**KURUKSHETRA UNIVERSITY, KURUKSHETRA**

**B.VOC FOOD SCIENCE AND QUALITY CONTROL**

**SEMESTER – I**

**(DIPLOMA IN FOOD SCIENCE AND QUALITY CONTROL)**

**LEVEL – 4**

**Q.P – DAIRY PROCESSING EQUIPMENT OPERATOR**

**REFERENCE ID.-FIC/Q 2002**

**KURUKSHETRA UNIVERSITY, KURUKSHETRA**

**SYLLABUS SCHEME**

**B.Voc in Food Science and Quality Control**

**DIPLOMA IN Food Science and Quality Control**

**Semester – I**

**W.e.f. 2016-17**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Paper Code** | **Nomenclature** | **Total Credits** | **Hrs /week** | **Max. Marks** | **Exam**  **Duration** |
| FTQ-1 | Basic Biochemistry | 2 | 2 | 50(40+10\*) | 3hrs |
| FTQ-2 | General Microbiology | 3 | 3 | 50(40+10\*) | 3hrs |
| FTQ-3 | Basic Principles of Food Processing &Preservation | 3 | 3 | 50(40+10\*) | 3hrs |
| FTQ-4 | Dairy Technology And Quality Control | 3 | 3 | 50(40+10\*) | 3hrs |
| FTQ-5 | Basic Biochemistry Lab | 2 | 4 | 50(40+10\*) | 3hrs |
| FTQ-6 | General Microbiology Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| FTQ-7 | Basic Principles of Food Processing & Preservation Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| FTQ-8 | Dairy Technology And Quality Control Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| FTQ-9 | Project Work | - | - | 25(20+5\*) | 3hrs |
| BVCOM-1 | Communication Skills  Theory  Practical | 2  2 | 2  4 | 50(40+10\*)  25(20+5\*) | 3hrs  3hrs |
| 104 | Basics of Computer  Theory  Practical | 2  2 | 2  4 | 50(40+10\*)  50(40+10\*) | 3hrs  3hrs |
|  | Total | 30 | 45 | 600(490+110) |  |

**\*Internal Assessment**

**One Credit Hour Point For Theory = 1 Hour Contact Time /Week**

**One Credit Hour Point For Practical= 2 Hours Contact Time /Week**

**Semester 1st Syllabus is formed according to the QP Dairy Process Equipment Operator Level 4**

**KURUKSHETRA UNIVERSITY, KURUKSHETRA**

**SYLLABUS SCHEME**

**B.Voc in Food Science and Quality Control**

**DIPLOMA IN Food Science and Quality Control**

**Semester – I**

**W.e.f. 2016-17**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.no Sr.No** | **Paper code** | **Nomenclature** | **Total**  **Credits** | **Hrs /week** | **Max.Marks** | **Exam Duration** |
| 1 | BVCOM-1 | Communication Skills Theory  Practical | 2  2 | 2  4 | 50(40+10\*)  25(20+5\*) | 3hrs |
| 2 | 104 | Basics of Computer Theory  Practical | 2  2 | 2  4 | 50(40+10\*)  50(40+10\*) | 3hrs |
| 3 | FTQ-1 | Basic Biochemistry | 2 | 2 | 50(40+10\*) | 3hrs |
| 4 | FTQ-5 | Basic Biochemistry Lab | 2 | 4 | 50(40+10\*) | 3hrs |
| **Total General Education Component** | | | **12** | **18** | **275(220+55\*)** |  |
| 5 | FTQ-2 | General Microbiology | 3 | 3 | 50(40+10\*) | 3hrs |
| 6 | FTQ-3 | Basic Principles of Food Processing &Preservation | 3 | 3 | 50(40+10\*) | 3hrs |
| 7 | FTQ-4 | Dairy Technology And Quality Control | 3 | 3 | 50(40+10\*) | 3hrs |
| 8 | FTQ-6 | General Microbiology Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| 9 | FTQ-7 | Basic Principles of Food Processing & Preservation Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| 10 | FTQ-8 | Dairy Technology And Quality Control Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| **Total Skill Component** | | | 18 | 27 | 300(240+60\*) |  |
| **Grand Total General Education Component and**  **Skill Component** | | | 12+ 18=30 | 18+27=45 | 275+300=575  575+25\*\*=600 |  |

**\*Internal Assessment**

**\*\*Project work**

**One Credit Hour Point For Theory = 1 Hour Contact Time /Week**

**One Credit Hour Point For Practical= 2 Hours Contact Time /Week**

**Semester I**

**FTQ- 1Basic Biochemistry**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**NOTE:**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type.

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**Unit I**

**Introduction to Bio-molecules**: Biological properties of water, pH, ionization, biological buffers, Classification and structure amino acids, essential amino acids, rare and non-protein amino acids.

**Proteins**: Classification and structure of amino acids, essential amino acids and non essential amino acids .Classification and Structural organization of proteins: Primary structure; Secondary structure-α-Helix, β- pleats and β – turn Tertiary structure myoglobin and lysozyme etc. Quaternary structure-hemoglobin. Forces stabilizing different structural levels.

**Structure and function of carbohydrates**: Monosaccharides; families of monosaccharides; simple aldoses and ketoses, pyranose and furanose ring forms, reducing and non-reducing sugars, sugar derivatives viz. sugar alcohols, amino sugars, deoxy sugars, acidic sugars, Glycosidic bond Disaccharides and Oligosaccharides: Definition, structure and function of important di and oligosaccharides viz. lactose, sucrose, maltose, raffinose, stachyose, verbascose etc. Polysaccharides: Homo and Hetero polysaccharides, storage polysaccharides: Starch and Glycogen. Structural polysaccharides: Cellulose and Chitin

**Unit II**

**Lipids**: Introduction and Classification – simple and complex lipids, Fatty acids – structure and nomenclature, soap value, acid value, iodine number, rancidity. Essential fatty acids. A generalaccount of structure and function of triacylglycerols, phospholipids, glycolipids, sphingolipids, steroids, bile acids, bile salts and terpenes

**Vitamins**: water soluble and fat soluble, their structure and functions.

**Enzyme:** general properties of enzymes and coenzymes, their nature, classification and nomenclature of enzymes, fundamentals of steady state kinetics, enzyme inhibition, isozymes.

**Nucleotides and Nucleic acids**: Building blocks: bases, sugars and phosphates. Structure and nomenclature of nucleosides and nucleotides; polynucleotides, DNA (A,B, ZDNA) 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.DavidRawn, Panima Publishing Corporation, NewDelhi
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

**Semester I**

**FTQ-2 General Microbiology**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**NOTE:**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type.

**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 as a modern Science Branches of microbiology.

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

**Control of microorganisms**: Principles and Applications of Physical Methods. Autoclave, Hot air oven, laminar airflow, Seitz filter, Sintered glass filter, and membrane filter. chemical Methods: Alcohol, Aldehydes, Phenols, Halogens and Gaseous agents. Radiation Methods: UV rays and Gamma stains.

**Staining techniques**: Principles of staining, types of stains – simple stains, structural stains and Differential stains.

**Unit II**

**Microbial Taxonomy**: Concept of microbial species and strains, classification of bacteria based on – morphology (shape and flagella), staining reaction, nutrition and extreme environment.

**General Account of Viruses and Bacteria**, Bacteria – Ultra structure of bacteria 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 micro-organisms.

**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 inaction. Cambridge University Press.

**Semester I**

**FTQ-3 Basic Principles of Food Processing & Preservation**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**NOTE:**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type.

**Unit I**

**Food Processing**: Scope and importance of food processing; historical developments in food processing, classification of food on basis of shelf life, pH and origin

**Food spoilage**: microbial, physical, chemical & miscellaneous.

**Thermal processing methods and preservation**: heat resistance of microorganisms, thermal death curve. Blanching, pasteurization, sterilization, Canning of foods, heat penetration

**Preservation by low temperature** Refrigeration, refrigeration load, refrigeration systems

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

**Unit II**

**Moisture removal**: Evaporation, drying, dehydration and concentration, Principle, Methods, equipment and effect on quality: Drying curve, drying methods and type of dryers; physical and chemical changes in food during drying. Need and principle of concentration, methods of concentration (thermal concentration, freeze concentration, memberane concentration) changes in food quality by concentration

**Preservation by salt and sugar**: Pickling, fermentation, intermediate moisture foods

**Food Additives**: Different types of food additives (preservatives, acidulants, emulsifiers, antioxidant, leavening agents etc.) and its application in food industry

**New and unconventional methods of preservation:** pulse electric field processing, high pressure processing, ohmic and infrared, microwave heating.

**Recommended Books:**

1. Norman, N.P and Joseph, H.H.(1997). Food Science, Fifth edition, CBS Publication, New Delhi
2. Kalia M. and Sangita, S. (1996). Food Preservation and Processing, First edition, Kalyani Publishers, New Delhi.
3. Sivasankar, B. (2002): Food Processing and Preservation, Prentice Hall of India Pvt.Ltd., New Delhi.
4. Fellows, Food process technology: Principles and Technology, CRC publications.
5. Khetarpaul N. (2005). Food Processing and Preservation, Dya Publishing House , New Delhi

**Semester I**

**FTQ-4 Dairy Technology and Quality Control**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**NOTE:**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type.

**Unit-I**

**Dairy industry in India**: scope, strengths and opportunities for dairy industry. Milk: definition, composition and nutritive value; factors affecting composition of milk Physico-chemical properties of milk.

**Introduction of basic unit operation and equipments involved in processing of milk and milk products:** transportation, milk procurement, handling, receiving, chilling, filtration/clarification, standardization, pasteurization & pasteurizer, sterilization, homogenization & homogenizer, UHT processing

**Drying and dehydration of milk**: Drying theories, drying equipments (spray and drum drier) manufacture of WMP ,SMP

**Technology of indigenous milk products**: Production of khoa, srikhand, rabri, dahi, kulfi ghee, paneer, channa

**Unit-II**

**Dairy products manufacturing**: Special milk, Yoghurt, Cheese making, Ice cream manufacturing, cream and butter (process and defects, their causes and prevention). Utilization of milk industry by-products

**Newer concepts in dairy product**s: cream powder, sterilized cream, butter powder, cheese spread, whey protein concentrates. Types of membranes, applications of reverse osmosis, ultra-filtration and microfiltration

**Quality Control**: Grading of milk and milk products, criterion of grading, milk adulteration problem, synthetic milk ,PFA standards for market milk and milk products.

