

SHIVAJI UNIVERSITY, KOLHAPUR.
BACHELOR OF FOOD TECHNOLOGY AND MANAGEMENT (B.F.T.M.)
(NON CONVENTIONAL VOCATIONAL COURSES FOR WOMEN)

APPENDIX – ‘A’

Three years Degree course in Food Technology & Management affiliated to Shivaji University, Kolhapur. This Course is full time course.

- * TIME:- 9.00a.m. to 3.00 p.m. - Monday to Saturday
- * 6 Work hours per day: “42” work hours per week.
- * In addition project work.
- * One educational visit for a month on Saturday.
- * One educational trip per year or workshop.

ELIGIBILITY AND ADMISSION PROCEDURE:

H.S.C. (10+2) of Maharashtra state board or equivalent with Science.

The students who have passed three years Diploma in Food Technology (10+3) shall be given admission directly to the second year BFTM

The institution shall not give weightage of more than 50% marks for entrance Examinations in the matter of admission.

**APPENDIX B: COURSE STRUCTURE
FOOD TECHNOLOGY: FIRST YEAR DEGREE COURSE**

FIRST YEAR

Sr. No.	Subjects	Total Marks Theory		Total Period per week		No. of papers duration for Exam.
		Written (theory)	Practical	Theory	Practical	
1	Communication Skill	100	--	4	---	One Theory (3 Hrs.)
2	Applied Math's & Statistics	100	--	4	---	One Theory (3 Hrs.)
3	Applied Physics	100	50	4	4	One Theory (3 Hrs.) one practical (3 Hrs.)
4	Food Chemistry	100	50	4	4	One Theory (3 Hrs.) one practical (3Hrs.)
5	Principles of food Science.	100	---	4	--	One Theory (3 Hrs.)
6	Human physiology	100	50	4	4	One Theory (3 Hrs.) one practical (3 Hrs.)
7	Human Nutrition	100	50	4	4	One Theory (3 Hrs.) one practical (3 Hrs.)
8	Human Resource Management	100	---	4	---	One Theory (3 Hrs.)
Total Marks =1000 Minimum passing marks in each subject head = 40%						

NOTE : ONE PERIOD IS OF 45 MINUTES
ONE BATCH OF TWENTY STUDENTS

FOOD TECHNOLOGY: SECOND YEAR DEGREE COURSE

SECOND YEAR

Sr.	Subjects	Total Marks		Total Period per week		No. of papers duration For Exam.
		Written (theory)	Practical	Theory	Practical	
1	Advanced Human Nutrition	100	50	4	4	One Theory (3 Hrs.) one practical (3 Hrs.)
2	Cereal, legume & oil seed Technology	100	50	4	4	One Theory (3 Hrs.) one practical (3 Hrs.)
3	Food Microbiology	100	50	4	4	One Theory (3 Hrs.) one practical (3 Hrs.)
4	Food Hygiene & Sanitation	100	--	4	--	One Theory (3 Hrs.)
5	Techniques in Food Analysis	100	50	4	4	One Theory (3 Hrs.) one practical (3 Hrs.)
6	Biochemistry	100		4	-	One Theory (3 Hrs.) One Practical (3 Hrs.)
7	Introduction to Computer	100	--	4	--	One Theory (3 Hrs.) one practical (3 Hrs.)
8	Bio- technology	100	---	4	---	One Theory (3 Hrs.)
9.	* Environmental Studies	70	30 (Project)			
Total Marks =1000 Minimum passing marks in each subject head = 40% * - For this subject Grading system as per University Examination pattern.						

