UG PROGRAM (4 Years Honors)

CBCS - 2020-21

B. Sc
FOOD TECHNOLOGY

Syllabus and Model Question Papers

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Note: BOS is to provide final soft copy in PDF and word formats and four copies of hard copies in bounded form to the office of Dean Academic affairs.

1. Resolutions of the Board of Studies:

Meeting heldon:08/07/2021..... Time: 10 AM – 4 PM
At: ANUR Convention Centre,
Adikavi Nannaya University
Rajahmahendravaram

Agenda:

As per the directions and guidelines/modalities issued by the APSCHE for revising the curriculum framework and updating the syllabus as out-come based B. Sc food technology programme to be effect from 2020-21 academic year under CBCS for implementing in all affiliated colleges of AKNU

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Resolutions:

1. It was resolved to adopt revised common programme structure as per the guidelines issued by APSCHE.

2. Resolved to adopt regulations and scheme of examinations and marks/grading system of the university UGprograms.

3. Resolved to prepare model question Courses in the given prescribedformat.

4. Resolved to prepare a list of equipments/software required for eachlab/practicals.

5. Resolved to give the eligibility criteria of students for joining thecourse.

6. Resolved to give the eligibility criteria of faculty for teaching thecourse.

7. Resolved to prepare a list of Course setters/Course evaluators/project evaluators in the given prescribedformat.

DETAILS OF COURSES AND CREDITS

Sem	Course No	Course Name	Course Type (L/T/P)	Hrs/Week	Credits	Max. Marks	Max. Marks Sem- End Exam
				Sciences: 4+2	Sciences: 4+1	Internal/ Conti./ Mid Assessment	
I	1	Food Production Trends	T	4	4	25	75
	2	Food Production Trends Lab	L	2	1	-	50
II	3	Food Preservation Techniques and Its Microbial Studies	T	4	4	25	75
	4	Food Preservation Techniques and Its Microbial Studies – Lab	L	2	1	-	50
III	5	Unit Operations and Its Material handling	T	4	4	25	75
	6	Unit Operations and Its Material handling –Lab	L	2	1	-	50
IV	7	Food Additives	T	4	4	25	75
	8	Food Additives-Lab	L	2	1	-	50
	9	Food Quality Management	T	4	4	25	75
	10	Food Quality Management- Lab	L	2	1	-	50
V	11	Food Packaging	T	4	4	25	75
	12	Food Packaging-Lab	L	2	1	-	50
	13	Food Analysis - Chemical and Microbial	T	4	4	25	75
	14	Food Analysis - Chemical and Microbial-lab	L	4	1	-	50

Note: * Course Type Code : T-Theory, L - Lab, P: Problem solving.

a. Proposed combination subjects: **Chemistry, Microbiology, Food Technology.**

b. Student eligibility for joining in the course: + 2/ Intermediate with Bi.P.C. , M.P.C. and Agriculture

c. Faculty eligibility for teaching the course: M.Sc. (Minimum Qualification) M.Tech ,Ph.D, are desirable.

d. Required instruments/software/ computers for the course (Lab/Practical course-wise required i.e., for a batch of 15students).

Sem. No.	Lab/Practical Name	Names of Instruments/Software/ computers required with specifications	Brand Name	Qty Required
1	Food technology	Tray drier	Mettler Toledo	2
		Cabinet drier	Coleparmer	2
		Food Mixer		2
		Ribbon blender	Kemi	2
		Juice machine	Coleparmer IKA	2
		Peeling m achines		2
		Vegetable slicer	Remi Remi	2
		Food chopper	Labline	2
		Ice making machines		2
		Rice Milling machines	Accumax India	2
			Labman	2
2	chemistry	Weighing balance digital and Non digital	Remi	2
			Thermo scientific	1
		PH Meter Water bath Vortex mixture	Thermo Fisher	1
		Magnetic stirrer		2
		Hot plate	Major science	2
		Hot air oven		
		Autoclave	Equiptronic	2
		Distillation unit	Shimadzu	1
		UVSpectrophoto meter		
3	Food chemistry	Soxhlet extractor	Borosilicate	1
		Rotary evaporator	Heidolph	1
		Dessicator	Borosil	1
		Mortar and pestle	Thermo scientific	2
		Glass and micro pipettes	Borosil Thermo scientific	15
		Millipore unit	Merck	1
4	Microbiology	Simple microscope	Olympus	2
		Compound microscope	Leica	2
5	Food microbiology	BOD Incubator	Kemi	1
		COD Incubator	Thermo Fisher	1
		Orbital shakers	Coleparmer	1
		Laminar air flow	Bionics Scientific	1
		Fume hood	Coleparmer Biorad	1
			Merck	1
				2

e. List of Suitable levels of positions eligible in the Govt/Pvt organizations Suitable levels of positions for these graduates either in industry/govt organization like., technical assistants/ scientists/ school teachers., clearly define them, with reliable justification.

