

SHIVAJI UNIVERSITY, KOLHAPUR



Estd. in 1962

'A++' Accredited by NAAC (2021) with CGPA 3.52

**CHOICE BASED CREDIT SYSTEM WITH MULTIPLE ENTRY
AND MULTIPLE EXIT OPTIONS AS PER NEP- 2020**

Syllabus For B.Sc.

Part – II

Food Science (Entire)

SEMESTER III and IV

(SYLLABUS TO BE IMPLMENTED FROM ACADEMIC YEAR 2023-24)

Structure of B. Sc. Food Science (Entire) Program (Semester III & IV)

S E M E S T E R – III (Duration – 6 Months)																	
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	Min	
								Max Marks	Min Marks	Hours	Max	Total Marks	Min				
1	DSC-FS-C1	2	3	2.4	4	8	6.4	10	4	2	40	80	28	Practical Examination is Annual	50	18	
2	DSC-FS-C2	2	3	2.4				10	4	2	40						
3	DSC-FS-C3	2	3	2.4	4	8	6.4	10	4	2	40	80	28		50	18	
4	DSC-FS-C4	2	3	2.4				10	4	2	40						
5	DSC-FS-C5	2	3	2.4	4	8	6.4	10	4	2	40	80	28		50	18	
6	DSC-FS-C6	2	3	2.4				10	4	2	40						
7	AECC-C	4	4	3.2	---	---	---	--	--	--	--	---	---	---	---		
8	SEC III	Any one			2	---	---	--	--	--	--	---	---	2	50	18	
TOTAL		16	22	17.6	14	24	19.2	60			240	350	---		---	---	
S E M E S T E R – IV (Duration – 6 Months)																	
1	DSC-FS-D1	2	3	2.4	4	8	6.4	10	4	2	40	80	28	As per BOS Guidelines	50	18	
2	DSC-FS-D2	2	3	2.4				10	4	2	40						
3	DSC-FS-D3	2	3	2.4	4	8	6.4	10	4	2	40	80	28		50	18	
4	DSC-FS-D4	2	3	2.4				10	4	2	40						
5	DSC-FS-D5	2	3	2.4	4	8	6.4	10	4	2	40	80	28		50	18	
6	DSC-FS-D6	2	3	2.4				10	4	2	40						
7	AECC- C AECC- D	---	---	---	---	---	---	--	--	3	70	100	25	As per BOS Guidelines	---	---	
										Project	30		10				
8	SEC - IV	Any one from pool			2	--	--								2	50	18
TOTAL		12	18	14.4	14	24	19.2					400	---			---	---
		28	40	32	28	48	38.4					750	--			350	
<ul style="list-style-type: none"> • Student contact hours per week : 36.8 Hours (Min.) • Theory and Practical Lectures : 48 Minutes Each 					<ul style="list-style-type: none"> • Total Marks for B.Sc.-II (Including EVS) 1100 • Total Credits for B.Sc.-II (Semester III & IV) : 56 												
<ul style="list-style-type: none"> • DSC : - Discipline Specific Core Course : All papers are compulsory. • AECC- Ability Enhancement Compulsory Course (C) : Environmental Studies: EVS (Theory – 70 & Project – 30 Marks) • There shall be separate passing for internal and University theory as well as practical / project examinations. • Practical Examination will be conducted annually for 100 Marks per course (subject). • 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. 																	