**Dairy plant sanitation**: hygiene in dairy Industry, different types of cleansing and sanitizing agents, their applications, cleaning systems

**Recommended Books:**

1. Sukumar, De (1994). Outlines of Dairy Technology. Oxford University Press.
2. Smith G. (2003). Dairy processing improving quality. Woodhead Publishers.
3. Aneja RP, Mathur BN, Chandan RC & Banerjee AK. 2002. *Technology of Indian Milk Products*. Dairy India Publ.
4. Rathore NS *et al.* 2008. Fundamentals of Dairy Technology *-* Theory & Practices. Himanshu Publ.

**Practical**

**FTQ-5**

**Basic Biochemistry Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

**List of Practicals**

1. Qualitative tests for Carbohydrates
2. Estimation of reducing and non-reducing sugars
3. Separation of sugars by Paper Chromatography
4. Qualitative tests for Proteins and Amino acids
5. Protein estimation by Lowry method
6. Determination of starch content from wheat flour.
7. Determination of acid value of a fat/oil.
8. Determination of saponification and iodine value of Lipids
9. Starch hydrolysis by salivary amylase
10. Estimation of Vit. C.
11. Estimation of DNA and RNA.

**Practical**

**FTQ-6**

**General Microbiology Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

1. Safety measures in microbiology laboratory
2. Cleaning and sterilization of glassware
3. Study of instruments: Compound microscope, Autoclave, Hot air oven, pH meter, Laminar airflow and centrifuge
4. Staining techniques in Microbiology-simple, negative and differential staining
5. Media preparation: Nutrients agar, MRBA and Nutrient broth Isolation of bacteria and fungifrom soil, air, and water – dilution and pour plate methods
6. Isolation, Purification, maintenance and preservation techniques of aerobic and anaerobic cultures.
7. Isolation of Micro organisms by pour plate and streak plate methods.
8. Presumptive and confirmation test for the determination of coliform bacteria.
9. Determination of viability of micro organisms.
10. Measurement of size of micro organism.

**\*Internal Assessment**

**Practical**

**FTQ-7**

**Basic Principles of Food Processing and Preservation Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

**List of Practicals**

1. Orientation to the 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 by using sugar and salt.
6. Preservation of food by drying, chemical and radiation.
7. Shelf life evaluation of various food products.
8. Production of a fermented food
9. Demonstration and prevention of Browning reactions

**Practical**

**FTQ-8**

**Dairy Technology and Quality Control Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

**List of Practicals**

1. Sampling of milk
2. To conduct the platform tests of milk sampling of dairy products
3. Determination of physico-chemical properties of milk.
4. Estimation of fat % by Gerber method
5. Detection of common adulterants in milk and milk products.
6. To perform SPC of milk
7. To ascertain microbiological quality of milk by MBRT
8. To prepare ice cream from a commercially available ice cream mix and to study defects in ice cream
9. Preparation of traditional Indian dairy products
10. Quality testing of dairy products likes khoa, paneer, ghee etc.
11. To prepare paneer using different curdling agents
12. Study on cleaning methods of dairy equipments

**\*Internal Assessment**

**Semester - I**

**BVCOM - 1: Communication Skills in English**

**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

**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**

**(20+5\*)**

**Exam. Duration: 3 hrs**

Developing, Listening and Speaking Skills through Various activities such as

1. Role play Activities
2. Practicing Short Dialogues
3. Debates
4. Speeches
5. Listening to News Bulletins
6. Viewing and Reviewing of TV Programmes
7. Mock Interview

**REFERENCES**

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

**\*Internal Assessment**

**Semester - I**

**104 – Basic of Computer**

**M. Marks: 50**

**Theory Exam: 40**

**Int. Assessment: 10**

**Duration of Exam: 3 hrs**

**Instructions for the examiners:** The examiner will set seven questions in all. All the questions will carry equal marks. Question No. 1 will be compulsory consisting of 5-10 short type questions and will be spread over the entire syllabus. The remaining six questions will be set from Unit I and II, three questions from each unit will be set.

**Instructions for the candidates:** The candidates are required to attempt five questions. Question

No.-1 will be compulsory; remaining four questions will be attempted by selecting two questions from each unit.

**Unit – I**

* Introduction to Computer: Data, Processing, information, Classification and evaluations of computers. Configurations of computers. Resolution Factor, Raster and Vector Data and image processing.
* Computer hardware – central processing, main memory, secondary memory, I/O Devices.
* Operation System (OS) Basic Concepts of MS – DOS / Windows 9X/NT or system management.
* Word processing: Work sheet, basic database, Business charts (Pie, Line Bar etc.) operations and professional presentation formations.

**Unit – II**

* Computer Applications in various fields of Fashion Industry, Fashion Communication through Digital Techniques, Fashion Photography, Latest Scanners.
* Current Trends: Internal, Latest net explorers installation, configuration and applications, Search engines.
* Introduction to the Computer Operations – Hardware and Software, Understanding OS and Basic System Management, Trouble Shooting operations.
* Word processing software, preparation, saving and printing of text documents.

**Semester - I**

**104 – Lab Computer**

**M. Marks: 50**

**Pr.: 40**

**Int. Assessment: 10**

**Duration of Exam: 3 hrs**

* Word processing software, preparation, saving and printing of text documents.
* Operation systems (os) basic concepts of MS- DOS/ Windows 9X/ NT or system management.
* Word processing: work sheet, basic database, business charts (Pie, Line bar) operation and professional presentation formation.
* Current trends: internal, latest net explorer installation, configuration and application and search engines.
* Word processing software, preparation, saving and printing of text documents.

**References:**

* Winfred Aldrick, CAD in clothing and textiles, Blackwell Science, 1994.
* Annual World, Computer in the World of Textiles Institute, UK.

**KURUKSHETRA UNIVERSITY, KURUKSHETRA**

**B.VOC FOOD SCIENCE AND QUALITY CONTROL**

**SEMESTER – II**

**(DIPLOMA IN FOOD SCIENCE AND QUALITY CONTROL)**

**LEVEL – 5**

**Q.P – PROCESSED FOOD ENTREPRENEUR**

**REFERENCE ID.-FIC/Q9001**

**KURUKSHETRA UNIVERSITY, KURUKSHETRA**

**SYLLABUS SCHEME**

**B.Voc in Food Science and Quality Control**

**DIPLOMA IN Food Science and Quality Control**

**Semester – II**

**W.e.f. 2016-17**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Paper Code** | **Nomenclature** | **Total**  **Credits** | **Hrs /week** | **Max. Marks** | **Exam**  **Duration** |
| FTQ-10 | Food Chemistry | 2 | 2 | 50(40+10\*) | 3hrs |
| FTQ-11 | Food Microbiology | 3 | 3 | 50(40+10\*) | 3hrs |
| FTQ-12 | Food Analysis and Instrumentation | 3 | 3 | 50(40+10\*) | 3hrs |
| FTQ-13 | Entrepreneurship Development and Management | 3 | 3 | 50(40+10\*) | 3hrs |
| FTQ-14 | Food chemistry Lab | 2 | 4 | 50(40+10\*) | 3hrs |
| FTQ-15 | Food microbiology Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| FTQ-16 | Food Analysis and Instrumentation Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| FTQ-17 | Entrepreneurship Development and Management Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| FTQ-18 | Project Work | - | - | 25(20+5\*) | 3hrs |
| BVCOM-2 | Communication Skills Theory  Practical | 2  2 | 2  4 | 50(40+10\*)  25(20+5\*) | 3hrs  3hrs |
| ES-68 | \*\*Environment Studies Theory  Project | 2  2 | 2  4 | 75  25 | 3hrs |
|  | Total | 30 | 45 | 500 |  |

**\*Internal Assessment**

**\*\*Indicates that marks not included in the grand total being a qualifying subject**

**One Credit Hour Point For Theory = 1 Hour Contact Time /Week**

**One Credit Hour Point For Practical= 2 Hours Contact Time /Week**

**Semester 2nd Syllabus is formed according to the QP Processed Food Entrepreneur Level 5**

**KURUKSHETRA UNIVERSITY, KURUKSHETRA**

**SYLLABUS SCHEME**

**B.Voc in Food Science and Quality Control**

**DIPLOMA IN Food Science and Quality Control**

**Semester – II**

**W.e.f. 2016-17**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.no Sr.No** | **Paper code** | **Nomenclature** | **Total**  **Credit** | **Hrs /week** | **Max.Marks** | **Exam Duration** |
| 1 | BVCOM-2 | Communication Skills Theory  Practical | 2  2 | 2  4 | 50(40+10\*)  25(20+5\*) | 3hrs  3hrs |
| 2 | ES-68 | \*\*Environment Studies Theory  Project | 2  2 | 2  4 | 75  25 | 3hrs |
| 3 | FTQ-10 | Food Chemistry | 2 | 2 | 50(40+10\*) | 3hrs |
| 4 | FTQ-14 | Food chemistry Lab | 2 | 4 | 50(40+10\*) | 3hrs |
| **Total General Education Component** | | | **12** | **18** | **175(140+35\*)** |  |
| 5 | FTQ-11 | Food Microbiology | 3 | 3 | 50(40+10\*) | 3hrs |
| 6 | FTQ-12 | Food Analysis and Instrumentation | 3 | 3 | 50(40+10\*) | 3hrs |
| 7 | FTQ-13 | Entrepreneurship Development and Management | 3 | 3 | 50(40+10\*) | 3hrs |
| 8 | FTQ-15 | Food microbiology Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| 9 | FTQ-16 | Food Analysis and Instrumentation Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| 10 | FTQ-17 | Entrepreneurship Development and Management Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| **Total Skill Component** | | | **18** | **27** | **300(240+60\*)** |  |
| **Grand Total General Education Component and**  **Skill Component** | | | **12+ 18=30** | **18+27=45** | **175+300=475**  **475+25\*\*=500** |  |

**\*Internal Assessment**

**\*\*Project work**

**One Credit Hour Point For Theory = 1 Hour Contact Time /Week**

**One Credit Hour Point For Practical= 2 Hours Contact Time /Week**

**Semester II**

**FTQ-10 Food Chemistry**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**NOTE:**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type.

