fulltime regular faculty is not available in college, then principal of the college shall invite internal examiner from fulltime regular faculty appointed in nearby college.
- Duration of Practical Examination shall be decided by respective BOS.

Internal Examination Pattern for Practical Course as follows:

Sr. No.	**Activity**	**Internal Evaluation**	
		4 credits	**2 credits**
1.	Assessment of Journal	10 marks	5 marks
2.	Assessment of Regular Notebook	10 marks	5 marks
3.	Attendance for every Practical	10 marks	5 marks
4.	Test Based on Practical work (Conduct at least Two test in each semester)	10 marks	5 marks
	Total	40 marks	20 marks

❖ Rules for UG Science (B. Sc.) Programme:

R.B.Sc.No.1

The three-year B. Sc. programme shall consist of 6 semesters which will have 132 credits altogether. However, the candidate who wishes to attempt a Four- Year B. Sc. (Hon./Research) may opt for 4th year which will have 44 credits. Hence, the Four-Year B. Sc. programme will be of 176 credits. (Please refer to the university regulations and structure of the programme for details).

The examination shall be held at the end of each semester.

The theory examination for 2 credits will be of 30 (Semester end examination) and 20 (Internal examination) marks. The practical examination for 2/4 credits will be 50/100 marks at the end of each semester with bifurcation as External evaluation 30/60 marks and Internal evaluation of 20/40 marks.

R.B.Sc.No.2

Structure of B. Sc. programme is as shown in Annexure 1.

R. B. Sc. No.3

List of Courses:

	Sem I	• Subject I: DSCI, DSCII, and Practical I • Subject II: DSC I, DSC II, and Practical I • Subject III: DSC I, DSC II, and Practical I • OE I (Theory/ Practical) • IKS I (Introduction to IKS)
B. Sc. I	**Sem-II**	• Subject I: DSCIII, DSCIV, and Practical II • Subject II: DSCIII, DSCIV, and Practical II • Subject III: DSCIII, DSCIV, and Practical II • OE II (Theory/ Practical) • VEC I (Democracy, Election and constitution)
B. Sc. II	**Sem III**	• Major V, VI, and Major Practical III • Minor V, VI, and Minor Practical III • OE III (Theory/ Practical) • VSC I Practical (Major Specific) • SEC I Theory/Practical • AEC I (English) • CC
	Sem IV	• Major VII, VIII, and Major Practical IV • Minor VII, VIII, and Minor Practical IV • OE IV (Theory/ Practical) • SEC II Theory/Practical • AEC II (English) • VEC II (Environmental Studies) • CEP

	Sem V	• Major IX, X, and Major Practical V, VI • Major I (Elective), Major (Elective) Practical- I • OE V (Theory/ Practical) • VSC II Practical II Major Specific • AEC III (English) • OJT
B. Sc. III	**Sem VI**	• Major XI, XII, and Major Practical VII, VIII • Major II (Elective), Major (Elective) Practical- II • VSC III Practical Major Specific • SEC III Practical • AEC IV(English) • IKS II (Major Specific) • FP

R. B. Sc. No. 4

(A) **Skill Enhancement Course (SEC):**

Skill Enhancement Course should be selected from the basket provided by University.

(B) **Open Elective Course (OE):** Open Elective **Course should be selected from the basket provided by University.** This course is to be chosen compulsorily from faculty other than that of major or Geography or Mathematics or Statistics from OE basket.

(C) **Co-curricular Courses (CC):** For Semester III one Co- curricular course such as Health and Wellness/ Yoga education / sports and fitness / Cultural Activities/ NSS / NCC / Fine Arts / Applied Arts / Visual Arts / Performing Arts is to be chosen compulsorily. The student should be engaged for four hours per week. The examination pattern will be decided by the respective bodies.

(D) **On Job Training (OJT):**

The candidate should complete the work of **On Job Training of 4 credits in Semester V.** The execution of OJT examination pattern shall be as per the OJT guidelines of the University. On-job training (OJT)/ Internship/ Apprenticeship of 120 hours must be completed by the candidate in industry/ health sectors / research labs/ public testing laboratories/ diagnostic laboratories/ Chemical Industry / Pharmaceutical Industry.

(E) **Field Project (FP):** The guidelines and examination pattern will be decided by the respective board of studies.

R. B. Sc. No. 5

The student must earn at least 60% of the credits from his/her mother institute. The students may earn at the most 40% of the credits in any head, except major related courses and minor courses through online mode approved by the University.

R. B. Sc. No. 6

The fees for the admission to B. Sc. Part I, B. Sc. Part II, B. Sc. Part III and B. Sc. Part IV Programme shall be as prescribed by the University from time to time.

R. B.Sc. No. 7

Detailed Syllabus:

The detailed syllabi for the various courses under this pattern shall be subject to such revision, modification etc. as may be made by the Academic council from time to time on the recommendations of the Board of Studies in different subjects. The textbooks and reference books for the various courses shall be those prescribed by the Academic Council from time to time on the recommendations of the respective Boards of Studies.

R. B. Sc. No. 8

The medium of instruction: For the Three Year (Six Semesters) B.Sc./ Four Year B.Sc. Degree Programme. The medium of instruction for Major, Minor, VSEC, SEC, and AEC is English. The medium of instruction for OE, CEP, CC, OJT, FP, VEC and IKS may be either Marathi or English.

R. B. Sc. No. 9

i. In B. Sc. Part II, the student can choose any one subject as major subject, one subject as minor subject from the three subjects (Discipline Specific Core) studied in B.Sc. Part I.

ii. The student will continue for B. Sc. Part III with the major subject he/ she opted in B. Sc. Part II.

R. B. Sc. No. 10 Multiple Entry and Multiple Exit (MEME):

- If an exited student wants to re-enter, he/she can reenter within three years from exit.

- One should complete his/ her degree program within a period of a maximum of seven years.

R. B. Sc. No. 11

No candidate shall be allowed to appear the B. Sc. Part-III (or Three-Year Undergraduate Degree in Science) Examination unless the candidate has satisfactorily kept two terms for the programme at a college affiliated to/ university department of this University or any other recognized university.

The principal of the college has to certify the attendance and the examination form of the candidate as per Ordinance O 31 and O 37. A candidate has to submit the University examination form as per the schedule and dates prescribed by the University for every examination to the University along with the prescribed fee through the Principal of the College.

