

KVA DAV College for Women, Karnal
SYLLABUS SCHEME
B. Voc. in Food Science and Quality Control
Semester I & II
w.e.f. 2014-15

SEMESTER – I

Paper No.	Name	Max. Marks	Exam Duration
FTQ-1	Basic Biochemistry	50 (40+10*)	3 hrs
FTQ-2	General Microbiology	50 (40+10*)	3 hrs
FTQ-3	Basic Principles of Food Processing & Preservation	50 (40+10*)	3 hrs
FTQ-4	Food Analysis and Instrumentation	50 (40+10*)	3 hrs
FTQ-5	Basic Biochemistry (Pr)	50	3 hrs
FTQ-6	General Microbiology (Pr)	50	3 hrs
FTQ-7	Principles of Food Processing & Preservation (Pr)	50	3 hrs
FTQ-8	Food Analysis and Instrumentation (Pr.)	50	3 hrs
FTQ-9	Project Work	25	
BVCOM-I	Communication Skills in English – I (Th)	50 (40+10*)	3 hrs
	(Pr)	25	3 hrs
ES-68	**Environment Studies (Th)	75	3 hrs
	(Pr)	25	
	Total Marks	500	

SEMESTER – II

Paper No.	Name	Max. Marks	Exam Duration
FTQ-10	Food Chemistry	50 (40+10*)	3 hrs
FTQ-11	Food Microbiology	50 (40+10*)	3 hrs
FTQ-12	Food Biotechnology	50 (40+10*)	3 hrs
FTQ-13	Food Safety and Quality Control	50 (40+10*)	3 hrs
FTQ-14	Food Chemistry (Pr.)	50	3 hrs
FTQ-15	Food Microbiology (Pr.)	50	3 hrs
FTQ-16	Food Biotechnology (Pr.)	50	3 hrs
FTQ-17	Food Safety and Quality Control (Pr.)	50	3 hrs
FTQ-18	Project Work	25	
BVCOM-II	Communication Skills in English – II (Th)	50 (40+10*)	3 hrs
	(Pr)	25	3 hrs
	**Computer Awareness (Th)	100	3 hrs
	(Pr)	100	3 hrs
	Total Marks	500	

* Internal Assessment

** Indicates that marks not included in the Grand Total being a qualifying subject.

Semester - I

FTQ – 1: Basic Biochemistry

M. Marks: 50

Theory Exam: 40

Int. Assessment: 10

Duration of Exam: 3 hrs.

NOTE:

Instructions for the examiners:- The examiner will set nine questions in all. All questions will carry equal marks. Question No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set unit wise with four questions from each unit. As far as possible the question will be of short answer type. Each question should be divided into parts & the distribution of marks will be indicated part wise.

Instructions for the candidates:- The candidates are required to attempt five questions. Question No. 1 will be compulsory remaining four others will be attempted by selecting two questions from each unit.

Unit - I

Carbohydrates: Structure and function of carbohydrates- monosaccharides; families of monosaccharides; configuration and conformation; stereoisomerism; Fischer and Haworth projection formula; pyranose and furanose ring forms; reducing and non-reducing sugars; disaccharides and oligosaccharides- definition, structure and function of important di and oligosaccharides viz. lactose, sucrose, maltose, raffinose, stachyose, verbascose; polysaccharides- structure and function of homo and hetero polysaccharides; storage polysaccharides- starch and glycogen; structural polysaccharides- cellulose and chitin.

Amino acids and Proteins: Classification and structure of amino acids; essential amino acids; titration of amino acids; classification and structural organization of proteins- primary structure, secondary structure- α -Helix, β - pleats and β – turn, tertiary structure- myoglobin, quaternary structure-hemoglobin; forces stabilizing different structural levels.

Unit - II

Lipids: Introduction and classification– simple and complex lipids; fatty acids– structure and nomenclature; soap value; acid value; iodine number; essential fatty acids; a general account of structure and function of triacylglycerols, phospholipids, glycolipids, sphingolipids, steroids, and terpenes.

Vitamins: Water soluble (Vit. B1, B2, B3, C) and fat soluble (Vit. A, D, E, K)- their structure and functions.

Enzyme: General properties of enzymes; enzyme action; classification and nomenclature of enzymes; coenzymes; enzyme inhibition; isozymes.

Nucleotides and Nucleic acids: Building blocks- bases, sugars and phosphates; Structure and nomenclature of nucleosides and nucleotides; polynucleotides- DNA (A,B, Z DNA) and RNA (rRNA, mRNA, tRNA).