S.No	Position	Company/ Govt organization	Remarks	Additional skills required, if any
1	Scientific assistant	Food Corporation of India	Upgrade their skills and get promoted	Communication skills Language skills Computational skills
2	Scientific assistant	Central ware house corporation	Upgrade their skills and get promoted	Communication skills Language skills Computational skills
3	Food safety officers	State and central government organizations	Upgrade their skills and get promoted	Communication skills Language skills Computational skills
4	Technicians	State and central government institutes and labs	Upgrade their skills and get promoted	Communication skills Language skills Computational skills

f. List of Govt. organizations / Pvt companies for employment opportunities or internships or projects

S.No	Company/ Govt organization	Position type	Level of Position
1	Food Corporation of India	Scientific assistant	Basic (can be upgraded)
2	Central ware house corporation	Scientific assistant	Basic (can be upgraded)
3	State and central government organizations	Food safety officers	Basic (can be upgraded)
4	State and central government institutes and Labs	Lab Technicians	Basic (can be upgraded)
5	National Institute of Nutrition	Lab assistant/project assistant	Basic (can be upgraded)
6	Central Food Technological Research Institute	Lab assistant/project assistant	Basic (can be upgraded)
7	International Crops Research Institute for the Semi-Arid Tropics	Lab assistant/project assistant	Basic (can beupgraded)
8	Indian Institute of Spices Research	Lab assistant/project assistant	Basic (can be pgraded)

3. Program objectives, outcomes, co-curricular and assessment methods

B.Sc.	Food Technology

1. Aim and objectives of UG program in Subject:

Food technology is the study of food processing in detail Its aim is to understand the fundamental chemical principles of foods. The program aims to provide an advanced understanding of the core principles and topics of foods and their experimental basis to enable students acquire a specialized chemical knowledge. The program also develops a foundation in the concepts and facts in modern food processing, food chemistry,food microbiology and familiar with various ways of organizing and accessing scientific knowledge.

2. Learning outcomes of Subject:

1. To study about various concepts of food structure ,composition and qulity aspects
2. To study about preservation methods and microbial spoilage
3. To learn about handling of equipment and its principles and specifications
4. To study about various food preservations, colorants and its applications
5. To study about various standards applied in food industry
6. To study about packaging helps and to increases shelf life of foods
7. To study about the composition of food and their microbial studies
8. Analyze, interpret, and participate in reporting to their peers on the results of their laboratory experiments;
9. Participate in and report orally on team work investigations of problem-based assignments;
10. Build knowledge and understanding in tackling more advanced and specialised courses, and more widely to pursue independent, self-directed and critical learning.
11. Recommended Co-curricular activities:(Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

A. Measurable:

1. Assignments
2. Student seminars (Individual presentation of Courses) on topics relating to: Immunology
3. Quiz Programmes on: Food Technology.
4. Individual Field Studies/projects
5. Group discussion
6. Group/Team Projects

B. General:

1. Collection of news reports and maintaining a record of Course-cuttings relating to topics covered in syllabus**.**
2. Group Discussions on: New scientific approaches and Discoveries**.**
3. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers

1. Any similar activities with imaginative thinking.

Organizing exhibitions
Preparation of charts and models Science fairs
Science
clubs Essay
writing

12. Recommended Continuous Assessment methods:

Slip test, Oral test, Assignments, Seminars

B. Sc	Semester – I	Credits: 04
Course: 1	Food Production Trends	Hrs/Wk:04

UNIT-I:
Status of food processing industry in India & Abroad, Indian Food Industry, Reasons for slow growth, Scope for Expansion, future priorities in food production need, magnitude and inter dependence of food production and processing agencies.

UNIT-II:
Dairy, Bakery, Confectionery, Beverage and Snack foods and their growth, popularity of Indian foods, National and International Projects and their food products.

UNIT-III:
Ministry of food processing industries (MOFPI), objectives and functions, APEDA - its objectives and functions, food characteristics, classification of foods, types of foods, convenience foods - Recent Trends for processing of foods, genetically modified foods.

UNIT-IV:
Functional foods and their advantages and disadvantages, Food Demand and Supply, Factors affecting Food Demand, Food Laws, Factors affecting food laws.

UNIT-V:
Global demand for food, World Food Day- its importance and action plan, classification of food crops, food losses, production and estimation of post harvest losses, Development programmes and strategies to eliminate food losses, Employment generation through post harvest operations.

