

 Estd. 1962 "A++" Accredited by NAAC (2021) With CGPA 3.52	SHIVAJI UNIVERSITY, KOLHAPUR - 416004, MAHARASHTRA PHONE:EPABX-2609000, www.unishivaji.ac.in, bos@unishivaji.ac.in शिवाजी विद्यापीठ, कोल्हापूर - ४१६००४, महाराष्ट्र दूरध्वनी-ईपीएबीएक्स - २६०९०००, अभ्यासमंडळे विभाग दुरध्वनी ०२३१-२६०९०९४ ०२३१-२६०९४८७	
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Ref.No.SU/BOS/Science/148

Date: 26/05/2026

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

Subject: Regarding revised syllabi of B.Sc. Part-III (Sem.V & VI) degree programme under the Faculty of Science and Technology as per NEP-2020 (2.0)

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 syllabi, nature of question paper of B.Sc. Part-III (Sem.V & VI) degree programme under the Faculty of Science and Technology as per NEP-2020 (2.0).

B.Sc. Part-III (Sem. V & VI) as per NEP-2020 (2.0)			
1.	Botany	9.	Geology
2.	Physics	10.	Zoology
3.	Statistics	11.	Chemistry
4.	Mathematics	12.	Electronics
5.	Microbiology	13.	Drug Chemistry
6.	Industrial Microbiology	14.	Pollution
7.	Biochemistry	15.	Food Science and Quality Control
8.	Computer Science (Optional)	16.	Biotechnology (Optional/Vocational)

This syllabus, nature of question and equivalence shall be implemented from the academic year 2026-2027 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in>Syllabus>Syllabus as per NEP2020.

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October /November 2026 & March/April 2027. These chances are available for repeater students, if any.

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.



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Structure and Syllabus in Accordance with National

Education Policy – 2020

With Multiple Entry and Multiple Exit Syllabus

For

**B.Sc. Part-III
Food Science & Quality Control**

SEMESTER V AND VI

To be implemented from Academic Year 2026-2027

SYLLABUS OF B.Sc. (Food Science and Quality Control) III (NEP2020)

❖ **Year of Implementation:** To be implemented from June 2024 onwards

- Guidelines shall be as per B.Sc. Regular Program.
- Rules and Regulations in accordance with National Education Policy with effect from Academic Year 2024-25.

❖ **Preamble:**

- Food science and quality control is an exciting field that allows you to build a strong background for many career opportunities.
- The preamble for food Science and quality control emphasizes the critical role of these disciplines in ensuring safe, high-quality food for consumers and promoting sustainable food systems, addressing issues like food safety, quality & Nutrition globally.

PROGRAM OUTCOMES	
PO1	Apply the scientific method to food science & Quality Control problems
PO2	Apply critical thinking and analytical evaluation to contemporary food science & Quality Control information and literature.
PO3	Apply principles from general chemistry, microbiology, analysis, bio-technology and biochemistry to food science & Quality Control problems.
PO4	To provide knowledge and skills for better preservation techniques, processing and Value addition to agricultural products.
PO5	To promote research and development for food product and process and guarantee sanitation and safety of processed food items.
PO6	Utilized advanced instruments and technologies to process and analyze food products and to solve food safety problems.
PO7	Critically access and analyze food science & Quality Control information available in the public domain in an innovative and ethical way.
PO8	Design food products that meet the various food regulations and laws
PO9	Utilize knowledge from the physical and biological sciences as a basis for Understanding the role of food and nutrients in health and disease processes.
PO10	Taking roles as researchers, academics, practitioners or professionals with Reliable skills, mastering concepts and theories, and applying and developing food and related sciences.

PROGRAM SPECIFIC OUT COMES

PSO1	To impart knowledge in various aspects of Food Technology through Theory and Practical knowledge.
PSO2	To impart the knowledge about various compounds such as protein, carbohydrates, lipids amino acids, minerals, vitamins. Associated with the chemical compositions of food, their structures and functions.
PSO3	The students can gain knowledge about some very essential topic of nutrition and its metabolism balance inside the body
PSO4	To make the students familiar with the technologies of food processing And preservation of plant and animal foods, cereals, pulses, oilseeds, fruits vegetables, spices, meat, fish, poultry, sea food, milk and dairy products.
PSO5	To development students understanding and communication skills through various assignments which will enable them to develop skills in writing and effective's inter personal skills. A presentation in different topics enhances their confidence, ability to express themselves & presentation skills

PROGRAM OBJECTIVE	
1	To train the student to be competent working professional in the food industry ,in the production of quality food by imparting better nutritional, sanitation & hygiene concepts
2	To encourage students to the entrepreneurs & develop the capacity for setting up small scale enterprises with respect to food within the country.
3	To organize functions for creating awareness about the importance of safe processed nutritious food
4	To provide diagnostic analysis of food products.
5	Food Chemistry & Food Microbiology Understand the role of chemical composition & Microorganism in Food Spoilage and Safety.
6	Food Processing and preservation Understand the principles of food Processing and preservation.
7	Evaluate the Safety and efficiency of genetically modified food and apply principles to food product development.
8	Evaluate the effect of packaging and distribution on food quality and safety.
9	Develop innovative solution for the food industry.
10	Help student gain practical skills through internship and collaborative project.

❖ **Duration of Program:**

3 years B.Sc. Program or

4yearsB.Sc. Program (Honors Degree) or

4yearsB.Sc. Program (Honors 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/Level6.0arerequiredtobescrutinized(withstipulatedprocedure)onthebasisof following criteria:

(A) Eligibility requirements for admission to B.Sc. Part-I(Level4.5):

- 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 Boarder an examining Body recognized as equivalent thereto.
OR
- iii) Completed2ndyearofthe3-year diploma after 10th

(B) Eligibility requirements for admission to B.Sc. Part-II (Level5.0):

- 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) Completed3-yeardiplomacoursewithsubjectsallied/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 5shall 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(Level6.0):

- 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 Honors / Honors 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 program 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. Program:**

The pattern of program will be of semester type. (A) Weight age: 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. Program with 132credits.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. Program will require 176 credits.(Please refer the university regulations and structure of the program for details).

