

SU/BOS/Science/498

Date: 10/07/2023

To,

The Principal, All Concerned Affiliated Colleges/Institutions Shivaji University, Kolhapur	The Head/Co-ordinator/Director All Concerned Department (Science) Shivaji University, Kolhapur.
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Subject: Regarding syllabi of B.Sc. Part-II (Sem. III & IV) as per NEP-2020 degree programme under the Faculty of Science and Technology.

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


B.Sc.-II (Sem. III & IV) as per NEP-2020			
1.	Computer Science (Opt)	8.	Food Technology & Management (Entire)
2.	Computer Science (Entire)	9.	Biochemistry
3.	Animation (Entire)	10.	Biotechnology (Optional/Vocational)
4.	Information Technology (Entire)	11.	Biotechnology (Entire)
5.	Food Science and Technology (Entire)	12.	Environmental Science (Entire)
6.	Food Science	13.	Pollution
7.	Food Science and Quality Control (Entire)		

This syllabus, nature of question and equivalence shall be implemented from the academic year 2023-2024 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October /November 2023 & March/April 2024. 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,


Dy Registrar
Dr. S. M. Kubal

Copy to:

1	The Dean, Faculty of Science & Technology	8	P.G. Admission/Seminar Section
2	Director, Board of Examinations and Evaluation	9	Computer Centre/ Eligibility Section
3	The Chairman, Respective Board of Studies	10	Affiliation Section (U.G.) (P.G.)
4	B.Sc. Exam/ Appointment Section	11	Centre for Distance Education



Shivaji University, Kolhapur

**Syllabus as per New Education Policy
of
B.Sc. Food Science and Technology
(Part - II)**

(To be implemented from Academic Year 2023-24)

B. Sc. FOOD SCIENCE AND TECHNOLOGY Part-II - COURSE STRUCTURE (NEP)

SEMESTER–III (Duration–6 Months)																	
S r. N o.	Course (Subject) Title	TEACHING SCHEME						EXAMINATION SCHEME									
		THEORY			PRACTICAL			THEORY						PRACTICAL			
		Credits	No. of lectures	Hours	Credits	No. of lectures	Hours	Internal			University						
								Max Marks	Min Marks		Hours	Max Marks	Total Marks	Min Marks			
1	DSC-C	2	3	2.4	4	8	6.4	10	4		2	40	80	28	PRACTICAL EXAMINATION IS ANNUAL		
2	DSC-C	2	3	2.4				10	4		2	40					
3	DSC-C	2	3	2.4	4	8	6.4	10	4		2	40	80	28			
4	DSC-C	2	3	2.4				10	4		2	40					
5	DSC-C	2	3	2.4	4	8	6.4	10	4		2	40	80	28			
6	DSC-C	2	3	2.4				10	4		2	40					
7	AEC C-C	4	4	3.2	-	---	---	---	---		---	---	---	---			
8	SEC-III	Any one from pool of courses			2	---	---	---	---		---	---	---	---	2	50	18
	TOTAL	16	22	17.6	14	24	19.2	60				240	350	---	50		

SEMESTER-IV(Duration-6Months)

Sr. No.	Course (Subject) Title	TEACHING SCHEME						EXAMINATION SCHEME								
		THEORY			PRACTICAL			THEORY				PRACTICAL				
		Credits	No. of lectures	Hours	Credits	No. of lectures	Hours	Internal		University				Hours	Max Marks	Min Marks
							Max Marks	Min Marks	Hours	Max Marks	Total Marks	Min Marks	Hours	Max Marks	Min Marks	
1	DSC -D	2	3	2.4	4	6.4	8	10	4	2	40	80	28	As per BOS Guide lines	100	35
2	DSC -D	2	3	2.4				10	4	2	40					
3	DSC -D	2	3	2.4	4	6.4	8	10	4	2	40	80	28		100	35
4	DSC -D	2	3	2.4				10	4	2	40					
5	DSC -D	2	3	2.4	4	6.4	8	10	4	2	40	80	28		100	35
6	DSC -D	2	3	2.4				10	4	2	40					
7	AEC C-C AEC C-D	- - -	---	- - -	- - -	---	---	- - -	---	3	70	100	25	2	50	18
										Pro ject	30	10				
8	SE C-IV	Any one from pool of courses			2	---	---									
	TOTAL	12	18	14.4	14	19.2	24					400	---		350	
		28	40	32	28	38.4	48					750	--	---		
● Student contact hours per week: 36.8 Hours (Min.)						● Total Marks for B.Sc.-II (Including EVS) 1100										
● Theory and Practical Lectures :48 Minutes Each						● Total Credits for B.Sc.-II (Semester III & IV):56										
● DSC: -Discipline Specific Core Course: Select any 3subject pairs, relevant to those opted at B. Sc. I, from DSC C1 to DSC C38 and / or DSC IC39 to DSC IC50 and DSCD1 to DSC D38 and/or DSC ID39 to DSC ID50.																
● AECC- Ability Enhancement Compulsory Course (C): Environmental Studies: EVS Theory and AECC-D EVS Project (Theory:70 & Project:30 marks)																
● There shall be separate passing for internal and University theory as well as practical / project examinations.																
● Practical Examination shall be conducted annually for 100 Marks per course (subject) and minimum 35 marks are required for passing.																
● Except Environmental Studies, there shall be combined passing for two theory papers of 40 marks each. i. e. minimum. 28 marks are required for passing out of 80.																
● Minimum 4 marks are required for passing out of 10 for Internal Examination of each paper.																
● Examination of SEC shall be either theory or practical depending upon type of SEC.																

