RAMAKRISHNA MISSION VIVEKANANDA EDUCATIONAL & RESEARCH INSTITUTE

(**Deemed to be University**, declared by Govt. of India under section 3 of UGC Act, 1956)

Po: Belur Math, District – Howrah, West Bengal -711202

INTEGRATED RURAL DEVELOPMENT & MANAGEMENT (IRDM) FACULTY CENTRE

at

Ramakrishna Mission Ashrama, Narendrapur, Kolkata :700 103

One Year PG Diploma in 'Post Harvest and Food Technology'

PROPOSED COURSE CONTENT (With effect from academic year 2021-22)

POST GRADUATE DIPLOMA

IN

POST HARVEST AND FOOD TECHNOLOGY

COURSE DURATION – 1 YEAR (2 SEMESTERS)

SEMESTER - I

COURSE NO.	COURSE DESCRIPTION	CREDIT
PHT 101	Principles of Food Processing And Post Harvest Technology	3+0
PHT 102	Food Chemistry	2+2
PHT 103	Food Microbiology	3+2
PHT 104	Food Processing and Engineering - I	2+0
PHT 105	Seed Processing Technology	3+0
PHT 106	Food Quality Testing Evaluation and Safety	3+0
SCH 101	Spiritual and Cultural Heritage of India - I	1+0
	SUB TOTAL	**21**

SEMESTER - II

COURSE NO.	COURSE DESCRIPTION	CREDIT
PHT 201	Food Processing and Engineering II	2+3
PHT 202	Industrial Visit and Report	0+4
PHT 203	Project work and Project Report	0+10
PHT 204	Entrepreneurship and Management	3+0
PHT 205	Seminar	0+1
SCH 201	Spiritual and Cultural Heritage of India - II	1+0
	SUB TOTAL	**24**

TOTAL = 21 + 24 = 45 CREDIT

POST GRADUATE DIPLOMA IN POST HARVEST AND FOOD TECHNOLOGY

Semester-I [Total: 15 (T) + 5 (P) = 20 credits]

PHT 101 : PRINCIPLES OF FOOD PROCESSING AND POST HARVEST TECHNOLOGY

3 + 0 = 3 Credits

Theory: 3 credits/ 54 hrs

UNIT I : Introduction to principles and methods of food preservation

Scope and importance of food processing, Principles and methods of food processing and preservation, canning , irradiation and Extrusion Cooking, Dielectric heating and Fermentation. **8hrs**

UNIT II : study on Membrane Technology and its uses

Membrane Technology, Introduction to pressure activated membrane processes micro filtration, UF, NF and RO and their industrial application, Hurdle technology and its application. **8hrs**

UNITIII : high pressure technology , ultrasonics, high intensity light, ohmic, IR heating **10hrs**

High Pressure processing concept, equipments for HPP treatment ,its application in food processing, Ultrasonic processing, Properties of Ultrasonics, application of ultrasonics as processing technique, Newer techniques in food processing Application of Technologies with high intensity light, Ohmic heating and IR heating. **8hrs**

UNIT IV: Post harvest technology of cereals, legumes, oilseeds, spices, vegetables

Principles of Post Harvest Treatment, Post Harvest technology for cereals, legumes, oilseeds, vegetables, and spices{cleaning ,grading, milling}, Hydrothermal treatment, and conditioning of grains, Modern paddy and wheat parboiling system, Drying Principles ,Crop Drying methods, selection criteria for dryers**.** **12hrs**

UNIT V: Food Packaging

Food Packaging, Packaging functions, Details of packaging material related to quality of food on storage, Degradable packing packaging polymers ,CA and MA, Innovation in food packaging, packaging waste management. **8hrs**

PHT 102: FOOD CHEMISTRY

2 + 2 = 4 Credits

Theory: 2 Credit / 36 hours

UNIT I

Food chemistry-definition and importance, structural ,analytical, physicochemical and functional properties of carbohydrates proteins, and amino acids, and Lipids in foods. **14 hrs**

UNIT II

Shelf life of food, Water activity and its impact on shelf life of food, effect of processing, losses ,of vitamins and minerals, due to processing, food additives, browning reaction in foods, Enzymes in foods ,and food industry ,food emulsion and emulsifiers. **10 hrs**

UNIT III

Chemistry of fruits, vegetables, cereals, legumes, oilseeds; essential nutrients- sources, functions, deficiency diseases; requirements and recommended dietary allowances **12 hrs**

Practical : 2 credit / 36 hours

1. Sampling techniques, Spectrospcopic techniques, using UV/VIS ,use of HUNTER-LAB color Flex in food analysis, polarimetry, refractometry, dough technology, Chromatographic Techniques, Adsorption, column, partition, affinity , ion exchange ,size exclusion, GC,HPLC, Separation Techniques. **4 hrs**
2. Determination of peroxidase and catalase activity. **6 hrs**
3. Comparison of different methods for moisture determination in food samples. **6 hrs**
4. Test for presence of carbohydrates, and proteins. Identification of gums. Estimation of minerals by atomic absorption, spectrophotometer, estimation of minerals by flame photometer. **8 hrs**
5. Determination of fat and protein content, determination of NEB, determination of total carotenoids; determination of reducing and total sugars, determination of extent of rancidity in fats. **6 hrs**
6. Special Techniques, Enzymatic methods of food analysis, thermal methods in food analysis (calorimetry) ,color and texture measurement techniques. **6 hrs**