**CBCS B. Sc. Food Science (Entire): List
of courses**

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

THEORY

Course code	Name of Course	Course code	Name of Course
Semester-III		Semester-IV	
DSC FS-C1	Cereal and Bakery Product Processing-I	DSC FS-D1	Milk and Milk Product Processing-I
DSC FS-C2	Cereal and Bakery Product Processing-II	DSC FS-D2	Milk and Milk Product Processing-II
DSC FS-C3	Legume and Oilseed Processing-I	DSC FS-D3	Meat, Fish and Poultry Processing-I
DSC FS-C4	Legume and Oilseed Processing-II	DSC FS-D4	Meat, Fish and Poultry Processing-II
DSC FS-C5	Fruits and Vegetable Processing-I	DSC FS-D5	Spices and Condiments Processing-I
DSC FS-C6	Fruits and Vegetable Processing-II	DSC FS-D6	Spices and Condiments Processing-II
AECC-C	Environmental Studies (Theory)	AECC-D	Environmental Studies (Project)

PRACTICAL

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

*DSC FS: Discipline Specific Core Course Food Science

*AECC: Ability Enhancement Compulsory Course: Environmental Studies

PROGRAM OUTCOMES	
PO1	Apply the scientific method to food science problems
PO2	Apply critical thinking and analytical evaluation to contemporary food science information and literature.
PO3	Apply principles from general chemistry, microbiology, analysis biotechnology and biochemistry to food science 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	Utilize advanced instruments and technologies to process and analyze food products and to solve food safety problems.
PO7	Critically access and analyze food science 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 OUTCOMES

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 etc 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 interpersonal skills. A presentation in different topics enhances their confidence, ability to express themselves & presentation skills

COURSE OUTCOME CEREALS AND BAKERY PRODUCT PROCESSING

CO1	Able to recognize the parts and structures of cereal grains. Capable of converting cereal grains into ingredients for baking goods
CO2	Recognize the crucial cereal quality traits and quality indicators. Have a working knowledge of how a cereal mill and quality lab work.
CO3	Capable of converting cereals into bakery goods
CO4	List the typical issues and their root causes in bakery products.

B.Sc. Part II, Semester III DSC FS –C1 CEREALS AND BAKERY PRODUCT PROCESSING-I

Credits 2 Hours 30,37.5 lectures of 48 Minutes

Unit I	Hours
<p>Wheat: Structure and chemical composition of wheat grain Wheat milling Grades of wheat flour Dough rheology</p> <p>Rice: Structure and chemical composition of rice gram Milling of rice Modern rice milling unit operation Rice Parboiling technology</p>	15
Unit II	
<p>Raw material of bakery products: Introduction and importance of bakery Ingredients used and their function Process parameter</p> <p>Equipments: Working, principle and application</p> <ol style="list-style-type: none"> 1. Dough mixer 2. Molding machine 3. Oven machine 	15

Suggested Reading:

1. Bakery Products Science and Technology, Y.H.Hui, Wiley Blackwell Publishing, 2014.
2. Bakery and Confectionary products, Acharya N.G. Ranga Agricultural University
3. Cereal Processing Technology, Gavin Owens, WoodHead Publishing Ltd, 2000.
4. Textbook of Bakery and Confectionery, Yogambal Ashokkumar, Prentice Hall India Learning

B.Sc. Part II, Semester III
DSC FS –C2 CEREALS AND BAKERY PRODUCT PROCESSING-II

Credits 2 Hours 30,37.5 lectures of 48 Minutes

Unit I	Hours
Corn Structure and composition of corn grain (different types) Wet and dry milling High fructose syrups and their uses Barley Structure and composition of barley Barley malting process Significance of malting Different types of malts and their food applications	15
Unit II	
Processing of bakery product: Procedure of different types of bakery products (bread, cookies, crackers, cake and biscuits etc) Defects of baked products Preservation of bakery products: Freezing and frozen storage of baked products Safety and hygiene of bakery plants	15

Suggested reading:

1. Bakery Products Science and Technology, Y.H.Hui, Wiley Blackwell Publishing, 2014.
2. Bakery and Confectionary products, Acharya N.G.Ranga Agricultural University
3. Cereal Processing Technology, Gavin Owens, WoodHead Publishing Ltd, 2000
4. Textbook of Bakery and Confectionery, Yogambal Ashokkumar, Prentice Hall India Learning Private Limited, 2012.
5. Post Harvest Technology of Cereals, Pulses and Oilseeds, A.Chakraverty, Oxford and IBH Publishing Company, 2014.