B. Sc. FOOD SCIENCE AND TECHNOLOGY Part-II - COURSE STRUCTURE (NEP)

Course Code	Name of Course	Course Code	Name of Course
Sem III		Sem IV	
DSC FST-C1	Cereal & Legume Technology I	DSC FST-D1	Processing of Fruits & Vegetables I
DSC FST-C2	Cereal & Legume Technology II	DSC FST-D2	Processing of Fruits & Vegetables II
DSC FST-C3	Post Harvest Technology I	DSC FST-D3	Oil Seed & Nuts Technology I
DSC FST-C4	Post Harvest Technology II	DSC FST-D4	Oil Seed & Nuts Technology II
DSC FST-C5	Bakery & Confectionary Technology I	DSC FST-D5	Food Packaging I
DSC FST-C6	Bakery & Confectionary Technology II	DSC FST-D6	Food Packaging II
AECC-C	Environmental Studies(Theory)	AECC-D	Environmental Studies(Project)
SEC-III		SEC-IV	

Practical

DSC FST-P9	Lab Course IX (Based on DSC FST C1 & DSC FST C2)	DSC FST-P12	Lab Course XII(Based on DSC FST D1 & D2)
DSC FST-P10	Lab Course X(Based on DSC FST C3 & DSC FST C4)	DSC FST-P13	Lab Course XIII(Based on DSC FST D3 & D4)
DSC FST-P11	Lab Course XI(Based on DSC FST C5 & DSC FST C6)	DSC FST-P14	Lab Course XIV(Based on DSC FST D5 & D6)

DSC FST: - Discipline Specific Core Course Food Science & technology

AECC : - Ability Enhancement Compulsory Course : Environmental Studies

B.Sc food Science & Tech. Part- II, Semester III
Cereal and Legume Technology – I DSC- FST- C 1
Credit-2

Unit-I	Hours Allotted
1. Introduction to cereals and legumes <ul style="list-style-type: none"> - Structure of wheat, rice, ragi, sorghum - Composition of wheat, rice, ragi, sorghum - Nutritive value of wheat, rice, ragi, sorghum - Processing and storage - Cooking quality 2. Wheat milling <ul style="list-style-type: none"> - Basic milling operations - Wheat milling – types of wheat, quality characteristics and rheological properties of wheat - End products of cereals. 3. Rice milling <ul style="list-style-type: none"> - milling of rice, types of rice mill, - parboiling of paddy, - by product utilization. 	15
Unit II	Hours Allotted
1. Ragi processing <ul style="list-style-type: none"> - types of ragi, milling of ragi, - Quality characteristics and rheological properties of ragi, - processed product 2. Sorghum processing <ul style="list-style-type: none"> - types of sorghum, milling of sorghum, - Quality characteristics and rheological properties of sorghum - product 3. Pulse processing <ul style="list-style-type: none"> - Structure and composition - Processing of tur dal, Moong dal, masoor dal, chick pea, urad dal, soaking, germination, decortications, cooking and fermentation. - Anti – nutritional factor - Milling of pulses- 	15

B.Sc food Science & Tech. Part- II, Semester III
Cereal and Legume Technology – II DSC- FST- C 2

