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

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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 Science (Entire)

Apprenticeship Embedded Degree Programme

(Faculty of Science and Technology)

Semester III and IV

(To be implemented from Academic Year 2026-27)

SYLLABUS OF B.Sc. (FOOD SCIENCE) 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 Behavior 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/ Level5.5/ Level6.0 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 there to.

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 upontheB.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 there to.

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	
Field Project(FP)	FP	02	**57.58**
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	
Value Education Courses	VEC	04	
Skill Enhancement Courses	SEC	06	6.06%
Co-Curricular Courses(NSS/NCC/Sports/Cultural Activities)	CC	02	
TOTAL		**132**	**100%**

a) **For**

b) **4 year 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
Ability Enhancement Courses	AEC	08	7.95
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) For4yearB.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	65.91
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	15.91
Research Methodology	RM	04	
Open Elective/Generic Elective Courses	OE/GE	10	5.68
Ability Enhancement Courses	AEC	08	7.95
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%**

*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–II (Level-5.0) Semester III

SEMESTER - III						
Sr. No.	Course Name	Teaching Scheme			Examination Scheme	
		Theory and Practical			University Assessment (UA)	Internal Assessment (IA)
		Lectures Hours	Practical Hours	Credit	Max Marks	Max Marks
		Hours per Week				
1	**Major V** Cereals & Bakery Products Processing I	2	-	2	30	20
2	**Major VI** Food Biochemistry	2	-	2	30	20
3	**Major P III** Laboratory Course VII (Based on Major V & VI)	-	4	2	30	20
4	**Minor V** Dairy Technology	2	-	2	30	20
5	**Minor VI** Meat Fish & Poultry Products Processing	2	-	2	30	20
6	**Minor P III** Laboratory Course VIII (Based on Minor V & VI)	-	4	2	30	20
7	**OE-3** (To be Selected from Basket)	2	-	2	30	20
8	**VSC I** Laboratory Course IX Vocational Skills for Fruit Preserve Products Manufacturing	-	4	2	30	20
9	**SEC I** Design & Development of New Products	2	-	2	30	20
10	**AEC I** (English)	2	-	2	30	20
11	**CC-I** **Marking scheme as per regular B. Sc. structure**	2	-	2	-	50

SEMESTER –IV						
Sr. No.	Course Name	Teaching Scheme			Examination Scheme	
		Theory and Practical			University Assessment (UA)	Internal Assessment (IA)
		Lectures Hours	Practical Hours	Credit	Max Marks	Marks Max
		Hours per Week				
1	**Major VII** Cereals & Bakery Products Processing II (2)	2	-	2	30	20
2	**Major VIII** Sugar & Confectionary Processing (2)	2	-	2	30	20
3	**Major P IV** Laboratory Course X (Based on Major VII & VIII) (2)	-	4	2	30	20
4	**Minor VII** Snack Food Processing (2)	2	-	2	30	20
5	**Minor VIII** Food Packaging (2)	2	-	2	30	20
6	**Minor P IV** Laboratory Course XI (Based on Minor VII & VIII)(2)	-	4	2	30	20
7	**OE-4** (To be Selected from Basket) (2) (T)	2	-	2	30	20
8	**SEC-II** Laboratory Course XII Design & Development of New Products (2) (P)	-	4	2	30	20
9	**AEC-II** (2) (English)	2	-	2	30	20
10	**VEC-II** (2) (Environmental studies)	2	-	2	30	20
11	**CEP-I** (2) **Marking scheme as per regular B. Sc. structure**	2	-	2	-	50

❖ **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 Hr
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:

Nature of Question Paper and Marking Scheme

A. University Assessment for 30 Marks

B. Sc. (Food Science) (Part-) (Semester-)

Examination

Course Name

(Course Code)

Day & Date: **Total Marks: 30**

Time:

Instructions:1)All the questions are compulsory.

2) Figures to the right indicate full marks.

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1) Select the correct alternatives from the given choices. **[10]**

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

Q.2 Answer the following Questions (Any 1) **[10]**

1.
2.

Q.3. Answer the following Questions (Any 2) **[10]**

1.
2.
3.

Internal Assessment for 20 Marks

B.Sc. (Food Science) Part II Semester III & IV–

1) Home Assignment = 05 marks

2) Class Assignment (Tutorial type) = 05 marks

3) Quiz = 05 marks

4) Midterm Test* = 05 marks

Note: 1) Midterm Test shall be conducted after completion of each unit

*Midterm Test Instruction Midterm Test shall be conducted after completion of each unit. (e. g For 4 units Syllabus, midterm test of 10 marks will be conducted after completion of each unit). A total of 40 marks of 4 midterm tests shall be converted to 10 marks and these marks shall be uploaded on university exam portal under the heading of Midterm Test for respective course.

2) Duration of Examination for 30 marks **1 Hour**

Duration of Practical Examination for 50 marks **2 Hours**

- **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 NEP2.0.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:(B.Sc. Food Science II NEP 2.0 & B.Sc. Food Science II) AEDP**