R. B. Sc. No. 12

All Semester-end theory and practical examinations for B.Sc. Part I (Sem I and II), B.Sc. Part II (Sem II and IV), B.Sc. Part III (Sem V and Vi), B.Sc. Part IV (Sem VII and VIII) shall be held twice (i.e. April /May and October/November) a year.

R. B. Sc. No. 13

a) A candidate who desires to seek a B. Sc. Degree in another Major course (DSE or ME), shall be permitted to do so. Selected major subject should be studied as Minor subject at level 5.0. Such candidate may appear at B.Sc. Part III (Semester V & VI) Examination on the submission of a new application for fresh admission and on payment of required fees. Such a candidate need not appear again for AEC and OE courses.

b) The Candidate as above (in clause „a‟) shall not be eligible for a second degree and a class, a prize, scholarship, medal, or any other award. The candidate will get the benefit of a new degree in a new course (subject) only if the candidate surrenders his first degree.

c) A candidate seeking degree in a specific course (subject) not offered at B.Sc.

Part II and III, but offered only at B.SC. Part I, needs to reappear for B.Sc. Part II (Sem III and IV) and Part III (V and VI), including both theory and practical. Such a candidate passing the examination shall not be eligible for class or additional degree. He shall be granted a certificate of having passed the additional subject. The candidate shall get new degree provide they surrenders his first degree.

R. B. Sc. No. 14

a) The result of the B.Sc. Part I (semester I and II) examinations shall be declared publicly in three categories

(i) Pass: Candidates who have passed the B.Sc. Part I (semester-I and II) examination.

(ii) Fail - ATKT: Candidates who are allowed to proceed to the B.Sc. Part II (semester-III).

(iii) Fail: Candidates who are failed to proceed to the B.Sc. Part II (semester- III).

b) The result of the B. Sc. Part II (semester III and IV) examinations shall be declared publicly in three categories.

(i) Pass: Candidates who have passed the B.Sc. Part II (semester-III and IV) examination in addition to the remaining courses, if any of previous examination.

(ii) Fail - ATKT: Candidates who are allowed to proceed to the B.Sc. Part III (semester-V).

(iii) Fail: Candidates who are failed to proceed to the B.Sc. Part III (semester- V).

c) If a candidate fails or remains absent in examination of all the courses of semester-I or not applied for semester I examination (provided he/she attended semester I) shall be allowed to proceed to semester II.

d) If a candidate fails or remains absent in examination of all the courses of semester-III or not applied for semester III examination (provided he/she attended semester III) shall be allowed to proceed to semester IV.

e) If a candidate fails or remains absent in examination of all the courses of semester-V or not applied for semester V examination (provided he/she attended semester V) shall be allowed to proceed to semester VI.

f) No candidate shall be allowed to proceed to semester-V unless the candidate has cleared semester-I and semester-II in all courses.

g) No candidate shall be allowed to proceed to semester-VII unless the candidate has cleared all previous semesters from –I to VI in all courses with a minimum 7.5 CGPA (or 75 % Marks).

h) If a candidate fails or remains absent in examination of all the courses of semester-VII or not applied for semester VII examination (provided he/she attended semester VII) shall be allowed to proceed to semester VIII.

i) Rules of ATKT made by the University will be applicable from time to time.

R. B. Sc. No. 15

(A) The Results of the Examination will be declared based on marks obtained, Grade points obtained, Credit points, Status, Percentage of marks, Result, SGPA and CGPA with numerical grade points, and letter grades. The list of Courses, course codes, Paper numbers of programme, numerical grade & letter grade table, and calculation of SGPA and CGPA table shall be mentioned on the backside of the mark sheet.

(B) In the case of a Three-Year B. Sc. Degree, the result of B. Sc. programme (Semester-I to VI) shall be declared in Grades by considering SGPA and CGPA (with percentage) based on the performances of all the courses at respective semesters. The award of scholarships and prizes for the B.Sc. programme shall be determined based on the aggregate performance of the candidate at the semester-I to VI examination.

(C) In the case of a Four-Year B. Sc. Degree, the result of B. Sc. programme (semester-I to VIII) shall be declared in grades by considering SGPA and CGPA (with percentage) based on the performances of all the courses at respective semesters. The award of scholarships and prizes for the B.Sc. programme shall be determined based on the aggregate performance of the candidate at the semester-I to VIII examination.

R. B. Sc. No. 16

Standard of Passing:

A) To pass the three-year B.Sc. degree examination, a candidate shall be required to pass in semester I, II, III, IV, V and VI examinations

a) To pass each semester examination a candidate shall be required to obtain a minimum of 40% of the total marks in each course.

b) A Candidate shall have to obtain 12 marks out of 30 for the semester end theory examination, 20 out of 50 for the semester end practical examination and 8 marks out of 20 in the internal examination in each semester. If the candidate fails/ absent in the internal examination then the candidate has to pass the internal examination as per University regulations.

c) The candidate has to complete the other applicable courses like VSEC, SEC, VEC, AEC OE, IKS, CC, OJT, CEP and FP according to the criterion applicable for the respective courses.

B) For Three year B. Sc Degree : Those of the successful candidates who obtain 45% or more of the aggregate marks in Parts-I, II& III semester Examinations, (i.e. Semester-I to VI aggregate) shall be declared to have passed the B.Sc. Degree Examinations in Second Class and those obtaining 60% or more of the aggregate marks in Parts-I, II & III Examinations (i.e. Semester-I to VI aggregate) shall be declared to have passed the B.Sc. Degree Examinations in First Class and those obtaining 70% or more of the aggregate marks in Parts-I, II & III (i.e. Semester I to VI aggregate) shall be declared to have passed the B.Sc. Degree Examination in First Class with Distinction.

C) For Four Year B. c. with (Hon./Research) Degree: Those of the successful l candidates who obtain 45% or more of the aggregate marks in Parts-I, II, III & IV Semester Examinations, (i.e. Semester-I to VIII aggregate) shall be declared to have passed the B.Sc. with (Hon./Research)Degree Examinations in Second Class and those obtaining 60% or more of the aggregate marks in Parts- I, II, III & IV Semester Examinations, (i.e. Semester-I to VIII aggregate) shall be declared to have passed the B.Sc. with (Hon./Research) Degree Examinations in First Class and those

Obtaining 70% or more of the aggregate marks in Parts- I, II, III & IV Semester Examinations, (i.e. Semester-I to VIII aggregate) shall be declared to have passed the B.Sc. with (Hon./Research) Degree Examination in First Class with Distinction.