NOTE : ONE PERIOD IS OF 45 MINUTES
ONE BATCH OF TWENTY STUDENTS

FOOD TECHNOLOGY-: THIRD YEAR DEGREE COURSE

Sr.	Subjects	Total Marks			Total Period per week		No. of papers duration For Exam.
		Written (theory)		Practical	Theory	Practical	
1	Clinical & Community Nutrition	100		50	4	4	One Theory (3 Hrs.) one practical (3 Hrs.)
2	Processing and Preservation of Fruits and Vegetables	100		50	4	4	One Theory (3 Hrs.) one practical (3 Hrs.)
3	Animal Product Technology	100		---	4	--	One Theory (3 Hrs.) one practical (3 Hrs.)
4	Dairy Technology	100		50	4	4	One Theory (3 Hrs.) one practical (3 Hrs.) 3
5	Bakery & Confectionery	100		50	4	4	One Theory (3 Hrs.) one practical (3 Hrs.)
6	Food Quality Control,Utilisation of industrial byproducts & waste	100		--	4	--	One Theory (3 Hrs.) one practical (3 Hrs.)
7	Production, Packaging & Marketing of Food Products	100		-	4	--	One Theory (3 Hrs.) one practical (3 Hrs.)
8	Project	100		---	--	--	---
Total Marks =1000 Minimum passing marks in each subject head = 40%							

THIRD YEAR

NOTE : ONE PERIOD IS OF 45 MINUTES
ONE BATCH OF TWENTY STUDENTS

APPENDIX C: STANDARD OF PASSING

- 1] A candidate must obtain minimum 40% of the marks in each paper (Theory as well as practical)
- 2] For passing the Project Examination a candidate shall have to obtain minimum 40% marks.
- 3] * The Candidates obtaining 50% but less than 60% marks in the final year examination be declared to have passed the B.F.T.M. examination in Second Class.
 * Those obtaining 60% but less than 70%marks in the final Year shall be declared to have passed the B.F.T.M. examination in FIRST CLASS.
 * Those obtaining 70% or above in the final Year shall be declared to have passed the B.F.T.M. examination in FIRST CLASS with distinction
- 4] A candidate who passes in at least FIVE papers of the B.F.T.M. Part-I examination shall be allowed to keep terms for B.F.T.M. Part-II Class. Such a candidate shall have to pass the BFTM I examination within four years from the time of appearance for B.F.T.M. part-I examination. along with papers of B.F.T.M.-II
- 5] A candidate who passes in at least FIVE papers of the B.F.T.M. Part-II & have cleared first year B.F.T.M.I examination shall be allowed to keep terms for B.F.T.M. Part-III . Such a candidate shall have to pass the BFTM II examination within four years from the time of appearance for B.F.T.M.-II along with the papers of B.F.T.M.–III.
- 6]. In addition to all the passing standards prescribed before all candidates will have to produce a certificate in prescribed form having completed all seminar, project work & the assignments, duly endorsed by the Principal of the college. The college shall maintain official records of enrolment of candidate this regard.
- 7]. B.F.T.M. degree merit will be awarded on the basis of final year examination. (Out of 1050)
- 8]. If a candidate fails in either theory or practical of any subject she will have to appear for theory as well as practical examination of the same subject.

APPENDIX 'D'
P R E F A C E

The main objective of a perfect nutrition are

-----to increase the employability of women in the food processing sector of Indian Economy which has been accorded priority in policy making.

-----To expose the participants to the basic essentials of food technology & preservation so that they become capable of independently handling food processing units.

-----To make them understand the nutritional side which may help inoculate the scientific view regarding dietary habits of population.

-----To enable the participants to keep themselves at least of recent changes in Food Technology & management.

---- To appreciate the management & marketing perspective of food processing industry.

-----Finally to create necessary awareness regarding the factors affecting food processing & preservation.

The need for qualified nutrition expert is very important, as he/she understand the importance of nutrition & its relation to health.

INTAKE AND MIGRATION:

The sanctioned intake of the candidates at the First Year level shall not exceed a maximum of 60 candidates in a class. If more than 60 candidates are admitted, separate classes shall be organized.

The institutions may permit at their discretion migration of students from one institute to another institute to the maximum number of students not exceeding the permitted maximum intake in a class.

COURSE AND PERIOD OF STUDIES:

1. The Institutions imparting instructions in Food Technology & Management may follow the lectures & the periods of studies as prescribed in Appendix 'A' & 'B'.
2. The Institution shall, as an integral part of Food Technology & Management education curriculum & as a part of teaching programme arranged for study tours, & other project facilities.