Recommended Books:

1. Lehninger: Principles of Biochemistry, 4th edition, by David L. Nelson and M.M. Cox (2005) Maxmillan/Worth publishers/W.H. Freeman & Company.
2. Biochemistry (2004) by J. David Rawn, Panima Publishing Corporation, New Delhi.
3. Biochemistry, 2nd edition, by R.H. Garrett and C.M. Grisham (1999). Saunders College Publishing, N.Y. Sons, NY.
4. Biochemistry, 4th edition, by L. Stryer (1995). W.H. Freeman & Co., N.Y.
5. Fundamentals of Biochemistry, 2nd ed., by Donald Voet, Judith G.Voet and Charlotte W. Pratt (2006), John Wiley & Sons, INC.

Semester - I

FTQ – 2: General Microbiology

M. Marks: 50

Theory Exam: 40

Int. Assessment: 10

Duration of Exam: 3 hrs.

NOTE:

Instructions for the examiners:- The examiner will set nine questions in all. All questions will carry equal marks. Question No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set unit wise with four questions from each unit. As far as possible the question will be of short answer type. Each question should be divided into parts & the distribution of marks will be indicated part wise.

Instructions for the candidates:- The candidates are required to attempt five questions. Question No. 1 will be compulsory remaining four others will be attempted by selecting two questions from each unit.

Unit - I

Introduction and Scope of Microbiology: Definition and history of microbiology, contributions of Antony van Leeuwenhoek, Louis Pasteur, Robert Koch, importance and scope of microbiology.

Microscope: Construction and working principles of different types of microscopes- compound, dark field, Phase contrast, Fluorescence and Electron (Scanning and transmission).

Sterilization: Principles and Applications of (a) Physical Methods- Autoclave, Hot air oven, Laminar airflow, Seitz filter, Sintered glass filter, Membrane filter, (b) chemical methods- Alcohol, Aldehydes, Phenols, Halogens, Gaseous agents and (c) radiation methods- UV rays, Gamma rays.

Staining techniques: Principle and types of staining.

Unit - II

Microbial Taxonomy: Concept of microbial species and strains, prokaryotes and eukaryotes, classification of bacteria based on- (a) morphology (shape and flagella), (b) staining reaction, (c) nutrition and (d) extreme environment.

General Account of Viruses and Bacteria: Bacteria- ultrastructure of bacterial cell (both Gram positive and Gram negative) including, endospore and capsule; Viruses- Structure and classification.

Principles of Microbial Nutrition: The requirements for carbon, nitrogen, sulfur, growth factors etc., role of oxygen in nutrition, nutritional categories among microorganisms.

Microbial growth: Kinetics of microbial growth, growth curve, synchronous growth, factors affecting bacterial growth.

Recommended Books:

1. Atlas, R.M. (1998) Microbiology: Fundamental and applications. 2nd edition, Macmillan Publishing Company, New York.
2. Pelezar, M.J., Chan, E.G.S. and Krieg, N.R. (1998) Microbiology.
3. Heritage, J., Evance, E.G.V. and Killington, R.A. (1999) Microbiology in action, Cambridge University Press.
4. Prescott, L.M., Harley, J.P. and Klein, D.A. (1999) Microbiology, W.C.B. Oxford.

Semester - I

FTQ – 3: Basic Principles of Food Processing & Preservation

M. Marks: 50

Theory Exam: 40

Int. Assessment: 10

Duration of Exam: 3 hrs.

NOTE:

Instructions for the examiners:- The examiner will set nine questions in all. All questions will carry equal marks. Question No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set unit wise with four questions from each unit. As far as possible the question will be of short answer type. Each question should be divided into parts & the distribution of marks will be indicated part wise.

Instructions for the candidates:- The candidates are required to attempt five questions. Question No. 1 will be compulsory remaining four others will be attempted by selecting two questions from each unit.

Unit - I

Food processing: Scope and importance of food processing; historical developments in food processing.

Food spoilage: Microbial, physical, chemical & miscellaneous.

Heat preservation and processing: Heat resistance of microorganisms, thermal death curve, types of heat treatments and effects on foods, canning of foods, cans and container types, spoilage of canned foods, heat penetration, brief concept of different heat processing methods: blanching, roasting, frying, baking etc.

Refrigeration storage: Requirements of refrigeration storage, changes of foods during refrigeration storage, refrigeration load, chilling and refrigeration, cold storage.

Freezing and frozen storage: Freezing curves, slow and quick freezing, factors determining freezing rate, freezing methods, changes in food during freezing, frozen food storage, freeze drying in food processing.