Sem. No.	B.Sc. Food Science II NEP 2.0	B.Sc. Food Science II AEDP	Remark/s
III	Cereals & Bakery Products Processing I	Cereals & Bakery Products Processing I	Slight change in Syllabus
III	Food Biochemistry I	Food Biochemistry	Slight change in Syllabus
III	Laboratory Course VII (Based on Major V & VI)	Laboratory Course VII (Based on Major V & VI)	Slight change in Syllabus
III	Dairy Technology	Dairy Technology	Slight change in Syllabus
III	Meat, Fish & Poultry Products Processing I	Meat, Fish & Poultry Products Processing	Slight change in Syllabus
III	Laboratory Course VIII (Based on Minor V & VI)	Laboratory Course VIII (Based on Minor V & VI)	Slight change in Syllabus
III	OE III	OE III	Slight change in Syllabus
III	VSC I Laboratory Course IX Vocational Skill Course in Jam, Jelly & Ketchup	VSC I Laboratory Course IX Vocational Skills for Fruit Preserve Products Manufacturing	Change in Syllabus as per NEP 2.0
III	SEC I Design & Development of New Product Processing	SEC I Design & Development of New Product Processing	No change in Syllabus
III	AEC I English	AEC I English	No change in Syllabus
III	CC	CC	No change in Syllabus

Sem. No.	B.Sc. Food Science II NEP 2.0	B.Sc. Food Science II AEDP	Remark/s
IV	Cereals & Bakery Products Processing II	Cereals & Bakery Products Processing II	No change in Syllabus
IV	Food Biochemistry II	Sugar and confectionary processing	Shifted from B. Sc. III NEP 2.0 Sem VI
IV	Laboratory Course XI (Based on Major VII & VIII)	Laboratory Course X (Based on Major VII & VIII)	Shifted from B. Sc. III NEP 2.0 Sem VI
IV	Dairy Technology II	Snack food processing	Shifted from B. Sc. III NEP 2.0 Sem VI
IV	Meat, Fish & Poultry Products Processing II	Food Packaging	Shifted from B. Sc. III NEP 2.0 Sem V
IV	Laboratory Course XII (Based on Minor VII &VIII)	Laboratory Course XI (Based on Minor VII &VIII)	Shifted from B. Sc. III NEP 2.0 Sem VI
IV	OE IV	OE IV	No change in Syllabus
IV	SEC II Design & Development of New Product Development	SEC II Design & Development of New Product Development	No change in Syllabus
IV	AEC II English	AEC II English	No change in Syllabus
IV	VEC II Environmental Studies	VEC II Environmental Studies	No change in Syllabus
IV	CEP I	CEP I	No change in Syllabus

Apprenticeship Embedded Degree Programme

Bachelor of Food Science (B.Sc. Food Science)-Course Structure (As per AEDP)

Credit Framework

SHIVAJI UNIVERSITY, KOLHAPUR

NEP-2020(2.0):Credit Frame work for UG (B.Sc.) Programme under Faculty of Science and Technology

First Year

SEM (Level)	COURSES			OE	VSC/ SEC	AEC/VEC/IKS	OJT/FP/CEP /CC/RP	Total Credits	Degree/Comic. MEME
	Course-1	Course-2	Course-3						
SEM I (4.5)	**DSC-I** Food Chemistry I (2) **DSC-II** Principles of Food Preservation I (2) **DSCP-I** Laboratory Course I (Based on DSC I & II) (2)	**DSC-I** Food Microbiology I (2) **DSC-II** Human Nutrition I (2) **DSCP-I** Laboratory Course II (Based on DSC I & II) (2)	**DSC-I** Fruits & Vegetables Processing I (2) **DSC-II** Food Analysis I (2) **DSCP-I** Laboratory Course III (Based on DSC I & II) (2)	**OE-1** (To be Selected from Basket) (2) (T)	-	**IKS-I** Introduction to IKS (2)	-	**22**	**UG Certificate 44**
SEM II (4.5)	**DSC-III** Food Chemistry II (2) **DSC-IV** Principles of Food Preservation II (2) **DSCP-II** Laboratory Course IV (Based on DSC III & IV) (2)	**DSC-III** Food Microbiology II (2) **DSC-IV** Human Nutrition II (2) **DSCP-II** Laboratory Course V (Based on DSC III & IV) (2)	**DSC-III** Fruits & Vegetables Processing II (2) **DSC-IV** Food Analysis II (2) **DSCP-II** Laboratory Course VI (Based on DSC III & IV) (2)	**OE-2** (To be Selected from Basket) (2) (T)	-	**VEC-I** (Democracy, Election and Constitution) (2)	-	**22**	
Credits	**8(T)+4(P)=12**	**8(T)+4(P)=12**	**8(T)+4(P)=12**	**2+2=4 (T)**	**--**	**2+2=4**	**--**	**44**	**Exit Option:4credits NSQF/Internship/ Skill courses**

Apprenticeship Embedded Degree Programme

Bachelor of Food Science (B.Sc. Food Science)-Course Structure (As per AEDP)

Credit Framework

SHIVAJIUNIVERSITY,KOLHAPUR

NEP-2020(2.0):Credit Framework for UG(B.Sc.) Programme under Faculty of Science and Technology

Second Year

SEM (Level)	COURSES			OE	VSC/SEC	AEC/VEC/IKS	OJT/FP/CEP /CC/RP	Total Credits	Degree/Comic. MEME
	MAJOR		MINOR						
SEM III (5.0)	**Major V** Cereals & Bakery Products Processing I (2) **Major VI** Food Biochemistry (2) **Major P III** Laboratory Course VII (Based on Major V & VI) (2)	--	**Minor V** Dairy Technology (2) **Minor VI** Meat Fish & Poultry Products Processing (2) **Minor P III** Laboratory Course VIII (Based on Minor V & VI) (2)	**OE-3** (To be Selected from Basket) (2) (T)	**VSC I** Laboratory Course IX Vocational Skills for Fruit Preserve Products Manufacturing (2) (P) **SEC I** Design & Development of New Product (2) (T)	**AEC I** (2) (English)	**CC-I** (2)	**22**	**UG Diploma 88**
SEM IV(5.0)	**Major VII** Cereals & Bakery Products Processing II (2) **Major VIII** Sugar & Confectionary Processing (2) **Major P IV** Laboratory Course X (Based on Major VII & VIII) (2)	--	**Minor VII** Snack Food Processing (2) **Minor VIII** Food Packaging (2) **Minor P IV** Laboratory Course XI (Based on Minor VII & VIII)(2)	**OE-4** (To be Selected from Basket) (2) (T)	**SEC-II** Laboratory Course XII Design & Development of New Product (2) (P)	**AEC-II** (2) (English) **VEC-II** (2) (Environmental studies)	**CEP-I** (2)	**22**	
Credits	**8(T) + 4(P)= 12**		**8(T) + 4(P)= 12**	**2 + 2=4(T/P)**	**2(P) + 2(T)+ 2 (P)=6**	**2+4=6**	**2+2=4**	**44**	**ExitOption:4credits NSQF/Internship/Skill courses**