R. B. Sc. No.17

A candidate who has satisfactorily completed all courses at Semester-I of B. Sc. Part I of the Universities in the State of Maharashtra shall be allowed to join for the Semester II of the B.Sc. Part I in this university. However, a candidate who has satisfactorily kept one term in any of the Universities in the State of Maharashtra for B. Sc. Part I Semester-I examination shall not be allowed to join for the Semester II of the B.Sc. Part I in this university unless and until the candidate has to clear all the courses (papers) of Semester-I from that university

R. B.Sc. No. 18

a) A candidate passing B.Sc. Part-I (Sem I and Sem II) Examinations of the B.Sc. Degree programme of other Statutory Universities in State of Maharashtra can take admission to next semester of Shivaji University and the marks of earlier semesters of previous Statutory University be converted in proportion to Shivaji University, Marks structure and grades be awarded accordingly.

(b) Multiple entry and exit rules as per university Regulations and Academic Bank of Credit Regulations are applicable.

R.B. Sc. No. 19

Relevant amendments in the rules and regulations as per the guidelines notified by UGC/University shall be applicable.

Semester III
Cereals Processing Technology (Major V)
(Credits 2)

Course Outcomes: Upon successful completion of this course, the student will be able to….

1. Know about structure and composition of cereals and millet.
2. Understand the technology of milling of various cereals and millets.
3. Evaluate the physical, chemical, and functional properties of cereals, and millets and their impact on product quality.
4. Get exposure to preparing products from cereals and millets.

UNIT I **(15 Lectures)**

❖ Milling of Cereals

• Wheat Milling - Introduction, Types, Milling methods and products of wheat

• Rice Milling - Introduction, Types, Milling methods and products of rice

• Corn Milling- Introduction, Types, Milling methods and products of corn

UNIT II **(15 Lectures)**

❖ Milling of Millets

• Sorghum- Introduction, Types, Milling methods, Products and by products of sorghum

• Ragi- Introduction, Types, Milling methods, Products and by products of ragi

• Bajara - Introduction, Types, Milling methods, Products and by-products of bajara

• Oats – Milling (oatmeal, oat flour & oat flakes)

References:-

1. Kent, N.L. (2003). Technology of Cereal, 5th Ed. Pergamon Press.

2. Chakraverty. (1988): Post Harvest Technology of Cereals, Pulses, and Oilseeds, revised Ed., Oxford & IBH Publishing Co. Pvt Ltd.

3. Marshall, (1994) Rice Science and Technology. Wadsworth Ed., Marcel Dekker, New York.

4. Manay, S. and Sharaswamy, M. 1987. Food Facts and Principles. Wiley Eastern Limited.

5. B Srilakshmi (2018), Food Science, New Age International Publishers, 7th Edition.

6. David A. V. Dendy and Bogdan J. Bobraszczyk, (2005), Cereal and Cereal Products, Springer.

Semester III
Fruits and Vegetables Processing Technology-I (Major VI)

(Credits 2)

Course Outcome- After completing this course, students will able to

1. Explain different processing and preservation of fruits products like jam, jelly, preserve, and candy.
2. Explain and understand the process of canning of fruits and vegetables and its specifications.
3. Acquaint with principles and methods of preservation and processing of fruits and vegetables into various products.
4. Learn different drying method and types of dryers.
5. Acquire knowledge about freezing theory, different food freezers and quality of frozen food.

Unit I **(15 Lectures)**

- Indian and Global scenario of Fruits and Vegetable processing industry.
- Fruit Processing- Jam, jelly and marmalade: Specifications, Processing and Problems in jam, jelly and marmalade
- Preserve and Candy -Specifications, Processing and Problems in preserve and Candy Production Crystallized and Glazed fruits- Specifications, Processing and Problems in crystallized and glazed fruits
- Pickles- Types, Problems, Defects and Spoilage in pickles
- Chutney and sauces - Classification and processing
- Canning of Fruits and Vegetables- Principle and Process, Containers for Packing of Canned Products – Tin Cans and Glass containers, Causes of Spoilage of Canned Foods – Physical, Chemical and Microbial Changes

Unit II **(15 Lectures)**

Drying/dehydration and concentration of fruits and vegetables

- Process of Drying/Dehydration of fruits and vegetables
- Types of Driers – Air Convection Driers, Drum/Roller Driers, Vacuum Driers
- Spoilage of Dried Products
- Reconstitution test for Dried/Dehydrated Products
- Food Concentration – Methods of Concentration
- Changes during Concentration

- Intermediate Moisture Food (IMF)

Freezing of Fruits and Vegetables

- Methods of Freezing
- IQF- Individual Quick Freezing
- Changes during Freezing
- Changes during Storage

References:

1) Fruit and Vegetable Preservation, Principles and Practices - R P Srivastav and Sanjeev Kumar

2) Preservation of fruits and vegetables - Girdhari Lal and T D Tandon

3) Principles of Fruit Preservation – T.N. Morris

4) Handbook of fruit science and technology - Salunkhe D.K, Kadam S.S

5) Preservation of fruit and vegetables - Bhatiya Vijaya

6) Fruits: Tropical and Subtropical- T K Bose, S K Mitra, D Sanyal.

7) Modern Technology of Tomato Processing and Dehydration – EIRI Board of Consultants and Engineers.

8) Food preservation Techniques – Atul Agnihotri

9) Fruit and Vegetable preservation – N.P. Singh

10) Fruit and Vegetable Preservation Techniques – R. K. Narang

Laboratory Course - VII (Major P III)

(Based on Major V & Major VI)

(Credits 2)

1. Physical characteristics of Wheat, Rice and paddy
2. Estimation of Gluten Content of flour
3. Process of puffing and popcorn
4. Determination of water absorption power of flour
5. Determination of particle size of flour
6. Determination of sedimentation value of flour
7. Visit to cereal processing industry
8. Preparation of fruit Jam
9. Preparation of jelly
10. Preparation of Marmalade
11. Preparation of preserve/candied fruit
12. Preparation of chutney
13. Dehydration of fruits and vegetables
14. Visit to Fruit & vegetable processing industry

Semester III
Food Packaging (Minor V)
Credits 2

Course Outcomes: Upon successful completion of this course, the student will be able to

1. Identify and explain the role and functions of food packaging in protecting, preserving, and promoting food products
2. Know the importance of packaging in food industry.
3. Explore and learn varieties of packaging material and its application in food industry.
4. Apply and examine the properties of packaging material and its selection for food material.
5. Gain knowledge of the types of packaging machines and their applications in the food industry.