Unit - II

Dehydration: Drying, dehydration and concentration, drying curves, drying methods and type of dryers; food concentration, methods of concentration of fruit juices, liquid food concentrates, changes in food during dehydration and concentration.

Water activity: Role of water activity in food preservation, intermediate moisture foods (IMF), principles, characteristics, advantages and problems of IM foods.

Food frying: General principles, frying process, shallow frying and deep frying, frying oils, factors affecting oil uptake during frying.

Emulsification in food processing: Principles, examples of emulsification in food- milk, ice-cream mix, coffee/tea whiteners, salad dressings, meat sausages, margarine and spreads.

Food preservation: Definition, principle and different methods (a) Chemical preservation- types, uses and effects of class I and class II preservatives in foods, (b) House hold preservation methods- pickling, salt curing, oiling and smoking, sugar addition.

Recommended Books:

1. Norman, N.P and Joseph, H.H.(1997). Food Science, Fifth edition, CBS Publication, New Delhi
2. Frazier, W.C and Westhoff, D.C (1996). Food Microbiology, 4th edition, Tata Mc Graw Hill Publication, New Delhi.
3. Kalia, M. and Sangita, S. (1996). Food Preservation and Processing, First edition, Kalyani Publishers, New Delhi.
4. Sivasankar, B. (2002): Food Processing and Preservation, Prentice Hall of India Pvt.Ltd., New Delhi.
5. Desrosier & Desrosier, Technology of Food Preservation.
6. Fellows, Food process technology: Principles and Technology, CRC publications.
7. Khetarpaul, N. (2005). Food Processing and Preservation, Dya Publishing House , New Delhi.

Semester - I

FTQ – 4: Food Analysis and Instrumentation

M. Marks: 50

Theory Exam: 40

Int. Assessment: 10

Duration of Exam: 3 hrs.

NOTE:

Instructions for the examiners:- The examiner will set nine questions in all. All questions will carry equal marks. Question No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set unit wise with four questions from each unit. As far as possible the question will be of short answer type. Each question should be divided into parts & the distribution of marks will be indicated part wise.

Instructions for the candidates:- The candidates are required to attempt five questions. Question No. 1 will be compulsory remaining four others will be attempted by selecting two questions from each unit.

Unit - I

Introduction to food analysis: Types of samples and sampling techniques, storage and preservation of samples, expression of results.

Proximate analysis of foods: Principles of moisture, fat, protein, carbohydrates, crude fiber and vitamins (vit. A and vit. C) in foods.

Sensory analysis of foods: Overview of the sensory principles and practices, selection and screening of the sensory panel, types of panel (trained, semi trained), methodology of sensory evaluation- discriminative tests, difference tests, paired comparison, duo trio, triangle; descriptive tests.

Unit - II

Instrumentation in food analysis: Principles, types and applications of colorimetry and spectroscopy, photometry, electrophoresis, chromatography and atomic absorption spectrophotometry, color measurement in foods, X-ray analysis of foods and its applications, mass spectroscopy, nuclear magnetic resonance (NMR), differential scanning calorimetry (DSC), refractometry and ultrasonics in food analysis, texture analysis in foods- sensory versus instrumental analysis of texture, rapid methods of microbial analysis, immunoassays methods.

Recommended Books:

1. Ronald S. Kirk, Ronald, Sawyer, (1991). Pearson's Composition & Analysis of foods, 9th Edition, Longman scientific & Technical, U.K.
2. Pomeranz, Y. & Mrloan (1978). Food Analysis: Theory and Practice, Westport, connectant: AVI .
3. Amerine, M.A. Pangborn, R.M., and Rosseler, E.B. 1965. Principles of Sensory Evaluation of Food. Academic Press, New York.

Semester - I

FTQ - 5: Basic Biochemistry (Practical)

M. Marks: 50

Duration of Exam: 3 Hrs

1. Qualitative tests for Carbohydrates.
2. Separation of sugars by Paper Chromatography.
3. Qualitative tests for Proteins and Amino acids.
4. Quantitative test of Sugars by Anthrone method.
5. Determination of starch content from wheat flour.
6. Determination of saponification value of Lipids.
7. Starch hydrolysis by salivary amylase.
8. Estimation of Vit. C.
9. Estimation of DNA by DPA method.
10. Estimation of RNA by orcinol method.