❖ **Credit distribution chart for B.Sc. Program:**

a) For 3year B.Sc. Program:

Course Name		Total Credits	%of total credits
Major			57.58
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	
Indian Knowledge System	IKS	02	
Community Engagement Program	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	6.06%
Skill Enhancement Courses	SEC	06	
Co-Curricular Courses (NSS/NCC/Sports/Cultural Activities)	CC	02	
TOTAL		132	100%

b) For 4-year B.Sc. Program (Honors 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 Program	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%

c) For 4-year B.Sc. Program (Honors 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 Program	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 honors degree with research, research project is applicable and for honors degree, courses related to major are incorporated.

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

❖ **StructureinAccordancewithNationalEducationPolicy-2020WithMultipleEntry and Multiple Exit Options**

• 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–IndianKnowledgeSystemTheoryPaper1 (Generic) • VEC-1–ValueEducationCourse(Democracy) Theory	• Total Marks for B.Sc.-I :1100 • Total Credits for B.Sc.-I (Semester I& II):44 • <i>Separate passing is mandatory for University and Internal Examinations</i>
• RequirementforExitafterLevel4.5: AwardofUGCertificatewith44Creditsandanadditional4 credit score NSQF course/Internship.	

B.Sc. Food Science & Quality Control Part–III (Level-5.5) Semester V

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	Maximum Marks
Major IX- Food Safety & Quality Management	2	0	2	40	10
Major X -Dairy Technology.	2	0	2	40	10
Major(P)-V (a) Laboratory Course XIV (Based on Major IX)	0	4	2	50	--
Major(P)-V (b) Laboratory Course XV (Based on Major X)	0	4	2	50	--
Major Program Elective I- 1. Nutraceutical & Functional Foods 2. Food Packaging	2	0	2	40	10
Major Program Elective I (2) XVI Laboratory Course (Based on Major Program Elective I) 1. Nutraceutical & Functional Foods Lab (2). Food Packing Lab (2)	0	4	2	50	--
Open Elective- V (T) Food Safety & Adulteration Awareness	2	0	2	40	10
VSC II - Vocational Skills Course, Lab Course XVII (P) Bakery Products Manufacturing.	0	4	2	50	-
AEC III English	2	0	2	40	10
OJT	-	0	4	80	20
Total			22	480	70

B.Sc. Food Science & Quality Control Part–III (Level-5.5) Semester VI

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	Maximum Marks
Major XI- Meat, Fish& Poultry Technology	2	-	2	40	10
Major XII-Fruits and Vegetables Processing Technology	2	-	2	40	10
Major(P)-VI (a) Laboratory course XVIII(Based on Major XI)	0	4	2	50	--
Major(P)-VI (b) Laboratory course XIX(Based on Major XII)	0	4	2	50	--
Major Program Elective II - 1. Snack Food Processing Technology 2. Food Additives	2	-	2	40	10
Major Program Elective -II- XX Laboratory Course (Based on Major Program Elective II) (2) 1. Food Additives Lab. 2.Snack Food Processing Lab	0	4	2	50	--
VSC –III Vocational Skills Course, Lab Course XXI (P) Snack & Savory Manufacturing.	0	4	2	50	--
SEC III (T), Food Industrial Economics and Management Skill	2	--	2	40	10
AEC IV English	2		2	40	10
IKS II- Traditional & Functional Aspect of Indian Spices	2	-	2	40	10
FP	--	--	2	40	10
Total			22	480	70

The question paper in each semester end examination for each theory course (paper) for B.Sc. (all Semesters) shall be of 40 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	2CreditCourse	Duration
Semester-end Examination	40 Marks	1.5 Hrs
Internal Assessment	10 Marks	1 Hr
Total marks for each course	50 Marks	--

1. 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.
2. 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 Program coordinator /Principal /Head of the Department. The Program 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:

Outline for continuous internal assessment activities -:

Level	Semester	Activities Per Semester	Marks
4.5	Semester–I	Assignment	10marks
	Semester–II	Unit test	10marks
5.0	Semester–III	Unit test	10marks
	Semester–IV	Oral examination/Group discussion	10marks
5.5	Semester–V	Seminar/ Group discussion/Field Work/ Project Work	10marks
	Semester–VI	Study tour /Field Work/Project Work/ Seminar	10marks
6.0	Semester–VII	Case Study/Field Work/Project Work	10marks

❖ **Ordinances regarding the examination:** O.B.Sc.2, 3and4shallprevail.

❖ **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. In such cases his previous performance of incomplete academic years (B. Sc. I, B. Sc. II or B. Sc. III) will be cancelled.

**Bachelor of Food Science & Quality Control (B.Sc. FSQC) Course Structure (As per NEP2020) Credit
Frame work / Third Year**

SEM Level	COURSES			OE	VSC/SEC	AEC/VEC/IKS	OJT/FP/CEP/ CC/ RP	Total Credits	Degree/ Cum. Cr. MEME
	Major	Minor							
SEM V(5.5)	Major-IX- Food Safety & Quality Management (2) Major-X- Dairy Technology (2) Major(P)-V (a) Laboratory Course XIV (Based on Major IX) (2) Major(P)-V (b) Laboratory Course XV (Based on Major X) (2)	Major Program Elective I 1) Nutraceutical & Functional Foods (2) Food Packing (2) Major Program Elective I (2) XVI Laboratory Course (Based on Major Program Elective I) 2. Nutraceutical & Functional Foods Lab (2). 3. Food Packing Lab (2)	-	OE-5 (T) Food Safety & Adulteration Awareness(2)	VSC II (P) Laboratory Course XVII Vocational Skill Course, Bakery Products Manufacturing (2)	AEC III English (2)	OJT(4)	22	UG Degree 132
SEMVI (5.5)	Major- XI- Meat, Fish & Poultry Technology (2) Major-XII Fruits & Vegetables processing Technology (2) Major(P)-VI (a) Laboratory course XVIII (Based on Major XI) (2) Major(P)-VI (b) Laboratory course XIX (Based on Major XII) (2)	Major Program Elective II (2) 1) Food Additives 2) Snack Food Processing Technology Major Program Elective -II- XX Laboratory Course (Based on Major Program Elective II) (2) 1. Food Additives Lab. 2. Snack Food Processing Lab	-	-	VSCIII(P) Laboratory Course XXI Vocational Skill Course Snacks & Savory Products Manufacturing (2) SECHII (T) Food Industrial Economics and Management Skills (2)	AECIV English (2) IKS II Traditional & Functional Aspect of Indian Spices (2)	FP(2)	22	
Credits	8(T)+8(P)=16	4(T)+4(P)=8	-	2(T/P)	2(T)+4(P)=6	2(T)+4(T)=6	4(T)+2(T)=6	44	