UNIT I **15 Hours**

• Introduction to food packaging, functions and principles of food packaging.
• Classification of packages- Primary, secondary and tertiary Packaging material
• Plastics- Introduction, types, properties and applications
• Metals- Introduction, types, lacquers and applications.
• Paper and Paper board - Introduction, properties and Types
• Glass- Definition, Composition, Properties, and Types

UNIT II **15 Hours**

• Thickness
• Tensile Strength & Bursting Strength
• Water Vapour Transition Rate
• Gas Transition Rate and Oxygen Transition Rate
• Grease and Tear Resistance for papers
• Active packaging and Aseptic packaging
• Controlled and modified atmospheric packaging (CAP and MAP)
• Biodegradable packaging
• Edible gums and coating Modern food packaging machines
• Importance of Eco- friendly packaging and sustainability Food packaging laws and regulations
• FSSAI guidelines on packaging and labelling of food products.

References:

1. P. Jacob John, A Handbook On Food Packaging (2017), Daya Publishing House, New Delhi.

2. Prof. Neelam Khetarpaul and Dr.Darshan Punia, Food Packaging (2017), Daya Publishing House, New Delhi.

3. Takashi Kadoya, Food Packaging (1990), Academic Press Inc., New York.

4. Jerry D'souza and JatinPradhan, Handbook of Food Processing, Packaging and Labelling,

5. Virag Gupta, The Food Safety and Standards Act, 2006 (2021), Commercial Law Publisher (India) Pvt. Ltd.

Semester III
Food Biochemistry (Minor VI)
Credits 2

Course Outcomes:

Upon successful completion of this course, the student will be able to

1. Understand anaerobic and aerobic glycolytic pathways, regulation of blood sugar through glycogen storage (glycogenesis) and breakdown (glycogenolysis), and synthesis of glucose from non-carbohydrates (gluconeogenesis).
2. Study the metabolism of proteins through amino acid catabolism, nitrogen excretion via the urea cycle
3. Study the metabolism of lipids through fatty acid oxidation, fatty acid and cholesterol synthesis
4. Understand the metabolism of adipose tissue, ketone bodies and lipoproteins

Unit I **15 Lectures**

Carbohydrate Metabolism

Introduction to Carbohydrate metabolism; Glycolysis: Aerobic, Anaerobic; Tricarboxylic acid cycle, Significance of TCA; Gluconeogenesis; Glycogenesis; Glycogenolysis; Hexose monophosphate shunt; Galactose & Fructose metabolism; Electron Transport Chain

Unit II **15 lectures**

Protein metabolism

Nitrogen Balance, Essential & Non-essential amino acids; Transamination, Deamination, Urea Cycle; Creatinine metabolism

Lipids metabolism

Fatty acid oxidation, Ketogenesis, Biosynthesis of Fatty Acids, Metabolism of Adipose tissue; Lipoproteins, Metabolism of Cholesterol

Reference Books:

1. U.Satyanarayna, U.Chakrapani (2019) Biochemistry (5th edition) Elsevier India.
2. A.C.Deb (2001) Fundamentals of Biochemistry,7th edition New Central Book agency
3. David l. Nelson Michael.M.Cox (2021) Lehninger Principles of Biochemistry (8th edition) W.H. Freeman and company.
4. Jeremy M. Berg LubertStryer , John L. Tymoczko (2015) ,Biochemistry (8th edition)
5. P. Agarwal(2014) Text book of Biochemistry, Krishan Prakashan.

6. Ramkrishnan. S (1995), Nutritional Biochemistry, TR Publications.
7. Dr. A. V. S. Srama Rao (2010) Textbook of Biochemistry (11th edition) CBS Publishers Distributors Ltd.
8. Patricia Trueman (2019) Nutritional Biochemistry (1st edition) MJP publishers
9. D. C. Sharma (2020) Nutritional Biochemistry (1st edition) CBS publishers.

Laboratory Course - VIII (DSC Minor Practical III)

(Based on Minor V & Minor VI)

Credits 2

1. Collection and study of different types of packaging materials
2. Measurement of thickness & basis weight of paper and paper board
3. Determination of water absorption and water vapour transmission rate of paper and paper board
4. Measurement of GSM of packaging material
5. Determination of grease resistance of paper
6. Designing of food product label
7. Visit to food packaging industry
8. Study of colorimeter and its applications
9. Verification of Beer–Lambert's law using colorimeter
10. Preparation of standard solutions for colorimeter
11. Estimation of glucose and creatinine in urine sample
12. Estimation of glucose and cholesterol and urea in blood
13. Estimation of serum total proteins
14. Study of glucose tolerance test (GTT)

Semester III

Open Elective – 03 (OE - 03)

Credits 2

OE will be selected from basket as per regular B. Sc. Structure.

Semester III

Laboratory IX

Vocational Skill Course (VSC) I (P)
Vocational Skill Course in Fruit Preserve Products Manufacturing
Credits: 2

Course Outcomes: After completing this course, students will be able to:

1: Understand and list the steps and equipments used in fruit preserve product manufacturing

2: Prepare flow charts and design a small-scale plant layout

3: Identify and explain food safety risks in manufacturing process.

4: Gain knowledge about the feasibility of a business plan

5: Implement documentation and record keeping protocols for a business

Practicals

1. Preparation a flow chart for fruit preserves product manufacturing process.
2. Operation and maintenance of fruit preserve product manufacturing equipment.
3. Designing of small-scale fruit preserve product manufacturing plant layout.
4. Developing a fruit preserve manufacturing business plan
5. Preparation of mandatory documentation for setting up a fruit preserve manufacturing unit.
6. Design and develop a food safety plan for fruit preserve manufacturing unit.
7. Packaging and labelling of any one major fruit preserver product.
8. Visit to fruit preserve manufacturing unit and submission of visit report.

Semester III
Design & Development of New Products (SEC-I Theory)
Credits 2

Course Outcomes: After completing this course, students will be able to:

- Understand fundamentals of food product development.
- Identify challenges in designing new food products.
- Apply product development techniques in the food industry.
- Develop innovative food products based on consumer needs.