**Unit-I**

**Food chemistry**: Definition, scope and importance; water in food, water activity and shelf life of food; chemistry and stability of water and fat soluble vitamins; 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, their occurrence and applications in food; starches: functionality of starch in foods, gelatinization and retro-gradation of starches, modified starches, resistant starches,

**Proteins:** Structures and sources of proteins; chemical and physical properties of protein, changes during processing protein penetration mechanism (folding and unfolding) and application

**Browning reaction**: Enzymatic and non enzymatic browning, advantages and disadvantages, factors affecting their reaction and control.

**Unit-II**

**Lipid: s**tructure, physical and chemical property, utilization of fats and oil, margarines, shortening, Hydrogenation and its importance, Lipid per oxidation: mechanism, development of rancidity, antioxidants in foods; types and function etc.

**Food enzymes**: enzymatic modification, criteria for purity of enzyme and application of enzymes in food technology

**Plant pigments**: structure and properties of chlorophyll, anthocyanins, carotenoids, chemical changes during processing

**Flavour and aroma of foods**: Importance and method of retention of flavor and technology, flavor enhancer MSG, recent development in flavor technology

**RECOMMENDED READING**

1. Enzymes in Food Processing, Ind. Edition Ed., by G.A. Tucker & L.F.J. Woods Blackie Academic, 1995.
2. Food Chemistry b. 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.

**Semester II**

**FTQ-11 Food Microbiology**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**NOTE:**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type.

**Unit-I**

**Microorganism important in food industry**: Introduction, historical developments in food microbiology; sources of microorganisms in foods; typed of microorganism and their importance in foods, microbiological criteria of foods and their significance

**Growth of microorganism in foods** -intrinsic and extrinsic factors controlling growth of microorganisms,

**Food preservation**: 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 borne diseases( foodborne infection and food borne intoxication)bacterial agents of food borne illness, food poisoning by *clostridium, salmonella, E. coli, bacillus, staphylococcus etc*, Fungal toxins, the HACCP system and food safety used in controlling microbiological hazards, GMP.

**Food spoilage**: microbes of milk, meats, fish and various plant products, spoilage of canned foods; Indicators microorganisms, detection and quantification of microbes and their products including toxins in food;;

**Control of microorganism**: Asepsis and sanitation

**Rapid methods of microbial analysis** - immunological methods; fluorescent, radio immunoassay, ELISA and nucleic acid probes and 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 Analysis and Instrumentation**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**NOTE:**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type.

**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 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; X-ray analysis of foods and its applications; mass spectroscopy; nuclear magnetic resonance (NMR). Refractometry and ultrasonics in food analysis;

**Texture analysis in foods**, Food texture, physical characteristics of food, texture profile analysis,texture measurement instruments(texturmeter, tenderometer, fibrometer),

**Measurement of various properties:** Consistency (adam’s consistometer) **,**viscosity(Brook Field viscometer), pH, specific gravity

**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,* connectiant : AVI .

3. Amerine, M.A. Pangborn, R.M., and Rosseler, E.B. 1965. Principles of Sensory Evaluation of Food. Academic Press, New York.

**Semester II**

**FTQ-13: Entrepreneurship Development and Management**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**NOTE:**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type.

**Unit I**

**Entrepreneurship**: Definition of Entrepreneur, Internal and External Factors, Functions of an Entrepreneur, Entrepreneurial motivation and Barriers, Classification of Entrepreneurship, Theory of Entrepreneurship, Concept of Entrepreneurship, Development of entrepreneurship; Culture, stages in entrepreneurial process

**Creativity and Entrepreneurial Plan**: Idea Generation, Screening and Project Identification, Creative Performance, Feasibility Analysis: Economic, Marketing, Financial and Technical; Project Planning: Evaluation, Monitoring and Control segmentation. Creative Problem Solving: Brainstorming, Synectics, Value Analysis, Innovation.

**Institutional support for new food ventures:** Supporting Organizations; Incentives and facilities; Financial Institutions and Small scale Industries, Govt. Policies for SSIs.

**Unit II**

**Managerial aspects of small Business**: Principles of Management (Definition, Function of management viz planning, Organisms, coordination, and control Operational Aspects of Production. Basic principal of financial management. Marketing techniques. Personnel and Inventory Management. Importance of communication in business

**Production management**: plant location and layout, production planning and control. marketing challenges and approaches for new products and services.. Agricultural sector and food processing industry problems and opportunities, Standard related to food industry

**Legal Aspects of small Business:** Elementary Knowledge income tax, sales tax, excise rules, factory act and paymemt of wages act.

**Recommended Books:**

1 Holt (1990) Entrepreneurship,New Venture Creation,Prentice-Hall

2 Dollinger M J (1999) Entrepreneurship,Prentice-Hall

3. Singh B.P., Management Concepts & Practices, DhanpatRai& sons, NaiSarak, Delhi.

4. Naidu NVRand Krishna Rao T (2009).Management and Entreneurship, I.K. International Pvt. Ltd.

5. Dwivedi R.S. Management – An Integrated Approach, National Publishing Co., Delhi.

**Practical**

**FTQ-14**

**Food chemistry Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

**List of Practicals**

1. Estimation of proteins from various food samples.
2. Determination of moisture in food sample
3. Determination of Acidity and pH in food sample/beverages
4. Precipitation of proteins by acid, alkali and metals.
5. Estimation of nitrogen content in various food samples.
6. Estimation of rancidity of fats.
7. Estimation of crude fibre in food sample
8. Determination of total, non-reducing and reducing sugars
9. Calculate activity of enzymes from various food samples.
10. Extraction of flavors from various fruits and vegetables.

**Practical**

**FTQ-15**

**Food microbiology Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

**List of Practicals**

1. Introduction to safety in the food microbiology laboratory
2. Basic activities in the food microbiology laboratory (Preparing dilution blanks and media, bacterial transfers, isolating single colonies, preparing slides, simple stain, Gram stain, enumeration of food-borne microorganisms)
3. Detection of coliforms in water
4. Effect of heat treatment on the microbial growth.
5. To check the microbial quality of milk by MBRT
6. Effect of pH and water activity on microbial growth
7. Microbiology of fresh fruits and vegetables
8. Microbiology of eggs
9. Microbiology of meat
10. Microbiology of cereal products

**\*Internal Assessment**

**Practical**

**FTQ-16**

**Food Analysis and Instrumentation Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

**List of Practical’s**

1. Introduction to Food Analysis Techniques
2. Sampling techniques and methods of sample preparation.
3. Experiment using principles of colorimetry and spectrophotometry
4. Moisture content comparison of fresh and intermediate moisture foods
5. Sensory evaluation of processed food
6. Paper and Thin Layer Chromatography
7. Gel Filtration Chromatography
8. Ion-exchange Chromatography
9. Affinity Chromatography
10. PAGE

**Practical**

**FTQ-17**

**Entrepreneurship Development and Management Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

**List of Practicals**

1. Overview of present status of food industries in India
2. Overview of management databases
3. Market Survey, Consumer survey to identify new products
4. Layout for different types of food industries.
5. Methods for economic analysis and profitability analysis of food plant
6. Data collection of materials and processes.
7. To study the essential elements of TQM.

**\*Internal Assessment**

**Semester – II**

**BVCOM-2: Communication Skills in English - II**

**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**

**(20+5\*)**

**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

**\*Internal Assessment**

**Semester – II**

**ES - 68: Environment studies**

**M. Marks: 100**

**Theory: 75**

**Project: 25**

**Duration of Exam: 3hr**

**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

1. Forest resources: Use and over exploitation, deforestation; case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
2. Water resources: Use and over- utilization of surface and ground water, floods, drought, conflicts over water, dam’s benefits and problems.
3. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
4. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
5. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy resources, case studies.
6. 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.

**KURUKSHETRA UNIVERSITY, KURUKSHETRA**

**B.VOC FOOD SCIENCE AND QUALITY CONTROL**

**SEMESTER – III & IV**

**(ADVANCE DIPLOMA IN FOOD SCIENCE AND QUALITY CONTROL)**

**LEVEL – 6**

**Q.P – QUALITY ASSURANCE MANAGER**

**REFERENCE ID: FIC/Q7007**

**KURUKSHETRA UNIVERSITY, KURUKSHETRA**

**SYLLABUS SCHEME**

**B.Voc in Food Science and Quality Control**

**ADVANCE DIPLOMA IN Food Science and Quality Control**

**Semester – III**

**w.e.f. 2016-17**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Paper**  **Code** | **Nomenclature** | **Total**  **Credit** | **Hrs/Week** | **Max Marks** | **Exam Duration** |
| FTQ-19 | Cereal and Bakery Technology And Quality Control | 3 | 3 | 50(40+10\*) | 3hrs |
| FTQ-20 | Fruit and Vegetable Technology And Quality Control | 3 | 3 | 50(40+10\*) | 3hrs |
| FTQ-21 | Basics of Food Packaging | 2 | 2 | 50(40+10\*) | 3hrs |
| FTQ-22 | Food Safety and Quality Assurance-I | 3 | 3 | 50(40+10\*) | 3hrs |
| FTQ-23 | Cereal and Bakery Technology And Quality Control Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| FTQ-24 | Fruit and Vegetable Technology And Quality Control Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| FTQ-25 | Basics of Food Packaging Lab | 2 | 4 | 50(40+10\*) | 3hrs |
| FTQ-26 | Food Safety and Quality Assurance-I Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| FTQ-27 | Industrial Training \*\* | - | - | 50(40+10\*) | 3hrs |
| BVEPD | Export Procedure and Documentation | 4 | 4 | 50(40+10\*) | 3hrs |
| BC-I | Business Communication-I | 4 | 4 | 50(40+10\*) | 3hrs |
|  | Total | 30 | 41 | 550 |  |