APPENDIX 'E' TEACHING STAFF STRUCTURES

Each Institute must have a staff structure consisting of the following :
Principal or Head of the Department & Professors/Asst. Professors or Readers & Lecturers in the ratio of 1:2:4.

Standard of Staff, equipment's, accommodation, training & other facilities for professional education.

The Institution shall maintain a Teacher/Student ratio of 1:10

The Institutions shall have a minimum number of 12 faculty members for a student strength of 100.

The Institution will the intake of 60 in a class may have the Standard faculty as prescribed by the University.

The Institution shall encourage the faculty members to involve in professional practice including research.

The Institution shall provide exchange of faculty members for academic programme. Not with standing anything contained in these regulation, the Institutions may prescribes minimum standard of Food Technology Education provided such standard does not in the opinion of the Council, fall below the minimum standards prescribed from time to time by the Council to meet the requirements of the professional & education thereof.

PROFESSIONAL EXAMINATION:

The University or an independent Examining Body shall conduct the examination at the end of each year.

The essential work shall be as far as possible, be assessed; by a jury at internal & external examiners.

The pass percentage shall not be less than 40% in each subject.

An examiner for any subject of examination shall have a minimum 3 years of teaching/professional experience in his/her field at study.

Qualification for the post of Lecturers Master Degree in relevant subjects with B+ grade.

BACHELOR OF FOOD TECHNOLOGY AND MANAGEMENT**SECOND YEAR****PAPER - I****ADVANCED HUMAN NUTRITION**

Theory: 100 Marks
Practical :- 50 Marks

Objectives :-

To enable students to:

- 1] Know the importance of therapeutic diet.
- 2] Knowledge about dietary control of different diseases.

Theory:-**Unit 1:- Introduction Nutritional role of**

- Carbohydrate and fibre
- Protein
- Lipid
- Vitamins
- Minerals

Unit 2 :- Body composition

- Definition
- Importance
- Classification
- Methods of assessment of body composition
- Energy value of food
- Determination of Energy value of food

Unit 3 :- Introduction to therapeutic diets.

- Basic concepts
- Principles,
- Factors considered,
- Classification,
- Feeding methods.
- Food exchange list
- Importance
- Types
- Classification

Unit 4 :- Diet in

Fever
Typhoid
Tuberculosis
Influenza
Rheumatic fever

Unit 5 :- Diet in Diseases of metabolic disorders

Arthritis
Diabetic mellitus
Gout

Unit 6:- Diet in Diseases of endocrine disorder**Unit 7 :- Diet in dental diseases****Unit 8 :-Diet in Gastro intestinal Diseases**

Indigestion
Peptic Ulcer
Dumping syndrome
Constipation
Diarrhea
Lactose intolerance
Celiac disease
Irritable Bowel Syndrome
Inflammatory Bowel Disease
Flatulence

Practicals :-

1. Weights and measures
2. Preparation of therapeutic diets – liquid diet, full fluid, solid and semisolid diet.
3. Diet in fever, diet in typhoid, diet in influenza, diet in tuberculosis
4. Diet in diabetes and gout.
5. Diet in endocrine disorder
6. Diet in Gastro intestinal Diseases

Reference: -

1. Joshi S. A. 'Nutrition and Dietetics', New Delhi, Tata Mc Graw Hill Publishing Co. Ltd.
2. Robinson 'Normal and Therapeutic Nutrition' New Delhi, Tata Mc Graw – Hill Publishing Co. Ltd.
3. Crampton E.W. and L. E. Lloyd (1915), 'Fundamentals of Nutrition', San Francisco W. H. Freeman
4. Davidson S.R, Passmore and J.F. Brock (1986), 'Human Nutrition and Dietetics' London Churchill, Livingstone
5. Antia F.P (1986), 'Clinical Dietetics and Nutrition', Bombay, 3rd edition, Oxford University Press.
6. Jelliffe B.B. 'Assessment of Community Nutriion Status'
7. B. Srilakshmi. ' Dietetics' 5th edition

BACHELOR OF FOOD TECHNOLOGY AND MANAGEMENT

SECOND YEAR

PAPER II

SUBJECT: CEREAL LEGUME AND OIL SEED TECHNOLOGY

Theory: 100 Marks
Practical :- 50 Marks

Objectives :-

To enable students to:

- 1] Develop protein concentrate, novel food stuff
- 2] Make them aware of importance of cereal legume and oil seed technology.