- University may decide to offer maximum of three subjects (Courses) in the first year. The student may select subject out of combination of three subjects (Courses), (which a student has chosen in the first year) as a **MAJOR** subject (Course) and one subject (Course) as **MIN OR** Subject in the second year. There by it is inferred that there mining third subject (Course) shall stand discontinued.
- **DSC:** Discipline Specific Course
- **MAJOR:** Mandatory/Elective
- **MINOR:** Course may be from different disciplines of same faculty of DSC Major
- **OE (Open Elective):** Elective courses/Open Elective to be chosen compulsorily from faculty other than that of the Major.
- **VSC/SEC: Vocational Skill Courses(MAJOR related)/Skill Enhancement Courses**
- **AEC/ VEC / IKS:** Ability Enhancement Courses (English, Modern Indian Language)/Value Education Courses/ Indian Knowledge System (Generic& Specific))
- **OJT/FP/RP/CEP/CC:** On-Job Training(Internship/Apprenticeship)/Field Project(Major related)/Research Projects(Major related)Community Engagement (**Major related**)/ **Co-Curricular courses(CC)** such as Health& Wellness, Yoga Education, Sport, and Fitness, Cultural activities, NSS/NCC and Fine /applied/visual/performing Arts/ Vivek Having etc.

❖ **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	40	10	50
Minimum Marks required for passing	14	4	18

1. There shall be a separate head of passing for semester end examination and internal examination.
2. Minimum 18 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.

Graduation Chart:

% of Marks Obtained	Numeric al 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:

1. Marks obtained ≥ 0.5 shall be rounded off to next higher natural number.
2. 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)

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 – 40

Modality of Assessment

Students appearing for the NEP B.Sc. I will be evaluated as per the 80:20 schemes wherein the term end exam will be of 40 marks each paper while 10 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 - 08 Marks,
- ✓ Question No. 1 will be of an objective type eight objective will carry - 08 Marks.
- ✓ Question 2 will be descriptive two questions are to be attempted out of three and will carry 16 Marks, 08 Marks each)
- ✓ Question 3 will be short answer type four questions are to be attempted out of six and will carry 16 Marks, 04 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 40 marks.

- The duration of this exam will be of 1.5 Hrs (90 minutes)
- For each unit there will be at least one question
- All questions shall be compulsory with internal choice within the questions

❖ **Nature of Question Paper and Marking**

Scheme University Assessment for 40 Marks

B. Sc. (Part-_____) (Semester -) Examination

Food Science and Quality Control

Course Name (Course Code)

Day & Date:

Total Marks: 40

Time:

Instructions: 1) All the questions are compulsory.

2) Figures to the right indicate full marks.

Q.1. Multiple choice questions(08-Questions) 08 marks

**Q.2. Attempt any two of the following:
(Essay type/Broad answer questions) 16marks**

A.

B.

C.

Q.3. Writeshortnotes(any four) 16marks

a)

b)

c)

d)

e)

f)

B Internal assessment 20%.

Sr No	Evaluation type(Any one of the following)	Marks
	Evaluation modalities: 1. Assignments that can include a. Essay Writing b. Solving Subjective Questions c. Problem Solving d. Report on lab/ Industry visit e. Any other subject/content specific assignments 2. Project based learning activities a. Group Discussion b. Research/Case studies c. Seminar Presentations d. Skits e. Poster Presentation f. Debate 3. Self-study/Class test 4. MCQ test	10

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 BOS before practical examination.
- Total marks-50 for each semester-I and II (Will be evaluated by Internal examiner.)
- Total-50 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.)Program:

R.B.Sc.No.1

The three-year B. Sc. Program 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. program will be of 176 credits. (Please refer to the university regulations and structure of the program 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. program is as shown in Annexure1.

R.B.Sc.No.3

List of Courses:

	Sem I	• Subject I: DSC I, DSC II, and Practical I • Subject II: DSCI,DSC II, and Practical I • Subject III:DSC I, DSC II, and Practical I • OE I(Theory/ Practical) • IKSI(Introduction to IKS)
B.Sc.I	Sem-II	• Subject I: DSC III, DSC IV, and Practical II • Subject II: DSC III, DSC IV, and Practical II • Subject III: DSC III, DSC IV, 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 • OEIII(Theory/ Practical) • VSC I Practical(Major Specific) • SEC I Theory/Practical • AECI(English) • CC
	Sem IV	• Major VII, VIII, and Major Practical IV • Minor VII, VIII, and Minor Practical IV • OEIV(Theory/ Practical) • SECII Theory/Practical • AECII(English) • VECII(Environmental Studies) • CEP

	SemV	• 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
B.Sc. III	Sem VI	• Major XI, XII, and Major Practical VII,VIII • Major II(Elective),Major ((Elective)Practical- II • VSCIII Practical Major Specific • SECIII Practical • AECIV(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 Program 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 Program 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 anyone subjects 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 re enter within three years from exit.
- One should complete his/her degree program with in 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 program 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 be 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, 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.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: Candidate swho 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: Candidate swho 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 program, 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. program (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. program 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. program (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. program shall be determined based on the aggregate performance of the candidate at the semester-I to VIII examination.

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 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 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.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 program 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.