**\*Internal Assessment**

**\*\*Students will undergo industrial training for 45 days at the end of second semester**

**One Credit Hour Point For Theory = 1 Hour Contact Time /Week**

**One Credit Hour Point For Practical= 2 Hours Contact Time /Week**

**KURUKSHETRA UNIVERSITY, KURUKSHETRA**

**SYLLABUS SCHEME**

**B.Voc in Food Science and Quality Control**

**ADVANCE DIPLOMA IN Food Science and Quality Control**

**Semester – III**

**w.e.f. 2016-17**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.no Sr.No** | **Paper code** | **Nomenclature** | **Credit** | **Hrs /week** | **Max.Marks** | **Exam Duration** |
| 1 | BVEPD | Export Procedure and Documentation | 4 | 4 | 50(40+10\*) | 3hrs |
| 2 | BC-I | Business Communication-I | 4 | 4 | 50(40+10\*) | 3hrs |
| 3 | FTQ-21 | Basics of Food Packaging | 2 | 2 | 50(40+10\*) | 3hrs |
| 4 | FTQ-25 | Basics of Food Packaging Lab | 2 | 4 | 50(40+10\*) | 3hrs |
| **Total General Education Component** | | | **12** | **14** | **200 (160+40\* )** |  |
| 5 | FTQ-19 | Cereal and Bakery Technology And Quality Control | 3 | 3 | 50(40+10\*) | 3hrs |
| 6 | FTQ-20 | Fruit and Vegetable Technology And Quality Control | 3 | 3 | 50(40+10\*) | 3hrs |
| 7 | FTQ-22 | **Food Safety and Quality Assurance-I** | 3 | 3 | 50(40+10\*) | 3hrs |
| 8 | FTQ-23 | Cereal and Bakery Technology And Quality Control Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| 9 | FTQ-24 | Fruit and Vegetable Technology And Quality Control Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| 10 | FTQ-26 | Food Safety and Quality Assurance-I Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| **Total Skill Component** | | | **18** | **27** | **300(240+60\*)** |  |
| **Grand Total General Education Component and**  **Skill Component** | | | **12+ 18=30** | **14+27=41** | **200+300=500**  **500+50\*\*=550** |  |

**\*Internal Assessment**

**\*\*Industrial Training**

**One Credit Hour Point For Theory = 1 Hour Contact Time /Week**

**One Credit Hour Point For Practical= 2 Hours Contact Time /Week**

**Semester III**

**FTQ-19 Cereal and Bakery Technology and Quality Control**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**NOTE:**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type.

**Unit-I**

**Cereal Technology**: Structure and chemical composition of prominent cereals(wheat, rice, corn, barley); criteria of wheat quality – physical and chemical factors; Wheat milling – general principles and operations, cleaning, conditioning and roller milling systems; flour extraction rates and various flour grades and types; criteria of flour quality, dough rheology and its measurement.

**Milling of rice:** types of rice mill; huller mill, sheller-cum-cone polisher mill; modern rice milling unit operation-dehusking, paddy separation, polishing and grading; factors affecting rice yield during milling; rice bran as rice milling byproducts. Rice parboiling technology, different parboiling methods, changes during parboiling, advantages and disadvantages of parboiling. Cooking characteristics of rice and factors affecting cooking of rice,rice convenience foods: precooked rice, canned

**Corn milling**; wet and dry milling of corn, products of wet and dry milling of corn,

**Barley malting process**: Steeping, germination and drying; significance of malting; different types of malts and their food applications

**Unit-II**

**Introduction**: Status and scope of bakery industry in India, Raw material for bakery products,their role and PFA specification of these raw material

**Bread making processes**,: Different types of bread and preparation of bread using different methods ,quality evaluation of bread, staling of bread;

**Technology of biscuit, cookies, crackers and cakes manufacturing**; Different types of biscuits and preparation of biscuits using different methods, quality evaluation of biscuits. Preparation of cakes using different methods, types of cakes quality evaluation of cakes.

**Technology of noodles and pasta products**, hygienic condition required in bakery plant, operation and maintenance of bakery equipment.

**Recommended Books**

1. Samuel, A.M. (1996) “The Chemistry and Technology of Cereals as Food and Feed “, CBS Publisher & Distribution, New Delhi.
2. Honeney, R.C. (1986) “Principles of Cereal Science and Technology”, Am. Assoc Cereal Chemists, St. Paul, MN, USA.
3. Pomeranz, Y. (1976) “Advances in Cereal Science and Technology”, Am. Assoc. Cereal Chemists St.Paul, MN, USA.
4. Chakraverty, A. 1988. Postharvest Technology of Cereals, Pulses and oilseeds. Oxford and IBH, New Delhi.
5. Durbey, S.C. 1979. Basic Baking: Science and Craft. Gujarat Agricultural University, Anand (Gujrat).
6. Kent, N.L. 1983. Technology of Cereals. 3rd Edn. Pergamon Press, Oxford, UK.

**Semester III**

**FTQ-20 Fruit and Vegetable Technology** **and Quality Control**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**NOTE:**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type.

**Unit-I**

**Introduction** : Status and scope of fruit and vegetable industry in India, General principles and methods of preservation and processing ,Classification and composition of fruits and vegetables and their nutritional significance, factors influencing maturity and ripening, preharvest factors influencing post-harvest physiology, bio-chemical changes during maturation, ripening,

**Post harvest handling procedures and treatments**: Precooling methods, washing, blanching, peeling, sorting and grading of fruits and vegetables, edible coatings.

**Storage systems**: CA & MA storage structures, refrigerated-refrigerants, definition and classification, natural cooling by evaporation.

**Canning of fruits and vegetables**: method, tin and glass containers, spoilage of canned foods.

**Unit-II**

**Vegetable Processing**: Tomato Products, pectic substances, fermented fruits, pickling & preparation of chutneys, vinegar production,

**Technology for Fruit juice**- Preparation of syrups, squash, RTS ,cordials & nectars, clarification and debittering of juices, concentration of juices,

**Fruit Technology** preparation of jam, jellies, marmalades, Fruit preserves and candied fruits, dehydrated fruits & vegetables, Utilization of waste.

**Processing and Preservation for a small scale industry**: Products for small scale manufacture, equipments, medium and large sized multi commodity processing.

**Quality Control: S**torage disorders, quality & safety factors & export standards, Standards for processed Fruit and vegetable products & regulations.

**Recommended Books:**

1. R.P.Srivastava and Sanjeev Kumar (2001) : Fruit and Vegetable Preservation – Principles and Practices, Third edition, International Book distributing Co. Lucknow(India)
2. A.K.Thompson (2003): Fruit and Vegetables – Harvesting, handling and storage. 2nd edition Blackwell Publishing.
3. Er. B. Pantastico: Post harvest Physiology, handling and utilization of tropical and subtropical fruits and vegetables. AVI Publishing Company, Inc.
4. W.V Cruess (1997): Commerical Fruit and Vegetable Products. Allied Scientific Publishers. Bikaner (India) Girdharilal (1996) Preservation of Fruits and Vegetables. ICAR, New Delhi
5. Dauthy, M.E. 1997. Fruit and Vegetable Processing. International Book Distributin Co. Lucknow, India.

**Semester III**

**FTQ-21 Basics of Food Packaging**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**NOTE:**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type.

**Unit-I**

**Introduction:** - Historical background. Basic concept, definitions, objectives and functions of packaging materials.

**Properties of Packaging Material**:- Product characteristics, packaging requirements and selection of packaging form and material such as WVTR, OTR, GTR, Tensile strength, bursting strength, tearing resistance etc. Method of testing and evaluating the packaging materials.

**Packaging Materials**:- Types of packaging materials such as wood, paper(kraft, bleached, greaseproof), plastics, glass, metal & biodegradable plastics. Different from of packaging. Composite rigid, semi- rigid and flexible forms with adhesive bands, classes

**Unit-II**

**Packaging Equipments & Machinery**:- Manual and automatic packaging machines, Special methods such as vacuum, gas, shrink, controlled atmosphere and modified atmosphere packaging ,aseptic packaging

**Packaging requirements of selected foods-** cereal and snack food, beverages, milk and dairy products, poultry & eggs, red meat, frozen foods, horticultural products and microwavable foods,

**Edible coatings and films**: use of edible active layers to control water vapour transfer,gas exchange,modification of surface condition with edible active layers

**Packaging Standards & Environmental Pollution**: - Evaluation of packaging performance to satisfy regulations & quality control standards complete with labeling & printing.

**Recommended Books:**

1. Robertson, G.L.(2006). Food Packaging: Principles and Practice (2nd ed.), Taylor & Francis
2. Sacharow, S. and Griffin, R.C. (1980) Principles of Foods Packaging, 2nd Ed., Avi,Publication Co. Westport, Connecticut, USA.
3. Athalye, A.S. (1992), Plastics in Packaging, Tata McGraw –Hill Publishing Co., New Delhi.
4. Rooney, M.L. (1995). Active Food Packaging, Blackie Academic & Professional, Glasgow,UK.
5. Bakker, M. (1986) The Wiley Encyclopaedia of Packaging Technology, John Willey & Sons. Inc; New York.
6. Food Packaging Technology Handbook. NIIR Board, National Institute of Industrial Research, 2003

**Semester III**

**FTQ-22 Food Safety and Quality Assurance-I**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type.

**Unit-I**

**Concepts of food quality applied to food industry**: general concept of quality and quality control, objectives, importance and functions of quality control.