BOOKS FOR REFERENCE:

1. N.N. Potter, Food Science, III edition,. AVI Publishing Co. Inc., West Port, USA, 1978.
2. K. VijayaRaghavan, Agricultural Administration in India.
3. Chidda Singh, Modern Techniques of Raising Field Crops, Oxford & IBH Publishing Co, New Delhi.
4. Graft and Saguy, Food Product Development, CBS Publishers, New Delhi.
5. M. Swaminathan, Food and Nutrition, Vol I &II, The Bangalore Printing & Publishing Co. Ltd, Bangalore.
6. Mahatab, S.Banji, N. Prashad Rao and Vinodini Reddy. Text Book of Human Nutrition, Oxford &IBH PublishingCo.Ltd. New Delhi

B. Sc	Semester – I	Credits: 1
Course: 1(L)	Food Production Trends Lab	Hrs/Wk:2

Practical's: Food Production Trends and Human Nutrition Lab

1. Drying of fruit slices pineapple slices, apple slices in cabinet drier.
2. Demonstration of various perishable food items and degree of spoilage.
3. Demonstration of various perishable food items and degree of spoilage.
4. To study IQF processing of fruits/ vegetable.
5. Demonstration of preserving foods under cold vs. freezing process.
6. Visit to food processing industry.

MODEL QUESTION PAPER

B.Sc DEGREE EXAMINATIONS

SEMESTER -I

Course 1: FOOD PRODUCTION TRENDS

Time :3 Hrs. **Max. Marks: 75**

SECTION – A

Answer any FIVE questions **5 X 5= 25 M**

1. What are the objectives of Food Science and Food Technology
2. What are the international and national projects of food.
3. write a short note on food losses and factors effecting on food losses.
4. Write a short note on criteria for success of food processing industry
5. Write a short note on APEDA.
6. Explain the classification of foods on the basis of pH.
7. What are the factors which effecting food demands?
8. Give a short note on Employment generation through post harvest operations

SECTION – B

Answer the following questions **5 X 10 = 50 M**

9. a) Explain the Status of Food Processing industry in India and Abroad

   OR

   b) What are the objectives and Sub-disciplines of Food Science and Food Technology

10. a) Explain the growth of food processing industries

    OR

    b) Explain brief the history of the world food processing industry.

11. a) Explain the food characteristics and it sources.

    OR

    b) Explain briefly about MOFPI.

12. a) What are the factors which effecting food demand

    OR

    b) Explain in detail about Functional foods.

13. a) Explain in detail about classification of food crops

    OR

    b) Explain in detail about Global demand for food, World Food Day- its importance and action plan.

B. Sc	Semester – II	Credits: 4
Course:2	Food Preservation Techniques and Its Microbial Studies	Hrs/Wk:4

UNIT-I:

Food Spoilage: Definition, types of spoilage - physical, enzymatic, chemical and biological spoilage. Mechanism of spoilage and its end products, shelf life determination. Use of preservative in foods: chemical preservative, bio preservatives, antibiotics, lactic acid bacteria.

UNIT-II:

Preservation by using Preservatives: Food preservation: Definition, principles, importance of food preservation, traditional and modern methods of food preservation. Food additives – definition, types, Class I and Class II preservatives. Preservation by fermentation: curing and pickling; Hurdle technology, Non- thermal (e.g. high pressure processing) and minimal processing technologies Ionization radiation.

UNIT-III:

Preservation by use of high Temperature: Pasteurization: Definition, types, Sterilization, Canning - history and steps involved, spoilage encountered in canned foods, types of containers used for canning foods. Food irradiation – Principles, merits and demerits, effects of irradiation and photochemical methods.

UNIT-IV:

Preservation by use of Low Temperature: Refrigeration - advantages and disadvantages, freezing: Types of freezing, common spoilages occurring during freezing, difference between refrigeration and freezing. cold storage, cold chain, freezing, IQF methodology (including cryogenic freezing)

UNIT-V:

Preservation by Removal of Moisture: Drying and dehydration - merits and demerits, factors affecting, different types of drying, Water activity of food and its significance in food preservation; Concentration: principles and types of concentrated foods.

REFERENCE BOOKS:

1. Gould, G. W. (2012), "New Methods of food preservation", Springer Science & Business Media.
2. Manay, N.S. Shadaksharaswamy, M. (2004), "Foods- Facts and Principles", New age international publishers, New Delhi.
3. Srilakshmi, B.(2003), "Food Science", New Age International Publishers, New Delhi.
4. Subalakshmi, G and Udipi, S.A.(2001),"Food processing and preservation". New Age International Publishers, New Delhi.