FTQ - 6: General Microbiology (Practical)

M. Marks: 50

Duration of Exam: 3 Hrs

1. Safety measures in microbiology laboratory.
2. Study of instruments: Compound microscope, Autoclave, Hot air oven, pH meter, Laminar air flow and centrifuge.
3. Staining techniques in Microbiology-simple, negative and Gram staining.
4. Media preparation: Cleaning and sterilization of glassware; Nutrients agar, MRBA and Nutrient broth.
5. Isolation of bacteria and fungi from soil, air, and water.
6. Pure culture of micro organisms by pour plate, streak plate and serial dilution spread plate method.
7. Measurement of size of microorganism.
8. Prepare growth curve for a bacterial culture.

Semester - I

FTQ - 7: Principles of Food Processing & Preservation (Practical)

M. Marks: 50

Duration of Exam: 3 Hrs

1. Orientation of the food processing laboratory.
2. Quality evaluation of various raw materials for food processing.
3. Roasting of food items.
4. Effects of low temperature storage on various foods.
5. Preservation of food by drying, chemical and radiation.
6. Shelf life evaluation of various food products.
7. Production of different fermented foods.
8. Demonstration and prevention of Browning reactions.

FTQ - 8: Food Analysis and Instrumentation (Practical)

M. Marks: 50

Duration of Exam: 3 Hrs

1. (a) Organoleptics
(b) Nutritional evaluation of processed food - Protein estimation by Lowry method;
Determination of acid value of a fat/oil.
(c) Sensory evaluation of processed food.
2. Moisture content comparison of fresh and intermediate moisture foods.
3. Thin Layer Chromatography
4. Gel Filtration Chromatography
5. Ion-exchange Chromatography
6. Affinity Chromatography
7. PAGE
8. Spectrophotometric analysis of protein, DNA and RNA.
9. Ultrafiltration
10. Ultrasonication
11. Lyophilisation

FTQ - 9: Project Work

M. Marks: 25

Project Report should be submitted up to December and will be evaluated by an External Examiner.

Semester - I
BVCOM - I: Communication Skills in English – I (Theory)

M. Marks: 50
Theory Exam: 40
Int. Assessment: 10
Duration of Exam: 3 hrs

Instructions for the Examiner: The examiner will set nine questions in all, selecting four questions from each section/unit and one compulsory objective type question.

Instructions for the Candidate: The candidate will attempt five questions in all, selecting at least one question from each unit as well as compulsory question.

OBJECTIVES

- To acquire skills for the effective communication.
- To communicate pleasantly with visitors to office using correct terminology related to textile and fashion designing work, make notes and write simple letters

COURSE CONTENTS

THEORY

UNIT – I

Spotting the errors pertaining to Nouns, Pronouns, Adjective and Adverbs, Concord (Grammatical Concord, National Concord) and the Principal of Proximity between Subject and Verb.

- Changing the Voice: From Active to Passive and vice-versa
- Lexis: Idioms and phrases: Words Often Confused, One-word Substitutes, Formation of Words (Suffixes, Prefixes and Derivatives).

UNIT – II

- Communication its meaning and its importance, one way and two way communication, Essentials of good Communication, Methods of communication - oral, written and non verbal.
- Introduction to principal components of spoken English- Transcription, Word-Accent, Intonation, Weak Forms in English.
- Developing Reading and Writing Skills through tasks/ activities as Developing Outlines, Key Expressions, Situation, Slogan Writing and Theme Building Exercises, Dialogue Writing, Interpreting Pictures/Cartoons

PRACTICALS

M. Marks: 25
Exam. Duration: 3 hrs

Developing, Listening and Speaking Skills through Various activities such as

- (a) Role play Activities
- (b) Practicing Short Dialogues
- (c) Debates
- (d) Speeches
- (e) Listening to News Bulletins
- (f) Viewing and Reviewing of TV Programmes
- (g) Mock Interview

REFERENCES

- Aysha Viswamohan, “English for Technical Communication”, Tata Mc-Graw – Hill Publishing Company Ltd., New Delhi, 2008.
- Dorothy E Zemach and Lynn Stafford Yilmaz, “Writers at Work: The Essay”, Cambridge University Press, Cambridge, 2008.
- E.Suresh Kumar and P. Sreehari, “A Handbook for English Language Laboratories”, Osmania University, Hyderabad, 2011
- Mark Ibboston, ”Cambridge English for Engineering”, Cambridge University Press, UK, 2011.

Semester – I

ES - 68: Environment studies

M. Marks: 75

Duration of Exam: 3 hrs.

NOTE:

Instruction for the examiners:- The examiner will set nine questions in all. All the questions will carry equal marks. Question no. 1 (compulsory), consisting of 10-15 short type questions and other eight questions will be set from all seven units. Unit – 8 is field work. It is concerned with project only.