Unit 1 :- Importance of cereals

- Types of cereals
- Varieties
- Morphology
- Composition
- Nutritive value
- Physiochemical properties

Unit 2 :- Milling and Processing of cereals

- different methods of milling of different cereals
- bran separation
- processing of cereal products
- production of starch
- malt
- flakes
- popcorn
- preparation of dextrins

Unit 3 :- Importance of legumes

- Types of legumes
- Composition
- Nutritive value
- Physiochemical properties

Unit 4 :- Milling and processing of Legumes

- methods of milling of pulses
- cooking quality and factors affecting cooking quality
- puffing, roasting and parching
- processing methods
- dehulling losses
- effect of dehulling on nutritive value.
- Cooking quality
- Grading methods
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Unit 5:- Importance of oil seed

- types of oil seed
- chemical composition
- nutritive value
- antinutritional factors

Unit:-6 Oil seed processing

- natural sources of oil extraction
- physiochemical properties
- oil processing machinery
- solvent extraction
- factors influencing extraction
- types of solvents
- refining of oil
- hydrogenation
- changes during storage
- oil for fortification
- non edible oil and their purification
- oil seed flour concentrates and isolate
- protein rich food

Unit 7 :- Antinutritional factors in cereals , legumes & pulses

Unit 8 :- Recent developments in cereal, legume & oilseed technology

PRACTICALS:

- parboiling
- rice cooking quality
- malting
- flaking
- puffing
- germination
- soaking and sprouting
- oil extraction
- food grade cake
- production of protein rich food
- formulation & design of new instant products
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REFERENCE BOOKS:

Cereal Technology - Kent

Post harvest technology of cereals, Legumes and oil seeds - Chakrawarti

Post harvest Biotechnology of cereals - D.K.Salunkhe

Processing protein stuff - Altschule

Cotton seed chemistry processing technology - A.E.Bailey

Rice production and utilization - Ber Sluh

Primary cereal processing - Bernard Godas, Claude William

Technology and refining of oils and fats - T.L.Mahata

Cottonseed chemistry and technology - K.S.Murti

Post harvest Biotechnology of oilseeds - K.T.Aachaya

**BACHELOR OF FOOD TECHNOLOGY AND MANAGEMENT (BFTM)
SECOND YEAR
PAPER III
SUBJECT: FOOD MICROBIOLOGY**

Theory: 100 Marks
Practical :- 50 Marks

Objectives :-

To enable students to:

- 1] Acquire knowledge regarding food microbiology.
- 2] To know the importance of microbes in food processing

Unit 1 :- General Microbiology

- Importance of Microorganisms in food
- General classification
- Study of morphology of bacteria
- Cultural characteristics and biochemical activity of bacteria.

Unit 2 :- Bacterial Growth curves

- Physical and chemical factors affecting growth of bacteria

Unit 3 :- Destruction of microorganism

- Control of microorganism by physical and chemical agent
- Preservation of microbial culture

Unit 4 :- Food preservation

principles of preservation

- Asepsis
- Use of temperature and sterilization
- Controlled water activity
- Drying
- Radiation
- Pressure

Unit 5 :- Spoilage of different groups of food

- Cereal and cereal product
- Milk and milk product
- Meat and meat product
- Fish and fish product
- Poultry and egg product
- Sugar and sugar product

Unit 6 :- Contamination

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- Food poisoning
- Food born infections
- Food born intoxication
- Myco toxins
- Waterborne diseases
- Immunology and vaccination