B. Sc	Semester – II	Credits: 1
Course:2(L)	Food Preservation Techniques and Its Microbial Studies – Lab	Hrs/Wk:2

Practical's: Food Preservation Techniques and Its Microbial Studies lab

1. Market survey of raw processed and preserved foods their costs
2. Weights and measurements
3. Various methods of cooking
4. Freeze drying
5. Preservation of reduction in moisture level by drying and dehydration
6. Study of different preservation techniques
7. Visit to the food processing industry

MODEL QUESTION PAPER

B. Sc DEGREE EXAMINATIONS

SEMESTER -II

Course 2: Food Preservation Techniques and Its Microbial Studies

Time :3 Hrs. **Max. Marks: 75**

SECTION – A

Answer any FIVE Questions. **5 X 5= 25 M**

Draw Labeled diagram wherever necessary

1. Write a short note on food spoilage**.**
2. Explain about principles of food preservation**.**
3. Write a short note on Pasteurization**.**
4. Write a short note on freezing**.**
5. Explain about dehydration**.**
6. Write a short note on Class I & Class II Preservatives**.**
7. Write a short note on Chemical Preservatives**.**
8. Explain in detail about food preservation.

SECTION – B

Answer the following Questions. **5 X 10 = 50 M**

9. a) Explain in detail about food spoilage**.** Physical, enzymatic, chemical and biological spoilage**.**

(OR)

b) Explain about food preservatives & types of food preservatives**.**

10. a) Explain in detail about modern & traditional methods of food preservation**.**

(OR)

b) Explain about food additives**.**

11. a) Write about history of canning & steps involved in canning**.**

(OR)

b) Explain about food Irradiation**.**

12. a) What are the difference between refrigeration and freezing**.**

(OR)

b) Explain about types of freezing**.**

13. a) Explain in detail about dehydration**.**

(OR)

b) Explain about water activity and its significance in food preservation**.**

B. Sc	Semester – III	Credits: 4
Course: 3	Unit Operations and Its Material Handling	Hrs/Wk:4

UNIT-I:

Unit Operations –Classifications-conservation of mass and energy.SI, FPS and MKS system of **UNIT**s-Evaporations-single effect evaporation and multiple effect evaporation ,vacuum evaporation-Short tube and long tube evaporators ,its applications in food industry.

UNIT- II:

Introduction and importance of Physical properties –Shape and size of grains ,Shape and size of Fruits ,Bulk density of grains , Cleaning ,Sorting and Grading ,peeling , Dehulling ,Dehusking ,Mixing Definition ,Mixing Equipment-Double cone mixer , Ribbon mixer ,Mixing- mixing of solids, liquids, pastes. Blending , emulsification.

UNIT- III:

Distillation- stage of distillation- Steam , vacuum and batch distillation. .Drying and Dehydration types of dryers – Tray dryer , tunnel dryer ,LSU dryer, Freeze dryer, osmatic dehydration , foam mat drying and their working principles and applications in food industry.

UNIT-IV :

Baking, principles of baking, different types of ovens Roasting and Frying equipment- principles, different types of equipments involved in roasting, different types of fryers. Extraction and Leaching, extraction equipment, supercritical fluid extraction, Leaching equipment. Crystallization and Distillation: Basic principles involved.

UNIT-V:

Mechanical Separations: Screening and Screening equipment, Centrifugation- principle, equipment involved in centrifugation, liquid-liquid centrifugation, liquid- solid centrifugation, clarifiers, desludging and decanting machines. Filtration: Principles involved in filtration, membrane separation, Pressure and vacuum filtration. Expression: batch and continuous type.

BOOKS F REFERENCE:

1. Chakravarthy A, Post Harvest Technology of Cereals, Pulses and Oilseeds, Oxford and IBH Publications Company Limited, Calcutta, 1988.
2. Charm S.E, Fundamentals of Food Engineering, The AVI Publishing Company, USA, 1971.
3. Dennis R.H, Food Process Engineering, The AVI Publishing Company, 1971.
4. Earle R.L, Unit Operations in Food Processing, Pergamaon press, New Delhi, 1983.
5. Mc Cabe and Smith J.C, Unit Operations of Chemical Engineering, Tata Mc Graw Hill Publishing Book Company, New Delhi, 1993.
6. 6.C.P. Arora, Refrigeration and Air Conditioning, Tata McGraw Hill Company, New Delhi, 2000.
7. . Fellows, Food Processing Technology, Principles and Practice, CRC Press. 2000.
8. Nuri N. Mohsenin, Physical Properties of Plant and Animal Materials, Ed.2009
9. Earle R.L, **UNIT** Operations in Food Processing. Pergamon Press, 1983.
10. K.M. Sahay and K.K Singh, **UNIT** Operations of Agricultural Processing, Vikash Publication House, New Delhi.