SEMESTER-V
T.Y. B.Sc.(Food Science and Quality Control)SEMESTERV
Major Subject
IX Food Safety and Quality Management ,
[CREDITS-02;LECTURES-30;LEC/WEEK-02]

Course Outcomes:

1. To understand the Food Safety Principles and Food quality & Quality Control.
2. To understand the Food Hazards (Biological, Chemical, Physical)and Study of Food Contamination and Diseases

		No. of Lecture: 30
Unit 1	Introduction of Food Safety 1.1 Defination and Importance of Food Safety 1.2 Food Hygiene and Sanitation 1.3 Personal Hygiene in Food Handling 1.4 Food Contamination and Food borne diseases	05
Unit 2	Principles of food Quality Control 2.1 Quality Control in Food Industries 2.2 Raw Material quality testing 2.3 Food additives(Preservatives, Colour,flavours) 2.4 Sample techniques and quality Evaluation	10
Unit 3	Food laws and Standards 3.1 Food Adulteration and detection methods 3.2 Organization like BIS,AGMARK,CODEX Alimentarius 3.3 Food labeling Regulation	05
Unit 4	Food Safety management Systems 4.1 HACCP(Hazard Analysis and Critical Control Point) 4.2 GMP(Good Manufacturing Practices) 4.3 GHP(Good Hygiene Practices) 4.4 TQM (Total Quality Management) 4.5 ISO (Standards related to Food safety)	10

SEMESTER-V
T.Y. B.Sc.(Food Science And Quality Control)SEMESTER V

Major Subject
X - Dairy Technology

[CREDITS-02;LECTURES-30;LEC/WEEK-02]

Course Outcomes:

- To provide knowledge of milk Composition and properties.
- To develop skills in milk Processing and preservation Techniques.
- To Train Student in quality control and Safety standards for Milk and dairy Products.

		No. of Lecture: 30
Unit 1	Introduction of Dairy Technology 1.1 Development of milk processing industry in India present status & scope. 1.2 Dairy layout for small scale, Dairy design & sanitation layout 1.3 Dairy equipments& sanitation	05
Unit 2	Introduction of milk & primary processes 2.1 Food value & Composition of milk. 2.2 Factors affecting Composition of milk. 2.3 Buying, receiving, collection, Transportation of milk, storage & distribution of Milk 2.4 Processing of milk, filtration, clarification, cream separation & heat treatment of milk	10
Unit 3	Different Milk products 3.1 Milk product Processing – cream, Butter, Khoa ,Paneer, Ice-cream, condensed milk & evaporated milk 3.2 Judging & grading of milk & its products 3.3 Manufacturing of Cheddar cheese – Introduction, Manufacturing process, packaging, storage, defects and their prevention. 3.4 Dried milk products – Buttermilk powder, Whey Powder, Ice Cream mix	05
Unit 4	Different Milk products (8) 3.1 Milk product Processing – cream, Butter, Khoa , Paneer, Ice-cream, condensed milk & evaporated milk 3.2 Judging & grading of milk & its products 3.3 Manufacturing of Cheddar cheese – Introduction, Manufacturing process, packaging, storage, defects and their prevention 3.4 Dried milk products – Buttermilk powder, Whey Powder, Ice Cream mix	10

References

1. Outline of Dairy technology by Sukumar de
2. Yarpar, WJ & Hall, C. W. 1975 Dairy technology & Engineering AVI Westport
3. Warner J. M, 1976 Principles of Dairy Processing.
4. Rosenthal, I. 1991. Milk & milk products. VCH, New York

Semester V
SUBJECT I
Major Program Elective I –
Food Packaging

Credits 2 (Marks 50) Hours 30, Lectures of 60 Minutes

Course Outcomes: The students will be able to

CO 1. Explain the roles of packaging in the food industry and the legislation involve.

CO 2. Describe the making process, suitability, and functionality of each type of packaging Materials for a specific product

CO 3. Explain the principles of innovative packaging technologies for use with food products

CO 4 Evaluate different packaging materials based on various types of analysis in the laboratory

Unit I	Hours Allotted
*Introduction and importance of food packaging. Properties of packaging material. Material used in package in rigid semi rigid and flexible. *Types of containers. Wood and paper packaging –Wood, structure, wooden container, paper and paperboard	15
Unit II	Hours Allotted
*Plastic packaging – packaging material, plastic banned in India ,Classification of polymer, testing of plastic packages Technique and method used for packaging. *Glass Packaging –glass, Composition, properties, structure, types. *Metal Packaging –properties, steel plate, Aluminum containers, aluminum foil, corrosion of metal cans. *Oxygen absorbents-	15

References:

1. P.JacobJohnInternationalPvt.Ltd.NewDelhi-110002AHandbookonFoodPackaging,
2. Prof. Neelam Khetarpaul and Dr.Darshan Punia Food Packaging,
3. Takashi Kadoya Food Packaging,
4. Jerry D'souza and Jatin Pradhan Hand book of Food Processing, Packaging and Labeling,

Semester V
SUBJECT I Major Program Elective I
Nutraceutical & Functional Foods Credits 2 (Marks50)
Hours30, Lectures of 60 Minutes

Course Outcomes: The students will be able to

- CO1: Underst and the basic concepts of nutraceuticals and functional foods.
CO2.Acquire knowledge on the bioactive components (carbohydrates, lipids, peptides).
CO3: Gain knowledge on prebiotics, probiotics, and their health benefits.
CO5: Comprehend the significance of nutraceuticals in disease management.

