

3rd Semester

FBM 211	Basics of Management	3 0 0 = 3
UNIT-I		
Introduction to management and organizational environment-Management: Concept, process, levels of management, managerial roles and skills, Nature of managerial work, Social Responsibility and managerial ethics; Systems and contingency approach to management.		
UNIT-II		
Decision making: Process of decision making Types or problems and decisions; Planning and its Process, MBO; Organizing-organization design & structure, Communication- forms of communication, Controlling- Process and Techniques		
UNIT -III		
Organisational Behaviour: Concept, Nature, Characteristics, Relationship of OBwith Other Fields, Individual Behaviour: Perception and Attribution: Concept, Nature, Process and Importance and applications; Attitude: Concept, Process and Importance, Attitude Measurement; Personality: Concept, Nature, Types and Theories ;Learning: Concept and Theories.		
UNIT-IV		
Motivation: Concept, Theories and their Application; Leadership: Concept, Function, Styles, Theories of Leadership-Trait, Behavioural and Situational Theories; Group Dynamics: Stages of Group Development, Formal and Informal Groups, Group Processes and Decision Making, Dysfunctional Groups.		
UNIT-V		
Organisational Change : Concept, Nature, Resistance to change, Managing resistance to change, Implementing Change, Kurt Lewin Theory of Change; Stress: Understanding Stress and Its Consequences, Causes of Stress, Managing Stress; Organisational Culture: Concept, Characteristics, Implications of Organisation culture.		
Text Books :		
<ol style="list-style-type: none"> 1. Robbins and Coulter, Management; Prentice Hall of India 2. Richard Daft, Principles of management; Cengage 3. Wehrich Heinz and Koontz Harold, Principles of Management; Tata McGraw Hill 4. Luthans Fred- Organizational Behaviour, Tata McGraw Hill 5. Robbins Stephen P. - Organizational Behaviour, Pearson Education, 12th Edition 6. Hersey Paul, Blanchard, Kenneth Hand Johnson Dewey E.-Management of Organizational Behavior: Leading Human Resources, Pearson Education, 8th Edition. 		
Course Outcome:		
<ol style="list-style-type: none"> 1. Observe and evaluate the influence of historical forces on the current practice of management. 2. Understand the key competencies needed to be an effective manager. 3. Raise awareness of the centrality of organisational behaviour to understanding organisational functioning, focusing particularly on the individual and group/team level. 4. Understand how models, theories and concepts about organisational behaviour can be used in practice in different workplaces across difference regions of the world. 5. Improve the ability to interact with and manage people. 6. Improve ability to design effective organisations 		

FBM 212	Basics of Finance and Accounting	3 0 0 = 3
THEORY		
Unit - I		
Overview: Accounting Concepts, conventions and principles; Accounting Equation, International Accounting principles and standards; Matching of Indian Accounting Standards with International Accounting Standards.		
Unit - II		
Mechanics of Accounting: Double entry system of accounting, journalizing of transactions; preparation of final accounts, Profit & Loss Account, Profit & Loss Appropriation account and Balance Sheet, Policies related with depreciation, inventory and intangible assets like copyright, trademark, patents and goodwill.		
Unit - III		
Analysis of financial statement: Ratio Analysis- solvency ratios, profitability ratios, activity ratios, liquidity ratios, market capitalization ratios ; Common Size Statement; Comparative Balance Sheet and Trend Analysis of manufacturing, service & banking organizations.		
Unit - IV		
Funds Flow Statement: Meaning, Concept of Gross and Net Working Capital, Preparation of Schedule of Changes in Working Capital, Preparation of Funds Flow Statement and its analysis ;		
Unit -V		
Cash Flow Statement: Various cash and non-cash transactions, flow of cash, preparation of Cash Flow Statement and its analysis.		

<p>Suggested Reading :</p> <ol style="list-style-type: none"> 1. Narayanswami - Financial Accounting: A Managerial Perspective, PHI, 2nd Edition 2. Ghosh T P - Accounting and Finance for Managers Taxman, 1st Edition 3. Maheshwari S.N & Maheshwari S K – An Introduction to Accountancy ,Vikas, 9th Edition 4. Ghosh T.P- Financial Accounting for Managers Taxman, 3rd Edition 5. Maheshwari S.N & Maheshwari S K – A text book of Accounting for Management, Vikas, 1st Edition <p>Course Outcome:</p> <ol style="list-style-type: none"> 1. Understand the basic concept of accounting, importance of accounting and users of financial information. 2. Understand the importance of accounting standard and general accepted accounting principles. 3. Analyze, interpret and communicate the financial statements of sole traders and joint stock companies. 4. Analyze the financial statements by using ratio analysis and comparative statements. 5. Understand fund flow statement and its preparations. 6. Discuss the importance of cash flow statement as per AS-3 and its preparation.