B. Sc	Semester – III	Credits: 1
Course:3(L)	Unit Operations and Its Material Handling- Lab	Hrs/Wk:2

Practical Paper: Unit Operations and Its Material Handling- Lab

1. Determination of separation efficiency of centrifugal separator.
2. Determination of energy requirement in size reduction using ball mill.
3. Experiments on tray dryer
4. Determination of engineering properties of food materials
5. Determination of viscosity of different food materials.
6. Shelf life calculations for food products
7. Determination of gas transmission rate.
8. Visit to an industry (extruder).

MODEL QUESTION PAPER

B. Sc DEGREE EXAMINATIONS

SEMESTER -III

Course 3: Unit Operations and it's Material Handling

Time :3 Hrs. **Max. Marks: 75**

SECTION – A

Answer any FIVE Questions **5 X 5= 25 M**

1. Write a short note on mass and energy
2. Write about vacuum evaporators
3. Give a brief note on physical properties of grains.
4. List out different mixing equipment**.**
5. Differentiate between Drying and dehydration with an appropriate examples
6. Define Distillation and list out types involved in it
7. What is Baking ,Roasting and Frying methods.
8. What is Centrifugation and give examples involved in food products**.**

SECTION – B

Answer the following Questions. **5 X 10 = 50 M**

9. a) Explain detail about single effect and Multiple effects evaporations with a neat diagram.

(OR)

b) Write about short and long tube evaporators with a neat diagram and its applications in food industry**.**

10. a) Write about any two grain separation equipment with neat diagram.

(OR)

b) Write about Mixing equipment of any two with a diagram

11. a) What is Distillation and Explain in detail about batch distillation with a neat diagram

(OR)

b) What is Freezing and list out freezing equipment with working principle and its applications.

12. a)What is Baking and list out Various equipment involved in it along with Working principles

(OR)

b) Differentiate between Extraction and Leaching and Explain each with neat sketch with principles

13. a) Define centrifugation and types of centrifugation and Explain any one centrifugation involved in food industry

(OR)

b) What is Filtration principles and its application in food industry**.**

B. Sc	Semester – IV	Credits: 4
Course: 4	FOOD ADDITIVES	Hrs/Wk:4

UNIT-I:

Introduction to Food Additives: Definition of Food Additives - Need of food additives in food processing – Types of additives with examples - benefits of additives - risks of additives, Functions and classification of food additives. Safety evaluation of food additives, Generally Recognized As Safe (GRAS) tolerance levels and toxic levels of additives in foods.

UNIT-II:

Major Food Additives: Food colours- types-natural & artificial food colours- risks of artificial food colours, Preservatives - class I&II preservatives, natural preservatives- chemical preservatives, Sweeteners- types-natural & artificial sweeteners- risks and benefits of sweeteners, Flavours- types- natural and artificial, flavour enhancers and their benefits.

UNIT-III:

Minor Food Additives: Anti-oxidants-types- natural and artificial anti oxidants - toxic effects of antioxidants-their role in foods, chelating agents- types and examples , Emulsifiers- types- natural and artificial emulsifiers- mechanism of action of emulsifiers in foods. Curing agent- examples and their role in Foods.

UNIT-IV:

Stabilizers and thickeners: Stabilizers and thickeners - examples - their role in Foods-mechanism of action in Foods - application of stabilizers and thickeners, leavening agents-examples- their role in Foods bleaching and maturing agents - examples- their role in Foods, Anti caking agents - examples and their role in Foods.

UNIT-V:

Nutritional Additives: Nutritional additives(fortificants/supplements), requirements (RDA and ADI), occurrence & commercial forms of various vitamins & minerals avaiLable. Antimicrobial agents – examples and Applications- benzoic acid & benzoates, Sorbic acid . Anti browning agents – food applications.

BOOKS FOR REFERENCE:

1. AL Branen, Davidson and S. Salminen, Food Additives. Marcel Dekker Inc NY 1990.
2. Swaminathan, Food Science, Chemistry & Experimental Foods. Bappco Publishers,Bangalore.
3. Mahindra S.N., Food additives – Characteristics detection and estimation. Tata Mc Graw Hill Publication Company, New Delhi.
4. Srivastav, R.P. and Sanjeev Kumar, Fruit and Vegetable Preservation, Principles and Practice. International Book Distribution Company, New Delhi.

B. Sc	Semester – IV	Credits: 1
Course:4(L)	FOOD ADDITIVES LAB	Hrs/Wk:2

Practicals : FOOD ADDITIVES

1. Estimation of chlorophyl
2. Estimatuon of carotenoids
3. Estimation of toral solible solids by refractometer
4. Estimation of nacl in butter
5. Estimation of nacl in pickles
6. Estimation of so2
7. Estimation of benzoatates

MODEL QUESTION PAPER

B. Sc DEGREE EXAMINATIONS

SEMESTER -IV

Course 4: FOOD ADDITIVES

Time :3 Hrs. **Max. Marks: 75**

SECTION – A

Answer any FIVE Questions **5 X 5= 25 M**

1. What is the need of food additives .
2. What are the natural sweeteners.
3. Write a short note on antioxidants.
4. Write a short note on anti caking agents.
5. Explain about anti Browning agent's .
6. Write a short note on food additives.
7. Write a short note on artificial food colours.
8. What are the nutritional additives.