UNIT I: **(15 Lectures)**

Basics of Food Product Development

- Introduction to Food Product Development- Definition of new food product, Classification of new food products
- Need for New Food Products- Consumer demand, Nutritional and health concerns, Social and economic factors
- Product Life Cycle- Introduction, Stages of product life cycle
- New Product Development Team- Role of food technologists, Marketing team, Production and quality team
- Concept of Market and Marketing- Market research, Consumer needs
- Steps in Food Product Development- Idea generation, Concept development, Product design, Prototype development

UNIT II: **(15 Lectures)**

Technology for New Product & Scale-Up Trials

- Technology for Product Development- Adaptable and sustainable technologies, Standardization of formulation
- Process Development- Processing methods, Process control parameters
- Scale-Up Production Trials- Laboratory scale, Pilot scale production
- Quality Assessment of Developed Products- Physical evaluation, Chemical analysis, Sensory evaluation
- Market Testing- Consumer acceptability, Market survey
- Costing and Economic Evaluation- Cost calculation, Profit estimation
- Commercialization- Product launch, Marketing strategy

References

1. Fuller, G. W. – *New Food Product Development: From Concept to Marketplace*. CRC Press.
2. Smith, J. & Charter, E. (Eds.) – *Functional Food Product Development*. Wiley-Blackwell.
3. Earle, M., Earle, R., & Anderson, A. – *Food Product Development: Maximizing Success*. Woodhead Publishing.
4. Sharma, Avantina – *Food Product Development*. CBS Publishers & Distributors.
5. Gilbert, K. & Prusa, K. – *Food Product Development*. Iowa State University Digital Press.
6. Aramouni, F. M. & Deschenes, K. – *Methods for Developing New Food Products*. DEStech Publications.
7. Hermann, J. & Schaffner, D. W. – *Food Product Design and Development*. Springer.
8. Moskowitz, H. R., Saguy, I. S., & Straus, T. – *An Integrated Approach to New Food Product Development*. CRC Press.

Semester III
Ability Enhancement Course - English (AEC I)
Credits 2

Syllabus of AEC – I will be as per regular B. Sc. Structure

Semester III
Co-curricular Course – I (CC I)
Credits 2

I. Co-curricular courses:

Introduction: - National Education Policy 2020 is made applicable to all higher education institutions in India. The aim of the policy is to develop good, thoughtful, well rounded and creative individuals. Shivaji University, Kolhapur has issued regulation to implement National Education Policy 2020 from the academic year 2024 to 25 in all affiliating higher education institutions. Credit Framework for undergraduate programmes incorporates a flexible choice based Credit System, multi-disciplinary approach and multiple entry and exit options. As per NEP guidelines co-curricular activities are mandatory to earn two credits in a semester. They promote co-curricular activities since the activities play a significant role in development of students. These activities will enhance learning process, personal growth, academic success and involvement of all stakeholders. They will help the students to go beyond the knowledge of courses. They will also fuel students learning and build important life skills.

II. Course objectives:-

- To explore strength and talent outside of Academics.
- To bring in social skills, intellectual skills, moral values, personality progress, coordination skills, leadership skills etc.
- To help to learn beyond courses.
- To make teaching and learning experience exciting for student.
- To provide students with a lot of interesting and important experience outside the class.
- To improve confidence and self- esteem through developing proficiency in a particular area.

III. Course outcomes:- After learning the students will be able to

- Learn strength and talents outside the classrooms.
- Learn various skills such as social, intellectual, coordination, leadership etc.
- Think beyond courses.
- Understand that teaching and learning experience is exciting.
- Develop confidence and self-esteem in a particular area.

IV. Examination pattern:-

Participation in activities- 40 marks

Seminar, report, group discussion, viva voce, etc - 10 marks

V. General policy guidelines for co-curricular activities:-

1. Activities conducted only by affiliating higher education institutions shall be considered for allotment of credits.
2. Students have to earn two credits towards completing mandatory co– curricular requirement.
3. 60 hours of participation is mandatory for two credits.
4. Students can participate in one or more (up to 6 activities) activities.
5. Minimum 10 hours of participation is necessary in one activity.
6. Students are expected to report the activities to the respective faculty in charge of that activity.
7. Maximum 40 marks will be given to students representing events at different levels and participating in different activities.
8. There will be Viva-voce/ discussion/ seminar/ paper presentation/ group discussion/ report submission etc for 10 marks.
9. If a student fails to secure minimum required marks, his result will be declared as fail in co-curricular courses. S h e / h e will not be awarded any credits in the course.
10. **Students are required to earn two credits through co-curricular courses such as health and Wellness, yoga education, sports and fitness, cultural activities, NSS, NCC, fine, applied, visual, performing arts, Vivek Vahini and any other activity conducted by higher education institution.**
11. **Rubrics for accumulation of credits :**

Events	Level	Marks
Participation In sports, NSS, NCC, cultural, yoga, etc representing HEI	International	40
	National	30
	State	20
	Local	10

Activities	Participation in hours (In one activitiy)	Marks
Fieldwork, community outreach, surveys, awareness programme on health/education/environment etc conducted by HEI	10	10

Note:- Minimum 10 hrs participation in one of the activities and maximum participation in six activities.

I. Diary for maintenance of records of the students:

Sr. No.	Nature of activity	Place of activities	Date	Total hrs	Signature of Student	Signature of in charge of activities

Signature of Student:-

Signature of In-charge of activities:-

Signature of the Principal:-

Semester IV
Legumes and Oilseeds Processing Technology (Major VII)

Credits 2

Course Outcomes: Upon successful completion of this course, the student will be able to

1. Know about the processing of pulses and oilseeds.
2. Understand the different technology of various pulses and oilseeds.
3. Evaluate the physical, chemical, and functional properties of pulses, and oilseeds and their impact on product quality.
4. Get exposure of preparing products from pulses and oilseeds.

Unit I **(15 Lectures)**

❖ Processing of Pulses

• Definition of legume. Classification and types of legumes and pulses. Chemical composition and nutritional value, Milling of pulses

• Antinutritional factors, their chemistry, methods of removal of antinutritional factors.

• Modern techniques in Dal mills- Dal milling – Principle, methods, equipments and effect on quality. Principle products, Dry and Wet milling of pulses,

• Fermented Products of legumes. Soaking – Principles, Methods of socking Sprouting, Puffing, Roasting & Parboiling of Legumes, Physical and Biochemical changes during these processes.

• Cooking quality of dhal – methods, factors affecting quality of dhal and cooking of dhal.