ENG- 211	ENGINEERING PROPERTIES OF FOOD MATERIALS	2 0 2 = 3
THEORY		
<p>UNIT-1 Introduction to engineering properties of food and biomaterials, structure and chemical composition of foods, physical properties (size, shape, surface area, volume, density, sphericity, porosity, specific gravity). Properties of powdery materials.</p>		
<p>UNIT-2 Moisture in food and biological materials, water activity, food stability, sorption and desorption isotherms.</p>		
<p>UNIT-3 Mechanical properties (strain and stress), rheological properties (viscosity, elasticity, visco-elasticity), textural properties.</p>		
<p>UNIT-4 Thermal properties (specific heat, heat capacity, thermal conductivity, thermal diffusivity, thermal radiation properties)</p>		
<p>UNIT-5 Frictional properties of food materials (angle of repose, coefficient of friction, rolling resistance), aero and hydrodynamic characteristics, optical properties, electrical and dielectric properties</p>		
<p>Practical Determination of the physical properties size, shape, sphericity of food products. Determination of average particle size and distribution of powdered material. Determination of moisture content and water activity of food products. Determination of bulk density, true density and porosity of food grains. Determination of color of various food grains, fruits, vegetables, spices and processed foods by hunter color lab. Determination of density and specific gravity of various liquid foods. Determination of rheological properties of food material by viscometer. Determination of frictional properties (angle of repose and coefficient of friction) of food grains. Measurement of firmness of fruits and vegetables by penetrometer Determination of electrical properties of food materials.</p>		
<p>Text Books : Serpil Sahin and Servet Gulum Sumnu. Physical Properties of Foods. CRC. Sahay KM & Singh KK. (1994). Unit Operation of Agricultural Processing. Vikas Publ. House. Reference Books D G Rao. (2012) Fundamentals of Food Engineering</p>		
<p>Course Outcome:</p> <ol style="list-style-type: none"> 1. To provide information about the food properties usefulness in designing the efficient process and equipment development. 2. Provides fundamental understanding of different properties of food materials 3. Delivers information about the food properties usefulness in designing the efficient process and equipment development. 4. Provides know how about which property is important for particular type of food 		

ENG 212	FOOD ENGINEERING I	3 0 2 = 4
THEORY		
<p>UNIT-1 Material and energy balances, types and Properties of fluids Flow rate, friction losses and pressure drop relationships for Newtonian fluids through pipe.</p>		
<p>UNIT-2 Material handling - Theory, classification of various material handling equipment -conveyors, elevators, trucks, cranes and hoists, Conveyance of food grain and powder in screw and vibratory conveyors. Selection of material handling equipments.</p>		
<p>UNIT-3</p>		

Cleaning - Types, aims of cleaning, methods of cleaning- dry, wet and combination methods. Dry cleaning methods: screening, aspiration, magnetic cleaning and abrasive cleaning. Wet cleaning methods: soaking, spray washing, flotation washing and ultrasonic washing. Sorting and Grading - Advantages of sorting and grading, grading factors, methods of sorting and grading. Size Reduction: principles and laws of size reduction, equipment selection, Particle size analysis.

UNIT-4

Mixing - Terminology (agitating, kneading, blending, and homogenizing), equipments - mixers for liquids of low or moderate viscosity (Paddle agitators, turbine agitators and propeller agitators), mixers for high viscosity pastes (Pan mixer, horizontal mixer and dough mixer), mixers for dry solids (tumbler mixer and vertical screw mixer), effect of mixing on foods. Power consumption and efficiencies.

UNIT-5

Theory and equipment for filtration, Expression, Sedimentation fluidization and centrifugation.

PRACTICALS

Material balance in food processes.

Heat balance in food processes.

Particle size analysis for determination of mean particle diameter.

Performance evaluation of different mills.

Efficiency of separation for a grain mixture using indented cylinder separator

Efficiency of separation for a grain mixture using spiral separator.

Mixing index of food material by ribbon blender and cone blender.

Efficiency of cyclone separator.

Text Books:

Geankoplis J Christie. (1999). Transport Process and Unit Operations. Allyn & Bacon.

Earle R. L. and Earle M.D.. Unit Operations in Food Processing

Reference Books

McCabe WL & Smith JC. (1999). Unit Operations of Chemical Engineering. McGraw Hill.

Sahay KM & Singh KK. (1994). Unit Operation of Agricultural Processing. Vikas Publ. House.