SECTION – B

Answer the following Questions. **5 X 10 = 50 M**

9. a).Explain in detail about classification of food additives

(OR)

b).Explain about functions and need of food additives in food processing

10. a). Explain in detail about food colours

(OR)

b). Explain in detail about food Preservatives

11. a).Explain in detail about antioxidants

(OR)

b). Explain in detail about emulsifiers

12. a).Explain in detail about stabilizers and thickeners

(OR)

b).Explain in detail about anti caking agents and leavening agents

13. a).Explain in detail about benzoates and sorbates

(OR)

b). Explain in detail about antimicrobial agents

B. Sc	Semester – IV	Credits: 4
Course: 5	FOOD QUALITY MANAGEMENT	Hrs/Wk:4

UNIT-I:

Quality Management System: Quality Management System- ISO 9000, Management Principles, Process Model, ISO 9000 Family, principles and requirements of ISO 9001. Food Safety Management System- Key role, Principles of FSMS, ISO-22000

UNIT-II:

Plant Sanitation: Sanitation - Personal hygiene - Sanitizers - Sanitation principles – Sanitizing methods - Sanitation agents. Risk assessment and management during food preparation. Definition, importance of sanitation, application of sanitation to food industry and food service establishments. Important principles in food hygiene and safety.

UNIT-III:

Cleaning, Pest Control, Recall Procedures, GMP/GHP, GLP, GAP. Food safety, Objectives (FSO), Microbiological criteria, definitions, sampling plans.

UNIT-IV:

HACCP: HACCP – prerequisite programs, definitions, HACCP principles, Flow diagrams, Application of HACCP principles, Limitations of HACCP, Hazard Identification, Risk assessment Risk communication with communication agencies and Hazard analysis, CCP Decision Tree, HACCP Plan.

UNIT-V:

Food laws & Standards: Food laws & Standards - FAO, Codex Alimentations, ISO, Indian food laws and standards, FSSAI Prevention of Food Adulteration (PFA) act, Fruit Products order(FPO), Meat Product order(MPO), Cold St(OR)age order (CSO), SWMA, BIS, AGMARK, APEDA, MPEDA, EIC,NABL.

REFERENCE BOOKS:

1. Early R.1995.Guide to Quality Management Systems for Food Industries. Blackie Academic.
2. Krammer A & Twigg BA.1973. Quality Control in Food Industry. Vol. I, II. AVI Publ.
3. FSSAI Book
4. Food Quality Certification 2002 Quality Control in Food Industry Vol. I, II AVI Publications.
5. Parker,R. (2003) Introduction to Food Science, 5th Edition, Chapman & Hall Publishres Inc, New York.

B. Sc	Semester – IV	Credits: 1
Course: 5(L)	FOOD QUALITY MANAGEMENT LAB	Hrs/Wk:2

Practical's: Food Quality Management

1. Testing of different foods for adulterants.
2. Determination of threshold value for basic tastes and odours (Pare Comparison)
3. Grading of food products (Fruites and Vegtables).
4. Candliing food products (Egg).
5. Sensory evalution of Food.
6. Visit to a certification agency.
7. Visit to fruits and vegetables market for quality assessment.

MODEL QUESTION PAPER

B. Sc DEGREE EXAMINATIONS

SEMESTER-IV

Course 5: FOOD QUALITY MANAGEMENT

Time :3 Hrs. **Max. Marks: 75**

SECTION – A

Answer any FIVE Questions **5 X 5= 25 M**

1. Write a short note on quality management system
2. Importance of sanitation.
3. Explain about GMP.
4. Applications of HACCP
5. NABL.
6. Write a short note on ISO
7. Write about CCP decision tree
8. Give a short note on CSO

SECTION – B

Answer the following Questions **5 X 10 = 50 M**

9. a) Explain in detail about FSMS.

   (OR)

   b) Describe about ISO 9000.

10. a) Write an account on sanitizing methods

    (OR)

    b) Write about sanitizing agents.

11. a) Write an essay on detail about GMP.

    (OR)

    b) Describe in detail about GLP.

12. a) What are the HACCP principles

    (OR)

    b) Explain about definition, application's and limitations of HACCP.

13. a) Give an account on PFA.

    (OR)

    b) Describe the FPO.