Unit - II **(15 Lectures)**

❖ Processing of Oilseeds

• Chemical composition and characteristics of oil seed and Oils,

• Oil extraction: Traditional Methods, Ghani, Power Ghanis, Expellers Principle of Expeller, structure design of expeller.

• Solvent extraction process: Principle, Pretreatment Breaking, Cracking, flaking. Extraction principles, factors affecting the extraction process. Desolventization. Refining of Oils Degumming, neutralization, bleaching, filtration, deodorization, their Principles and process controls.

• Refining of crude oil Modification of oil •Hydrogenation, fractionization, winterization

• Quality assessment of oils and fats

References:

1. Hamilton R.J. and Bharti A.. Fats and Oils: Chemistry and Technology Applied

2. Wolf Hamm and Richard J. Hamilton (2004), Edible oil Processing, Blackwell publishing.

3. Salunkhe, D.K., Kada, Handbook of World Food Legume: Chemistry, Processing and Utilization.

4. Srilakshmi (2018), Food Science, New Age International Publishers, 7 th Edition.

5. Shakuntala Manay, M Shadakshaksharaswamy (2023), Food Facts and Principles (Fifth revised edition), New

Age International Publishers.

6. A. Chakraverty (2020), Post Harvest Technology of Cereals, Pulses, and Oilseeds, third Edition, CBS Publishers and Distributors Pvt, Ltd.

Semester IV

Fruits and Vegetables Processing Technology-II (Major VIII)

Credits- 02

Course Outcome- After completing this course, students will able to

- Learn about processing of different fermented and unfermented fruit beverages, squash, cordial, nectar, cordial, wine and vinegar.
- Learn about processing of potato into different products, specification of different tomato products like puree, paste, ketchup and soup.
- Understand processing of different value-added products of fruits and vegetables.
- Acquire knowledge about utilization of waste from fruit and vegetable processing industry.

Unit I **(15 Lectures)**

Fruit Beverages

- Un-fermented Beverages- Classifications, processing of fruit juice, FPO specifications and Manufacturing of RTS, Squash, cordial, nectar, syrup and crush, fruit juice concentrate and fruit powder.
- Fermented Beverages- Classifications and Manufacturing of wine and vinegar

Vegetable Processing

- Potato processing - Important consideration and Products, peeling potatoes for processing, potato chips/wafers, French fries, potato flour and canned potato
- Tomato processing - Specification and processing of tomato juice, tomato puree, paste, tomato sauce/ketchup, tomato chutney, tomato soup

Unit II **(15 Lectures)**

Value Added Products of fruits and vegetables

- Sauerkraut - Principle, Processing, Defects and Spoilage Some Other Valuable Products from Fruits and Vegetables
- Processing of Amchur, Mango Leather
- Processing of Fruit Cheese and Fruit Butter, Fruit Toffee etc.

Utilization of fruits and vegetable waste

References:

1) Fruit and Vegetable Preservation, Principles and Practices - R P Srivastav and Sanjeev Kumar

2) Preservation of fruits and vegetables - Girdhari Lal and T D Tandon

3) Principles of Fruit Preservation – T.N. Morris

4) Handbook of fruit science and technology - Salunkhe D.K, Kadam S.S

5) Preservation of fruit and vegetables - Bhatiya Vijaya

6) Fruits: Tropical and Subtropical- T K Bose, S K Mitra, D Sanyal.

7) Modern Technology of Tomato Processing and Dehydration – EIRI Board of Consultants and Engineers.

8) Food preservation Techniques – Atul Agnihotri

9) Fruit and Vegetable preservation – N.P. Singh

10) Fruit and Vegetable Preservation Techniques – R. K. Narang

Semester IV
Laboratory Course - X (Major Practical IV)
(Based on Major VII & Major VIII)
Credits 2

1. Study of Malting of Legumes
2. Determination of Bulk Density and Tapped Density
3. Angle of Repose and Thousand Kernal weight of Legumes
4. Preparation of Soy-based products
5. Determination of Saponification value of oil
6. Determination of Acid value of oil
7. Visit to pulses/oil processing industry
8. Preparation of RTS and Squash
9. Preparation of cordial
10. Preparation of tomato products
11. Preparation of potato chips/ wafer
12. Preparation of sauerkraut
13. Preparation of fruit butter
14. Preparation of pickles

Semester IV

Diet Therapy (Minor VII)

Credits 2

Course Outcomes: Upon successful completion of the course, students will be able to:

1. Learn Basic Principles for Dietetic Practice
2. Understand Pathophysiology and Nutritional Management of Infections and Fevers
3. Gain knowledge about Dietary Management of Obesity
4. Learn Dietary Management of Gastrointestinal Disorders

UNIT I **15 Hours**

- **Basic Principles for Dietetic Practice**: Definition of RDA, Balanced Diet, Evidenced based Dietetics Practice. The Nutrition Care Process (NCP)- Nutrition Assessment, Nutrition Diagnosis, Nutrition Intervention, Nutrition Monitoring and Evaluation.
- **Infections and Fevers**- Pathophysiology of Fevers, General Dietary Considerations of Typhoid, Tuberculosis, Malaria, Influenza. HIV and AIDS- Stages, signs and symptoms, WHO clinical Staging System, Objectives of Medical Nutrition Therapy, Nutritional Assessment, Nutritional Requirements, Nutrient Drug Interactions, Counselling Focus Points
- **Obesity**- Symptoms and Clinical Features, Assessment of Nutritional Status, Objectives of MNT, Individualized Diet and Treatment Plans, Dietary Strategies for Weight Loss, Maintenance of Weight Loss, Counselling Focus Points

UNIT II **15 Hours**

Gastrointestinal Disorders:

- Fatty Liver- Symptoms, Diagnosis, Objectives of MNT, MNT and Dietary Recommendations, Counselling Focus Points; Chronic Liver Disease- Symptoms, Diagnosis, Objectives of MNT, MNT and Dietary Recommendations, Counselling Focus Points.
- Pancreatitis- Symptoms, Diagnosis, Objectives of MNT, MNT and Dietary Recommendations, Counselling Focus Points.
- Celiac Disease- Symptoms, Diagnosis, Objectives of MNT, MNT and Dietary Recommendations, Counselling Focus Points
- Inflammatory Bowel Disease- Symptoms, Diagnosis, Objectives of MNT, MNT and Dietary Recommendations, Counselling Focus Points

- ❖ Dietary Considerations for Other Commonly Encountered GI Problems- Reflux, Flatulence, Constipation, Cholecystitis, Peptic Ulcer

References:

1. Clinical Dietetics Manual, Second Edition (2018), Indian Dietetics Association, Elite Publishing House, New Delhi
2. Shrilakshmi B., Dietetics, 9th Edition (2024), New Age International (P) Ltd., New Delhi
3. Jatana A. et al, Apollo Clinical Nutrition Handbook, First Edition (2022), Jaypee Brothers Medical Publishers (P) Ltd, New Delhi
4. Vimala V., Advances in Diet Therapy, Second Edition (2020), New Age International Publishers, New Delhi.
5. Joshi Shubhangini, Nutrition and Dietetics, 5th Edition (2022), McGraw Hill Education (India) Pvt. Ltd. Chennai.