Unit I	Hours Allotted
*Introduction to Nutraceuticals and Functional Foods: Definition, History and Classification Perceived Effects of Functional Foods *Introduction to Probiotics, Prebiotics and Symbiotic Probiotics: Taxonomy and Important Features of Probiotic Microorganisms Health Effects of Probiotic Microorganisms *Probiotics In various Food –Prebiotics Non-Digestible Carbohydrates/Oligosaccharides, Dietary Fiber, Resistant Starch, Gums	15
Unit II	Hours Allotted
*Poly phenols: Flavonoids, Catechins, Isoflavones, Tannins *Pigments: Carotenoids, Lycopene, Curcumin Introduction to Anti nutritional Factors, example Sources and role of Resveratrol, Kaempferol, Quercetin Cinnamaldehyde, Crocin, Lutoline, Capsaicin, Piperine, Gingerol, Eugenol, Rosmarinic acid, Apigenine, Thymoquinone	15

References

1. Wildman, R.E.(2016).Hand book of Nutraceuticals and Functional Foods. CRC Press
2. Gibson, G. R. and Williams, M. C. (2001). Functional Foods Concept to Product. CRC Press.
3. Vattam, D.A. and Maitin V.(2016). Functional Foods, Nutraceuticals and Natural Products, Concepts and Applications. DES tech Publications, Inc
4. Gupta, R.C.(2016).Nutraceuticals: Efficacy, Safety and Toxicity. Academic Press.

Major Practical.-V: PRACTICALSBASEDON DSC IX &X

[CREDITS-02; PRACTICALS-60hours, Practical's/week-02]

Major(P)-V (a) Laboratory Course XIV

(Based on Major IX)

Credits-02 Marks : 50

1. Personal hygiene and sanitation practices
2. Detection of adulteration in common food products
3. Raw material quality evaluation
4. Study of food additives
5. Food labeling as per FSSAI regulations
6. Preparation of HACCP plan
7. Sensory evaluation of food products
8. Quality analysis of food samples

Major(P)-V (a) Laboratory Course XV

(Based on Major IX)

Credits-02 Marks : 50

1. Standardization of Milk Using Pearson Square Method.
2. Acidity determination of milk sample
3. Platform tests of miulk
4. Preparation of Flavored Milk.
5. Preparation of Paneer.
6. Preparation of Khoa.
7. Preparation an of Shrikhand.
8. Preparation of gulabjamun.

B.Sc food Science and Quality Control

SEMESTER V

Major Program Elective I

Laboratory course XVI

**(Based on Major Programmed Elective I) Nutraceuticals and
Functional Foods Lab,
Credit 2**

1. Products based on Market survey.
2. Preparation of Probiotic Butter Milk.
3. Development of Polyphenol rich functional herbal drinks.
4. Development of Pre-biotic Based fibre rich products.
5. Comparative study of anti-nutritional factor reduction by soaking.
6. Determination of dietary fibre in selected food.
7. Isolation of bacteria from Probiotic foods like curd / Yoghurt.

B.Sc food Science and Quality Control
SEMESTER V
Major Program Elective I
Laboratory course XVI (Based on Major Program Elective I)
Food packaging Lab,
Credit 2

- 1) Determination on water vapor transmission Rate.
- 2) Determination of GSM of different packaging Material.
- 3) Examination of cut out of can.
- 4) Polymer Identification.
- 5) Working of tearing strength tester.
- 6) Determination of Thickness of packaging material.
- 7) Identification of packaging material.

OPEN ELECTIVE (OE) courses designed by Faculty of Science & Technology
Course Title- Food Safety & Adulteration Awareness
Credits- Two (30 Lectures)
Level- 5.0 (Semester V)

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

1. To define sanitation and discuss types of cleaning compounds
2. To discuss effecting ways of waste disposal
3. To understand measures taken to maintain personal/food hygiene in food industry

Unit 1: (1 Credit-15 Lectures)

Introduction to Common Foods and Adulteration, Definitions: food adulteration.

Types of Adulterants:

Intentional:- Adding cheap substitutes like chalk powder or water for profit.

Incidental:- Accidental contamination from pesticides or improper storage. Metallic: Harmful traces of lead, mercury, or arsenic. Impact on Health: General health hazards including food poisoning, allergic reactions, and long-term risks like organ damage or cancer.

Unit 2: (1 Credit-15 Lectures)

Adulteration of Common Foods and Detection.(simple household or laboratory-scale testing methods),

Milk & Dairy: Detection of water, starch, urea, and detergents.

Oils & Fats: Identification of mineral oil, castor oil, or argemone oil in edible oils.

Spices & Condiments: Testing for brick powder in chilli, metanil yellow in turmeric, and papaya seeds in black pepper.

Grains & Grains Products: Detecting stones, sand, or marble chips in rice and pulses.

Sweeteners: Checking for chalk powder or washing soda in sugar and honey.

References:

1. The Food Adulteration Handbook: Protecting Your Kitchen, Health & Home,
2. Rapid Detection of Food Adulterants and Contaminants: Theory and Practice,
3. Food Adulteration: A Complete Guide to Detection, Prevention & Consumer Safety,
4. Edwin M. Bruce Manual for Detection of the Common Food Adulterants

SHIVAJI UNIVERSITY,,KOLHAPUR.
Syllabus as per National Education Policy (NEP) 2020
B.Sc. Food Science & Quality Control
SEMESTER– V
Laboratory Course XVII (VSC) II (P)
Vocational Skills for Bakery Products Manufacturing
Credits: 2 / Marks: 50

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

- CO1: Understand and list the steps and equipments used in bakery 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

Practical's -

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

SHIVAJI UNIVERSITY,KOLHAPUR
Syllabus as per National Education Policy (NEP)2020
B.Sc. Food Science &Quality Control
SEMESTER–V
AEC III English
Credits: 2
Semester End 40 Internal Assessment: 10 Total: 50
Introduces From June 2025

As per the regular B.sc Structure.

Semester V

On Job Training (OJT) Guidelines for 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-jobtraining(OJT)/Internship/Apprenticeship of 120 hours must be completed by the candidate in food industries/ hospitals / research labs/ food testing laboratories.