B. Sc	Semester - V	Credits: 04
Course: 6	Food Packaging	Hrs/Wk:04

UNIT-I:
Packaging Science, Definition, History, Functions, Types of Materials - Uses, Application, Advantages and Disadvantages of each - Status of Packaging industry in India, Economics, Environmental hazards, Waste management and Consumer awareness.

UNIT-II:
Need of Packaging food - Logistics - Merchandising Outlets - Handling - Transportation - Packaging machinery - Technology upgradation - Public distribution- Cost effective packaging - Packaging requirements - Levels of Packaging - Packaging functions - Attractiveness - Protection - Convenience - Printability – Differentiability.

UNIT-III:
Labeling Laws - Packaging laws and Regulations - SWMA Rules - PFA Rules - FPO Rule MFPO Rules - Agmark Rules - Class 'A' commodities - Class 'B' commodities - Misbranded Labeling rules for infant foods.

UNIT-IV:
Classification of Packages, Primary, Secondary and Tertiary – Special Box / Carton, Shrink, Aerosol, Vacuum, Boil-in-bag, Tetra pack, Squeeze tubes, etc. Significance and functions - Construction of Packages, Process Chart - Shelf life testing.

UNIT-V:
Machinability - Environmental Impact - Low cost containment - Communication – Resealing features - Non toxicity - Aroma retention Hazards acting on Package during transportation - Moisture impact - Light impact – Common insect pests - Changes in food quality - Biological changes in food quality

BOOKS FOR REFERENCE:

1. Gorden l Robertson, *Food Packaging Principles and Practice*, CRC Press, London.
2. Ranganna S, *Handbook of Analysis and Quality Control, Fruits and Vegetables Products*, Tata Mc Graw Hill, New Delhi, 1986.

B. Sc	Semester – V	Credits: 1
Course: 6(L)	Food Packaging LAB	Hrs/Wk:2

Practical's : Food Packaging

1. Measurement of thickness of paper and paper boards.
2. Measurement of basic weight of paper and paper boards.
3. Measurement of bursting strength of paper and paper boards.
4. Measurement of resistance.
5. Visit to an Industry.
6. Visit to Dairy Industry.

MODEL QUESTION PAPER

B. Sc DEGREE EXAMINATIONS

SEMESTER -V

Course 6 : Food Packaging

Time :3 Hrs. **Max. Marks: 75**

SECTION – A

Answer any FIVE questions **5 X 5= 25 M**

1. Define packaging & Explain its Functions in detail
2. Explain briefly different forms of packaging
3. Give a note on advantages & disadvantages of Non-Migratary Bioctive polymes.
4. Write Different Active & Intelligent
5. Write a short note on Labelling
6. Define Barcoding. Explain its importance
7. Explain Shrink Packaging in detail with sutiable examples
8. Write a short note on Green plants

SECTION – B

Answer the following Questions **5 X 10 = 50 M**

9. a) Explain about applications of Food packaging in Detail**.**

   (OR)

   b) Describe status of packaging industry in India

10. a) Explain about packaging Requirements & Levels of packaging

    (OR)

    b) Explain about packaging machinery in detail

11. a) Briefly explain packaging Laws & Regulations

    (OR)

    b) Explain in detail about Misbrand Labeling rules for infant Foods**.**

12. a) Write the classification of packaging. Explain in detail

    (OR)

    b) Explain the construction of packaging process Chat& shelf life testing

13. a) Explain in detail about Aroma Retiontion Hazard acting on packaging during Transportation**.**

    (OR)

    b) Briefly explain about changes in Food Quailty &Biological Changes in Food during Transportation

B. Sc	Semester – V	Credits: 4
Course: 7	Food Analysis – Chemical and Microbial	Hrs/Wk:4

UNIT-I:

Foods, moisture in foods, water activity, official methods for the analysis of foods – AOAC, AACC, AOCS, Chlorophyll- physical characteristics, structure, colour loss during thermal processing, HTST processing, re greening during thermal processing, carotenoids, structure, physical properties, and chemical properties.

UNIT-II :

Functional properties of carbohydrates ,proteins ,fats lipids and their applications Enzymes in food industry, carbohydrases , amylases, pectinolytic enzymes, cellulases and hemi- cellulases, proteases, endopeptidases, lipid hydrolyzing enzymes, lipases, phospholipasesBioavaiLability of vitamins, optimization of vitamin retention – enrichment, restorations, fortification, functional properties of minerals.

UNIT-III:

Food colourants, use of certified dies, colours exempt from certification. Vitamins – Toxicity of Vitamins, sources of vitamins, dietary recommendation, Classification, Sources and Chemistry of lipids – physical properties and chemical properties in foods. Steps in manufacture of food fats. Role of fat and applications in food preparation, Shortenings, shortening value and factors affecting it. Selection of fats and oils, fat substitutes, Deterioration of fats/ oils, Rancidity, Tests for Rancidity, Reversion and Polymerization. Anti Classification, Sources and Chemistry of lipids – physical properties and chemical properties in foods. Steps in manufacture of food fats. Role of fat and applications in food preparation, Shortenings, shortening value and factors affecting it.