Third Year

	Major		Minor	OE	VSC/SEC	AEC/VEC/IKS	AEDP	Total credits	Degree/Comic. MEME
SEM V (5.5)	**Major IX** Food Safety Management System I (2) **Major X** Legume & Oilseed Processing (2) **Major P V** Laboratory Course XIII (Based on Major IX & X) (2)	**Major I (ELEC)** Food Additives Or Food Refrigeration (2) **Major P-I (ELEC)** Laboratory Course XIV (Based on Major I ELEC) (2)	-	**OE-5** (To be Selected from Basket) (2) (T)	**VSC II (4)** Laboratory Course XV Vocational Skill Course in Bakery Processing (P)	**AEC III** (2) (English) **IKS- II** Traditional and Functional Aspects of Indian Spices (2)	-	**22**	**UG Degree 132**
SEM VI (5.5)	--				**SEC III** Food Industrial Economics and Management Skills (T) (2)		**Apprenticeship** (6 months) (20)	**22**	
Credits	**4(T) + 4(P)= 08**	**2(T) + 2(P)=4**	**-**	**2 (T)**	**2(P) + 2(T)=4**	**4 + 2= 6**	**20**	**44**	
Total Credits	**30+16=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	11	7	18

1. There shall be a separate head of passing for semester end examination and internal examination.
2. Minimum18 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)**	**CGPA**	**Letter Grade**
Absent	--	-	-
0–34	0	0.0–4.99	F (Fail)
35–44	5	5.00–5.49	C
45–54	6	5.50–6.49	B
55–64	7	6.50–7.49	B+
65–74	8	7.50–8.49	A
75–84	9	8.50–9.49	A+
85–100	10	9.50–10.0	O (Outstanding)

Note:

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

1. The SGPA & CGPA shall be rounded off to2 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)**

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

❖ **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.

❖ **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 schemes 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.1will be of an objective type 10 objective will carry- 10 Marks.
- ✓ Question 2 will be descriptive type, one question is to be attempted out of two and will carry 10 Marks each)
- ✓ Question 3 will be short answer type, Two questions are to be attempted out of three 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 30marks

- The duration of this exam will be of 1 Hr (60 minutes)
- For each unit there will be at least one question
- All questions shall be compulsory with internal choice within the questions

Internal Assessment for 20 Marks

B.Sc. (Food Science) Part II Semester III & IV–

1) Home Assignment = 05 marks

2) Class Assignment (Tutorial type) = 05 marks

3) Quiz = 05 marks

4) Midterm Test* = 05 marks

Note: 1) Midterm Test shall be conducted after completion of each unit

*Midterm Test: Instruction:

Midterm Test should be conducted after completion of each unit (viz., For 4 units syllabus, Midterm term shall be of 10 marks). Total 40 marks of 4-unit tests, shall be converted to 10 marks. These marks shall be uploaded on the Exam portal of Shivaji University, Kolhapur under the heading Midterm Test for respective course.

2) Duration of Examination for 30 marks **1 Hour**

Duration of Practical Examination for 30 marks **2 Hours**

PRACTICALEXAMINATION

- 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 BOS before practical examination.
- Total marks-30 for each semester-I and II (Will be evaluated by Internal examiner.)
- Total-30 Marks for each Sem.-III and IV (Will be evaluated by one Internal examiner and one external examiner)
- Total-100 Marks (4 credit course) for each Sem.-V and VI (Will be evaluated by two external examiner)
- Total-50 Marks (2 credit course) for each Sem.-V and VI (Will be evaluated by one Internal examiner and one external examiner)
- Nature of question paper for practical examination will be provided by BOS before the practical examination.

❖ 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 40 (Semester end examination) and 10 (Internal examination) marks. The practical examination for 2 credits will be 50 marks at the end of each semester.

R.B.Sc.No.2

Structure of B. Sc. programme is as shown in Annexure1.

R.B. Sc.No.3

List of Courses:

B.Sc. I	**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 • OEI(Theory/Practical) • IKSI(Introduction to IKS)
	Sem. –II	• Subject I:DSCIII,DSCIV,andPracticalII • Subject II: DSCIII ,DSCI V, and Practical II • Subject III: DSC III, DSCI V, and Practical II • OEII(Theory/Practical) • VECI(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 • OEIV(Theory/Practical) • SEC II Theory/Practical • AECII(English) • VECII(Environmental Studies) • CEP

B.Sc. III	**Sem.- V**	• Major IX, X, and Major Practical V, VI • Major I(Elective),Major(Elective)Practical-I • OEV(Theory/Practical) • VSC II Practical II Major Specific • AEC III(English) • OJT
	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) • IKSII(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 Laboratorys/public testing Laboratoryoratories

/ Diagnostic Laboratoryoratories/ Chemical Industry/ Pharmaceutical Industry.

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 pre scribed by the University from time to time.