A student will be assessed by the following points:

1. Seminar based on OJT
2. Submission of report based on OJT
3. Attendance (minimum 80%) and Certificate of student

The scheme of evaluation for On Job Training (OJT) is given below–

Sr. No.	University Assessment (UA)	Internal Assessment (IA)	Total marks
On Job Training (OJT)	80	20	100

After successful completion of On Job Training (OJT) the assessment for 100 marks shall be done by External and Internal Examiners as under:

Sr.No.	Particular	Marks
1	Quality and effectiveness of presentation	10
2	Depth of knowledge and demonstration skills	10
3	Variety and relevance of learning experience	10
4	Practical applications and relationships with concepts taught	10
5	Internship Report	30
6	Attendance record, student log, supervisor evaluation	30

SEMESTER-V
T.Y. B.Sc.(Food Science And Quality Control)SEMESTERIV
Major Subject
XI - Meat, Fish & Poultry Technology
[CREDITS-02;LECTURES-30;LEC/WEEK-02]

Course Outcomes:

- To study structure , composition and slaughtering operations at meat, poultry
- To study Postmortem changes and major quality attributes
- Processing of meat, fish and Poultry products

		No. of Lecture: 30
Unit 1	Importance of meat products 1.1 Introduction & Importance of meat products in India 1.2 Chemical Composition & microscopic structure of meat 1.3 Pre-slaughter inspection of animal 1.4 Transportation, feeding of animal before slaughtering	05
Unit 2	Stunning & slaughter operations , 2.1 Slaughtering of animal 2.2 Bones & cuts of Carcass 2.3 Quality and grading of meat 2.4 Post Mortom inspections 2.5 Meat tenderization, aging curring & rigourmortis , preservation of meat &Poultry products 2.6 Meat plant sanitation & safety	10
Unit 3	Egg & Egg products, 3.1 Structure, composition, Nutritive value & functional properties of egg 3.2 Processing of Egg 3.3 Quality of egg & Egg Products 3.4 Effects of heat on egg proteins	05
Unit 4	Seafood , 4.1 Classification of Seafood 4.2 Types of fish 4.3 Composition and structure of Fish 4.4 Postmortem changes in Fish 4.5 Canning , smoking freezing & dehydration of fish	10

SEMESTER-V
T.Y. B.Sc.(Food Science And Quality Control)SEMESTERIV
Major Subject
XII - Fruits and Vegetables Processing Technology
[CREDITS-02;LECTURES-30;LEC/WEEK-02]

Course Outcomes:

• Understand the composition and Nutritional value of Fruit And Vegetables, • Explain principles of Preservation, • Understand the different methods of processing,		
		No. of Lecture: 30
Unit 1	Introduction of Fruits and Vegetables 1.1 Importance of fruits and vegetables in human nutrition 1.2 Classification of fruits and vegetables 1.3 Composition and Nutritional value	05
Unit 2	Jams jellies and marmalade 2.1 definitions of jam jellies and marmalade 2.2 Methods of preparation. 2.3 Role of ingredients 2.4 FPO specifications and preservation	10
Unit 3	Tomato products 3.1 Introduction 3.2 Preparation of tomato juice, soup 3.3 Preparation of tomato puree, ketchup 3.4 preservation	10
Unit 4	Fruit and vegetable beverages Types of beverages preparation of squashes, syrup, cordials, RTS preservation	05

References:

- 1) Preservation of fruit and vegetables – Bhatiya Vijaya
- 2) Food preservation Techniques – Atul Agnihotri.
- 3) Fruit and Vegetable preservation – N.P.Singh.
- 4) Fruit and Vegetable Preservation Techniques – R.K.Narang

Semester VI
SUBJECT I
Major Program Elective II –
Food Additives

Credits 2 (Marks 50) Hours 30, Lectures of 60 Minutes

Course Outcomes: The students will be able to

CO1 Students will be able to describe the various additives and ingredients used in food Industries.

CO2 Students will be able to describe the mechanisms of food additives involved in foods.

CO3 Students will be able to explain the significance of different additives in food quality, Preservation and storage

CO4 Students will be able to describe the safety of use of food additives and ingredients.

Unit I	Hours Allotted
Food additives- definitions, classification and functions Preservatives class I and II Antioxidants- mechanisms of oxidation inhibition, natural and synthetic antioxidant colors and flavors- classification (synthetic and natural), sources, applications in food industry Antimicrobial agents: Introduction, Types of antimicrobial agents.	15
Unit II	Hours Allotted
Emulsifiers- function, mechanism and application Sequestrants, humectants, hydrocolloids, sweeteners, acidulants, buffering salts, anticaking agents	15

References:

1) Fennema .O.R Principles of food science part – I

2) Potter N.N. & Hotchkiss .J .H .(1966); Food Science 5th edn, CBS Publisher & distributor .

3) Shrilaxmi B. (2003) Food Science 3rd edn . New International (P) Limited Publisher.

4) Manay S.N & Shadakshar swamy M. (2001) Food Facts and Principles, 2nd New Age International (P) Limited Publisher.

5) Furia T.E .V ol – I&II Food Science Handbook of Food Additives .

Semester VI
SUBJECT I
Major Program Elective II –
Snack Food Processing Technology
Credits 2 (Marks 50) Hours 30, Lectures of 60 Minutes

Course Outcomes: The students will be able to

CO 1.To gives knowledge of various developments of snack food products.

CO 2. The student will be able to practically prepare snack foods from a variety of raw material

CO 3.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 I	Hours Allotted
Introduction to snack Food Technology Importance, Scope and global/ Indian Market trends in snack foods. Snack Food Ingredients Common ingredients ; Cereals(Maize, rice), Pulses, Oils/Fats, Spices, Flavors, Preservatives and additives Physical, Chemical and functional attributes and their roles Packaging and Quality Evaluation Packaging materials and techniques Quality parameters :- Sensory, Physical , Microbial and Nutritional evaluation Standards (FSSAI, HACCP) and Shelf -life testing	15
Unit II	Hours Allotted
Fried and Nut Based snacks Potato chips and simulated potato chips (Slicing , frying , de-oiling) Meat based snacks (Mincing , forming , frying) Nut based snacks (Salted, spiced , sweetened: roasting, coating) Savory mixed and farsans Traditional Indian Snacks Processing of papad, chips and waters Indian savory sweets (Sev and gathiya)Application of seasonings and flavors Puffed, Baked and Popcorn snacks Popcorn-based snacks	15

References -:

- 1) FICSI: Savory and snack and Processing Technician, Level4.
- 2) RP Srivastav and Sanjeev Kumar Fruit and Vegetable Preservation, Principles and Practices.
- 3) Girdhari Lal and TDT and on Preservation of fruits and vegetables
- 4) Salunkhe D.K, Kadam S. Handbook of fruit science and technology
- 5) Atul Agnihotri Food preservation Technique

Major Practical.-V: PRACTICALSBASEDON DSC XI&XII

[CREDITS-02; PRACTICALS-60hours, Practical's/week-02]

Laboratory course XVIII (Based on Major Paper XI& XII)

Meat, Fish& Poultry Technology Lab

And

Fruits and Vegetables Processing Technology Lab

Major(P)-VI (a)

Laboratory course XVIII

(Based on Major XI

1. Estimation of quality and grading of eggs.
2. Isolation of albumin from egg.
3. Isolation of lecithin from egg yolk.
4. Study of slaughtering operation of meat animals.
5. Preservation of meat by pickling.
6. Preparation of meat nuggets
7. Canning of meat
8. Visit to slaughter house

Major(P)-VI (a)

Laboratory course XVIII

(Based on Major XII)

1. Preparation and Analysis of Fruits Juice
2. Preparation and Analysis of Jam.
3. To determine maturity indices of given fruits.
4. Preparation of Sauerkraut.
5. Preparation and Analysis of Tomato souse.
6. Preparation and Analysis of squash.
7. Preparation of Fruit Leather.
8. Preparation and Analysis of Amla Candy.

B.Sc. food Science and Quality Control
SEMESTER VI

Laboratory course XX (Based on Major programme Elective II)
Food Additives Lab (50 Marks)
Credit 2

Practical

- 1) Write the application of additives used in given food products
- 2) Effect of thickener in food products
- 3) Effect of Gelling agent in food products
- 4) Effect of emulsifier in food products
- 5) Effect of bread improver in Bread
- 6) Effect of Flavors in food products
- 7) Effect of Colors in food product
- 8) Estimation of salt percentage.

B.Sc. food Science and Quality Control

SEMESTER VI

Laboratory course XX(Based on Major Program Elective II)

Snack Food Processing Lab - Credits 2 (50 Mark)

Practical -:

- 1) Preparation of Potato Chips.
- 2) Preparation of Banana Chips.
- 3) Preparation of Extruded Snacks.
- 4) Preparation of Namkeen Mixture.
- 5) Preparation of Sev and Gathiya.
- 6) Preparation of papad.
- 7) Preparation of Puffed Rice Snacks.
- 8) Packaging and Shelf-life Study of Fried Snacks.
- 9) Preparation of Khakhra.

SHIVAJI UNIVERSITY, KOLHAPUR.
Syllabus as per National Education Policy (NEP) 2020
B.Sc. Food Science & Quality Control
SEMESTER – VI
Laboratory Course XXI (VSC) III (P)
Vocational Skills for Snack & Savory Products Manufacturing
Credits: 2 Marks: 50

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

CO1: Understand and list the steps and equipments used in snack & savory 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

Practical -:

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

SHIVAJI UNIVERSITY, KOLHAPUR
Syllabus As per National Education Policy (NEP) 2020
SEMESTER– VI
SEC III. Food Industrial Economics and Management Skills
Credits: 2
Semester End 40, Internal Assessment: 10 Total: 50
Introduces From June 2026

Course Out comes: The students will be able to
. CO1. Understand the key management principles
CO 2. Get basic knowledge of management concepts
CO 3. Understand the basic knowledge of business economics
CO 4. Get basic knowledge of demand analysis

Unit I	Hours Allotted
Principles of Management *Introduction, definition and importance of management *Functions of Management Planning, Organizing, Staffing, Coordinating, Directing, Motivating and Controlling. *Concept and Structure of an Organization Types of industrial organization a) Line organization b) Functional organization c) Line and Functional organization *Hierarchical Management Structure Top, middle and lower-level management	15
Unit II	Hours Allotted
Business Economics and Demand Analysis *Meaning and features of Business Economics *Meaning and determinants of demand Law of demand, Demand forecasting *Elasticity of Demand- Concept, types and importance *Production Function and Economic Markets *Meaning & Features of Production Function *Law of Variable Proportion, Law of Return to Scale Perfect Competition Market, Monopoly Market: Meaning Characteristics Monopolistic Competition Market, Oligopoly Market: Meaning Characteristics	15

References:

1. Principles and Practice of Management by Shyamal Bannerjee: Oxford and IBM Publishing Co, New Delhi.
2. Financial Management by MY Khan and PK Jain, Tata McGraw Hill Publishing Co., 7,
3. West Patel Nagar, New Delhi.
4. Modern Management Techniques by SL Goel: Deep and Deep Publications Pvt Limited
5. Rajouri Garden, New Delhi.
6. Management by James AF Stoner, R Edward Freeman and Daniel R Gilbert Jr. :
- 7.

SHIVAJI UNIVERSITY,KOLHAPUR
Syllabus as per National Education Policy (NEP)2020
B.Sc. Food Science & Quality Control
SEMESTER– VI
AEC IV English

Credits: 2

Semester End 40 Internal Assessment: 10 Total: 50

Introduces From June 2025

To be referred from Shivaji University Website.

SHIVAJI UNIVERSITY, KOLHAPUR
Syllabus as per National Education Policy (NEP)2020
B.Sc. Food Science& Quality Control
SEMESTER– VI
IKS II -Traditional and Functional Aspects of Indian Spices
Credits: 02

After completion of the course, students will be able to:

CO1: Explain the concept of Ahara (food) in Indian Knowledge Systems.

CO2: Classify spices using Ayurvedic parameters.

CO3: Identify bioactive compounds and functional properties of major spices.

CO4: Evaluate the relevance of traditional spice knowledge in modern functional food Development.

- **Unit I -:**

- Introduction to Indian Spices**

15

- *History of Indian spices and their role in global trade.