Instructions for the candidates:- The candidates are required to attempt five questions in all. Question no. 1 will be compulsory.

Unit - 1

The Multi-disciplinary nature of environmental studies

Definition, scope and importance

Need for public awareness.

Unit - 2

Natural Resources

Renewable and Non-renewable resources:

Natural resources and associated problems

- (a) Forest resources: Use and over exploitation, deforestation; case studies. Timber extraction, mining, 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, dam's benefits and problems.
 - (c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
 - (d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
 - (e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy resources, case studies.
 - (f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- Role of an individual in conservation of natural resources.
 - Equitable use of resources for sustainable lifestyles.

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, characteristic features, structure and function of the following ecosystems:

- (a) Forest ecosystem (b) Grassland ecosystem (c) Dessert ecosystem
- (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit - 4

Bio-diversity and its conservation

- Introduction-definition: genetic, species and ecosystem diversity.
- Biogeographical classification of India.
- Value of Bio-diversity: consumptive use, productive use, social, ethical, aesthetic and option values.
- Bio-diversity at global, National and local levels.
- India as a mega-diversity Nation.
- Hot-spots of bio-diversity.
- Threats to Bio-diversity; Habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India.
- Conservation of Bio-diversity: In- situ and Ex- situ conservation of Bio-diversity.

Unit - 5

Environmental Pollution

Definition

- Causes ,effects and control measures of:
 - (a) Air pollution (b) Water pollution (c) Soil pollution d) Marine pollution
 - (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards
- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of individual in prevention of pollution.
- Pollution case studies
- Disaster management: Floods, earthquake, cyclone and landslides.

Unit - 6

Social Issues and the Environment

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation , rain water harvesting , watershed management
- Resettlement and rehabilitation of people; its problems and concerns: case studies.
- Environmental Ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.

- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and Control of Pollution) Act.
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation.
- Public awareness

Unit - 7

Human Population and the Environment

- Population growth, Variation among Nations.
- Population explosion- Family Welfare Programme.
- Environment and Human health.
- Human Rights.
- Value Education.
- HIV/AIDS.
- Women and Child Welfare.
- Role of Information Technology in environment and human health.

Unit - 8

Field work

- Visit to a local area to document environmental assets- river/ forest/ grassland/ hill/ mountain.
- Visit to a local polluted site- Urban/ Rural/ Industrial/ Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems- pond, river, hill slopes, etc.

Recommended Books:

1. Environmental Studies, Gupta A.K and Kaur G., 4th edition, Tara Publications, Yamuna Nagar, Haryana.
2. Environmental Chemistry, A.K. De, Wiley Eastern Ltd., New Delhi.
3. Environmental Biotechnology, Agarwal S.K. (1998), APH Publishing Corporation, New Delhi.
4. Environmental Science and Technology, Stankey E.M. (1997), Lewis Publishers, New York.

PRACTICALS

M. Marks: 25

Project work on any topic related to theory syllabus

Semester - II

FTQ - 10: Food Chemistry

M. Marks: 50

Theory Exam: 40

Int. Assessment: 10

Duration of Exam: 3 hrs.

NOTE:

Instructions for the examiners:- The examiner will set nine questions in all. All questions will carry equal marks. Question No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set unit wise with four questions from each unit. As far as possible the question will be of short answer type. Each question should be divided into parts & the distribution of marks will be indicated part wise.

Instructions for the candidates:- The candidates are required to attempt five questions. Question No. 1 will be compulsory remaining four others will be attempted by selecting two questions from each unit.

Unit - I

Food chemistry: Definition, scope and importance; water in food, water activity and shelf life of food; chemical properties of minerals and their bioavailability, enrichment and fortification.

Carbohydrates: Classification, physical and chemical properties of sugars, functional properties and uses of pectic substances, gums and dietary fiber in food; browning reaction in food- enzymatic and non-enzymatic browning, kinetics and control, their occurrence and applications in food; starches- functionality of starch in foods, gelatinization and retro-gradation of starches, modified starches, resistant starches

Proteins: Types and sources of proteins; protein penetration mechanism (folding and unfolding) and application; enzymatic and non-enzymatic browning; texturization– spirit and extrusion process.

Unit - II

Food enzymes: Enzymatic modification, criteria for purity of enzyme and application of enzymes in food technology.

Lipid peroxidation: Mechanism, development of rancidity, antioxidants in foods, types and functions.

Aroma substances: Analysis, isolation, enzymatic and non-enzymatic reactions, individual aroma compounds, food aromatization, microbial aromas.