Credit 2

Unit-I	Hours Allotted
1). Pulse processing <ul style="list-style-type: none"> - Structure and composition - Processing of tur dal, Moong dal, masoor dal, chick pea, urad dal, soaking, germination, decortications, cooking and fermentation. - Anti – nutritional factor Milling of pulses- 2) processing of corn <ul style="list-style-type: none"> - Structure and composition of corn grain - Types of corn - wet and dry milling of corn and their product corns 	15
Unit-II	Hours Allotted
1) processing of barely <ul style="list-style-type: none"> - Structure and composition of barley - Barley malting process - Significance of malting Different types of malts and their food application. 2) processing of legumes <ul style="list-style-type: none"> - Soaking roasting steaming and cooking. - Germination, - Factor affecting cooking and legumes - Processing of fried pulses - End products of legumes - Soybean Processing Product 	15

Reference-

- 1) Food Facts & Principles by Mannay; New age international
- 2) Food Science By Narman N. Potter; CBS Publication
- 3) Food Science 7th Edition By B.Shri laxmi
- 4) Cereals & cereals Product – Chemistry & Technology by DAV Dendy & B.J. Dobraszez, As Pen Publication.

B.Sc food Science & Tech. Part- II, Semester III
Post Harvest Technology – I DSC- FST- C 3
Credit-2

Unit-I	Hours Allotted
1) Plantation crops <ul style="list-style-type: none"> - Introduction to Plantation crops 2) Tea <ul style="list-style-type: none"> - Occurance, history - Chemical constituents. - Harvesting - Leaf processing - Types and varieties - Manufacturing of green and black tea - Packaging 3) Coffee <ul style="list-style-type: none"> - History, occurrence - Chemical constituents. - Harvesting - Types and varieties - Manufacturing of coffee - Fermentation and changes during fermentation - Quality and grading - Adulterants used in coffee - Instant coffee 	15
Unit-II	Hours Allotted
1) Coconut processing <ul style="list-style-type: none"> - Production - Composition - Grading - Post harvest technology - Processing and product(coconut milk, desiccated coconut) cashew nut harvesting and processing. 2) Sugar Processing <ul style="list-style-type: none"> - 	15

B.Sc food Science & Tech. Part- II ,Semester III
Post Harvest Technology – II DSC- FST- C 4
Credit 2

Unit-I	Hours Allotted
1) Post harvest technology <ul style="list-style-type: none"> - History of spices and condiments - Classification and composition of spices and condiments - Fumigation and irradiation of spices 2) Major spices <ul style="list-style-type: none"> - Chemistry, constituents, nutritional value, functional benefits of -the following - Peeper (black white and green) - Cardamom - Clove - Ginger - Chilli (Red and green) - Turmeric - Oleoresins and volatile oils 	15
Unit-II	Hours Allotted
1) Minor spices <ul style="list-style-type: none"> - Cumin, Coriander, - garlic - fenugreek, - saffron, - tamarind, - cinnamon, - mustard, - nutritive value - oleoresins and volatile oil - onion - asafoetida functional benefits2) Other plantation crops <ul style="list-style-type: none"> - Vanilla - Annatto - their processing - quality control 	15

Reference-

- 1) Food Fact & Principles – N. Shakuntala Many, M. Shadaksharswamy
- 2) Food Science- Sumati R. Mudambi, Shalini M. Rao, M. V. Rajagopal.
- 3) Essentials of food Science- Vickie A. Vaclavik, Elizabeth W. Chrishian.
- 4) Food Science- Shri Laxmi

B.Sc food Science & Tech. Part- II ,Semester III
Bakery and Confectionary Technology – I DSC- FST- C 5
Credit-2

Unit-I	Hours Allotted
1) Introduction of bakery products <ul style="list-style-type: none"> - Introduction - Importance of bakery - Principal used in bakery products - Moulding machine - Oven machine - Equipment for batch and continuous processing of bakery product. 2) Baking <ul style="list-style-type: none"> - Essential and optional ingredients - Role of each ingredient - Types of quality of flour - Various dough and their uses - Process parameter 	15
Unit-II	Hours Allotted
1) Introduction to confectionery <ul style="list-style-type: none"> - Confectionery terms - Small and large equipment used in confectionery 2) Introduction of confectionery product <ul style="list-style-type: none"> - Principles involved in confectionery product - Classification of confectionery - Types of confectionery product - Characteristic of confectionery product Indian confectionery 	15

B.Sc food Science & Tech. Part- II ,Semester III
Bakery and Confectionary Technology –II DSC- FST- C 6
Credit-2