COURSE OUTCOME LEGUME AND OILSEED PROCESSING

CO1	To understand how to prepare items using pulses and various aspects of processing pulses
CO2	Gain knowledge of various oil seeds, expeller-milled oils, solvent extraction of oils, oil refining, and the usage of oil seed meals for various food applications.
CO3	The student will get knowledge of how the main grains and pulses are processed and learn more about grain handling and storage equipment.
CO4	Students will learn about value-added products made from all grains as well as be exposed to various processing techniques and equipment

B.Sc. Part II, Semester III DSC FS –C3 LEGUME AND OILSEED PROCESSING-I

Credits 2 Hours 30,37.5 lectures of 48 Minutes

Unit I	Hours
Legume Introduction and composition of legumes Structure of legumes Processing (germination, fermentation, soaking, popping, dehulling, milling etc)	15
Unit II	
Introduction to oilseeds Structure and chemical composition of oilseeds Functional and nutritional importance of dietary oil seeds Post harvest handling storage processing of oilseeds	15

Suggested reading:

1. Post Harvest Technology of Cereals, Pulses and Oilseeds, A.Chakraverty, Oxford and IBH Publishing Company, 2014.
2. Cereal Processing Technology, Gavin Owens, WoodHead Publishing Ltd, 2000.
3. Food Science, B. Srilakshmi, New Age International Pvt Ltd Publisher 7th Edition, 2018.
4. Physical and chemical characteristics of oils, fats and waxes, David Firestone, Amer oil chemist's society, 3rd Edition, 2006
5. Vegetables and oils in food technology Frank D.Gunstone.2002

B.Sc. Part II, Semester III
DSC FS –C4 LEGUME AND OILSEED PROCESSING-II

Credits 2 Hours 30,37.5 lectures of 48 Minutes

Unit I	Hours
Introduction and composition of pulses Structure of pulses Processing of pulses (milling, decortications, soaking, fermentation, parching and puffing, extrusion etc)	15
Unit II	
Extraction and refining of oil Extraction methods Traditional and modern Advantage and disadvantages Refining Refining processes (clarification, degumming, deodorization, bleaching, nutilisation ,etc) Processing of refined oils (hydrogenation, fractionation, winterization etc)	15

Suggested reading:

1. Post Harvest Technology of Cereals, Pulses and Oilseeds, A.Chakraverty, Oxford and IBH Publishing Company, 2014.
2. Cereal Processing Technology, Gavin Owens, WoodHead Publishing Ltd, 2000.
3. Food Science, B. Srilakshmi, New Age International Pvt Ltd Publisher 7th Edition, 2018.
- 4.Physical and chemical characteristics of oils, fats and waxes, David Firestone, Amer oil chemists society, 3rd Edition, 2006
5. Vegetables and oils in food technology Frank D.Gunstone.2002

COURSE OUTCOME FRUITS AND VEGETABLES PROCESSING

CO1	To become familiar with the fundamentals of fruit and vegetable processing
CO2	Describe the spoiled fruits and vegetables and give the cause, taking safety precautions as necessary
CO3	To get a fundamental understanding of the processes used to process fruits and vegetables
CO4	To evaluate the student's produce in each lab and to put the methods and techniques of fruit and vegetable processing into practise

B.Sc. Part II, Semester III DSC FS –C5 FRUITS AND VEGETABLE PROCESSING-I

Credits 2 Hours 30,37.5 lectures of 48 Minutes

Unit I	Hours
Introduction of fruits and vegetable Classification and composition of fruits and vegetables Climacteric and non- climacteric fruits Post harvest handling and treatments Storage of fresh fruits and vegetables	15
Unit II	
Processed fruit products Jam (constituents, processing and technology) Jelly (Essential constituents, processing defect in jelly) Marmalade (types, processing and technology, defects)	15