R.B. Sc. No. 7

Detailed Syllabus:

The detailed sylLaboratoryi for the various courses under this pattern shall be subject to such revision, modification etc. as maybe 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 min or 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.10MultipleEntryandMultipleExit (MEME):

- If an exited student want store enters, 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

The Scheme of Physical Education has been made operative for B. Sc. Part-I. The students will get a maximum of 10 Marks after completing the Physical Education Tests conducted by the University authorities. The benefit of marks, obtained by the students shall be as under:

1. If a student fails in up to four courses (of two credits each) of passing of the University examination (Theory/Practical) and has passed in all the remaining heads, the marks obtained by him / her in the Physical Education Test shall be added to maximum up to four courses (of two credits each) for passing in which he has failed as the case may be.
2. A student getting the benefit of Physical Education marks should not be given advantage of any other Ordinance. The Physical Education Marks Shall not is considered for the award of Class and for deciding merit.
3. If as a result of the addition of Physical Education marks a student does not pass the examination the marks obtained by him / her in

Physical Education shall not be considered.

4. If a student is failing in more than four courses (of two credits each) the marks of the physical education test should not be added to any head.

5. The marks of Physical Education obtained by the unsuccessful students at the B.Sc. Part-I semester Examination shall be carried forward for their subsequent attempt/s.

6. The marks obtained in Physical Education shall not be considered for earning exemption in a subject of head of passing, but the marks will be carried forward for availing the benefit at the subsequent attempts.

7. The marks secured by the students under the Physical Education scheme, if not used for promotion, shall be added to the total of his marks in the examination irrespective of the fact of his passing or failure in the examination. The Physical Education marks shall be shown as "Total + P. E. Marks".

8. The Physical Education Test shall be conducted in the second semester.

9. The student can avail the benefit of marks of test of physical education only once in his three-year degree course.

R.B.Sc.No.13

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.14

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, need store appear for B. Sc. Part II(Sem. II 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.15

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 privies 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.16

(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.17

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 35% of the total marks in each course.

b) A Candidate shall have to obtain 14 marks out of 40 for the semester end theory examination, 18 out of 50 for the semester end practical examination and 4 marks out of 10 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 obtain45% 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 obtaining70% 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.18

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. 19

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.20

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

SHIVAJI UNIVERSITY,KOLHAPUR

Syllabus as per National Education Policy (NEP) 2020

B.Sc. Food Science

SEMESTER– III

Major V Cereals and Bakery Products Processing I

Credits: 2

Semester End 30 Internal Assessment:20 Total:50

Introduces From June 2026

COURSEOUTCOME: The students will be able to

CO1Recognize the parts and structures of cereal grains and capable of converting cereal grains into ingredients for baking goods

CO2Recognize the crucial cereal quality traits and quality indicators. Have a working knowledge of how a cereal mill and quality Laboratory works.

CO3Understand the steps involved in rice milling, including de-hulling, polishing, and grading, and assess how these operations affect the quality and nutritional content of the rice.

CO4Under stand the working principles, applications, and importance of various bakery Equipments, and assess their role in ensuring the efficiency and quality of the baking process.

Unit No	Content	No. of Hours
1	**Wheat:** Structure and chemical composition of wheat grain Wheat milling Grades of wheat flour Dough rheology **Rice:** Structure and chemical composition of rice gram Milling of rice Modern rice milling unit operation Rice Parboiling technology	15
2	**Raw material of bakery products:** Introduction and importance of bakery Ingredients used and their function Process parameter **Equipments:** Working principle and application 1. Dough mixer 2. Molding machine 3. Oven machine	15

Suggested Reading:

1. Bakery Products Science and Technology , Y. H. Hui, Wiley Black well Publishing, 2014.
2. Bakery and Confectionary products, Acharya N.G. Ranga Agricultural University
3. Cereal Processing Technology, Gavin Owens, WoodHeadPublishingLtd,2000
4. Textbook of Bakery and Confectionery, Yogambal Ashokkumar, Prentice Hall India Learning Private Limited, 2012.
5. PostHarvestTechnologyofCereals,PulsesandOilseeds,A.Chakraverty,OxfordandIBH Publishing Company, 2014

SHIVAJI UNIVERSITY,KOLHAPUR

Syllabus as per National Education Policy(NEP)2020

B.Sc. Food Science

SEMESTER–III

Major VI Food Biochemistry

Credits: 2

Semester End 30 Internal Assessment:20 Total:50

Introduces From June 2026

COURSEOUTCOME: The students will be able to

CO1 Explain the fundamental principles of biochemistry as they relate to food, including the structure and function of bio molecules (proteins, carbohydrates, lipids, and nucleic acids) and their role in food science.

CO2 Identify and explain key metabolic pathways involved in the conversion of food components into energy, including glycolysis, the citric acid cycle, and oxidative phosphorylation.

CO3 Describe the different types of carbohydrates (sugars, starches, fibers) in food, and understand their functional roles in food texture, sweetness, fermentation, and nutritional properties.

CO4 Explain the structure and properties of lipids (fats and oils) in food, including their role in flavor, texture, and as energy sources. Understand lipid oxidation and its impact on food quality and safety.