- *Indigenous classification and identification of spices

- *Composition of spices and Major and minor spices of India

- *Indigenous drying, roasting, tempering (tadka) and grinding practices

- **Unit II -:15**

- * Medicinal aspects of spices

- *Traditional blending techniques

- * Functional aspects: Spices in food preservation and digestion

- * Nutraceutical properties of spices

- * Spices in Ayurveda and Siddha medicine

Semester VI Field Project (FP)

As per NEP 2020, students of B Sc. III (Semester VI) need to perform a Field Project (FP) for TWO (2) Credits i.e. 50 Marks.

The guidelines regarding the field project are as follows:

- 1) The total time allocation for the student to carry out field project is 60 hours.
- 2) Students should participate in field-based projects under the supervision of faculty.
- 3) Assignment of project topics to individual students or groups of students (2 to 4 students in one group) and one faculty member from the department will act as Guide for the student or group of students.
- 4) For a SURVEY based project related questionnaire (15 or more questions) should be prepared by students.
- 5) For an Experimental based project work, report should include Sample collection/Data collection/ Experiment performances in laboratory.
- 6) The departmental coordinator/guide should check the questions and finalize the questionnaire.
The question that may create unnecessary complications should be avoided. The questions should be qualitative as well as quantitative.
- 7) The student should compile all the relevant data and carry out its analysis.
- 8) A project report should be written individually in the standard format (2 Copies): Index, Introduction, Review of Literature, Materials and Methods, Results and Discussion, Summary and Conclusion/, References (APA Format) etc.
- 9) The project report should be of minimum 20 pages (excluding Title page, Certificate, Index, Acknowledgement etc.). Submit the project report with the Guide's signature to the department.
- 10) The oral presentation for all the projects should be arranged in the department. To evaluate the project, examiner should be appointed by Board of studies.
- 11) The total project work including preparation of questionnaire to presentation should be evaluated for 2 credits (50 Marks).
- 12) The scheme of evaluation for field project is given below –

Sr. No.	University Assessment (UA)	Internal Assessment (IA)	Total marks
Field Project (FP)	40	10	50

Appendix I
GUIDE INTERACTION DIARY FORM

I, the undersigned Ms /Mr. _____ Roll No. _____ studying in the _____ Year of _____ Full time Course is doing my project work under the guidance of Dr./Ms./Mr. _____, wish to state that I have met my Internal guide on the following dates mentioned below for Project Guidance:-

Sr. No.	Date	Signature of Guide

Signature of the Candidate

Signature of Guide

**NATURE OF QUESTION PAPER FOR B.Sc. PART – II, (40 + 10 PATTERNS)
ACCORDING TO REVISED STRUCTURE AS PER NEP – 2020 TO BE IMPLEMENTED
FROM ACADEMIC YEAR 2025-26**

Maximum Marks: 40

Duration: 1.5 hrs.

A. University Assessment for 40Marks

B. Sc Food Science & Quality Control (Semester-) Examination

Course Name (Course Code)

Day & Date: Total Marks: 40Time:

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. [08]

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

Q.2 Answer the following Questions (Any 2 out of 3) [16]

- 1.
- 2.
- 3.

Q.3. Answer the following Questions (Any 4 out of 6) [16]

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

B. Internal Assessment for 10 Marks

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

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

C. Practical Examination:**University Assessment for 100 Marks**

B. Sc Food Science& Quality Control (Semester-) Examination

Course Name (Course Code)

Day & Date: Total Marks: 100

Time:

Instructions:

1) All questions are compulsory.

2) Figures to the right indicate full marks.

3) draw neat labeled diagram wherever necessary.

Q. 1. A) Perform the experiment arranged on table	25Marks
B) Perform the experiment arranged on table	25Marks
Q.2. Journal	20 Marks
Q.3. Viva	20 Marks
Q.4. A) Write_____	05Marks
B) Write _____	05Marks

**B. Sc Food Science& Quality Control (Semester-) Examination
Practical Semester Waits**

Course Name (Course Code)

Day & Date:

Total Marks: 50

Time:

Instructions:

1) All questions are compulsory.

2) Figures to the right indicate full marks.

3) Draw neat labeled diagram wherever necessary.

Q. 1. Principle Writing	5 Marks
Q.2. Perform the Experiment	25 Marks
Q.3. Journal	10 Marks
Q.4. Viva	10 Marks

Equivalence of Second Year B.Sc Food Science and Quality Control Semester V and VI

The Equivalence for the subjects/courses of Food Science and Quality Control at Second Year B. Sc Semester V and VI pre-revised Program under the faculty of Science and Technology is as follows.

Second Year B. Sc semester V

Sr. No	Third Year B. Sc (Food Science & Quality Control) Semester V Pre-revised syllabus	Third Year B.Sc(Food Science & Quality Control) Semester V Revised syllabus	Remark
1.	Fermentation Technology	Fermentation Technology Added in 4th Year	Added in 4th Year Added according to NEP 2.0 Structure.
2.	Dairy Technology	Dairy Technology -X	Minor Changes on Content.
3.	Bakery and Confectionery Technology	Bakery and Confectionery Technology	Added in 2nd Year to NEP 2.0 structure
4.	Food Quality control and Waste Management	Food Safety & Quality Management	Added according to NEP 2.0 structure
5.	AEC : English	AEC English	Added according to NEP 2.0 structure
6.	SEC	-----	-----

Second Year B. Sc semester VI

Sr. No	Third Year B. Sc (Food Science& Quality Control) Semester VI Pre-revised syllabus	Third Year B.Sc (Food Science& Quality Control) Semester VI Revised syllabus	Remark
1	Food Biotechnology	Food Bio technology	Added according in 4th years per NEP 2.0 Structure.
2	Meat, Fish and poultry products Technology	Meat, Fish and poultry products Technology	Minor Changes on Content
3	Food Hygiene and Sanitation-	Basic of Food Hygiene and Sanitation	Added according to NEP 2.0 Structure.
	-	Fruit & Vegetable processing Technology	Shifted from SY B Sc Sem III to TY B Sc Sem VI as per NEP structure
4	Food Packaging Technology	Food Packaging Technology	Minor Changes on Content
5	_____	AEC English	Added according to NEP 2.0 structure
6	SEC	Food Industry Economics and Management Shills	Added according to NEP 2.0 structure