Suggested reading:

1. Preservation of fruits and vegetables: principles and practices Dr. Shrivastav and Dr. Sanjeevkumar, Hardback Published, 2002.
2. Preservation of Fruits and Vegetables Girdhari Lal, Siddhapa and Tondon, New Delhi : Publications and Information Division, Indian Council of Agricultural Research, 2011.
3. Fruit and Vegetable Processing, Sri S. Chenna Kesava Reddy, Acharya NG Ranga Agricultural University.
4. Fruit and Vegetables Harvesting, Handling and Storage, A. K. Thompson, Blackwell Publishing Ltd, 2003.
5. Handbook of Fruits and Fruit Processing, Editor Y. H. Hui Associate Editors J'ozsef Barta, M. Pilar Cano, Todd W. Gusek, Wiley-Blackwell publisher, 2006.

B.Sc. Part II, Semester III
DSC FS –C6 FRUITS AND VEGETABLE PROCESSING-II

Credits 2 Hours 30, 37.5 lectures of 48 Minutes

Unit I	Hours
Introduction and processing of fruit juices Types of fruit juices Preservation of fruit juices (pasteurization, chemical preserved with sugar, freezing, drying, tetra- packaging, cordial, nector etc.)	15
Unit II	
Processed vegetable products Tomato (introduction, processing of tomato juice, puree, paste, sauce, ketup and soup) Potato (introduction, processing of potato chips and French fries)	15

Suggested reading:

1. Preservation of fruits and vegetables: principles and practices Dr. Shrivastav and Dr. Sanjeevkumar, Hardback Published, 2002.
2. Preservation of Fruits and Vegetables Girdhari Lal, Siddhapa and Tondon, New Delhi : Publications and Information Division, Indian Council of Agricultural Research, 2011.
3. Fruit and Vegetable Processing, Sri S. Chenna Kesava Reddy, Acharya NG Ranga Agricultural University.
4. Fruit and Vegetables Harvesting, Handling and Storage, A. K. Thompson, Blackwell Publishing Ltd, 2003.
5. Handbook of Fruits and Fruit Processing, Editor Y. H. Hui Associate Editors J'ozsef Barta, M. Pilar Cano, Todd W. Gusek, Wiley-Blackwell publisher, 2006

COURSE OUTCOME MILK AND MILK PROCESSING

CO1	Students will acquire knowledge about basic dairy processing
CO2	Students will be able to describe how milk is made and what goes into it, the ingredients in milk and can explain milk's sensory and physical characteristics.
CO3	To describe the process of making milk and , lists the milk pretreatments and explains the significance of the pasteurisation and UHT procedures.
CO4	To describe the terms pasteurised milk and sterilised milk, as well as the processes involved in making yoghurt, butter, cheese, milk powder, ice cream, and other fermented milk products

B.Sc. Part II, Semester IV DSC FS –D1 MILK AND MILK PRODUCT PROCESSING-I

Credits 2 Hours 30,37.5 lectures of 48 Minutes

Unit I	Hours
Introduction of dairy industry Milk processing industry in India Dairy layout for small scale industry Introduction and composition of milk	15
Unit II	
Introduction of Milk and Primary Processes The Food value and Composition of milk. Factors affecting Composition of milk (Buying, receiving, collection, Transportation of milk, storage and distribution of milk, processing of milk, filtration, clarification, cream separation and heat, Treatment of milk.)	15

Suggested reading

1. Outlines of Dairy Technology, Sukumar De, Oxford University Press, 1st edition, 2001.
2. Dairy Engineering Advanced Technologies and Their Applications, Rupesh S Chavan, Netra R Goyal, MurlidharMeghwal, Taylor and Fancis, 1st edition, 2017.
3. Dairy Technology, Shivashraya Singh, illustrated, New India Publishing Agency- Nipa, 2013.
4. Structure of Dairy Products, A.Y. Tamime, Wiley-Blackwell, 1st edition, 2007.
5. Indian Dairy Products, Rangappa K.S., Asia Pub. House, 2nd edition, 1975.