UNIT-IV:

Food Spoilage – Contaminants of various foods stuffs – vegetables, cereals, pulses, oilseeds, milk, meat, egg and poultry during handling and processing. Extrinsic and intrinsic parameters affecting growth and survival of microbes, chemical changes caused by microorganisms, organic acids, other compounds, lipids, pectic substances.

UNIT-V:

Control of micro-organisms by antibiotics, characteristics of antibiotics, removal of microorganisms, maintenance of anaerobic conditions. Food contamination and public health hazards: Food poisoning, food borne intoxications and infections, symptoms, mode and sources of transmission and methods of prevention, investigations and detection of food borne and outbreak Importance of sanitation and hygiene, personnel hygiene, food hygiene, environmental hygiene, food plant hygiene, sanitizing methods, sanitizing agents, acid and alkali compounds.

BOOKS FOR REFERENCE:

1. P Tauro K. K. Japur and K.S. Yadav, An Introduction to Microbiology, Wiley Eastern Limited, New Delhi.
2. C.B. Power and H.F. Daginawala, General Microbiology, Himalaya Publishing House, Bombay.
3. Frazier, W.C.and Westhoff , D.C. IV Edn., Food Microbiology, Mc Graw Hill Inc, New Delhi, 1988.
4. Adam, M.R and Moss M.O, Food Microbiology, New Age International Pvt. Ltd, New Delhi.
5. Dr. Ling, H D Belitz, Dr. Ing, W. Grosch, Food Chemistry, Springer, New York, 1987.
6. Braverman, Introduction to the Bio-Chemistry of Foods, Elsevier Scientific Publishing Company.
7. AOAC Methods for Food Analysis.
8. Meyer, Food Chemistry, AVI Publishing Company, USA 1983.
9. Sadasivam and Manickyam, Biochemical Methods, New Age International Publications, New Delhi, 1996.
10. John M. Deman, Principles of Food Chemistry, Springer International edition, Third edition, 2007.

B. Sc	Semester – V	Credits: 1
Course: 7(L)	Food Analysis – Chemical and Microbial LAB	Hrs/Wk:2

Practical's: Food Analysis – Chemical and Microbial

1. Demonstrating the principles and applications of colorimeter and Spectrophotometer
2. Determination of carbohydrate content in foods by Anthrone method
3. Determination of reducing sugars by Nelson Somogyi's method
4. Determination of FFA content in fats/ oils
5. Determination of protein in foods by Micro kjeldhal method.
6. Determination of titratable acid content in foods (Acetic acid and citric acid content in foods)
7. Determination of Vit. A and total carotenes. Determination of Vit.C in foods by dye method
8. Estimation of Chlorophyll
9. Isolation of micro organisms – Pour plate methods, spread plate and streak plate methods.
10. Morphological identification of important molds, yeasts in foods (Slides and Cultures)
11. Microbial production of alcohol.
12. Microbial production of acetic acid.
13. Visit to an Industry.

MODEL QUESTION PAPER

B. Sc DEGREE EXAMINATIONS

SEMESTER -V

Course 7 : Food Analysis – Chemical and Microbial

Time :3 Hrs. **Max. Marks: 75**

SECTION – A

Answer any FIVE Questions. **5 X 5= 25 M**

What is Food moisture and give some examples of moisture levels in foods

1. Expend HTST, give appropriate example.
2. Write about functional properties of Lipids.
3. What is Rancidity and tests involved in it
4. Define Shortening and saponification value.
5. What are vitamins and give some sources
6. What is Food spoilage with examples
7. Define food hygiene

SECTION – B

Answer the following Questions. **5 X 10 = 50 M**

8. a). Define water activity and its mechanism in food with appropriate graph and examples**.**

   (OR)

   b) What are carotenoids Explain about its properties along with structures

9. a) What are carbohydrates and its classification examples

   (OR)

   b) What are enzymes and its applications in food industry

10. a) Explain about food colourants and certified dyes and its limitations in briefly

    (OR)

    b) Write about shortening and factors affecting in it

11. a) What is pectin and their substances and give some food examples along with Flow chart

    (OR)

    b) Write in detail about food spoilage and sources of contamination at different levels of processing stages

12. a) What are food poisoning and Food borne intoxication**.**

    (OR)

    b) What are sanitation and hygiene and list out steps involved in CIP in Dairy Industry.

13. a)what are food poisoning and food borne intoxication.

    (OR)

    b) what are sanitation and hygiene and list out steps involved in CIP in Dairy Industry.