Unit-I	Hours Allotted
1) Processing of bakery product <ul style="list-style-type: none"> - Cake :- types, formulation and process, principle of cake, characteristic of cake. - Bread:- formulation process, principles of bread, preparation, baking, defect. - Biscuit and cookies definition, difference between biscuit and cookies, types of cookies and biscuit, cracker and general defect. 2) Preservation of bakery product <ul style="list-style-type: none"> - Preservation of baked product - Freezing and frozen storage of baked a product - Equipment for Frozen storage, canned bakery product - Safety and hygiene of bakery plants. 	15
Unit-II	Hours Allotted
1) Cocoa & Chocolate processing <ul style="list-style-type: none"> - Introduction - Composition - Grading - Processing - Cocoa Product - Chocolate introduction - Ingredients used in chocolate - Chocolate Processing - Defect 2) Sugar confectionery <ul style="list-style-type: none"> - Chewing gum and bubble gum - Hard and soft boiled sugar confectionery – fondant, fudge, caramel, toffee, nut brittles - Gelatin sweets - fruit chews, jellies gums - Defect in confectionery 	15

Reference-

- 1) Basic Baking by Dubey.S.C 4th edition
- 2) Bakery Products Science & Technology by Y. H. Hui
- 3) Bakery & Confectionary Products by Acharya N. G. Ranga

B.Sc food Science & Tech. Part- II Semester IV
Processing Of Fruits And Vegetables – I DSC- FST- D 1
Credit-2

Unit-I	Hours Allotted
1) Introduction of fruit. <ul style="list-style-type: none"> - Classification and composition of fruits. - Climatic and non climatic fruits. - Post harvest handling. - Pre cooling methods. - Current scenario of fruit 2) Introduction to vegetables. <ul style="list-style-type: none"> - Morphology of vegetables. - Classification of vegetables. - Composition & Nutritive Value - Biochemical changes in vegetables. - Present status constituents and prospective. - Current scenario of Vegetables. 	15
Unit-II	Hours Allotted
1) Drying & dehydration of fruits and vegetables. <ul style="list-style-type: none"> - Sun drying. - Changes During drying. - Process of drying - Types of Driers. - Principle and pre-treatment for drying. 2) Freezing process of fruits and vegetable. <ul style="list-style-type: none"> - Method of Freezing - Types of Freezing - Changes during freezing. - Changes during storage. 	15

B.Sc food Science & Tech. Part- II Semester IV
Processing of Fruits and Vegetables – II DSC- FST- D 2
Credit-2

Unit-I	Hours Allotted
1) Fruit processing <ul style="list-style-type: none"> - Jam - introduction, constituent, selection of fruit processing and technology, test for end Point determination problem in jam making and pectin properties. - Jellies - difference between jam and jelly, processing of jelly, End point determination, failure of jellies to set, Defect of Jelly - Marmalade - types, jam marmalade, jelly marmalade, problem in marmalade making. - Glazed and crystallized fruit.. 2) Fruit beverage. <ul style="list-style-type: none"> - Introduction. - Processing of fruit, juice, - processing of RTS, squashes, cordials nector and Fruit powder. - preservation of Product's 	15
Unit-II	Hours Allotted
1) Vegetables processing <ul style="list-style-type: none"> - Pickles Processing - Saurkraut - principle, process, defect and spoiling Saurkraut. - Chutney – preparation. - Sauces and ketchups - difference between sauce and ketchup classification and sauce- thick and thin, processing of tomato sauce /ketchup. 2) Other Value added product of Fruit & Vegetables <ul style="list-style-type: none"> - Mushroom processing. - Processing of amchur. - Processing of mango leather , fruit cheese fruit butter, toffee, papin. 	15

Reference-

- 1) Food Fact's & Principles- N Shakuntla Manay, M.Shadaksharwamy.
- 2)Food Science N. N. potter
- 3) Food Science- B. Srilakshmi.

B.Sc food Science & Tech. Part- II Semester IV
Oil Seed And Nuts Technology – I DSC- FST- D 3
Credit-2

Unit-I	Hours Allotted
1) oilseeds <ul style="list-style-type: none"> - Structure, composition. - nutritive value. - toxic constituents. - Processing method and manufacture of oil and fats. - Effect of processing on composition nutritive value. - Fortification and value added product. 2) Nuts <ul style="list-style-type: none"> - Structure composition. - Toxic constituent. - Health benefit. 	15
Unit-II	Hours Allotted
<ul style="list-style-type: none"> - Methods of Extraction of oil. - Mechanical expelling. - Extraction of groundnut soybean, sunflower, gingelly seeds, coconut ,mustard, olive,cotton seed, rice bran, maize germ 	15