B.Sc. Part II, Semester IV
DSC FS –D2 MILK AND MILK PRODUCT PROCESSING-II

Credits 2 Hours 30,37.5 lectures of 48 Minutes

Unit I	Hours
Different milk products Concentrated milk products (Condensed Milk, Evaporated Milk, Khoa, Gulabjamun, Pedha) Coagulated milk products (Paneer, Rasgula) Fermented product (curd, yoghurt, shrikhand) Dried product (butter milk powder, whey powder, ice cream mix powder, infant milk food, WMP, SMP) Other product (whole milk, standardized milk, reconstituted milk, toned & double toned milk, cream and butter)	15
Unit II	
Byproducts Utilization Introduction, Classification and Composition of byproducts. Principles and methods of Whey utilization whey based beverages like lassi and buttermilk.	15

Suggested reading:

1. Outlines of Dairy Technology, Sukumar De, Oxford University Press, 1st edition, 2001.
2. Dairy Engineering Advanced Technologies and Their Applications, Rupesh S Chavan, Netra R Goyal, MurlidharMeghwal, Taylor and Fancis, 1st edition, 2017.
3. Dairy Technology, Shivashraya Singh, illustrated, New India Publishing Agency- Nipa, 2013.
4. Structure of Dairy Products, A.Y. Tamime, Wiley-Blackwell, 1st edition, 2007.
5. Indian Dairy Products, Rangappa K.S., Asia Pub. House, 2nd edition, 1975

COURSE OUTCOME MEAT, FISH AND POULTRY PROCESSING

CO1	To impart fundamental knowledge regarding the nature and use of meat, poultry, and fish technology.
CO2	To give a fundamental grasp of how Meat, Poultry & Fish Technology is used in the food sector.
CO3	To describe the modifications that animal flesh undergoes after being slaughtered post-harvest, and describes the key characteristics of meat quality, how they are measured and the procedures used to ensure quality.
CO4	Learn how to properly handle and store meat, fish, and poultry products.

B.Sc. Part II, Semester IV DSC FS –D 3 Meat, fish and poultry processing I

Credits 2 Hours 30,37.5 lectures of 48 Minutes

Unit I	Hours
Poultry processing Poultry products: types Chemical and nutritive value of poultry meat Slaughtering and evaluation of poultry carcasses Poultry cut parts and meat/ bone ratio Preservation of poultry- meat.	15
Unit II	
Egg and egg products Structure, composition and nutritive value of egg Storage and shelf -life problems Quality evaluation of eggs Egg products: egg powder, value added egg products Preservation of egg	15

Suggested reading:

1. Meat, Poultry & Fish Products Technology, Syed Imran Hashmi, VNMAU Parbhani
2. Principles of Meat Science Aberle E.D. Kendall Hunt Publication, Fifth edition, 2012
3. Handbook of Heat and Meat Processing Hue Y.H. CRC Press, New York, 2012
4. Meat Processing Improving Quality, Joseph Kerry.
5. Fish Processing Technology, George M Hall published by Backie academic and professional, 2nd edition.
6. Post-harvest technology of fish and fish products, K.K.Balachandran published DAYA publishing house, 2016

B.Sc. Part II, Semester IV
DSC FS –D 4 Meat, fish and poultry processing II

Credits 2 Hours 30,37.5 lectures of 48 Minutes

Unit I	Hours
Meat processing Introduction and importance of meat products in India Chemical composition and nutritive value of meat Ante-mortem examination of meat animals Pre- slaughtering operations Scientific techniques of slaughtering Post-mortem inspection, storage, preservation	15
Unit II	
Fish processing Introduction, types of fish, water activity and shelf life, factors affecting quality of fish Processing of fish (chilling, freezing, curing, smoking, canning etc) Fish products By products of fish industries and their utilization	15