Unit 7 :- Industrial Microbiology

Role of microbes in production of
Fermented food
Vinegar
Pickles
Acid

Unit 8 :- Indicators of Food safety & quality

PRACTICALS

1. Microbiology
2. Sterilization of glasswares
3. Preparation of nutrient media
4. Techniques of inoculation
5. Staining methods
6. Preparation of pure cultural techniques
7. Determination of microbial number
8. Mold examination in food
9. Microbial examination of fish, egg, milk and milk product

REFERENCE BOOKS:

1. Fundamentals of microbiology - Frobisher Martin
2. Bacteriology - A.S. Salle
3. Introduction to Microbiology – Edward J.C. and Singh R.B.
4. Microbiological Application – Bensen, Harold J.
5. Biology of Microorganism – R.D. Crock
6. Food Microbiology – W.C. Frasier
7. Modern food microbiology- James Jay
8. Basic food Microbiology- G.J. Banwart

**BACHELOR OF FOOD TECHNOLOGY AND MANAGEMENT (BFTM)
SECOND YEAR
PAPER IV
SUBJECT: FOOD HYGIENE AND SANITATION**

Theory: 100 Marks

Objectives :-

To enable students to:

- 1] Gain knowledge of hygienic handling of food.
- 2] Apply basic principles of sanitation in the maintenance of food processing plant.

Unit 1 :- Introduction:

- Importance of food hygiene and sanitation

Unit 2 :- General principles of food hygiene in rural and urban areas in relation to food

Preparation

- personal hygiene
- hygiene during processing, packaging and storage

Unit 3 :- Water

- Sources
- Purity requirement
- Physical and chemical methods of treatment and storage

Unit 4 :- Sanitation

- Definition
- Terminology related to sanitation
- Types of sanitation
- Properties of detergents and sanitizing agents
- Sanitation facilities and procedures in food plant operation
- Rural and urban area
- Fairs and festivals
- Plant sanitation
- Layout construction
- Design of plants machineries

Unit 5 :- Disposal of Sewage

- Night soil
- Sewage treatment
- Microbial standards for foods
- Layout and sanitation in vegetable processing
- Dairy
- Meat
- Poultry
- Cereal
- Bakery
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Unit 6 :- Waste disposal

- Terminology viz.
- Industrial waste
- Sewage
- Influence
- Waste water
- Sludge
- Dissolved oxygen
- B.O.D
- C.O.D
- Waste disposal and treatment
- Pollution hazards
- Solid and liquid wastes
- Physical, chemical and biochemical methods
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Unit 7 :- Gobar gas

- Introduction
- Merits and demerits
- Chemistry of fermentation
- Factors affecting gas production
- Properties of biogas and its use.

Unit 8 :- Legal aspects of waste disposal & treatment**REFERENCE BOOKS:**

Guide to improving food hygiene - Ed Gaston and Tiffney
Practical food microbiology and Technology (2nd edition) - Harry H.Weiser
Food poisoning and food hygiene (3rd edition)- Betty C. Hobbi
Principles of food sanitation - Marriott, Norman G

BACHELOR OF FOOD TECHNOLOGY AND MANAGEMENT (BFTM)
SECOND YEAR
SUBJECT: TECHNIQUES IN FOOD ANALYSIS PAPER V

Theory: 100 Marks
Practical: - 50 Marks

Objectives: -

To enable students to:

- 1] Understand the different techniques in food analysis.
- 2] Develops skill in analysis

Unit 1 :- Proximate analysis of food

- Preparation of sample
- Methods of preparation of sample
- Moisture estimation
- Protein estimation
- Fat estimation
- Fibre estimation
- Ash estimation
- Carbohydrate estimation

Unit 2:- Types of Solutions & their preparation

- Molar Solution
- Normal solution
- Colloidal solutions
- Buffer solutions
- Measure of pH

Unit 3 :-Colorimetry and spectrophotometry

- principle
- Beer's - Lambert's law
- Construction
- Working
- Care of colorimeter
- Standard solution
- Blank solution

Unit 4 :-Chromatographic Techniques

- principle
- classification
- Partition chromatography
- Adsorption chromatography
- Gel chromatography
- Ion exchange chromatography
- Affinity chromatography
- Paper chromatography
- Column chromatography
- HPLC