**Quality assurance and total quality control** : Principles of food quality assurance, nature of total quality control ,approaches to TQC ,general awareness and role of management practices in quality control, GAP, GMP, GHP, good lab practices

**Quality improvement techniques:** Quality improvement plans (QIP), Quality control circles (QCC), Statistical quality control (Definition, need and importance)

**Unit-II**

**Quality control in food industry:** Methods of evaluation and control **of** the various aspects of quality of raw materials and manufacturing process and testing of finished products

**Food adulteration and food safety:** nature of adulterants, methods of evaluation of food adulterants and toxic constituents. Food safety, Current challenges to food safety

**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.

**Practical**

**FTQ-23**

**Cereal and Bakery Technology and Quality Control Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

**List of Practicals**

1. Physico chemical properties of wheat and wheat based products.
2. Quality assessment: Flour, yeast, water, leavening agents.
3. Manufacturing and comparative Sensory evaluation of bread
4. Manufacturing of and Sensory evaluation of cookies
5. Manufacturing and comparative sensory evaluation of cakes
6. Manufacturing and sensory evaluation of cracker
7. Manufacturing and sensory evaluation of pizza and noodles
8. Cooking quality of rice
9. Malt preparation
10. Visit to bakery plants.

**FTQ-24**

**Fruit and vegetable Technology and Quality Control Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

**List of Practicals**

1. To determine the TSS of the given sample using refractometer.
2. To determine the titrable acidity and acid brix ratio of the given sample.
3. Determination of ascorbic acid content in given sample.
4. To study the preservative action of sugar in fruit juice.
5. Testing of adequacy of blanching
6. Preparation and quality evaluation of pickles, chutneys.
7. Preparation and comparative sensory evaluation of tomato products.
8. Preparation and comparative sensory evaluation of jam, jellies, and preserve.
9. Preparation and quality evaluation fruit juices.
10. Drying and shelf life evaluation of fruit and vegetables.
11. Waste utilization: Extraction of pectin from apple peels and lemon rind.
12. Visit to fruits and vegetable processing industries

**\*Internal Assessment**

**FTQ-25**

**Basics of Food Packaging Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

**List of Practicals**

1. Paper: Thickness, Grammage, moisture content and water absorption capacity.
2. Identification of different types of plastic packaging materials
3. Glass ; Study on various defects in glass containers, To perform non-destructive tests for glass containers,
4. To study grease resistance of packaging material.
5. Determination of WVTR of packaging material.
6. Shelf life study of packaging food.
7. To determine the strength of packaging material by drop test.
8. Tetra packing
9. Labeling of packing

**FTQ-26**

**Food Safety and Quality Assurance-I Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

**List of Practicals**

1. To study the essential elements of Good lab practices
2. Estimation of adulterants in various food products
3. Detection of Indicator microbes in various food products
4. To study the essential elements of Good Hygiene Practices
5. To study the essential elements of Good Manufacturing Practices
6. Application of Statistical quality control
7. Study of QA department responsibility
8. Study of QC department responsibility

**\*Internal Assessment**

**Semester-III**

**BVEPD: Export Procedures And Documentation**

**M. Marks: 50**

**Theory Exam: 40**

**Int. Assessment: 10**

**Duration of Exam: 3 Hrs.**

**Note : There will be eight questions in all. A candidate is required to attempt five questions including the question No. 1 which is compulsory. Question No. 1 will attempt of six short answer questions. All questions shall carry equal marks.**

Entering Export Business - Procedures and Formalities.

Key Documents Required in Export Business - A Detailed Discussion.

Aligned Documentation System.

Processing of an Export Order - Stages and Roles Played by Various Parties.

Methods of Payment in International Business.

INCOTERMS

Institutional Infrastructure for Indian Exporters.

Export Incentives and Schemes.

EXIM Policy

Management of Risk in Export Business

**SUGGESTED READINGS**

* 1. Khurana, P.K., Export Management, Galgotia Publishing Company.
  2. Joshi, R.M. International Marketing, Oxford Publications.
  3. Varshney, Bhattacharya, International Marketing, Sultan Chand & Sons.
  4. Pepsi Handbook of Indian Exports, Global Business Press.
  5. Rathore, B.S., Export Marketing, Himalaya Publishing House

**Semester- III**

**BC- I: Business Communication –I**

**M. Marks: 50**

**Theory Exam: 40**

**Int. Assessment: 10**

**Duration of Exam: 3 hrs.**

**Note:-**

**Paper setter will set nine questions in all. Question number one will be compulsory which will be from the entire syllabus. It will contain six short type questions. Students are required to attempt four questions from the remaining eight questions. All questions will carry equal marks.**

Business communication: Meaning, Basic forms of communicating, Communication models and processes, Effective communication, Theories of Communication; Audience Analysis.

Self –Development and Communication: Development of positive personal attitudes; SWOT analysis; Votes model of independence, Whole communication; Body Language: Kinesics, Proxemics, Para Language. Effective listening: Principles of effective listening, Factors affecting listening exercise, Oral, written and video sessions.

Corporate communication: Formal and informal communication network, Business Miscommunication (Barriers); Improving communication, Practices in Business Communication; Group discussion; Mock interviews; Seminars; Effective listening exercises, Individual and Group Presentation; Report writing and its contents.

Modern Forms of Communicating: Fax, E-mail, Video Conferencing, etc.

**Recommended Books:**

1. Bovee and Thill: *Business Communication Today,* Tata McGraw Hill, New Delhi.
2. Ronald E. Dulek and Jhon S. Fielder, *Principles of Business Communication;* Macmillan Publication Company, London.
3. Randall E. Magors:  *Business Communication;* Harper and Row, New York.
4. *Webster’s Guide to Effective Letter Writing,* Harper and Row, New York.
5. Balasubramanyam: *Business Communication;* Vikas Publication House, Delhi.
6. Kaul: *Business Communication;* Prentice Hall, New Delhi.
7. Kaul: *Effective Business Communication:* Prentice Hall, New Delhi.
8. Patri V.R. *Essential of Communication;* Greenspan Publication, New Delhi.

**KURUKSHETRA UNIVERSITY, KURUKSHETRA**

**SYLLABUS SCHEME**

**B.Voc in Food Science and Quality Control**

**ADVANCE DIPLOMA IN Food Science and Quality Control**

**Semester – IV**

**w.e.f. 2016-17**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Paper Code** | **Nomenclature** | **Total**  **Credits** | **Hrs /week** | **Max. Marks** | **Exam**  **Duration** |
| FTQ-28 | Meat Technology And Quality Control | 3 | 3 | 50(40+10\*) | 3hrs |
| FTQ-29 | Technology of Pulses, Legumes and Oilseeds And Quality Control | 3 | 3 | 50(40+10\*) | 3hrs |
| FTQ-30 | Food Safety and Quality Assurance-II | 3 | 3 | 50(40+10\*) | 3hrs |
| FTQ-31 | Food Biotechnology | 2 | 2 | 50(40+10\*) | 3hrs |
| FTQ-32 | Meat Technology And Quality Control Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| FTQ-33 | Technology of Pulses, Legumes and Oilseeds And Quality Control Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| FTQ-34 | Food Safety and Quality Assurance-II Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| FTQ-35 | Food Biotechnology Lab | 2 | 4 | 50(40+10\*) | 3hrs |
| IM | International Marketing | 4 | 4 | 50(40+10\*) | 3hrs |
| BM-I | Business Management | 4 | 4 | 50(40+10\*) | 3hrs |
|  | Total | 30 | 41 | 500 |  |

**\*Internal Assessment**

**One Credit Hour Point For Theory = 1 Hour Contact Time /Week**

**One Credit Hour Point For Practical= 2 Hours Contact Time /Week**

**Semester 4th Syllabus is formed according to the QP Quality Assurance Manager Level 6**

**KURUKSHETRA UNIVERSITY, KURUKSHETRA**

**SYLLABUS SCHEME**

**B.Voc in Food Science and Quality Control**

**ADVANCE DIPLOMA IN Food Science and Quality Control**

**Semester – IV**

**w.e.f. 2016-17**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.no Sr.No** | **Paper code** | **Nomenclature** | **Credit** | **Hrs /week** | **Max.Marks** | **Exam Duration** |
| 1 | IM-I | International Marketing | 4 | 4 | 50(40+10\*) | 3hrs |
| 2 | BM-I | Business Management | 4 | 4 | 50(40+10\*) | 3hrs |
| 3 | FTQ-31 | Food Biotechnology | 2 | 2 | 50(40+10\*) | 3hrs |
| 4 | FTQ-35 | Food Biotechnology Lab | 2 | 4 | 50(40+10\*) | 3hrs |
| **Total General Education Component** | | | **12** | **14** | **200 (160+40\*)** |  |
| 5 | FTQ-28 | Meat Technology And Quality Control | 3 | 3 | 50(40+10\*) | 3hrs |
| 6 | FTQ-29 | Technology of Pulses, Legumes and Oilseeds And Quality Control | 3 | 3 | 50(40+10\*) | 3hrs |
| 7 | FTQ-30 | Food Safety and Quality Assurance-II | 3 | 3 | 50(40+10\*) | 3hrs |
| 8 | FTQ-32 | Meat Technology And Quality Control Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| 9 | FTQ-33 | Technology of Pulses, Legumes and Oilseeds And Quality Control Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| 10 | FTQ-34 | Food Safety and Quality Assurance-II Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| **Total Skill Component** | | | **18** | **27** | **300(240+60\*)** |  |
| **Grand Total General Education Component and**  **Skill Component** | | | **12+ 14=30** | **14+27=41** | **200+300=500**  **500+50\*\*=550** |  |

**\*Internal Assessment**

**One Credit Hour Point For Theory = 1 Hour Contact Time /Week**

**One Credit Hour Point For Practical= 2 Hours Contact Time /Week**

**Semester IV**

**FTQ-28 Meat Technology and Quality Control**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**NOTE:**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type.

**Unit-I**

**Introduction**: Status and scope of meat industry in India; Structure and physico-chemical properties of muscle meat: composition and nutritive value, conversion of muscle into meat, post mortem changes in meat, rigor mortis, cold shortening, pre-rigor processing; stunning and slaughtering methods, aging of meat, meat tenderization- natural and artificial methods; cooking methods for meat: roasting, frying and braising;

**Storage and preservation of meat**: chilling, freezing, curing, smoking, dehydration, freeze-drying, irradiation, canning. Cooking, palatability and eating quality of meat, microbial spoilage of meat; restructured meat products (sausages), meat analogs; meat industry by products: importance and applications; intermediate moisture and dried meat products; meat plant hygiene and good manufacturing practices; packaging of meat products.

