**KURUKSHETRA UNIVERSITY, KURUKSHETRA**

**SYLLABUS SCHEME**

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

**Advance Diploma In Food Science and Quality Control**

**Semester – III**

**( For Old Students)**

**Semester III**

|  |  |  |  |
| --- | --- | --- | --- |
| **Paper No.** | **Nomenclature** | Max Marks | Exam Duration |
| FTQ-19 | Fruit and Vegetable Technology And Quality Control  | 50(40+10\*) | 3hrs |
| FTQ-20 | Dairy Technology and Quality Control | 50(40+10\*) | 3hrs |
| FTQ-21 | Basics of Food Packaging  | 50(40+10\*) | 3hrs |
| FTQ-22 | Technology of Spices, Herbs & Food Additives | 50(40+10\*) | 3hrs |
| FTQ-23 | Fruit and Vegetable Technology And Quality Control Lab | 50(40+10\*) | 3hrs |
| FTQ-24 | Dairy Technology and Quality Control Lab | 50(40+10\*) | 3hrs |
| FTQ-25 | Basics of Food Packaging Lab | 50(40+10\*) | 3hrs |
| FTQ-26 | Technology of Spices, Herbs & Food Additives Lab | 50(40+10\*) | 3hrs |
| BVEPD | Export Procedure and Documentation | 50(40+10\*) | 3hrs |
| BC-I | Business Communication | 50(40+10\*) | 3hrs |
|  | Total Marks | 500 |  |

**\*Internal Assessment**

**Semester III**

**FTQ-19 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-20 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.

**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 Technology of Spices, Herbs And Food Additives**

 **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**: Importance and role of spices in food processing, Classification and properties of spices and herbs – their products, including medicinal properties.

**Spices And their Uses:** ginger, pepper, turmeric, Clove, cardamom, Fenugreek, mustard seasame, garlic

**Common medicinal plant and their uses**: Brahmi, tulsi, mint, turmeric,lemon grass, herbal tea, saffron

Preparation of pastes, extraction of oleoresins

Packaging of spices, herbs and their products.

**Unit II**

**Food additives** – Definition and importance classification of food additives, function and uses: Preservatives ,Antioxidants , Emulsifiers Acidulants, Anti – caking agents , Flour maturing and bleaching agents , Colorants , Flavoring agents stabilizers, thickeners ,Humectants , Leavening agents , non – calorie sweetening agents , Fat replacers **.**

Stability of food additives during processing ,Legal standards and permissible limits of food additives

**Recommended Books**

1. Kelnneth T. Farrell, Spices, condiments and seasonings,The AVI Pub.
2. W. Purseglove, E G Brown, C L Green and S R Robbins, Spices, Longman Publica tions.
3. Kenji Hirasa and Mitsno Takemasa, Spice Science and Technology, Marcel Dekker, Inc
4. S. Pruthi, Quality assurance in spices and spice products (Modern methods of analysis), Allied Publishers Limited.

**Practical**

**FTQ-23**

**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

**Practical**

**FTQ-24**

 **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 like khoa, paneer, ghee etc.
11. To prepare paneer using different curdling agents
12. Study on cleaning methods of dairy equipments

**\*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**

 **Technology of Spices, Herbs & Food Additives Lab**

**M. Marks: 50**

**40+10\***

**Duration of Exam: 3Hrs**

**List of Practicals**

1. Identification of different spices.
2. Determination of moisture content in spices.
3. Demonstration of process of oil extraction and oleoresin of different spices.
4. Study of detection of adulteration in spices.
5. Study of sensory characteristics of oleoresin.
6. Dehydration of ginger, process of turmeric.
7. Demonstration of processing of locally available spices and herbs.

**\*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: 50**

**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**

**( For Old Students)**

**Semester IV**

|  |  |  |  |
| --- | --- | --- | --- |
| **Paper No.** | **Nomenclature** | Max. Marks | Exam Duration |
| FTQ-27 | Meat Technology And Quality Control | 50(40+10\*) | 3hrs |
| FTQ-28 | Technology of Pulses, Legumes and Oilseeds And Quality Control | 50(40+10\*) | 3hrs |
| FTQ-29 | Cereal and Bakery Technology And Quality Control | 50(40+10\*) | 3hrs |
| FTQ-30 | Entrepreneurship Development and Management | 50(40+10\*) | 3hrs |
| FTQ-31 | Meat Technology And Quality Control Lab | 50(40+10\*) | 3hrs |
| FTQ-32 | Technology of Pulses, Legumes and Oilseeds And Quality Control Lab | 50(40+10\*) | 3hrs |
| FTQ-33 | Cereal and Bakery Technology And Quality Control Lab | 50(40+10\*) | 3hrs |
| FTQ-34 | Entrepreneurship Development and ManagementLab | 50(40+10\*) | 3hrs |
| IM-I | International Marketing | 50(40+10\*) | 3hrs |
| BM-I | Business Management | 50(40+10\*) | 3hrs |
|  | Total Marks | 500 |  |

**\*Internal Assessment**

**Semester IV**

**FTQ-27 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-28 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-29 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 IV**

**FTQ-30: 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-31**

**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-32**

**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**

 **Practical**

**FTQ-33**

**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.

**Practical**

**FTQ-34**

**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-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

**KURUKSHETRA UNIVERSITY, KURUKSHETRA**

**SYLLABUS SCHEME**

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

**DEGREE IN Food Science and Quality Control**

**Semester – V & VI**

**(For Old Students)**

**Semester V**

|  |  |  |  |
| --- | --- | --- | --- |
| **Paper No.**  | **Nomenclature**  | **Max. Marks**  | **Time (Hours)** |
| FTQ-35 | Advances in Food Processing and Preservation | 50(40+10\*) | 3hrs |
| FTQ-36 | Principles of Food Engineering | 50(40+10\*) | 3hrs |
| FTQ-37 | Microbial technology and Therapeutic Foods | 50(40+10\*) | 3hrs |
| FTQ-38 | Food Industry Waste and By-product Management | 50(40+10\*) | 3hrs |
| FTQ-39 | Nutrition and Health | 50(40+10\*) | 3hrs |
| FTQ-40 | Advances in Food Processing and Preservation Lab | 50(40+10\*) | 3hrs |
| FTQ-41 | Principles of Food Engineering Lab | 50(40+10\*) | 3hrs |
| FTQ-42 | Microbial technology and Therapeutic Foods Lab | 50(40+10\*) | 3hrs |
| FTQ-43 | Food Industry Waste and By-product Management Lab | 50(40+10\*) | 3hrs |
| FTQ-44 | Nutrition and Health lab | 50(40+10\*) | 3hrs |
| BVHR | Human Rights | 50(40+10\*) | 3hrs |
|  | Total Marks | 550 |  |

**Semester VI**

|  |  |  |  |
| --- | --- | --- | --- |
| **Paper No.**  | **Nomenclature**  | **Max. Marks**  | **Time (Hours)** |
| FTQ-45 | Industrial training cum project  | 200(160+40\*) | 3hrs |
|  | **Grand Total (I-VI)** | 2750 |  |

**\*Internal Assessment**

**Semester V**

**FTQ-35 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-36 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-37 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-38 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-39 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-40**

**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-41**

**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-42**

 **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-43**

**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-44**

**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 individuals **\*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.