**KURUKSHETRA UNIVERSITY, KURUKSHETRA**

**Syllabus Scheme**

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

**w.e.f. 2017-18**

**KURUKSHETRA UNIVERSITY, KURUKSHETRA**

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

**SEMESTER-V**

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

**Level 7**

**Q.P-Production Manager**

**REFERENCE ID: FIC/Q9003**

**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. 2017-18**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **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 | Advances in Food Processing and Preservation Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| FTQ-41 | Principles of Food Engineering Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| FTQ-42 | Microbial Technology and Therapeutic Foods Lab  | 2 | 4 | 50(40+10\*) | 3hrs |
| FTQ-43 | Food Industry Waste and By-product Management Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| BVHR | Human Rights | 4 | 4 | 50(40+10\*) | 3hrs |
| BVCOM -3 | Communication Skills (Th.) (Pr) | 22 | 24 | 50(40+10\*)25(20+5\*) | 3hrs |
| PD-1\*\* | Product Development |  |  | 25 |  |
|  | Total  | 30 | 43 | 550 |  |

**\*Internal Assessment**

**\*\*Internal examination**

**One Credit hour point For Theory = 1 hour Contact Time/ Week**

**One Credit hour point For Practical = 2 Hours Contact Time/ Week**

**\*\*\*This syllabus is applicable for the students of batch 2016-17**

**Semester V Syllabus is formed according to the QP Production Manager Level 7**

**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. 2017-18**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **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 | BVCOM -3 | Communication Skills Theory Practical | 22 | 24 | 50(40+10\*)25(20+5\*) | 3hrs |
| 3 | FTQ-38 | Microbial Technology and Therapeutic Foods | 2 | 2 | 50(40+10\*) | 3hrs |
| 4 | FTQ-43 | Microbial Technology and Therapeutic Foods Lab  | 2 | 4 | 50(40+10\*) | 3hrs |
|  **Total General Education Component** |  **12** |  **16** | **225 (200+45 \*)** |  |
| 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-40 | Advances in Food Processing and Preservation Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| 10 | FTQ-41 | Principles of Food Engineering Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| 11 | FTQ-42 | Food Industry Waste and By-product Management Lab | 3 | 6 | 50(40+10\*) | 3hrs |
| 12 | PD-1\*\* | Product Development | - | - | 25\*\* |  |
|  **Total Skill Component** | **18** | **27** | **325 (240+85\*)** |  |
|  **Grand Total General Education Component and**  **Skill Component**  | **12+ 18=30** | **16+27=43** | **225+325=550** |  |

**\*Internal Assessment**

**\*\*Internal examination**

**Semester V Syllabus is formed according to the QP Production Manager Level 7**

**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 Food
3. s.
4. Prescott & Dunn's Industrial Microbiology by B. Reed millian Publishers Ltd. Connecticut
5. 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.

**Practical**

**FTQ-40**

**Advances in Food Processing and Preservation Lab**

**M. Marks: 50**

**Practical: 40**

**Internal: 10**

**Duration of Exam: 3Hrs**

**List of Practical’s**

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**

**Practical: 40**

**Internal: 10**

**Duration of Exam: 3Hrs**

**List of Practical’s**

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**

**Practical: 40**

**Internal: 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**

**Practical: 40**

**Internal: 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

**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**

* Concept of Human Rights:

Meaning, Definition

 Nature and Scope of Human Rights

* Theories of Rights:

Natural, Liberal, Marxist and Social Theory

**Unit-II**

* Constitutional Perspective:

 Fundamental Rights,

Fundamental Duties and their Co-relation.

* Constitutional Mechanism for Enforcement of Human Rights:

 Legislative, Executive and Judiciary.

Readings

 1. Desai, A.R. (ed.), (1986), Violations of Democratic Rights in India, Bombay: Popular Prakashan.

2. Sathe S.P., (2004), Judicial Activism in India, New Delhi: OUP.

3. Austin, Granville, (2000), Working of Democratic Constitutions: The Indian Experience, New Delhi: Oxford University Press.

 4. Austin, Granville, (2002), The Indian Constitutions: Cornerstone of a Nation, New Delhi: OUP.

**Semester-V**

**BVCOM - 3: Communication Skills**

**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.

**THEORY**

**Unit - I**

1. Communication Skills in English: The importance of English, English as the first or second language, uses of English.
2. Listening Skills: Types, objectives and Barriers, (Exercise).
3. Reading Skills: Definition, Importance, types and techniques of reading, Academic reading tips, (Exercise).

**Unit - II**

1. Writing skills: Parts of Speech, articles, Types of Sentences, Paragraph Writing, Summary, Precis Writing, Email, Resume Writing.
2. Speaking Skills: Definition, Types of communication and Barriers of communication.
3. Reviewing Grammar, Punctuation, Vocabulary, Idioms & Phrases, One word substitution.

**PRACTICAL**

**M. Marks: 25**

**Practical: 20**

**Int. Assessment: 5**

**Duration of Exam: 3 Hrs.**

1. Practicing the four skills & testing the ability of the students. (All the exercise should be task based).

Writing: Diary Entry, Dialogue, Story, Outlines.

Listening: TV (News, Songs, and Movies), Radio, Peer-group interaction etc.

Reading: Newspapers, Books, Novels, Blogs etc.

Speaking: Role Play, Mock-Interview, Debate, Speech, Drama/Play/Skit, Extempore etc.

1. Any one of the following:-
2. Write an on the spot story-line/ thematic/ current issue or develop any idea/theory.
3. To talk about any topic.
4. To first listen to some news & then ask the student to paraphrase.
5. To read accurately, fluently and with proper accent etc. a piece of writing.

**REFERENCES**

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

Mark Ibboston,”Cambridge English for Engineering”, Cambridge University Press, UK, 2011.

**PD -1 Product Development**

**Max Marks: 25**

* The student will examine the research and development process related to new food products. The student will apply a product development process to generate ideas, design, develop and evaluate new food products .The students will develop three value added products.
* A student will be evaluated by a committee of three members of faculty.

**KURUKSHETRA UNIVERSITY, KURUKSHETRA**

**SYLLABUS SCHEME**

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

**DEGREE IN Food Science and Quality Control**

**Semester – VI**

**w.e.f. 2017-18**

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| --- | --- | --- | --- | --- |
| **Paper No.**  | **Nomenclature**  |  **Credits** | **Max. Marks**  | **Exam Duration** |
| FTQ-44 | Industrial Training cum Project  | 30 | 200(160+40\*) | 3Hrs |
|  |  **Total** |  | 200 |  |

**\*Internal Assessment**

**Semester VI Syllabus is formed according to the QP Production Manager Level 7**

**Semester-VI**

 **FTQ-44 Industrial Training cum Project**

**M. Marks: 200**

**Practical: 160**

**Int. Assessment: 40**

**Duration of Exam: 3 Hrs.**

The student will undergo a training of Four months including project work in Institute or Industry and have to submit a training and project report