Singh RP and Heldman DR. (1993). Introduction to Food Engineering. Academic Press

Course Outcome:

1. To provide the basic information required to design food processes and different equipments.
2. Informs about the background and basic principles of different unit operations that are most relevant to food industry.
3. Delivers, the basic information required to design food processes and different equipments

BAS 212	Food Microbiology and Safety	2 0 2 = 3
THEORY		
UNIT-1		
Microorganisms important in food industry		
Types of microorganisms, their importance in foods, classification of food borne bacteria, their morphology and distinguishing features with examples.		
UNIT-2		
Growth of microorganisms in foods		
Intrinsic (pH, moisture content, redox potential, nutrient content, antimicrobial constituents and biological structures) and extrinsic factors (temp., RH, presence and concentration of gases) governing growth of microorganisms in food.		
UNIT-3		
Food spoilage		
Chemical changes caused by microorganisms in foods (breakdown of proteins, carbohydrates, fats and other constituents during spoilage), specific microorganisms causing spoilage of milk and milk products, meat, fish, egg, cereals, fruits, vegetables and their processed products, quality defects in canned foods, sugar and confectionary products		
UNIT-4		
Food fermentations		
General description of fermenters, parts and their functions, different types of fermentations (static, submerged, agitated, batch, continuous). Microbial culture selection by screening methods and strain improvement. Starter cultures - definition, types, Fermentation - definition, types (acid, alcohol). Fermented foods - types, methods of manufacture for vinegar, ethyl alcohol, cheese, yoghurt, baker's yeast and traditional Indian foods.		
UNIT-5		
Microbial Food-borne Diseases		
Introduction, types of microbial foodborne diseases (foodborne intoxications and foodborne infections), symptoms and prevention of some commonly occurring food borne diseases.		
PRACTICAL		
<ol style="list-style-type: none"> 1. Enumeration of coliforms, yeasts and molds and total viable bacteria in fruits and vegetables. dairy products 2. Enumeration of coliforms, yeasts and molds and total viable bacteria in dairy products. 3. Enumeration of aerobic spore forming bacteria in food sample. 		

<ol style="list-style-type: none"> 4. Estimation of alcohol content in fermented product 5. Isolation and identification scheme for detection of Salmonella in foods 6. Casein hydrolysis by microorganism on SMA 7. Starch hydrolysis by microorganism using starch agar 8. Evaluation of Starter Culture by Starter Activity Test 9. Assessment of surface sanitation by swab /rinse method and assessment of personnel hygiene by hand wash 10. To study the given sample (milk) using Methylene blue reduction test (MBRT) 11. To find total viable bacteria and coliforms in water by membrane filtration technique 12. Evaluation of canned products for anaerobic spore formers 13. Preparation of Yoghurt
<p>Suggested Books:</p> <ol style="list-style-type: none"> 1. Food Microbiology, TMH, New Delhi by W C Frazier & D C Westhoff 2. Modern Food Microbiology, CBS Publication, New Delhi by J M Jay 3. Essentials of Food Microbiology, Arnold, London by John Garbutt 4. Microbiology, 5th Ed., TMH, New Delhi by M J Pelczar, E C S Chan and Noel R Krieg 5. Microbiology of Safe Food, Blackwell Science, Oxford by S J Forsythe 6. Fundamentals of Food Microbiology AVI Publishing Co. Inc., Connecticut, USA by M L Fields 7. Microbiology of foods by J C Ayres, J O Mundt, W E Sandine, W H Freeman
<p>Course Outcome:</p> <p>Students will be able to acquire, articulate, retain and apply the technical terms and knowledge relevant to microbiology. They would be able to understand and explain roles played by microorganisms in healthy ecosystems and how microbiology and various biotechnologies impact human life and healthy living and food quality. The students would be able to acquire and demonstrate competency in laboratory safety and in routine and specialized microbiological laboratory skills applicable to microbiological research or clinical methods, including accurately reporting observations and analysis. They would also be able to communicate scientific concepts, experimental results and analytical arguments clearly and concisely.</p>