**Unit II**

**Egg:** Structure, composition and nutritive value of eggs, Storage and shelf life problems

**Quality evaluation of eggs**: international and external quality evaluation, candling, albumen index, Haugh unit, yolk index etc

**Egg preservation:** grading of eggs, whole egg preservation, and pasteurization, dehydration, freezing, and egg products: egg powder, value added egg products (e.g., Meringues and Foams etc.), packaging of egg and egg products.

**Poultry products**: types, chemical and nutritive value of poultry meat, slaughtering and evaluation of poultry carcasses; poultry cut-up parts and meat/bone ratio; preservation, grading and packaging of poultry meat

**Fish processing**: factors affecting quality of fresh fish, fish dressing, chilling, freezing, glazing, salting and canning of fish; manufacturing of fish paste, fish oil, fish protein concentrate and fish meal; by-products of fish industry and their utilization.

**Recommended Books:**

1. Joshi, B. P. (1994). Meat Hygiene for Developing Country, Shree Almora Book Depot,
2. India.
3. William J. & Owen J., (1977). Egg Science & Technology, AVI Publishing Company,
4. INC. Westport, Connecticut.
5. Lawrie, R.A. (1998). Meat Science. Woodhead Publishers.
6. Mead, G. (2004). Poultry Meat Processing and Quality. Woodhead Publishers.
7. Panda, P.C. (1992). Text Book on Egg and Poultry Technology, Vikas Publishers

**Semester IV**

**FTQ-29 Technology of Pulses, Legumes and Oilseeds** **and Quality Control**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**NOTE:**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type.

**Unit I**

**Introduction**: Status, production and major growing areas of pulses, legumes and oilseeds in India and world; structure and chemical composition of pulses and oilseeds; nutritional and antinutritional factors.

**Milling:** Milling techniques: dry milling and wet milling;

**Processing of legumes**: Soaking, germination, decortication, cooking, fermentation; puffing, roasting and parching; utilization of pulses; protein isolates and concentrates; role of legumes in human nutrition.

**Processing and utilization of soybean for value added products**; soy based fermented products;

**Innovative products from pulses and oilseeds**; future developments in products and processes; products from legumes and uses: starch, flour, protein concentrates and isolates

**Unit II**

**Oilseeds**: Sources of edible oils (groundnut, mustard, soyabean, sunflower, safflower, coconut, sesame and oil from other sources); physio-chemical properties; processing of oilseeds: rendering, pressing, solvent extraction, refining, hydrogenation; factors affecting extraction; packing and storage of fats and oils, changes during storage. Oil specialty products: margarine, mayonnaise, salad dressing, fat substitutes etc; chemical adjuncts: lecithins and GMS; Nutritional food mixes from oilseeds: processing of oilseeds for food use, protein rich foods, protein enriched cereal food.

**Recommended Books:**

* 1. Hamilton, R.J. and Bharti, A. Ed. 1980. Fats and Oils: Chemistry and Technology. Applied Science, London.
  2. Salunkhe, O.K. Chavan, J.K, Adsule, R.N. and Kadam, S.S. 1992. World Oilseeds: chemistry, Technology and Utilization. VNR, New York.
  3. Wolf, I.A. Ed. 1983. Handbook of Processing and Utilization in Agriculture.(2 vol. set). CRC Press, Florida.
  4. Mathews, R.H. Ed. 1989. Legumes: Chemistry, Technology and Human Nutrition. Marcel Dekker, New York.
  5. Salunkhe, D.K., Kadam, S.S. Ed. 1989. Handbook of World Food Legumes: Chemistry,Processing and Utilization, (3 vol. set). CRC Press, Florida.

**Semester IV**

**FTQ-30 Food Safety and Quality Assurance-II**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type.

**Unit-I**

**Food safety management System**: HACCP and its application in food industry, TQM (importance and application)

Food safety and Standards Act 2006: salient provision and Prospects

**ISO 9000 series for food safety and quality**: ISO 22000, ISO -19011, ISO 15161, ISO 14000

**Unit –II**

**Food Law and Regulations**: - Development of food standards, objectives and requirements of consumers protection Act. (1986), PFA-1954, BIS, AGMARK, Vanaspati control Order (1978), Export quality control and inspection Act. (1963), Meat products order (1974) Codex alimentarous Act, Food Safety and Standards Authority of India (FSSAI), Introduction to WTO agreements: SPS and TBT agreements.

**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

**Semester IV**

**FTQ-31 Food Biotechnology**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**NOTE:**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type.

**Unit I**

**Introduction to Food biotechnology:** Importance and scope. Isolation, cultivation and preservation of microorganisms of food biotechnological importance. G.M. Food and their scope. Use of genetically modification food and various legal and ethical aspects involved.

**Biotechnological Techniques: -** Genetic Engg. Technique and their application in food technology. Transgenic plant foods: golden rice, Bt.brinjal, maize, tomato, potato, soyabean etc. Biotechnology applied to fats and oils, Nutritional value and flavor novel food. Production of single cell protein, low calorie sweeteners, food coloring.

Enzyme Immobilization, definition and different method. Application of immobilized enzymes in food processing technology.

**Unit II**

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

**Modification and Bioconversion of food raw materials**: Bioconversion of whey, molasses and starch and other food waste for value addition.

**Regulatory and Social aspects of Food Biotechnology**Modern Biotechnological regulatory aspects in food industries, Biotechnology and Food: A Social Appraisal.

**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 Keyness.

3. Knorr, D. (1987). Food Biotechnology, Marcel Dekker , INC , new yark.

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.

**Practical**

**FTQ-32**

**Meat Technology and Quality Control Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

**List of Practical**

1. Physico-chemical and micro-biological quality of raw egg and their products.
2. Preservation of shell eggs by various methods.
3. Determination of egg density.
4. Determination of egg components.
5. Studies on hygiene and sanitation in meat, poultry and egg processing plants.
6. Preservation of meat by curing, freezing, smoking, drying and determination of shelf-life
7. Preparation quality evaluation of Various value added meat products

**FTQ-33**

**Technology of Pulses, Legumes and Oilseeds and Quality control Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

**List of Practical**

1. Extraction of oil from seeds.
2. Identification and description of common pulses.
3. Preparation of germinated food
4. Estimation of rancidity in edible oils
5. Milling of different legumes
6. Preparation of Soybean based edible cheese
7. Estimation of protein in gram flour
8. Extraction of starch/protein from flour

**\*Internal Assessment**

**FTQ-34**

**Food Safety and Quality Assurance-II Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

**List of Practicals**

1. Implementation of ISO 9000 (QMS) in bakery industry
2. Prepare FSMS plan (ISO 22000) for spice industry
3. To conduct internal audit of canteen, food lab (ISO 19011)
4. To study EMS regulation for food industry (ISO 14000)
5. Implementation of FSSAI regulations for foods in food industry
6. To prepare chart of specification for different food products as specified by BIS
7. Determination of CCP,PRP, OPRP (HACCP Plan) for production line of milk, fruits & vegetable and meat industry as per HACCP

**Practical**

**FTQ-35**

**Food Biotechnology Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

**List of Practicals**

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
7. Preparation of prebiotic foods

**\*Internal Assessment**

**Semester - IV**

**IM-I: International Marketing**

**M. Marks: 50**

**Theory Exam: 40**

**Int. Assessment: 10**

**Duration of Exam: 3 hrs.**

**Instruction for the examiners**

The examiner will set nine questions in all. All the questions will carry equal marks. Question no. I will be compulsory consisting of 5-10 short type questions and will be set from unit I and unit II, four questions from each unit will be set.

**Instructions for the candidates**

The candidates are required to attempt five questions. Q.No. I will be compulsory remaining four questions will be attempted by selecting two questions from each unit.

**UNIT-I**

International marketing: Nature, Definition and scope of international marketing; domestic marketing vs. international marketing; international marketing environment-economic, cultural, political & legal environment; Identifying and selecting foreign market; Foreign market entry mode decision.

**UNIT-II**

Product planning for international market: Product designing; standardizing vs. adaptation; branding and packaging; Labeling and Quality issues, after sales services.

International pricing: Factors influencing international price, pricing process methods; international price quotation and payment terms.

**References:-**

1. Bhattacharya R.L. and Varshney B, International Marketing Management; Sultan Chand, New Delhi.
2. Bhattacharya B: Export Marketing Strategies for Success; Global Press, New Delhi.
3. Keegan W.J: Multinational Marketing Management, Prentice Hall, New Delhi.
4. Kriplani V: International marketing: Prentice Hall, New Delhi.
5. Taggaet J.H and Moder Mott M.C. The Essence of International Business; Prentice Hall, New Delhi.

**Semester - IV**

**BM–I Business Management**

**M. Marks: 50**

**Theory Exam: 40**

**Int. Assessment: 10**

**Duration of Exam: 3 hrs.**

**Instruction for the examiners**

The examiner will set nine questions in all. All the questions will carry equal marks. Question no. I will be compulsory consisting of 5-10 short type questions and will be set from unit I and unit II, four questions from each unit will be set.

**Instructions for the candidates**

The candidates are required to attempt five questions. Q.No. I will be compulsory remaining four questions will be attempted by selecting two questions from each unit.

**UNIT - I**

* Definition of Management : Characteristics of Management, Principles of Management, Management Functions, Management Levels, Difference of Mgt/ Adm.
* Planning : Definition of Planning, Nature of Planning, Steps of Planning, Limitations of Planning, Types of Planning
* Decision Making: Features & Meaning of Decision Making, Types of decision making, and techniques of decision making, problem management process of solving problem, Techniques of Solving Problem.