Suggested reading:

1. Meat, Poultry & Fish Products Technology, Syed Imran Hashmi, VNMAU Parbhani
2. Principles of Meat Science Aberle E.D. Kendall Hunt Publication, Fifth edition, 2012
3. Handbook of Heat and Meat Processing Hue Y.H. CRC Press, New York, 2012
4. Meat Processing Improving Quality, Joseph Kerry.
5. Fish Processing Technology, George M Hall published by Backie academic and professional, 2nd edition.
6. Post-harvest technology of fish and fish products, K.K.Balachandran published DAYA publishing house, 2016

COURSE OUTCOME SPICES AND CONDIMENTS PROCESSING

CO1	To provide information about different kinds of spices and condiments, how they are categorized, the significance of each spice, where it is produced
CO2	Student will be able to describe how spices are processed in detail by applying numerous chemical principles to preservation and processing is possible.
CO3	To improve their knowledge of spices and condiments and learn more about the evaluation of spice quality, safety, and enlivening components.
CO4	Students will also be able to examine how different processing methods affect the flavor and consistency of spices and condiments.

B.Sc. Part II, Semester IV DSC FS –D 5 SPICES AND CONDIMENTS PROCESSING I

Credits 2 Hours 30,37.5 lectures of 48 Minutes

Unit I	Hours
Spices Definition, Classification, Properties of spices Spice oil and Oleoresins - Definition, Technology of Manufacturing, Use of Spices, Production of spices in India, Adulteration of spices Major Spices Production and processing of Major Spices: Pepper, Cardamom, Ginger, Chilies, Turmeric and onion.	15
Unit II	
Minor Spices Production and processing of Minor spices – Ajwain, coriander, cumin, cinnamon, fenugreek, garlic, mustard, saffron, tamarind, cloves, mint, vanilla, asafoetida and spice production.	15

Suggested reading:

1. Production technology of spices, Aromatic, Medicinal, and Plantation crops - Acharya N.G. Ranga.
2. Production technology of spices, Aromatic, Medicinal, and Plantation crops, N.kumar, Oxford and IBH publish ungo.pvt.ltd.2018.
3. Plantation Crops, P.K. Abdul Khader, University of Calicut, 2005.
4. Spices and plantation crops, Jitendra Singh, National Book Trus, 1996.
5. Handbook of herbs and spices, K. V. Peter. Woodhead Publishing, 2012
6. Spices and Plantation Crops K.G. ShanmugaveluAgrotech Publication, Delhi

B.Sc. Part I, Semester IV
DSC FS –D6 SPICES AND CONDIMENTS PROCESSING II

Credits 2 Hours 30, 37.5 lectures of 48 minutes

Unit I	Hours
Plantation Crops Importance of plantation crops and Chemical composition Processing of Tea leaves: Black tea, Green tea and Oolong tea, Instant tea, Processing of coffee: coffee beans, grinding, storage, Soluble /Instant coffee, Use of chicory in coffee, decaffeinated coffee.	15
Unit II	
Condiments Definition, difference between spices and condiments, types of condiments Herbs Definition, difference between herbs and condiments, types of herbs Seasoning Definition, types of seasoning	15

Suggested reading:

1. Production technology of spices, Aromatic, Medicinal, and Plantation crops - Acharya N.G. Ranga.
2. Production technology of spices, Aromatic, Medicinal, and Plantation crops, N.kumar, Oxford and IBH publish unngo.pvt.ltd.2018.
3. Plantation Crops, P.K. Abdul Khader, University of Calicut, 2005.
4. Spices and plantation crops, Jitendra Singh, National Book Trus, 1996.
5. Handbook of herbs and spices, K. V. Peter. Woodhead Publishing, 2012
6. Spices and Plantation Crops K.G. ShanmugaveluAgrotech Publication, Delhi

B.Sc. Part I, Semester

AECC - C Environment Studies (Theory)

Unit 1: Nature of Environmental Studies.