ENG 213	Mechanical Engineering	3 0 2=4
THEORY		
UNIT-1		
Basic concept of thermodynamics: Introduction to state, path, process, work, heat, laws of thermodynamics, internal energy, enthalpy and entropy. Properties of Numerical on thermodynamics laws, steady flow energy equations		
UNIT-2		
Steam generation, use of steam tables and steam quality measurement. Types of boilers (fire tube and water tube boilers), mountings and accessories, Constructional and operational details of Cochran and Babcock and Wilcox boiler. Boiler characteristics.		
UNIT-3		
I.C. Engines: Introduction, classification, constructional details and working of two-stroke and four-stroke petrol and diesel engines, efficiency of otto, diesel and dual cycles .		
UNIT-4		
Hydraulic turbines & pumps: Introduction, classification, construction details and working of Pelton, Francis and Kaplan turbines, Specific speed and selection of turbines, classification of water pumps. Centrifugal, reciprocating pump, screw pump, vane pump, gear pump, lobe pump.		
UNIT-5		
Power transmission methods and devices: Introduction to power transmission, belt, rope, chain drive, gear drive and hydraulic drives. Numericals on belt drive only.		
UNIT-6		
Stresses and strains: Introduction, concept & types of stresses and strains, poisson's ratio, stresses and strains in simple and compound bars under axial flexure loading. Stress-strain diagrams, hooks law, elastic constants and their relationships.		
PRACTICAL		
To study the construction and working of a boiler.		
To study the working and the function of Mountings and Accessories in boilers.		
To study the construction and working of two stroke Petrol engine and Diesel engines.		
To study the construction and working of four stroke Petrol engine and Diesel engines.		
To study the constructional features and working of turbines.		
To study the constructional features and working of reciprocating pump.		
To study the constructional features and working of centrifugal pump.		
To study the constructional features and working of gear pump.		
To study the constructional features and working of screw pump.		
Text Books:		
D S Kumar (2013), Basics of Mechanical Engineering. (KATSON publishers)		
Sadhu Singh (2000), Strength of Material		
Reference Books:		

Nag P. K, (2001), Thermodynamics. Tata Mc graw Hill, New Delhi.
 Ethirajan Ram Krishanan (2010), Fundamentals of Engineering Thermodynamics. (PHI)

Course Outcome:

1. To make the students aware about the need, construction & working of various mechanical devices such as boilers, turbines, pumps, and the concept of power transmission & stress/strain etc.
2. Emphasis laid upon the principles and fundamentals involved in the inter-conversion of thermal energy into mechanical energy and vice versa.
3. The subject also offers a view to students about the common about strength and other related vital aspects of materials.
4. Understand the basic concepts of fundamental of power transmission and thermodynamics.
5. To understand basic principle of steam generation and steam generators.
6. Understand the basic concepts of power generation & pumps

BAS 211

Food Chemistry

3 0 2 = 4

THEORY

Unit 1

Introduction to different food groups and importance of food chemistry Water: The basic molecular of life. Physical properties of water. Properties of Hydration, solvation. Bound water, free water, gels, emulsions and foams, water activity. Distribution of water in various foods and moisture determination.

Unit 2

Carbohydrates: Sources of food carbohydrates; Physico-chemical and functional properties; chemistry and structure of homosachharides and heterosachharides. Cellulose, starch, fructans, galactans, hemi-cellulose, pectic substances, changes in carbohydrates during processing. Carbohydrates determination methods.

Unit 3

Proteins: Sources and physico-chemical and functional properties; Common food proteins. Changes in protein during processing, protein determination methods. Proteins from plant and animal sources.

Unit 4

Fats: Sources and physico chemical and functional properties; PUFA [Poly-unsaturated Fatty Acids] hydrogenation and rancidity; Saponification number, iodine value, Reichert-Meissl number, Polenske value; Lipids of biological importance like cholesterol and phospholipids. Changes in lipids during food processing

Unit 5

Minerals and Vitamins: Sources and structures of minerals & vitamins; Effect of processing and storage of vitamins, Pro vitamins A & D; Vitamins as antioxidants. Food Pigments & Flavouring Agents: Importance, types and sources of pigments - their changes during processing and storages.

PRACTICAL

1. Determination of water activity of different food materials
2. Determination of moisture in food sample
3. Determination of Protein in food sample
4. Determination of Acidity and pH in food sample/beverages
5. Determination of total, non-reducing and reducing sugars
6. Determination of Vitamin C in food sample
7. Estimation of crude fibre in food sample
8. Analysis of lysine content in animal /vegetable sources
9. Estimation of mineral in food products
10. Estimation of Carotenoids

Suggested Reading:

1. Essentials of Food & Nutrition by Swaminathan, Vol. 1 & 2
2. Food Chemistry by L. H. Moyer
3. Hand Book of Analysis of fruits & vegetables by S. Ranganna
4. Food Chemistry by Linhinger
5. Chemical changes in food during processing by Richardson

Course Outcome:

1. Demonstrated ability to identify solutions to problems related to the chemical composition and functionality of food and to apply and expand upon the theoretical concepts presented in lectures.
2. Ability to use terminology, appropriate to the field of food chemistry, correctly and contextually.
3. Ability to explain the benefits and limitations (scientific and ethical)of food additives and processing aids currently used by the food processing industry and those additives which may be permitted to be used in the future.
4. Capacity to formulate foods that are designed to address and contribute to reducing community health concerns.