Unit No	Content	No. of Hours
1	**Introduction to metabolism** Catabolism Metabolism **Metabolism of Carbohydrates** Digestion and Absorption of Carbohydrates Basics of Metabolic Pathways Glycolysis Kreb's cycle **Protein metabolism** Digestion and absorption of proteins Transamination Deamination Urea cycle	15
2	**Electron Transport Chain** Gluconeogenesis Glycogen metabolism HMP pathway **Lipid metabolism** Digestion and absorption of Lipids Oxidation of fatty acids Ketone bodies **Enzymes** Chemical nature and nomenclature, classification, sources and properties, mechanism of action, Coenzyme and prosthetic groups application.	15

Suggested Reading:

1. U Satyanaraynaa and U. Chakrapani. Biochemistry
2. Dr. A. C. Deb Fundamentals of Biochemistry
3. J. L. Jain .Fundamentals of Biochemistry
4. D. L . Nelsonand M. M. Cox. Lehninger's Principles of Biochemistry

SHIVAJI UNIVERSITY,KOLHAPUR

Syllabus as per National Education Policy (NEP)2020

B.Sc. Food Science

SEMESTER–III

Minor V Dairy Technology

Credits: 2

Semester End 30 Internal Assessment:20 Total:50

IntroducesFromJune2026

COURSEOUTCOME: Students will be able to

CO1 Explain the fundamental principles of dairy science including the types and composition of milk, its nutritional properties, and the factors affecting its quality.
CO2 Understand the procedures involved in milk collection, handling, and preservation techniques.
CO3 Assess milk quality control measures.
CO4 Explain various dairy processing methods, such as pasteurization, homogenization, sterilization, and fermentation, and their importance in ensuring milk safety and extending shelf life.
CO5 To describe the terms pasteurized milk and sterilized milk, as well as the processes involved in making yoghurt butter, cheese, milk powder, ice-cream, and other fermented milk products.

Unit No	Content	No. of Hours
1	**Introduction of dairy industry** Present status and future prospects of dairy industry Composition of milk Factors affecting Composition of milk Physico–Chemical properties of milk. Buying, receiving, collection ,transportation of milk, storage and distribution of milk, Judging and Grading of Milk Flavor defects in Milk, their causes and prevention	15
2	**Primary Processing of Milk** Filtration, Clarification cream separation Heat treatment of milk. **Different milk products** Concentrated milk products(Condensed Milk, Evaporated Milk, Khoa, GuLaboratoryjamun, Pedha) Coagulated milk products Fermented product	15

Suggested Reading:

1. S.JanarthananandS.Vincent.PracticalBiotechnology–MethodsandProtocols(Universities Press)
2. Chinnarayappa Molecular Biotechnology(Universities Press)
3. Knorr, D.1982.FoodBiotechnology.MarcelDekker, NewYork.
4. Steinkraus, K.H.1983.HandbookofIndigenousFermentedFoods.MarcelDekker, N.York.
5. Fermentation Biotechnology, Principles, Processed Products by Ward OP, Open University Press.

SHIVAJI UNIVERSITY,KOLHAPUR

Syllabus as per National Education Policy(NEP)2020

B. Sc. Food Science

SEMESTER–III

Minor VI Meat, Fish Poultry Products Processing

Credits: 2

SemesterEnd30 InternalAssessment:20 Total:50

Introduces From June 2026

COURSEOUTCOME: Students will be able to

CO1 Describe the basic structure and composition of meat and poultry, and understand how these components influence the quality and processing of the products.
CO2 Explainthevariousmeatprocessingtechniques,andunderstandhowtheseprocesses affect the flavor, texture, and safety of the final meat products
CO3 Explain the functional properties of egg components and their role in food applications.
CO4 Assess the impact of storage conditions (temperature, humidity) on the freshness and quality of eggs, and recognize the signs of egg spoilage.

Unit No	Content	No. of Hours
1	**Introduction of meat and slaughtering of animals** Pre-slaughter transport and care and ante mortem inspection Slaughtering of animals, post-mortem inspection and grading of meat Pre and post slaughter operations, Classification and Structure and composition of meat Nutritive value of meat **Processing and preservation of meat** Manufacture of meat products and packaging. Recent concepts in animal product processing Aging or chilling, freezing, pickling, curing, cooking and smoking of meat Meat tenderization, Preservation with antibiotics, radiations,	15
2	**Structure, Composition and Quality of Egg Structure**, composition of egg Nutritive value of egg **Evaluation of quality and grading of eggs** Processing and Preservation of eggs Egg processing–freezing, drying and canning Preservation of shell eggs Effect of heat on egg protein.	15

Suggested Reading:

1. Meat, Poultry & Fish Products Technology, Syed Imran Hashmi, VNMAU Parbhani
2. Principles of Meat Science Aberle E. D. Kendall Hunt Publication,Fifthedition,2012
3. Handbook of Heat and Meat Processing Hue Y.H.CRCPress,NewYork,2012
4. Meat Processing Improving Quality, Joseph Kerry.
5. Fish Processing Technology, George MH all published by Backie academic and professional, 2nd edition.

SHIVAJI UNIVERSITY,KOLHAPUR **Syllabus as per National Education Policy (NEP)2020** **B.Sc. Food Science** **SEMESTER–III** **OE III** **Credits:2** **Semester End 30 Internal Assessment:20 Total:50** **Introduces From June 2026**
As per Shivaji University Regular B.Sc. structure

SHIVAJI UNIVERSITY,KOLHAPUR

Syllabus as per National Education Policy (NEP) 2020

B.Sc. Food Science

SEMESTER–III

SEC I Design & Development of New Products

Credits: 2

Semester End 30 Internal Assessment:20 Total:50

Introduces From June 2026

COURSEOUTCOME

CO1Understandandgainexperiencein the process of food product development
CO2 Identify challenges involved in the development of a new food product and how to find solutions.
CO3Applytherelationshipbetweentheoreticalandpracticalaspectsof Newproduct development
CO4 Develop critical thinking skills related to food products..