Flavours and flavour enhancers: Mechanism of synthesis, types, monosodium glutamate, 5-nucleotides, maltol and other compounds.

Food colours: nature and types- acids (acetic, lactic, citric acids etc.), bases and microbial colours.

Sweeteners and sugar substitutes: Types- natural, synthetic and artificial; saccharin, aspartame, cyclamates, thaumatin etc.

Recommended Books:

1. Enzymes in Food Processing, Ind. Edition Ed., by G.A. Tucker & L.F.J. Woods Blackie Academic, 1995.
2. Food Chemistry by H.D. Belitz & W. Grosch Springer-Verlag, Berlin, 1997.
3. Food Chemistry: A Laboratory Manual by Miller, D.D., John-Wiley, USA, 1998.
4. Food Science by N.N. Potter & J.H. Hotchkiss Chapman & Hall, 1995.
5. Food Enzymes: Structure & Mechanism by Dominic W.S. Wong, Chapman & Hall, & Hall, 1995.
6. Food Composition & Analysis by L.W. Ausand et. al., AVI Publishers, 1987.
7. Principles of Food Chemistry by de Man, J.M. an aspean Publication, Maryland, USA, 1999.

Semester - II

FTQ - 11: Food Microbiology

M. Marks: 50

Theory Exam: 40

Int. Assessment: 10

Duration of Exam: 3 hrs.

NOTE:

Instructions for the examiners:- The examiner will set nine questions in all. All questions will carry equal marks. Question No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set unit wise with four questions from each unit. As far as possible the question will be of short answer type. Each question should be divided into parts & the distribution of marks will be indicated part wise.

Instructions for the candidates:- The candidates are required to attempt five questions. Question No. 1 will be compulsory remaining four others will be attempted by selecting two questions from each unit.

Unit - I

Microbiology: Introduction, historical developments in food microbiology; sources of microorganisms in foods; microbiological criteria of foods and their significance.

Effect of food preservatives: Heating process, irradiation, low temperature storage, chemical preservatives and high-pressure processing on the microbiology of foods; control of water activity and microbial growth, applications of hurdle technology for controlling microbial growth.

Unit - II

Foods microbiology and public health: Food poisoning, types of food poisonings, important features; bacterial agents of food borne illness, food poisoning by *Clostridium*, *Salmonella*, *E. coli*, *Bacillus*, *Staphylococcus*; non-bacterial agents of food borne illness: poisonous algae, and fungi - a brief account, the HACCP system and food safety used in controlling microbiological hazards.

Food spoilage: Food spoilage and microbes of milk, meats, fish and various plant products, spoilage of canned foods; Indicator microorganisms, methods of isolation and detection of microorganisms or their products in food; conventional methods; rapid methods (newer techniques)- immunological methods; fluorescent, antibody, radio immunoassay, principles of ELISA, PCR (Polymerized chain reactions).

Recommended Books:

1. James M. Jay (2000). Modern Food Microbiology, 5th Edition, CBS Publishers.
2. Banwart, G.J. (1997). Basic Food Microbiology, CBS Publishers.
3. Adam, M.R. & Moss, M.O. (1995). Food Microbiology, New Age International Pvt. Ltd Publishers.

4. Bibek Ray (1996). Fundamental Food Microbiology, CRC Press.
5. Stanier, R.Y. (1996). General Microbiology, Vth Edition, MacMillan.

Semester - II

FTQ - 12: Food Biotechnology

M. Marks: 50

Theory Exam: 40

Int. Assessment: 10

Duration of Exam: 3 hrs.

NOTE:

Instructions for the examiners:- The examiner will set nine questions in all. All questions will carry equal marks. Question No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set unit wise with four questions from each unit. As far as possible the question will be of short answer type. Each question should be divided into parts & the distribution of marks will be indicated part wise.

Instructions for the candidates:- The candidates are required to attempt five questions. Question No. 1 will be compulsory remaining four others will be attempted by selecting two questions from each unit.

Unit - I

Food biotechnology: Introduction to food biotechnology; basic principles of genetic engineering; improvement of the food crops by genetic engineering; genetically modified plants and animals for enhanced food production; safety of GM food crops.

Natural antimicrobials for food preservation: Phytoalexins, essential oils and their components; bacteriocins: nisin, pediocins etc; applications of bacteriocins in food systems as biopreservatives.

Unit - II

Protein engineering in food technology: Methods, applications of protein engineering to produce glucose isomerase, Lactobacillus beta- galactosidase and peptide antibiotic nisin.