BAS 124

Computer Programming and IT applications

2 0 2 = 3

Unit 1

Importance of Computerization in Food Industry, IT applications in Food Industry, Computer Fundamental, Problems Solving Using Computer, ERP Software for Food Engineering

Unit 2

Introduction to Operating Systems and its types, Client Server Technology, Introduction of C programming language, Functions, Recursion, Arrays and Pointer

Unit 3

Software Engineering, Software Life Cycle Models, Software Design, Reverse Engineering and Re-Engineering, Case study of Food Industry Software

Unit 4

Introduction to Database System, ER Model, Introduction to Data warehouse & Data Mining concepts, Introduction to MATLAB, MATLAB Basics, MATLAB Programming,

Unit 5

Artificial Intelligence, Introduction of Expert system, Machine learning and its applications, Big data analysis, Uses of Big Data in Food and Beverage industries

Practical

1. Program to find sum of two number using functions.
2. Program to find largest of three numbers.
3. Program to find largest and second largest out of ten numbers.
4. Program to find largest number out of ten numbers.
5. Program to find factorial of number entered through keyboard.
6. Program to find reverse a number entered the through keyboard.
7. Program to swap to numbers.
8. Program to check whether a number is even or odd.
9. Program to check whether a year is leap or not.
10. Program to sum digits of number entered through keyboard.
11. Program to concatenate two strings.
12. Program to check whether a string is palindrome or not.
13. Program to reverse a string.
14. Program to check whether a number is prime or not.
15. Program to generate Fibonacci series.
16. Program to generate function overloading.
17. Program to print student details using constructor and destructor.
18. Create a class and access members function of a class.
19. Program to draw Pyramid of stars.
20. Write a program to find average of male & female height in the class.
21. Write a program to multiply two matrices.
22. Write a MATLAB program to find personal interest.
23. Write a MATLAB program to find current.
24. Write a MATLAB program to find the inverse of a matrix.
25. Write a MATLAB program on division of matrix.

Textbooks

1. R P Singh, Computer Application in Food Technology, Academic Press
2. Operating System Concepts: 7th edition, Silberschatz Galvin
3. Let Us C, Yashwant Kanitkar
4. Amos Gilat, "MATLAB- An introduction with Applications"
5. Software Engineering: Roger S Pressman
6. An Introduction to Database System: Bipin C Desai

Course Outcome:

The course would give awareness to the Students about computing/ processing algorithm The students would be able to get the desired knowledge about Software up gradation, Food industry based ERP system, Industry related software packages for different operations,

1. Installation and maintenance of software
1. Students aware about computing/ processing algorithm
2. Software knowledge up gradation
3. Food industry based ERP knowledge enhancement
4. Industry related software packages awareness for different operations
5. Installation and maintenance of software

Objective

To get acquainted with basic elements of postharvest technology

UNIT I

Postharvest technology: Present status, scope and importance of postharvest management of fruits and vegetables; Causes of postharvest losses; Principles of postharvest physiology; Postharvest biology of fruits and vegetables

UNIT II

Morphology, structure and composition of fruits and vegetables; maturity indices and standards for selected fruits and vegetables; methods of maturity determinations, Preharvest factors affecting postharvest quality, Post harvest physiological disorders - chilling injury, freezing injury and disease

UNIT III

Factors affecting postharvest losses; Harvesting and handling of important fruits and vegetables, Harvesting tools and their design aspects; primary processing for sorting and grading at farm and cluster level; Packing house unit operations

UNIT IV

Postharvest physiological and biochemical changes in fruits and vegetables; ripening of climacteric and non-climacteric fruits; Storage practices: CA and MA, hypobaric storage, pre-cooling and cold storage, Zero energy cool chamber; Commodity pretreatments - chemicals, wax coating, prepackaging, VHT and irradiation.

Suggested Readings

1. Kadar AA.2002. Post-harvest Technology of Horticultural Crops. 2nd Ed. University of California.
2. Thompson, A.K. 2015. Fruit and Vegetables: Harvesting, Handling and Storage. Vol. 1 and 2. Wiley Blackwell, UK.

Course outcomes:

1. Acquaintance with introductory postharvest management
2. Understand the importance of postharvest
3. Understand the basic causes of postharvest losses and remedial practices to reduce postharvest losses and maintain quality under supply chain