**UNIT - II**

* Authority - Concept of Authority, Concept of Power, Difference between Authority & Power, Concept Responsibility, Delegation & Decentralization, Difference between Delegation & Decentralization
* Delegation- Meaning, Obstacles Decentralization – Factors.
* Motivation- Features, Techniques, Moral Building Theories

**References**

* + 1. R.K singla, Principles of Business Management
    2. Sandeep Garg, Business Management

**KURUKSHETRA UNIVERSITY, KURUKSHETRA**

**Syllabus Scheme**

**B.Voc. in Food Science and Quality Control**

**(W.e.f 2016-2017)**

**KURUKSHETRA UNIVERSITY, KURUKSHETRA**

**SYLLABUS SCHEME**

**B.Voc in Food Science and Quality Control**

**DEGREE IN Food Science and Quality Control**

**Semester – V**

**w.e.f. 2016-17**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Paper No.** | **Nomenclature** | **Credits** | **Hrs /week** | **Max. Marks** | **Exam**  **Duration** |
| FTQ-36 | Advances in Food Processing and Preservation | 3 | 3 | 50(40+10\*) | 3hrs |
| FTQ-37 | Principles of Food Engineering | 3 | 3 | 50(40+10\*) | 3hrs |
| FTQ-38 | Microbial technology and Therapeutic Foods | 2 | 2 | 50(40+10\*) | 3hrs |
| FTQ-39 | Food Industry Waste and By-product Management | 3 | 3 | 50(40+10\*) | 3hrs |
| FTQ-40 | Nutrition and Health | 2 | 2 | 50(40+10\*) | 3hrs |
| FTQ-41 | Advances in Food Processing and Preservation Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| FTQ-42 | Principles of Food Engineering Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| FTQ-43 | Microbial technology and Therapeutic Foods Lab | 2 | 4 | 50(40+10\*) | 3hrs |
| FTQ-44 | Food Industry Waste and By-product Management Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| FTQ-45 | Nutrition and Health lab | 2 | 4 | 50(40+10\*) | 3hrs |
| BVHR | Human Rights | 4 | 4 | 50(40+10\*) | 3hrs |
|  | Total | 30 | 42 | 550 |  |

**SYLLABUS SCHEME**

**B.Voc in Food Science and Quality Control**

**DEGREE IN Food Science and Quality Control**

**Semester – VI**

**w.e.f. 2016-17**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Paper No.** | **Nomenclature** | **Credits** | **Max. Marks** | **Exam Duration** |
| FTQ-46 | Industrial training cum project | 30 | 200  (160+40\*) | 3Hrs |
|  | **Total** |  | 200 |  |
| **Grand Total(I-VI)** | |  | 2900 |  |

**\*Internal Assessment**

**KURUKSHETRA UNIVERSITY, KURUKSHETRA**

**SYLLABUS SCHEME**

**B.Voc in Food Science and Quality Control**

**DEGREE IN Food Science and Quality Control**

**Semester – V**

**w.e.f. 2016-17**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.no Sr.No** | **Paper code** | **Nomenclature** | **Total**  **Credits** | **Hrs /week** | **Max.Marks** | **Exam Duration** |
| 1 | BVHR | Human Rights | 4 | 4 | 50(40+10\*) | 3hrs |
| 2 | FTQ-38 | Microbial technology and  Therapeutic Foods | 2 | 2 | 50(40+10\*) | 3hrs |
| 3 | FTQ-40 | Nutrition and Health | 2 | 2 | 50(40+10\*) | 3hrs |
| 4 | FTQ-43 | Microbial technology and Therapeutic Foods Lab | 2 | 4 | 50(40+10\*) | 3hrs |
| 5 | FTQ-45 | Nutrition and Health lab | 2 | 4 | 50(40+10\*) | 3hrs |
| **Total General Education Component** | | | **12** | **16** | **250 (200+50 \*)** |  |
| 6 | FTQ-36 | Advances in Food Processing and Preservation | 3 | 3 | 50(40+10\*) | 3hrs |
| 7 | FTQ-37 | Principles of Food Engineering | 3 | 3 | 50(40+10\*) | 3hrs |
| 8 | FTQ-39 | Food Industry Waste and By-product Management | 3 | 3 | 50(40+10\*) | 3hrs |
| 9 | FTQ-41 | Advances in Food Processing and Preservation Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| 10 | FTQ-42 | Principles of Food Engineering Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| 11 | FTQ-44 | Food Industry Waste and By-product Management Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| **Total Skill Component** | | | **18** | **27** | **300(240+60\*)** |  |
| **Grand Total General Education Component and**  **Skill Component** | | | **12+ 18=30** | **16+27=43** | **250+300=550** |  |

**SYLLABUS SCHEME**

**B.Voc in Food Science and Quality Control**

**DEGREE IN Food Science and Quality Control**

**Semester – VI**

**w.e.f. 2016-17**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Paper No.** | **Nomenclature** | **Credits** | **Max. Marks** | **Exam Duration** |
| FTQ-46 | Industrial training cum project | 30 | 200  (160+40\*) | 3Hrs |
|  | **Total** |  | 200 |  |
| **Grand Total(I-VI)** | |  | 2900 |  |

**\*Internal Assessment**

**Semester V**

**FTQ-36 Advances in Food Processing and Preservation**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**NOTE:**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type.

**Unit I**

**Extrusion technology**: general principles, extrusion process (hot & cold), advantages of extrusion, extrusion equipment, single screw extruders and twin screw extruders, effect of extrusion on food properties, extrusion of starch based foods.

**Hydrostatic pressure technology**: general principles, effect of hydrostatic pressure on microorganisms-possible mode of action, application of hydrostatic pressure technology in food industry.

**Hurdle technology**: principles and basic aspects of hurdle technology, different hurdles, hurdle effect, application of hurdle technology in food products,

**Osmotic dehydration**: mechanism of osmotic dehydration, application of osmotic dehydration.

**Unit II**

**Membrane separation**: Principle, different types of Membrane processing, Application in Food industry

**Pulsed electric fields processing**: PEF treatment systems, main processing parameters. Mechanisms of action: mechanisms of microbial inactivation.

**Ultrasound processing**: fundamentals of ultrasound, ultrasound as a food preservation and processing aid, effects of ultrasound on food properties.

**Alternate thermal processing**: Microwave heating, Radio-frequency processing: dielectric heating, radio-frequency heating; Ohmic heating, Freeze drying, freeze concentration, UV radiation

**Recommended Books:**

1. Gloud, G. W. (1995). New Methods of Food Preservation, Springer Publication
2. Holdswarth, S. D. (1993). Aseptic Processing and Packaging of Food Products, Elsevier, London.
3. Church, P. N. (1993). Principles and Applications of Modified Atmosphere Packaging of Food, Blackie Academic & Professional, U.K.
4. Leistner L & Gould G.W. (2002). Hurdle Technologies: Combination Treatments for Food Stability, Safety and Quality. Springer Publications
5. Gustavo V. Barbosa-Cánovas, María S. Tapia, M. Pilar Cano (2005). Novel Food Processing Technologies, CRC press
6. Tewari, G, Juneja, V.K. (2007). Advances in thermal and non-thermal preservation, Wiley Blackwell Press

**Semester V**

**FTQ-37 Principles of Food Engineering**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**NOTE:**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type

**Unit I**

**Material & Energy Balance: -** Properties of wet, dry saturated & superheated steam,use of steam tables & Mollier diagram, Numerical problems on material and energyBalance related of food processing.

**Thermal Processing: -** Microbial inactivation, concept of F, Z & D value, evaluation Of thermal process time for batch sterilization by graphical & formula method,Calculation of process time, continuous flow system, factor affecting rate of heat Penetration, effect of can size on sterility requirement, different types of sterilizers (Batch and continuous type).

**Evaporation: -** Boiling point elevation. Basic principles of evaporators. Construction And operation. Different types of evaporators used in food industry. Basic concept of multiple effect evaporator.

**Unit II**

**Drying and Dehydration**: Introduction to principles of drying, Equilibrium moisture content, bound and unbound moisture, rate of drying, constant, & falling rate periods, Engg. aspects of different types of dries used in food processing including tray drier, drum drier,fluidized bed drier, spray and freeze drier etc.

**Freezing: -** Depression of Freezing point, Planks equation and other modified equations for prediction of freezing time, freezing time calculation for a product having uniform temperature (negligible internal resistance), Different types of Freezers like air blast freezer, plate freezer and cryogenic freezer.

**Liquid transport system**- pipelines and pumps for food processing plants-positive displacement pumps, air-lift pumps, propeller pumps, centrifugal pumps and jet pumps.

**Recommended Books**:

1. Singh, R.P and Heldman, D.R.(1984). *Introduction to Food Engg.,*Academic Press, INC, London.

2. Earle, R.L. (1983) *Unit Operations in Food processing*, 2nd Edition Pergamon Press Oxford,U.K.

3. Toledo, R.T.(1997). *Fundamentals of Food Process Engineering*, CBS Publishers, New Delhi.

4. Batty, J.C. and Folkman, S.L. 1983. *Food Engineering Fundamentals.*John wiley and Sons, New York

**Semester V**

**FTQ-38 Microbial Technology and Therapeutic Foods**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**NOTE:**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type.

**Unit-I**

**Introduction**:Definition, development of functional foods, isolation, storage, processing and stability of phyochemicals/bioactive compounds.

**Prebiotics and probiotics**: usefulness of probiotics and prebiotics in gastro intestinal health and other benefits, beneficial microbes; prebiotic ingredients in foods; types of prebiotics and their effects on gut microbes, resistant starch, fructo-oligosaccharides as probiotic food components.. Health benefits of nutraceuticals, natural pigments (chlorophyll, chlorophyllin, carotenoids) anthocyanins, glucosinolates, isoflavonoids, phytoestrogens, omega-3 and omega-6 fatty acids, antioxidants, phytosterols; dosage for effective control of disease or health benefit with adequate safety

**Unit-II**

**Fermentation technology**:- Fermentation definition, type- aerobic and anaerobic Fermentation. Design of typical bioreactors and their parts, function and operations.

**Fermented Food Products:-** Microbial starter culture, their uses in dairy, meat, fruits, and vegetables products. Production of pickle and olives, alcoholic beverages and acetone, butanol, glutamic acid, lactic acid, citric acid, and baker’s yeast. and L-Aspartic acid.

**Production of vitamins**-Thiamin B-1, Riboflavin (B-2), vitamin B-12. Microbial polysaccharides: fermentative production of Xanthan gums, Dextran, Pullulan.