Semester IV
Food Quality Control (Minor VIII)
Credits 2

Course Outcomes: Upon successful completion of this course, the student will able to

1. Understand the fundamental concepts of food quality and legal requirements & regulations related to food safety and quality management
2. Implement hazard analysis and critical control points (HACCP) in food production processes
3. Implement quality control measures to ensure the production of safe and high-quality food products
4. Develop and implement food safety management systems in compliance with industry standards and certifications.

Unit I: **15 lectures**

Concept of Food Quality Control and Safety

- Terms related quality, factors affecting food safety, principles of quality control, food hazards, food sampling.
- Quality evaluation methods- subjective and objective.
- Total Quality Management, GHP, GMP. General principles of food hygiene.
- HACCP- Principles of HACCP. Application and implementation of HACCP.

Unit II: **15 lectures**

Food Laws and Regulations

- Food Safety Management System- ISO 22000- objectives and benefits.
- Food adulteration- definition, types, common adulterants in food.
- National food laws- FSSA 2006, AGMARK, EIC, BIS, types of licensing
- International standards- Codex standards, ISO, SQF, BRC.
- International organizations- WHO, WTO, FAO, FDA, WTO. Concept of auditing.

References:

1. Sukhneet Suri and Anita Malhotra, Food Science, Nutrition and Safety, Dorling Kindersley (India) Pvt. Ltd, Pearson, 2014.
2. Sunetra Roday, Food Science and Nutrition, 3rd Edition, Oxford University Press, 2018.
3. Pulkit Mathur, Food Safety and Quality Control, Orient Blackswan Pvt. Ltd, 2018.
4. Alok Kumar, Fundamentals of Food Hygiene, safety and Quality, I. K. International Pvt. Ltd., 2019.
5. Virag Gupta, The Food Safety and Standards Act, 2006, 12th Edition, Commercial Law Publishers (India) Pvt. Ltd., 2019.
6. Yeshajehu Pomeranz and Clifton E. Meloan, Food Analysis: Theory and Practice, 3rd Edition, CBS Publishers and Distributors Pvt. Ltd., 1996.
7. S. Ranganna, Handbook of Analysis and Quality Control for Fruits and Vegetable Products, 2nd Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2012.
8. N. Shakuntala Manay and M.Shadaksharswamy, Food Facts and Principles, New Age International (P) Limited, 2008.
9. B. Srilakshmi, Food Science, 6th Edition, New Age International Pvt. Ltd, 2015.

Semester IV
Laboratory Course - XI (Minor Practical IV)
(Based on Minor VII & Minor VIII)
Credits 2

1. Standardization of Recipes
2. Assessment of Nutritional Status & Exchange Lists for Meal Planning
3. Therapeutic Modification of the Normal Diet
    - Modification in Consistency
    - Modification in Nutrients
4. Nutritional Support in Critically Ill Patients
    - Tube Feeding- Adults

      Paediatric
5. Diet Planning for Fevers
    - Typhoid
    - Tuberculosis
6. Diet Planning for Weight Management
    - Obesity
    - Underweight
7. Diet Planning for Gastrointestinal Diseases
    - Peptic Ulcer
    - Coeliac Disease
8. Detection of basic tastes and their threshold value
9. Sensory evaluation of different food products using sensory tests
10. Detection of adulteration in common food commodities
11. Preparation of HACCP plan
12. Determination of proximate analysis of food sample
13. Determination of Gluten content of Wheat Flour
14. Visit to Food analysis laboratory/Quality control of food industry

Semester IV

Open Elective – 4 (OE - 04)

Credits 2

OE will be selected from basket as per regular B. Sc. Structure.

Semester IV
Laboratory X
Design & Development of New products (SEC II – P)
Credits 2

1. Formulation & development Energy bar
2. Development of Convenience food
3. Formulation & development of probiotic drink
4. Formulation & development of amylase-rich food
5. Formulation & development of Weaning food
6. Formulation & development of Protein-rich food product
7. Formulation & development of Diabetic food
8. Formulation & development of Ketogenic food
9. Formulation & development of edible cutlery
10. Formulation & development of value-added food product

Semester IV
Ability Enhancement Course - English (AEC II)
Credits 2

AEC – II will be as per regular B. Sc. Structure

Semester IV
Value Education Course – Environmental Studies (VEC II)
Credits 2

VEC – II will be as per regular B. Sc. Structure

Semester IV
Community Engagement Programme (CEP – I)
Credits 2

Community Engagement Programme (CEP):

1. INTRODUCTION:

New generation of students are increasingly unaware of local rural and peri-urban realities surrounding their HEIs, as rapid urbanization has been occurring in India. A large percentage of Indian population continues to live and work in rural and peri-urban areas of the country. While various schemes and programs of community service have been undertaken by HEIs, there is no singular provision of a well- designed community engagement course that provides opportunities for immersion in rural realities. Such a course will enable students to learn about challenges faced by vulnerable households and develop an understanding of local wisdom and lifestyle in a respectful manner

2. OBJECTIVES:

- To promote a respect for rural culture, lifestyle, and wisdom among students.
- To learn about the present status of agricultural and development initiatives.
- Identify and address the root causes of distress and poverty among vulnerable households.
- Improve learning outcomes by applying classroom knowledge to real-world situations.