Unit No	Content	No of Hours
1	**Basics of Food Product Development** Definition, Classification of new food product Reason for new food, Product development–social concerns, Health concerns. Product lifecycle New Product Development team, concept of market and marketing Steps in Food Product Development)	15
2	**Technology for New Product &Scale up Trials** Adaptable technology and sustainable technology for standardized formulation for process development Scale up production trials for new product development at Laboratory and pilot scale Quality assessment of new developed products Market testing and marketing plan Costing and economic evaluation of developed products, Commercialization / product launch for marketing	15

Suggested Readings:

1. Food Product Development, M Earle, R Earle, A Anderson, Woodhead Publishing, 2001.
2. New Food Product Development: from Concept to Marketplace, Gordon W Fuller, CRC Press, 3rd edition, 2011.
3. Methods for Developing the New Food Products, Fadi Aramouni, Kathryn Deschenes, Desteh Publications, 2nd edition, 2017.
4. Strategies for Formulations Development: A step-by-step Guide using JMP, Ronald D. Snee, Roger W. Hoeri, SAS Institute; revised edition, 2016
5. New Food Product Design and Development: Beckley, Blackwell Publishing Oxford UK

SHIVAJI UNIVERSITY,KOLHAPUR Syllabus as per National Education Policy (NEP)2020 B.Sc. Food Science SEMESTER–III Major Practical III Laboratory Course VII (Based on Major V & VI) Credits: 2 Semester End: 30 Internal Assessment: 20 Total:50 Introduces From June 2026	
1	Physico-chemical properties of grains
2	Introduction to utensils and equipments used in bakery
3	Effect of kneading on the development of gluten
4	Determination of gluten content in wheat flour
5	Quality testing of flour and yeast
6	Effect of water ratio on cooking quality of rice
7	Preparation of standard solutions and buffers
8	Effect of saliva amylase a. Effect of temperature b. Effect of pH c. Effect of salinity
9	Retention of carbohydrates a. Glucose b. Fructose c. Sucrose
10	Detection of protein

SHIVAJI UNIVERSITY, KOLHAPUR Syllabus as per National Education Policy (NEP) 2020 B.Sc. Food Science SEMESTER–III Minor Practical III Laboratory Course VIII (Based on Minor V & VI) Credits: 2 Semester End: 30 Internal Assessment: 20 Total:50 Introduces From June 2026	
1	Physical examination of milk
2	Specific gravity of milk
3	Determination of natural acidity of milk
4	Preparation of khoa
5	Preparation of gulab jamun
6	Study of post-mortem changes in meat
7	Quality evaluation of meat
8	To study shelf-life of eggs by different method of preservation
9	Quality evaluation of fish
10	Quality evaluation of egg

SHIVAJI UNIVERSITY,KOLHAPUR

Syllabus as per National Education Policy (NEP)2020

B.Sc. Food Science

SEMESTER–III

VSC I : Laboratory course IX Vocational Skills for Fruit Preserve Products Manufacturing

Credits: 2

Semester End: 30 Internal Assessment: 20 Total:50

Introduces From June 2026

COURSE OUTCOME: After completing this course, students will be able to:

CO1: Understand and list the steps and equipments used in fruit preserve product manufacturing

CO2: Prepare flow charts and design a small-scale plant layout

CO3: Identify and explain food safety risks in manufacturing process..

CO4: Gain knowledge about the feasibility of a business plan

CO5: Implement documentation and record keeping protocols for a business

Sr. No.	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.

SHIVAJI UNIVERSITY,KOLHAPUR **Syllabus as per National Education Policy (NEP) 2020** **B.Sc. Food Science** **SEMESTER–III** **AEC I English** **Credits: 2** **Semester End 30 Internal Assessment: 20 Total:50** **Introduces From June 2026**
COURSE OUTCOME
As per Shivaji University Regular B. Sc. structure

SHIVAJI UNIVERSITY, KOLHAPUR **Syllabus as per National Education Policy (NEP)2020** **B.Sc. Food Science** **SEMESTER–III** **CC Co-curricular courses** **Credits: 2** **Introduces From June 2026**
As per Shivaji University Regular B.Sc. structure

SHIVAJI UNIVERSITY,KOLHAPUR

Syllabus as per National Education Policy (NEP) 2020

B.Sc. Food Science

SEMESTER–IV

Major VII Cereals & Bakery Products Processing II

Credits: 2

Semester End 30 Internal Assessment:20 Total:50

Introduces From June 2026

COURSEOUTCOME: The student will be able to

CO1 Explain the structure and chemical composition of **corn**, including its different types, and understand how the components influence its processing and uses.

CO2 Describe the malting process of barley & understand the significance of malting in the production of malt extracts, beer, and other fermented products.

CO3 Capable of converting cereals into bakery goods

CO4Analyzetypicalissues and their root causes in bakery products.

Unit No	Content	No. of Hours
1	**Corn** Structure and composition of corn grain(different types) Wet and dry milling High fructose syrups and their uses **Barley** Structure and composition of barley Barley malting process Significance of malting Different types of malts and their food applications	15
2	**Processing of bakery product:** Procedure of different types of bakery products (bread, cookies, crackers, cake and biscuits, etc.) Defects of baked products **Millets** Oat/Rye, Importance of Millet, composition, processing of millet **Preservation of bakery products** Freezing and frozen storage of baked products Safety and hygiene of bakery plants	15

Suggested Reading:

1. Bakery Products Science and Technology, Y. H. Hui, Wiley Black well Publishing, 2014.
2. Bakery and Confectionary products, Acharya N.G. Ranga Agricultural University
3. Cereal Processing Technology, Gavin Owens, WoodHeadPublishingLtd,2000
4. Textbook of Bakery and Confectionery, Yogambal Ashok kumar, Prentice HallIndia Learning Private Limited, 2012.
5. Post-Harvest Technology of Cereals, Pulses and Oilseeds, A. Chakraverty, Oxford and IBH Publishing Company, 2014