Definition, scope and importance. Multidisciplinary nature of environmental studies Need for public awareness.

Unit 2: Natural Resources and Associated Problems.

- a) Forest resources: Use and over-exploitation, deforestation, dams and their effects on forests and tribal people.
- b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.
- c) Mineral resources: Usage and exploitation. Environmental effects of extracting and using mineral resources.
- d) Food resources: World food problem, changes caused by agriculture effect of modern agriculture, fertilizer-pesticide problems.
- e) Energy resources: Growing energy needs, renewable and non-renewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, Nuclear energy.
- f) Land resources: Solar energy, Biomass energy, Nuclear energy, Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of individuals in conservation of natural resources.

Unit 3: Ecosystems

Concept of an ecosystem.

Structure and function of an ecosystem. Producers, consumers and decomposers.

Energy flow in the ecosystem.

Ecological succession.

Food chains, food webs and ecological pyramids.

Introduction, types, characteristics features, structure and function of the following ecosystem :- a) Forest ecosystem, b) Grassland ecosystem, c) Desert ecosystem, d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit 4: Biodiversity and its conservation

Introduction- Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India.

Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.

India as a mega-diversity nation.

Western Ghat as a biodiversity region. Hot-spot of biodiversity.

Threats to biodiversity habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India.

Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit 5: Environmental Pollution

Definition: Causes, effects and control measures of: Air pollution, Water pollution, soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.

Unit 6: Social Issues and the Environment

Disaster management: floods, earthquake, cyclone, tsunami and landslides. Urban problems related to energy

Water conservation, rain water harvesting, watershed management Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issue and possible solutions.

Global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.

Wasteland reclamation. Consumerism and waste products.

Unit 7: Environmental Protection

From Unsustainable to Sustainable development. Environmental Protection Act.

Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act.

Forest Conservation Act.

Population Growth and Human Health, Human Rights.

Unit 8: Field Work

Visit to a local area to document environmental assets-
River/Forest/Grassland/Hill/Mountain.

or

Visit to a local polluted site - Urban / Rural / Industrial / Agricultural. or

Study of common plants, insects, birds. or

Study of simple ecosystems - ponds, river, hill slopes, etc.

References :

- 1) Agarwal, K.C.2001, Environmental Biology, Nidi Pub. Ltd., Bikaner.
- 2) Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd.,Ahmedabad 380013, India, [Email:mapin@icenet.net](mailto:mapin@icenet.net) (R)
- 3) Brunner R.C.,1989, Hazardous Waste Incineration, McGraw Hill Inc.480p
- 4) Clank R.S. Marine Pollution, Clanderson Press Oxford (TB)
- 5) Cunningham, W.P. Cooper, T.H.Gorhani, E. & Hepworth, M.T.2001,Environmental Encyclopedia, Jaico Pub. Mumbai, 1196p
- 6) De A.K., Environmental Chemistry, Wiley Wastern Ltd.
- 7) Down to Earth , Centre for Science and Environment , New Delhi.(R)
- 8) Gleick, H.,1993, Water in crisis, Pacific Institute for studies in Dev., Environment& Security. Stockholm Env. Institute. Oxford Univ. Press473p
- 9) Hawkins R.E., Encyclopedia of Indian Natural History, Bombay NaturalHistorySociety, Bombay (R).
- 10) Miller T.G. Jr., Environmental Science. Wadsworth Publications Co.(TB).
- 11) Odum, E.P.1971, Fundamentals of Ecology, W.B.Saunders Co. USA,574p.
- 12) Rao M.N.and Datta, A.K.1987, Waste Water Treatment, Oxford & IBHPubl. Co.Pvt. Ltd., 345p
- 13) Sharma B.K., 2001, Environmental Chemistry, Gokel Publ. Hkouse,Meerut
- 14) Survey of the Environment, The Hindu (M)
- 15) Townsend C., Harper, J. and Michael Begon, Essentials of Ecology,BlackwellScience (TB)
- 16) Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines,Compliances and Standards, vol. I and II, Environmental Media (R)
- 17) Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno-SciencePublications (TB)
- 18) Wagner K.D.,1998, Environmental management, W.B. Saunders Co.Philadelphia, USA 499p.
- 19) Paryavaran shastra – Gholap T.N.
- 20) Paryavaran Sahastra - Gharapure
(M) Magazine
(R) Reference (TB) Textbook