B.Sc food Science & Tech. Part- II Semester IV
Oil Seed And Nuts Technology – II DSC- FST- D 4
Credit-2

Unit-I	Hours Allotted
1) Refining oil <ul style="list-style-type: none">- Classification, Degumming, neutralizations, bleaching, deodorization, blending oil, processing of refined oils hydrogenation, fractionation ,- Factor affecting extraction- Packaging and storage of fats and oil- Changes during storage	15
Unit-II	Hours Allotted
1) Processing of fats <ul style="list-style-type: none">- Margarine, butter equivalent , mayonnaise, peanut butter, salad dressing, low fat spread peanut butter- Fat substitute, lard, tallow, cocoa ,- nutritional food mixes from oil seeds.	15

Reference-

- 1) Vegetables & Oils in food Technology by frnk. D. Gunstone
- 2) Bailey's industrial Oil & fat product 4th ed. john Wiley & Son.
- 3) Modern Technology in the oils & fats industry by s.c signal, OTA (I).

B.Sc food Science & Tech. Part- II Semester IV

Food Packaging – I DSC- FST- D 5

Credit-2

Unit-I	Hours Allotted
<p>1) Introduction</p> <ul style="list-style-type: none">- History.- Importance and functional of food packaging.- Properties of packaging material.- Package design.- Tests for flexible packaging material.- Material used in packaging rigid, semi rigid and flexible.- Types of containers. <p>2) Wood and paper packaging.</p> <ul style="list-style-type: none">- Wood, structure , wooden containers ,types of wooden boxes, properties, paper and paper board.- Structure, properties, types ,uses of paper and paper board, CFB boxes comparison with Woody containers.	15
Unit-II	Hours Allotted
<p>1) Plastic packaging.</p> <ul style="list-style-type: none">- Plastic packaging material.- Plastic banned in India.- Classification of polymers.- Functional and Mechanical properties of thermoplastic polymers.- Processing and converting of thermoplastic polymers.- Testing of plastic packages. <p>2) Techniques and methods used for packaging.</p> <ul style="list-style-type: none">- Techniques and method used for packaging of serial and serial product ,Fruit and vegetables ,milk and milk products, meet and meet products, beverages.	15

B.Sc food Science & Tech. Part- II Semester IV

Food Packaging – II DSC- FST- D 6

Credit-2

Unit-I	Hours Allotted
<p>1) Glass and metal packaging</p> <p>a) - Glass</p> <ul style="list-style-type: none">- Composition- Properties- Structure- Types- Manufacture of glass containers uses, closure for glass material, breakage in glass containers. <p>b) - Metal</p> <ul style="list-style-type: none">- Properties of metal- Steel plate and function of Steel.- Formation of two piece and three piece cans.- Aluminium containers.- Tinning process.- Lacquering types and application.- Aluminium foil.- Corrosion of metal cans. <p>2) Packaging method.</p> <ul style="list-style-type: none">- Aseptic packaging and food sterilization of packaging material, food contact surfaces and aseptic packaging systems.- Active food packaging definition, scope, physical and chemical principle involved.- Edible films and coatings.	15
Unit-II	Hours Allotted
<p>1) Oxygen absorbents.</p> <ul style="list-style-type: none">- Classification and main type of oxygen absorbents.- Factor influencing the choice of oxygen absorbents.- Application of oxygen absorbents for shelf life of food.- Advantages and disadvantages of oxygen absorbents. <p>2) Safety consideration in food packaging.</p> <ul style="list-style-type: none">- Labelling.- Types of food safety association with package.- Package labelling, and food safety.- Food packaging and environment recycling, composting, thermal treatment ,and laud field.	15

Reference-

- 1) Robertson G. L (2006) Food Packaging, Principles & Practise (3rd edition)
- 2) Food packaging technology- Richard coles
- 3) Food Science by shri laxmi- New Age International.

Nature of Question Paper for B.Sc. Part – I, II & III (40 + 10 Pattern)
according to Revised Structure as Per NEP – 2020 to be implemented
from academic year 2022-23

Maximum Marks: 40

Duration : 2 Hr

Q.1 Select the most correct alternate from the following (08)

I) To VIII) MCQ one mark each with four options

- A)
- B)
- C)
- D)

Q. 2 Attempt any TWO of the following (16)

- A)
- B)
- C)

Q.3) Attempt any FOUR of the following (16)

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