**Recommended Books:**

1. (Gibson GR & William CM. (2000).Functional Foods - Concept to Products.
2. Goldberg I. (1994). Functional Foods: Designer Foods, Pharma Foods.
3. Prescott & Dunn's Industrial Microbiology by B. Reed millian Publishers Ltd. Connecticut
4. Biotechnology by R.H. Rejm and G. Reed Vol. 4, 5, 6, & 7a), Verlag Press

**Semester V**

**FTQ-39 Food Industry Waste and By Product Management**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**NOTE:**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type.

**Unit I**

**Introduction:-**Type of waste and magnitude of waste generation in different food processing industries, concept, scope and importance of waste management and effluent treatment.

**Waste Characterization**:- Temperature, pH, oxygen Demand (BOD, COD, TOD), fat, oil and grease content, metal content, forms of phosphorus and sulphur in waste waters, microbiology of waste, other ingredients like insecticide, pesticides and fungicides, residues

**Utilization of waste**: Processes for waste utilization from fruit and vegetable industries - Distillation for production of alcohol - oil extraction from waste - waste management in sugar mills - citric acid production from fruit waste, extraction of active ingredients from fruit waste.

**By-Products Utilization of Wheat and Pulse Mill** : By products of wheat milling- germs and bran - by products of pulses milling - husk, germs and broken. Coconut processing - byproduct utilization - fuel briquette.

**Unit II**

**Fish, Meat and Poultry Waste Utilization** : Fish Industry by products and Waste utilization-meat and poultry waste recycling. .

**Environmental Protection Act** and specification for effluent of different food industries. Waste, Utilization Environment management systems (ISP 14000) and its application in food industry

**Effluent Treatment**:- Pre-treatment of waste: sedimentation, coagulation, flocculation and floatation. Secondary treatments: biological oxidation-trickling filters, oxidation ditches, activated sludge process, rotating biological contractors, lagoons

**Tertiary treatment**:- Advanced waste water treatment process-sand, coal and activated carbon filters, phosphorus, sulphur, nitrogen and heavy metals removal Assessment, treatments and disposal of soil waste; concept of vermin composting and bio-gas generation

**Recommended Books:**

1. Robert R. Zall (2004), Managing Food Industry Waste: Common sense methods for Fod Processors, Blackwell Publishing.
2. Loannis S. and Arvanitoyannis (2008). Waste Management in Food Industry, Academic Press
3. VassoOreopoulou and Winfried Russ (2007). Utilization of byproducts and treatments of waste in Food Industry, Springer publication.
4. Lawrence K. Wang (2006). Waste Treatments in Food Industry, Taylor and Francis.

**Semester V**

**FTQ-40 Nutrition and Health**

**Max Marks: 50**

**Theory Marks: 40**

**Internal Assessment: 10**

**Time: 3 hrs.**

**NOTE:**

**Instructions for the examiner:** The examiner will set nine questions in all. All questions will carry equal marks. Q. No. 1 which will be objective/short answer type covering the entire syllabus, will be compulsory. The remaining questions will be set section wise with questions 4 from each section. Each question should be divided into parts & the distribution of marks be indicated part wise

**Instructions for the candidates:** The candidates will be required to attempt Q. No. 1 & four others selecting 2 questions from each section. As far as possible the question will be of short answer type.

**Unit I**

**Foods and nutrients**: basic definitions, functions of food and nutrients, levels of nutritional status, changing concepts of nutrition.

**Energy**: energy content of foods, physiological fuel value, measurement of energy value of foods, estimating energy requirements of individuals and groups.

**Energy balance**: food energy measure, energy control in human metabolism, basal metabolic rate (B.M.R.), factors affecting B.M.R., measuring B.M.R., energy requirements and its estimation. , RDA

**Malnutrition**: type of malnutrition, causes, under and over nutrition, nutrition infection and immunity, nutrition education

**Nutrition and weight management**: obesity and its causes, body composition, B.M.I., Weight for height measures, health implications of obesity.

**Unit II**

**Carbohydrates**: dietary importance, special functions of carbohydrates in body tissues, relationship between dietary fiber and various health problems

**Fats**: functions of EFA, role of ω-3, ω -6 fatty acids in health and disease, Trans fatty acids and prostaglandins, essential fatty acids, cholesterol, LDL and HDL and their health importance.

**Proteins:** nature and essentiality of amino acids and proteins, functions of protein, the concept of protein balance, comparative quality of food proteins, biological value, therapeutic applications of specific amino acids

**Vitamins**: clinical applications, sources, requirements and functions of Vitamin A, D, E, K, C and B complex, vitamins toxicity problems

**Minerals**: minerals in human health, macro and micro minerals, trace minerals- functions, clinical applications, food sources and requirements

**Recommended Books:**

1. Insel, P., Turner R.E. & Ross, D.(2006). Discovering Nutrition, IInd Edition. ADA, Jones and Bartlett Publishers Inc., USA.
2. MudambiSumati R. &Rajagopal, M.V. (1995). Fundamentals of Food & Nutrition. New Age International (P) Limited, Publishers.
3. ICMR (1995). Nutrient Requirement & RDA, ICMR, New Delhi.
4. Gibney, M.J., Elia, M., Ljungqvist, O. &Dowsett, J. (2005). Clinical Nutrition. The Nutrition society textbook series, Blackwell publishing company.
5. Srilakshmi B. (2011). Dietetics. New Age International Publishers
6. Swaminathan M. 1974. Essentials of Foods and Nutrition. Vol. II. Ganesh & Co.

**Practical**

**FTQ-41**

**Advances in Food Processing and Preservation Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

**List of Practicals**

1. Filtration of juices for preservation
2. Microbial load estimation in preserved food
3. Ultra sonication preservation of food
4. Microwave treatment of food
5. Estimation of loss of nutrient due to microwave and thermal treatment
6. High temperature processing of the given food material- blanching, evaporation.
7. To study the effect of processing on the keeping quality of food

**Practical**

**FTQ-42**

**Principles of Food Engineering Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

**List of Practicals**

1. Determine the evaporation capacity of an evaporator by material balance.
2. Calculate the specific heat of the given sample.
3. Determine the viscosity of the given sample using capillary viscometer.
4. Find the thermal conductivity of the given sample.
5. Calculate the rate of heat transfer through a pipe.
6. To perform dehydration of given food sample and to evaluate its moisture content on wet and dry basis.
7. Study the effectiveness of different filter aids.
8. Evaluation efficacy of thermal treatment.

**\*Internal Assessment**

**Practical**

**FTQ-43**

**Microbial technology and Therapeutic Foods Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

**List of Practicals**

1. Production of probiotic foods e.g. juice, milk, etc.
2. Production of wine e.g. cider, red wine, etc.
3. Production of ethanol from whey
4. Production fermented juice
5. Production lactic acid
6. Production of sauerkraut
7. Bacterial Single cell production

**Practical**

**FTQ-44**

**Food Industry Waste and By Product Management Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

1. Identification of useful products from food and agricultural waste
2. Estimation of Water portability and acceptable parameters
3. Characterization of industrial effluents for pH, TS, TDS, TSS, alkalinity and hardness parameters.
4. Evaluation of population potential of waste materials as Biochemical Oxygen Demand (BOD).
5. Determination of chemical oxygen demand (COD) in various effluents.
6. Formation of value added product from industrial waste
7. Water treatment using microbes

**Practical**

**FTQ-45**

**Nutrition and Health Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

**List of Practicals**

1. Role of various national and international agencies in field of human nutrition
2. Preparation of nutritional diet of individuals
3. Calculation of BMR and body surface area.
4. Estimation of trans fat in food
5. Estimation of total vitamin in given foods
6. Diet chart against diabetic, heart and obesity patient
7. Mineral chart requirement of individual

**\*Internal Assessment**

**Semester-V**

**BVHR: Human Rights**

**M. Marks : 50**

**Theory Exam : 40**

**Int. Assessment : 10**

**Duration of Exam : 3 Hrs.**

**Instruction for the examiners**

The examiner will set nine questions in all. All the questions will carry equal marks. Question No. I will be compulsory consisting of 5-10 short type questions and will be set from unit I and unit II, four long questions from each unit will be set.

**Instructions for the candidates**

The candidates are required to attempt five questions Q No. I will be compulsory remaining four questions will be attempted by selecting two questions from each unit.

**Unit-I**

 **Understanding Social Inequality**

1. Caste, Gender, Ethnicity and Class as distinct categories and their interconnection.

2. Globalisation and its impact on workers peasants, dalits, adivasis and women.

 **human Rights**

1. Human Rights : Various Meanings

2. UN Declarations and Covenants

3. Human Rights and Citizenship Rights

4. Human Rights and the Indian Constitution.

5. Human Rights, Laws and Institutions in India; the role of

the National Human Rights Commission.

6. Human Rights of Marginalised Groups : Dalits, Adivasis,

Women, Minorities and Unorganised Workers.

7. Consumer Rights : The Consumer Protection Act and

grievance redressal mechanisms.

8. Human Rights Movement in India.

**Unit-II**

 **GENDER**

1. Analysing Structures of Patriarchy

2. Gender, Culture and History

3. Economic Development and Women

4. The issue of Women’s Political Participation and Representation in India

5. Laws, Institutions and Women’s Rights in India

6. Women’s Movement in India

**References**

1. Agarwal, Anil and Sunita Narain (1991), Global Warming and Unequal World : A case of Environmental Colonialism, Centre for Science and Environment, Delhi.
2. Baxi, Upendra (2002), The Future of Human Rights, Oxford University Press, Delhi.
3. Beteille, Andre (2003), Antinomies of Society : Essays on Ideology and Institutions, Oxford University Press, Delhi.
4. Chandhoke, Neera (2003), Conceits of Civil Society, Oxford University Press, Delhi.
5. Geetha, V (2002) Gender, Stree Publications, Kolcutta.
6. Ghanshyam Shah, (1991) Social Movements in India, Sage Publications, Delhi.
7. Guha, Ramachandra and Mahadev Gadgil, (1993) Environmental History of India, University of California Press, Berkeley.