Unit 5 :-Electrophoresis

- Principle
- Types of electrophoresis
- Moving boundary electrophoresis
- Zone electrocphoresis
- Isoelectric focusing
- Factors affecting electrophoresis
- Applications
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Unit 6 :-Flame photometer

- Principle
- Construction
- Working
- Applications

Unit 7:- Fluorimetry

- Principle
- Working
- Applications
- Fluorimetric determination of thiamin & Riboflavin

Unit 8 :-Atomic absorption spectroscopy

Principles ,instrumentation & applications

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PRACTICALS:

- 1 Principle and working of analytical instrument such as colorimeter, balances, oven, muffle furnace,,incubator, centrifuge
 2. Estimation of Moisture from food sample
 - 3 Estimation of Protein from food sample
 - 4 Estimation of Fat from food sample
 - 5 Estimation of Ash from food sample
 - 6 Estimation of Fibre from food sample
 - 7 Determination of acidity of honey sample
 - 8 Determination of gluten content from the wheat flour
- Qualitative estimation of aminoacids by paper chromatography
Verification of Beer's Lambert's law

REFERENCE BOOKS:

- Food analysis theory and practice - Pomeranz and Meloan
Methods in food analysis - Maynard
Elementary principles of laboratory instrument - Lee L.W, C.W.Mosly
Principles and Technology of practical biochemistry - E.D.William, K.Watson and Edward, Arnold Pub.
5 Pearson's composition & analysis of foods

BACHELOR OF FOOD TECHNOLOGY AND MANAGEMENT**SECOND YEAR
PAPER VI
SUBJECT: BIOCHEMISTRY**

Theory: 100 Marks

Objectives :-

To enable students to:

- 1] Understand the chemistry of food
- 2] To know the importance of biochemistry in nutrition.

Unit 1:- Introduction to metabolism

Catabolism & Anabolism

Unit 2 :- Carbohydrate metabolism

Digestion and absorption of carbohydrates,

- Glycolysis / EMP
- Krebs' cycle / TCA
- HMP
- Electron transfer chain and oxidative phosphorylation
- Glycogenesis
- Glycogenolysis
- Cori's cycle
- Inborn errors of carbohydrate metabolism

Unit 3:- Protein metabolism

Protein Digestion

- Absorption
- Transamination
- Deamination
- Urea cycle
- Decarboxylation of amino acid
- NPU
- NPN
- Inborn error of protein metabolism

Unit 4 :- Lipid metabolism

Digestion and absorption of fats

β-oxidation of fatty acids

- ω oxidation
- Inborn errors of fat metabolism

Unit 5 :- Nucleic acid

- structure
- classification
- metabolic function

Unit 6 :- Enzymes

- Definition
- Occurrence
- Nomenclature

- Classification
- Mechanism of enzyme action
- Factors affecting enzyme activity
- Coenzymes
- Prosthetic groups
- Enzyme kinetics

Unit 7 :- Hormones

- Definition
- Classification
- Metabolic functions
- Mechanism of action of hormones

Unit 8:- Acid – Base balance

REFERENCE BOOKS:

1. Outlines of Biochemistry - Hawk
 2. Text book of Biochemistry - West and Todd
 3. Osner Hawk's practical Physiological Chemistry - Hawk
- Principles of Biochemistry - Lehninger
Principles of Biochemistry - Voet
Practical Biochemistry - Thamian

**BACHELOR OF FOOD TECHNOLOGY AND MANAGEMENT (BFTM)
PAPER VII**

SECOND YEAR

SUBJECT: INTRODUCTION TO COMPUTER

Theory: 100 Marks

Objectives :-

To enable students to:

- 1] Understand the importance of advance technology in food processing.
- 2] Develop the skill of using computer in Food Industry.

Unit 1 :- Introduction to the computer-characteristics of a computer

Unit 2 :- Block diagram, to illustrate basic organization of a computer system, function of various units.

Unit 3 :-Input device, output device, Types of memory-primary and secondary memory

Unit 4 :- Concept of hardware and software, types of software.