To achieve the objectives of the socio-economic development of New India, HEIs can play an important role through active community engagement. This approach will also contribute to improve the quality of both teaching and research in HEIs in India. India is a signatory to the global commitment for achieving Sustainable Development Goals (SDGs) by 2030. Achieving these 17 SDG goals requires generating locally appropriate solutions. Community engagement should not be limited to a few social science disciplines alone. It should be practiced across all disciplines and faculties of HEIs. These can take the forms of enumerations, surveys, awareness camps and campaigns, training, learning manuals/films, maps, study reports, public hearings, policy briefs, cleanliness and hygiene teachings, legal aid clinics, etc. For example, students of chemistry can conduct water and soil testing in local areas and share the results with the local community. Students of science and engineering can undertake research in partnership with the community on solid and liquid waste disposal Therefore, students are being encouraged to foster social responsibility and community engagement in their teaching and research.

3. LEARNING OUTCOMES:

After completing this course, students will be able to

- Gain an understanding of rural life, Indian culture, and social realities.
- Develop empathy and bonds of mutuality with the local community.
- Appreciate the significant contributions of local communities to Indian society and

economy.

- Learn to Value local knowledge and wisdom.
- Identify opportunities to contribute to the community's socioeconomic improvement.

4. **Credits:** Two credit Course; Students are expected to complete 60 hours of participation

5. COURSE STRUCTURE:

Sr.	Module Title	Module Content	Teaching/Learning/Methodology
1	Appreciation of Rural Society	Rural lifestyle, rural society, joint family, caste and gender relations, rural values with respect to community, rural culture nature and public resources, ponds and fisheries, elaboration of soul of India lies in villages' rural infrastructure,	Classroom discussions, Field visit Individual /Group conference Report/journalsubmission& VIVA
2	Understanding rural and local economy and livelihood	Agriculture, farming, land ownership, water management, animal husbandry, non-farm livelihood and artisan's rural entrepreneurs, rural markets, migrant labour, social innovation projects	Classroom discussions, Field visit Individual /Group conference Report/journalsubmission& VIVA
3	Rural and local Institution	Traditional rural and community organization, self-help groups, decentralized planning, panchayat raj institutions Gram panchayat, Nagarpalika and Municipalities, local Civil Society, Local administration, National rural, Livelihood Mission [NRLM], Mahatma Gandhi National Rural Employment. Guarantee [MGNREGA].	Classroom discussionsField visit Individual /Group conference Report/journalsubmission& VIVA
4	Rural and National development programmers	History of rural development and current National Programms in India: Sarva shiksha Abhiyan, Beti Bachao-Beti Padhao, Ayushman Bharat, eShram Swachh Bharat, PM Awas yojana, Skill India, Digital India, Start-Up India, Stand-Up India, Scheme of Fund for Regeneration of Traditional Industries (SFURTI), Jal Jeevan Mission, Mission Antyodaya, ATMANIRBHAR Bharat, etc..	Classroom discussionsField visit Individual /Group conference Report/journalsubmission& VIVA

Note: Faculty can make addition in the list of activities as per domain content:

Recommended field-based activities (Tentative):

- Participate in Gram Sabha meetings, and study community participation;
- Visit to Swachh Bharat Mission project sites, conduct analysis and initiate problem-solving measures;
- Interaction with Self Help Groups (SHGs) women members, and study their functions and challenges; planning for their skill-building and livelihood activities;
- Visit Mahatma Gandhi National. Rural Employment Guarantee Act 2005 (MGNREGS) project sites, interact with beneficiaries and interview functionaries at the work site;
- surveys on Mission Antyodaya to support under Gram Panchayat Development Plan
- Visit Rural Schools/mid-day meal centres, study academic and infrastructural resources, digital divide and gaps;
- Associate with Social audit exercises at the Gram Panchayat level, and interact

with programme beneficiaries;

- Visit to local Nagarpalika office and review schemes for urban informal workers and migrants;
- Attend Parent Teacher Association meetings, and interview school drop outs;
- Visit local Anganwadi and observe the services being provided;
- Visit local NGOs, civil society organisations and interact with their staff and beneficiaries;
- Organize awareness programmes, health camps, Disability camps and cleanliness camps;
- Conduct soil health test, drinking water analysis, energy use and fuel efficiency surveys and building solar powered village;
- Understanding of people's impacts of climate change, building up community's disaster preparedness;
- Organise orientation programmes for farmers regarding organic cultivation, rational use of irrigation and fertilizers, promotion of traditional species of crops and plants and awareness against stubble burning;
- Formation of committees for common property resource management, village pond maintenance and fishing;
- Identifying the small business ideas (handloom, handicaraft, khadi, food products, etc.) for rural areas to make the people self-reliant.
- Interactive with local leaders, panchayat functionaries, grass-root officials and local institutions regarding village development plan preparation and resource mobilization;
- Financial Literacy Awareness Programme
- Digital Literacy Awareness Programme
- Education Loan Awareness Programme
- Entrepreneurship Awareness Programme
- Awareness Programmes on Government Schemes
- Products Market Awareness
- Services Market Awareness
- Consumer Awareness Programme
- Accounting Awareness Programme for Farmers
- Accounting Awareness Programme for Street Vendors etc.

6. IMPORTANT RULES AND REGULATIONS FOR CEP:

Concurrent Fieldwork:

Students must conduct comprehensive studies on various challenges that they face in their chosen field. Every work relevant to the subject matter should be compiled and documented.

Students should keep separate fieldwork diary or maintain journal in order to record their fieldwork experiences i.e. reading, e- contents, tasks, planning and work hours have to be recorded in the diary. Detailed work records report on students' fieldwork experiences and activities to be submitted and should be presented. The fieldwork conference is part of the timetable and is mandatory. Faculty should hold a fieldwork conference FOREIGHTNIGHTLY for all students.

In addition to the principal curriculum, the students engage in a variety of community development- related activities. They are encouraged to plan and carry out programs, processions, and events for social causes. These activities seek to enhance students' personal and professional skills as well as foster self- development. "Rural Camp" should be embedded in the curriculum for first-year students to be held in the backward and neglected areas of District's

Concurrent Fieldwork is the core curriculum activity in the CEP course. Hence, 100% attendance of the students is mandatory in case of absence on any student, supplementary fieldwork must be arranged and accomplished with the approval of the faculty supervisor.

7. EVALUATION/ASSESSMENT SCHEME:

Students should keep a Field Diary / journal to record, content, readings and field visit planning. The assessment pattern is internal and external i.e. 40+10.

Internal continuous Assessment: Participation in concurrent field visits 40%; individual/group field project conference, report/journal submission 40%.

External Assessment: Presentation of field project findings (VIVA) should be assigned 20%.