Biotechnological routes to food flavour production: Microbial, enzymatic etc. Biotechnology and Food ingredients- biogums, fat substitutes, biocolors, organic acids and sweeteners.

Transgenic plant foods: Golden rice, Bt brinjal, maize, tomato, potato, soyabean etc.

Intellectual property rights (IPR): Issues and biopiracy problems; effect of biotech foods on the food business of developing and developed countries.

Recommended Books:

1. Lee, B.H. (1996). Fundamentals of Food Biotechnology, VCH Publishers.
2. Tombs, M.P. (1991). Biotechnology in Food Industry, Open University Press, Milton Keynes.
3. Knorr, D. (1987). Food Biotechnology, Marcel Dekker , INC , New York.
4. Schwartzberg, A & Rao (1990). Biotechnology & Food Process Engineering, Marcel Dekker , INC , New York.

5. Goldberg, I & Williams, R. (1991). *Biotechnology and food Ingredients*, Van Nostrand Reinhold, New York.
6. King, R. D. and Cheetham, P.S.J. (1986). *Food Biotechnology*, Elsevier Applied Science, London.

Semester - II

FTQ - 13: Food Safety and Quality Control

M. Marks: 50

Theory Exam: 40

Int. Assessment: 10

Duration of Exam: 3 hrs.

NOTE:

Instructions for the examiners:- The examiner will set nine questions in all. All questions will carry equal marks. Question No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set unit wise with four questions from each unit. As far as possible the question will be of short answer type. Each question should be divided into parts & the distribution of marks will be indicated part wise.

Instructions for the candidates:- The candidates are required to attempt five questions. Question No. 1 will be compulsory remaining four others will be attempted by selecting two questions from each unit.

Unit - I

Introduction: Concepts of food quality, food safety, food quality assurance and food quality management; objectives, importance and functions of quality control, Current challenges to food safety.

Food adulteration: Nature of adulterants, methods of evaluation of food adulterants and toxic constituents.

Food quality: Principles of food quality assurance, total quality management (TQM)-good manufacturing/management practices, good hygienic practices, good lab practices, general awareness and role of management practices in quality control Food safety management, applications of HACCP in food safety, concept of food traceability for food safety.

Unit - II

Microbial quality control: Determination of microorganisms in foods by cultural, microscopic, physical, chemical methods.

Statistical quality control in food industry Food safety and Standards Act 2006: Salient provision and prospects, Role of national and international regulatory agencies, Bureau of Indian Standards (BIS), AGMARK, Food Safety and Standards Authority of India (FSSAI), Introduction to WTO agreements: SPS and TBT agreements, Codex alimentarius commission, USFDA, International organization for standards (ISO) and its standards for food quality and safety (ISO 9000 series, ISO 22000, ISO 15161, ISO 14000).

Recommended Books:

1. Early, R. (1995): Guide to Quality Management Systems for the Food Industry, Blackie, Academic and professional, London.

2. Gould, W.A and Gould, R.W. (1998). Total Quality Assurance for the Food Industries, CTI Publications Inc. Baltimore.
3. Bryan, F.L. (1992): Hazard Analysis Critical Control Point Evaluations A Guide to Identifying Hazards and Assessing Risks Associated with Food Preparation and Storage. World Health Organization, Geneva.
4. Krammer, A. and Twigg, B.A. (1970). Quality Control for the Food Industry. 3rd Edn. AVI, Westport.
5. Rekha, S. Singhal, Pushpa R. Kulkarni, Dananesh V. Rege, (1997). Hand Book of Indices of food Quality and Authenticity, wood head Publishing Ltd.

Semester - II

FTQ - 14: Food Chemistry (Practical)

M. Marks: 50

Duration of Exam: 3 Hrs

1. Estimation of proteins from various food samples.
2. Precipitation of proteins by acid, alkali and metals.
3. Estimation of nitrogen content in various food samples.
4. Estimation of rancidity of fats.
5. Calculate activity of enzymes from various food samples.
6. Identification of natural food colour from various fruits and vegetables.
7. Estimation of proteins from cereals for the development of dough.
8. Application of HACCP in a food plant/food service institution.

FTQ - 15: Food Microbiology (Practical)

M. Marks: 50

Duration of Exam: 3 Hrs

1. Enumeration of food-borne microorganisms.
2. Detection of coliforms in water.
3. Effect of heat treatment on the microbial growth.
4. To check the microbial quality of milk by MBRT.
5. Effect of pH and water activity on microbial growth.
6. Microbiological study of fresh fruits and vegetables.
7. Microbiological study of canned foods
8. Microbiological study of eggs
9. Microbiological study of meat
10. Microbiological study of cereal products

FTQ - 16: Food Biotechnology (Practical)

M. Marks: 50
Duration of Exam: 3 Hrs

1. DNA extraction from cell.
2. Restriction Digestion of DNA.
3. Demonstration of preparation of GM food.
4. Production of bacteriocin.
5. Biopreservation of food.
6. Preparation of probiotic food.