SHIVAJI UNIVERSITY,KOLHAPUR

Syllabus as per National Education Policy (NEP)2020

B. Sc. Food Science

SEMESTER–IV

Major VIII SUGAR AND CONFECTIONERY PROCESSING

Credits: 2

Semester End 30 Internal Assessment:20 Total:50

Introduces From June 2026

COURSE OUTCOME: Students will be able to

CO1Identify commodities and specialist equipment associated with the production of sugar and chocolate confectionery items and demonstrate knowledge of their application

CO2 Produce a range of chocolate candies, using appropriate pre-crystallization Methods

CO3 Produce a range of sugar confectionery items, using appropriate cooking methods

CO4 Describe and discuss the principles, techniques and methods used in the production of sugar and chocolate confectionery

Unit No	Content	No. of Hours
1	**Sugar sources and manufacturing** Uses of sugar in food industry, Types of syrups Sugar based confectionery processing: High boiled sweets, Toffee, Fudge, and Caramel, Lozenges, fondants and chewing gums. Problems in confectionery products	15
2	**Chocolate Processing** Cocoa processing Chocolate processing: Ingredients, mixing, refining, conching, tempering, moulding, cooling, coating. Problems in Chocolate processing **Machinery and Additives in confectionery** Quality parameters of confectionary products	15

Suggested Reading:

1. Yogambal Ashok kumar, Textbook of Bakery and Confectionery , Prentice Hall India Learning Private Limited, 2012.
2. William P Edwards, The Science of Sugar confectionery, Royal Society of Chemistry, 2nd edition,2018.
3. Peter P. Greweling, Wiley, Chocolate and Confections; Formula, Theory and Technique for the Artisan Confectioner, 2nd edition, 2012.4. Ferenc A. Mohos, Wiley-Blackwell, Confectionery and Chocolate Engineering: Principles and Applications, 2010.
5. Bakery and Confectionery, Acharya NG Ranga Agricultural University.
6. Yogambal Ashok kumar, Textbook of Bakery and Confectionery , Prentice Hall India Learning Private Limited, 2012.
7. William P Edwards, The Science of Sugar confectionery, Royal Society of Chemistry, 2nd edition,2018.

SHIVAJI UNIVERSITY,KOLHAPUR

Syllabus as per National Education Policy(NEP)2020

B.Sc.Food Science

SEMESTER– IV

Minor VII Snack Food Processing

Credits: 2

Semester End 30 Internal Assessment:20 Total:50

Introduces From June 2026

COURSE OUTCOME: Students will be able to

CO1Give knowledge of various developments of snack food products.
CO2 Practically prepare snack foods from variety of raw material
CO3 The student will be competent in analyzing the shelf life and quality of snack food.
CO4 Provides knowledge about shelf life and quality characteristics of snack food product.

Unit No	Content	No of Hours
1	**Introduction to Snack Food Ingredients** Importance and scope of snack food technology Ingredients commonly used in snack food, their attributes and functions. **Equipment and Packaging** Equipment for frying, drying, baking, Equipment for popcorn processing. Quality Evaluation of Snack Food ,	15
2	**Snack Food Products and Processing** Potato Chips, Meat based snacks. Snacks based on popcorn, Puffed and flaked cereals, simulated potato chips, baked snacks. Nut based snacks (salted, spiced and sweetened) , Savory and Farsans, Processing of Papad, Chips and Wafers Application of seasonings Indian Savory Sweets	15

Suggested Reading:

1. Snack Foods Processing, Edmud W Luaas, Lloyd W Rooney, CRC Press, 2001.
2. Advances in Food Extrusion Technology, MedeniMaskan, Aylin Altan, illustrated edition, 2016.
3. Snack Foods, R. Gordon Booth, Springer, 5th edition, 2011.
4. The Complete Technology Book on Snack Foods, Dr.Himatri Panda, NIIR Project Company Services, 2nd edition, 2013

SHIVAJI UNIVERSITY,KOLHAPUR

Syllabus as per National Education Policy (NEP) 2020

B.Sc. Food Science

SEMESTER– IV

Minor VIII Food Packaging

Credits: 2

Semester End 40 Internal Assessment:10 Total:50

Introduces From June 2026

COURSE OUTCOME: The students will be able to

CO1 Explain the role of packaging in the food industry and the legislation involve.
CO2 Describe the making process, suitability, and functionality of each type of packaging materials for a specific product.
CO3 Explain the principles of innovative packaging technologies for use with food products.
CO4 Evaluate different packaging materials based on various types of analysis in the Laboratory.

Unit No	Content	No of Hours
1	**Introduction to Food Packaging** Package functions Need of Packaging Classification of packages-Primary, secondary & Tertiary **Introduction of Packaging Material** Different packaging and its properties Types of Packaging materials : Metal, Glass and Paper	15
2	**Packaging Accessories** Active packaging Controlled and modified atmospheric packaging (CAP and MAP) Aseptic packaging Packages for microwave ovens Biodegradable packaging Edible gums and coating Plastic as packaging material	15

Suggested Reading:

1. International Pvt. Ltd. New Delhi- 110 002A Handbook on Food Packaging, P.Jacob John
2. Food Packaging, Prof. Neelam Khetar paul and Dr.DarshanPunia
3. Food Packaging, Takashi Kadoya
4. Handbook of Food Processing, Packaging and Laboratoryelling, Jerry D'souza and Jatin Pradhan
6. International Pvt. Ltd. New Delhi- 110 002A Handbook On Food Packaging ,P.Jacob John
7. Food Packaging, Prof.NeelamKhetarpaul and Dr.DarshanPunia
8. Food Packaging , Takashi Kadoya
9. Handbook of Food Processing, Packaging and Laboratoryelling, Jerry D'souza and Jatin Pradhan
10. Aseptic Processing & Packaging of Food A Food Industry Perspective, Jairus R.D David, Ralph H. Graves and V.R. Carlon

SHIVAJI UNIVERSITY,KOLHAPUR **Syllabus as per National Education Policy (NEP) 2020** **B.Sc. Food Science** **SEMESTER–IV** **OE IV** **Credits:2** **Semester End 30 Internal Assessment: 20 Total:50** **Introduces From June 2026**
As per Shivaji University Regular B.Sc. structure

SHIVAJI UNIVERSITY,KOLHAPUR **Syllabus as per National Education Policy (NEP)2020** **B.Sc. Food Science** **SEMESTER–IV** **AEC II English** **Credits: 2** **Semester End 30 Internal Assessment:20 Total:50** **Introduces From June 2026**
As per Shivaji University Regular B.Sc. structure

SHIVAJI UNIVERSITY,KOLHAPUR **Syllabus as per National Education Policy (NEP)2020** **B.Sc. Food Science** **SEMESTER–IV** **VEC II Environmental Studies** **Credits: 2** **Semester End 30 Internal Assessment: 20 Total:50** **Introduces From June 2026**
As per Shivaji University Regular B. Sc. structure

SHIVAJI UNIVERSITY,KOLHAPUR Syllabus as per National Education Policy (NEP)2020 B.Sc. Food Science SEMESTER–IV Major Practical IV Laboratory Course X (Based on Major VII & VIII) Credits: 2 Introduces From June 2026	
1	Preparation of Cake
2	Cake faults and their causes
3	Preparation of bread
4	Preparation of pancake
5	Preparation of Karachi Cookies
6	Preparation of Fudge/ Fondant.
7	Preparation of caramel.
8	Development Indian traditional sweet.
9	Determination of moisture in cocoa powder.
10	Development of Hard boiled candy.

SHIVAJI UNIVERSITY,KOLHAPUR Syllabus as per National Education Policy(NEP)2020 B. Sc. Food Science SEMESTER–IV Minor Practical IV Laboratory Course XI (Based on Minor VII &VIII) Credits: 2 Introduces From June 2026	
1	Preparation of Flaked cereals (Poha) and its quality evaluation.
2	Preparation of Puffed cereals (Churmura) and its quality evaluation.
3	Preparation of Puri and its quality evaluation.
4	Preparation of Chips and its quality evaluation.
5	Preparation of Moong dal and its quality evaluation
6	Measurement of thickness of paper and paper boards
7	Measurement of water absorption of paper and paper boards
8	Measurement of bursting strength of paper and paper boards
9	Measurement Tear resistance of papers
10	Measurement of puncture resistance of paper and paperboard

SHIVAJI UNIVERSITY,KOLHAPUR Syllabus as per National Education Policy (NEP)2020B.Sc. Food Science SEMESTER–IV SEC II Laboratory Course XII Design & Development of New Product Credits: 2 Introduces From June2026	
1	Market survey of existing various products
2	Formulation of new products based on corporate decision/ need based a. Protein-energy rich b. Low calorie (fat replacer) c. Low sodium content d. Glycemic index based e. Cholesterol emic index based
3	Product development based on above formulation depending on local sources/ technology
4	Quality assessment. New product development for a. Infant/weaning foods b. Geriatric c. Physiological status
5	Visit to industry

SHIVAJI UNIVERSITY,KOLHAPUR **Syllabus as per National Education Policy (NEP)2020** **B.Sc. Food Science** **SEMESTER–IV** **Community Engagement Programme I (CEP)** **Credits: 2** **Introduces From June2026**
COURSEOUTCOME :
As per Shivaji University Regular B. Sc. structure

NATURE OF QUESTION PAPER FOR B.Sc. PART –II,
(60+40 PATTERN)
ACCORDING TO REVISED STRUCTURE AS PER NEP – 2020
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2026-27

Maximum Marks: 30
Duration: 1 hrs.

University Assessment for 30 Marks

B.Sc. Food Science

(Semester-)
Examination Course Name
(Course Code)

Day & Date:
Total Marks: 30 **Time: 1 hr.**

Instructions:

1) All the questions are compulsory.

2) Figures to the right indicate full marks.

Q.1) Select the correct alternatives from the given choices. **[10]**

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

Q.2 Answer the following Questions (Any 1 out of 2) **[10]**

1.

2.

Q.3 Answer the following Questions (Any 2out of 3) **[10]**

1.

2.

3.

B. Internal Assessment for 20 Marks

B.Sc. (Food Science) Part II Semester III & IV–

1) Home Assignment = 05 marks

2) Class Assignment (Tutorial type) = 05 marks

3) Quiz = 05 marks

4) Midterm Test* = 05 marks

Note: 1) Midterm Test shall be conducted after completion of each unit

Practical Examination:

University Assessment for 30 Marks

B.Sc. Food Science II

(Semester-)

Examination

Course Name

(Course Code)

Day& Date: **Total Marks: 30**

Time:

Q. 1 Principle Writing	5 Marks
Q. 2 Performance and Experiment writing	15 Marks
Viva	10 Marks

Internal Assessment for 20 Marks

Assessment of Journal	5 marks
Assessment of Regular Notebook	5 marks
Attendance for every Practical	5 marks
Test Based on Practical work (Conduct at least Two Test in Each Semester)	5 marks