**NATURE OF QUESTION PAPER
FOR B.Sc. PART – I, (40 + 10 PATTERN)
ACCORDING TO REVISED STRUCTURE
AS PER NEP – 2020
TO BE IMPLEMENTED FROM ACADEMIC
YEAR 2022-23**

Duration: 2 hrs

Maximum Marks: 40

Q. 1 Select the most correct alternate from the following [8]

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)

Practical

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

DSC FS –P9 CEREALS AND BAKERY PROCESSING

1. Effect of kneading on the development of gluten
2. Determination of gluten content in wheat flour
3. Effect of water ratio on cooking quality of rice
4. Parboiling of paddy
5. Preparation of malt
6. Production of popcorn
7. Cake faults and their causes
8. Quality testing of flour and yeast
9. Preparation of food grade cake
10. Preparation of bread
11. Preparation of pancake
12. Preparation of cream biscuits

DSC FS –P10 MILK AND MILK PRODUCT PROCESSING

1. Physical examination of milk
2. Specific gravity of milk
3. Determination of heat stability of milk
4. Determination of natural acidity of milk
5. Preparation of khoa
6. Preparation of gulabjamun
7. Preparation of paneer
8. Preparation of mishit dahi
9. Preparation of rasgulla 10.Preparation of whey beverage 11.Preparation of lassi
- 12.Preparation of shrikhand

DSC FS –P11 LEGUME AND OILSEEDSPROCESSING

1. Sprouting of whole pulses
2. Preparation of instant dhokhla
3. Production of protein rich product
4. Preparation of extruded products that is noodles
5. Determination of melting point of fats and oil
6. Determination of specific gravity and refractive index of fats and oils
7. To prepare test sample and determine moisture content of fats and oils
8. To determine adulteration in fats and oils
9. Detection of presence of rancidity

DSC FS –P12 MEAT FISH AND POULTRY PROCESSING

1. Slaughtering and dressing of poultry bird
2. Study of poultry meat cut
3. Quality evaluation of meat
4. Quality evaluation of egg
5. To study shelf-life of eggs by different method of preservation
6. Quality evaluation of fish
7. Study of the anatomy of fish
8. Determination of moisture content from the different fish samples
9. Estimation of moisture content of meat
10. Study of post-mortem changes in meat

DSC FS –P13 FRUITS AND VEGETABLES PROCESSING

1. Study of different equipments
2. Preparation of fruits jam
3. Preparation of fruit jelly
4. Preparation of RTS and squash
5. Preparation of jam marmalades
6. Preparation of tomato soup
7. Preparation of tomato chutney
8. Preparation of tomato sauce / ketchup
9. Processing of potato 10. Preparation of Anola pickle

DSC FS –P14 SPICES AND CONDIMENTS PROCESSING

1. Microscopic examination of spices
2. Determination of adulteration of argemone seed on mustard
3. Detection of adulteration mineral oil in black pepper
4. Detection of adulteration of papaya seed in black pepper
5. Detection of adulteration in turmeric
6. Detection of adulteration in chilies
7. Detection of adulteration in coriander
8. Detection of adulteration in black pepper
9. Detection of adulteration in saffron 10. Detection of adulteration in Asafoetida