Unit 5 :- Importance of computerizing in food processing

- Computer applications in stimulating and modeling

Unit 6 :- Introduction to word processor-

Basics features of MS.WORD, formatting, creating tables, mail merge, Introduction to PowerPoint, creating presentation-using PowerPoint.

Unit 7: - Introduction to excel-

Worksheet, cell, workbook, creating formulas, built in function of excel

Unit 8:- Introduction to Internet

Internet application email, Protocols, Browsers, URL

REFERENCE BOOKS:

1. Fundamental of computer - Rajaraman
2. Computer Fundamental-P.K.Shina
3. M.S. office-Kannan C.N.
4. Notes for computer course-Phadake Prakashan
5. Internet complete-BPB.
6. System stimulation with digital computer - Narsingh Dev

BACHELOR OF FOOD TECHNOLOGY AND MANAGEMENT**SECOND YEAR****SUBJECT: Bio-technology.****PAPER- VIII**

Theory: 100 Marks

Objectives :-

To enable students to:

- 1] Obtain knowledge ,recent advances in molecular biology.
- 2] To make the students aware of applications of biotechnology in food industries

Unit 1 :- DNA- structure, experimental evidence as proof of genetic material ,
prokaryotic & eukaryotic DNA , chromosomal & extrachromosomal DNA.

Unit 2 :- RNA Structure ,types and functions

Unit 3 :- General overview of replication ,transcription and translation, regulation
of gene expression

Unit 4 :- Recombinant DNA technology-enzymes involved ,vectors - plasmids ,
cosmids
isolation of gene, cDNA library

Unit 5 :- Microbial production of citric acid ,vinegar and other substances added to
Foods

Unit 6 :- Use of enzymes in food industry
Use of proteases in food processing
Use of lactase in dairy industry
Use of glucose oxidase & catalase
Enzymes in fruit juices & brewing industry

Unit 7 :- Mushrooms

Unit 8 :- Genetically modified foods & space foods

REFERENCES :-

- 1.Biotechnology –B.D.Singh
- 2.Food microbiology-William C Frazier
- 3.Principles of biochemistry-Albert Lehninger

4. Microbial genetics – Maloy

QUESTION PAPER PATTERN AND MARK DISTRIBUTION**THEORY PAPER: - 100 Marks Each****A] Objective questions: - 15 Marks**

Fill in the blanks
 Match the following
 Answer in one sentence.

B] Short notes - 15 Marks

Write short notes on any three from five.

C] Subjective Questions – 70 Marks

Solve any 5 questions from Question No. 3 to 9.

PRACTICAL PAPER – 50 Marks each Duration 3 hours.**Distribution of 50 Marks**

*	Journal-	10 Marks
*	Viva-	10 Marks
*	Writing of the - principle	5 Marks
*	Observation table -	5 Marks
*	Result & conclusion –	5 Marks
*	Experiment -	15 Marks

PROJECT- 100 Marks

*	Inplant training of thirty day	- 50 marks
*	Submission of the project	- 25 marks.
*	Project viva	- 25 marks

Equivalence B.F.T.M I

Old Course	New Course
Communication Skill	Communication Skill
Applied Math's & Statistics	Applied Math's & Statistics
Applied Physics	Applied Physics
Food Chemistry	Food Chemistry
Principles of food Science.	Principles of food Science.
Human physiology	Human physiology
Human Nutrition	Human Nutrition
Personnel Management & Industrial Relation	Human Resource Management

Equivalence B.F.T.M II

Old Course	New Course
Advanced Human Nutrition	Advanced Human Nutrition
Cereal, legume & oil seed Technology	Cereal, legume & oil seed Technology
Food Microbiology	Food Microbiology
Food Hygiene & Sanitation	Food Hygiene & Sanitation
Techniques in Food Analysis	Techniques in Food Analysis
Biochemistry	Biochemistry
Computer application to food industry	Introduction to Computer
Bio- technology	Bio- technology
Indian Constitution (Marks allotted are internal)	There is no theory paper
* Environmental Studies	* Environmental Studies