FTQ - 17: Food Safety and Quality Control (Practical)

M. Marks: 50
Duration of Exam: 3 Hrs

1. Good lab practices.
2. Estimation of adulterants of each food group.
3. Culturing and staining of Indicator microbes.
4. HACCP- different steps of HACCP plan.
5. ISO 9000
6. ISO 22000
7. ISO 15161
8. ISO 14000
9. FSSAI regulations for foods.

FTQ - 18: Project Work

M. Marks: 25

Project Report should be submitted up to April and will be evaluated by an External Examiner.

Semester – II

BVCOM-II: Communication Skills in English - II (Theory)

M. Marks: 50
Theory Exam: 40
Int. Assessment: 10
Duration of Exam: 3 hrs

Instructions for the Examiner: The examiner will set nine questions in all, selecting four questions from each section/unit and one compulsory objective type question.

Instructions for the Candidate: The candidate will attempt five questions in all, selecting at least two questions from each unit as well as compulsory question.

OBJECTIVES

- To enable students to participate independently in conversations and discussions conducted in English.
- To familiarize students with basic letter patterns.
- To train the students in report writing and presentation of the same.
- To train the students in reading skills such as skimming, scanning and drawing inference from a text.
- To enable students to read literary text with understanding and enjoyment.

COURSE CONTENTS

THEORY

UNIT –I

- Vocabulary
- Writing and Discussion Skills
- Letter Writing (Formal and Informal)

UNIT II

- Resume Writing
- Group Discussion, Interview Skills
- Email Writing, Advertisements and Notices

PRACTICALS

M. Marks: 25
Exam Duration: 3 hrs

Writing of letter to various companies/industries/any other institute to apply for a post of in your specific area

- Students will include following contents in the submission.
 - Subject
 - Introduction of the applicant
 - Education
 - Reasons for the Job
 - Willingness for the Interview.

Writing of Resume

- Students will include following contents in the submission:
 - Name
 - Personal and Family Introduction
 - Educational qualification
 - Co- curricular and extra curricular
 - On Job Training
 - Projects
 - Awards/ Merits
 - Internship

REFERENCES

- Business communication by Dr. Rodrigue
- Developing Communication Skills by Krishna mohan & Meera Banerjee
- Essential English Grammar by Raymond Murphy
- Education & Communication for Development by O.P. Dahama & O.P. Bhatnagar

Semester - II

Computer Awareness (Theory)
L I-(I) Basic Computer Education

M. Marks: 100
Duration of Exam: 3 hrs.

NOTE:

The Examiner Will Set Total 10 (Ten) Questions Covering Entire Syllabus. Student Will Attempt Any Five Questions. All Questions Carry Equal Marks.

Computer: Definition, Characteristics, Applications, Components of Computer System, Input/output Devices, Concept Of Memory, Magnetic And Optical Storage Devices.

Operating System-Windows: Definition And Functions Of Operating System, Basic Components Of Windows, Exploring Computer, Icons, Taskbar, Desktop, Managing Files And Folders, Control Panel Display Properties, Add/Remove Software And Hardware, Setting Date And Time, Screensaver And Appearance.

Word Processing: Introduction to Word Processing, Menus, Creating, Editing And Formatting Document, Spell Checking, Printing Views, Tables, Word Art, Mail Merge, Macros.

Computer Communication: Internet And Its Applications, Surfing The Internet Using Web Browser, Creating Email Id, Viewing An E-Mail, Sending An E-Mail To Single And Multiple Users, Sending A File As An Attachment.

References Books

1. Sinha, P.K & Sinha, Priti, Computer Fundamentals, Bpb.
2. Dromey, R.G, How To Solve It By Computer, Phi.
3. Microsoft Office – Complete Reference – Bpb Publication.

Semester - II

Computer awareness (Practical)

L I-(II) Software Lab-I

M. Marks: 100

Duration of exam: 3 hrs.

Windows Operating System and Word Processing

Practical exposure as per theory syllabi

Computer Communication

1. Connect the Internet; open any website of your choice and save the web pages.
2. Search any topic related to your syllabi using any search engine and download the relevant material
3. Create your Email id on any free E mail server, Log in through that and implement various operations provided in it.