PHT 103 : FOOD MICROBIOLOGY

(3+2) = 5 Credits

Theory: 3 credits/ 54 hours

UNIT I

History of Microbiology of foods, Types of Microorganisms normally associated with food mold, yeast and bacteria newer and rapid methods, for qualitative and quantitative assay demonstrating the presence and characterization of microbes. **18 hrs**

UNIT II

Microbial growth in food, intrinsic, extrinsic an implicit factors, Microbial interactions, Inorganic, organic, and antibiotic additives, Effect of injury on growth or survival. **18 hrs**

UNIT III

Contaminants of food stuff ,vegetables ,fish ,meat and milk during handling and processing .Food poisoning and microbial Toxins, microbial food fermentation, (yoghurt ,curd, cheese, beer, sauer kraut ,dairy products etc) standards for different foods ,Food borne intoxicants and mycotoxins. **18 hrs**

Practical : 2 credits / 36 hours

1. Modern methods of cell culture , synchronous and co-cell culture, continous cell culture in liquid and solid media, Cell mobilization and application Pre and Probiotics in food. **18 hrs**
2. Detection of food and adulteration, Techniques to detect food adulteration, Immunoassay Technique ELISA, Immuno electrophoresis, Ouchterlony double diffusion method, Quality assessment of fermented food products. **18 hrs**

PHT 104: FOOD PROCESSING AND ENGINEERING - I

2+0 = 2 credits

Theory: 2 Credits/36 hours

UNIT I: Introduction to Food Engineering and basics study

Introduction to Food Engineering and processes: principles of thermodynamics, and heat transfer applied to food engineering, Engineering properties of foods, Engineering properties of foods (Thermal, Optical, frictional, Aerodynamics, Rheological, Physical) and their significance. **10 hrs**

UNIT II: Food Engineering unit operations I

Basic concepts of fluid flow ,heat transfer, mass transfer and its application in food processing, concept of thermal process evaluation- sterilization and pasteurization. **8 hrs**

UNIT III: Food Engineering Unit operations II

Food Chilling and freezing,- Pre cooling and cold storage, freezing point depression, Cryogenic freezing, and IQF, food freezing, equipment air blast freezers, plate freezers, Immersion, Lyophilisation. **10 hrs**

UNIT IV: Food Engineering Unit operations III

Basic concept of Bio separation Technology ,Separation of characteristics of food products Carbohydrates, proteins, fats and enzymes - size, stability and food properties, filtration, centrifugation, flocculation, fractionation, absorption, evaporation and dehydrationin downstream food products, including case studies. **8 hrs**

PHT 105: SEED PROCESSING TECHNOLOGY

3 +0 = 3 Credits

Theory : 3 Credits/54 hours

1. Introduction to seeds,-structure of seeds Grouping of seed forms, Physical properties of seeds, chemical composition of foods. **10 hrs**
2. General seed production ,cereal/legume/forage seed production **12 hrs**
3. Seed certification ,and seed quality testing, Management of seed programmes, Longevity and storage of seeds ,Seed processing-Pre processing seed storage ,seed dryers ,Pre cleaners, and Fine cleaners, Air cleaners and gravity separators, indented cylinders ,spiral separators, magnetic separators Electronic color separators, seed graders. **12 hrs**
4. Vibratory feeders, seed coaters ,seed polishers, seed conveyors ,and elevators, seed treater, bagging, weighing and storage equipments **10hrs**
5. General seed processing plant and Modern (computerized) seed processing plant features, selection, operation and maintenance, Mobile seed cleaners visit to local seed industry. **10 hrs**

PHT 106: FOOD QUALITY, TESTING, EVALUATION AND SAFETY

3+0 = 3 Credits

Theory : 3 Credit / 54 Hours

1. Food safety and Securities Act and testing methods for food quality, testing evaluation and safety **12 hrs**

2. FOOD QUALITY, TESTING AND EVALUATION : Concept of food quality and its monitoring, The principles of quality assurance for the agro industries ,Establishment of decision making process is using official, (government and industry) instrumental, chemical and sensory procedures, the use of statistical tools in quality assurance and their applications, Development of hazard analysis procedures, Rheological techniques and instrumentation for measuring the mechanical properties of foods ,relationship of these properties to food textural qualities, Application of methods to various foods and bio renewable materials, Food specifications ,grades, and standards, Sensory test methods and procedures used to evaluate the flavor, colour and texture of foods. **30 hrs**

3. FOOD REGULATION AND SAFETY**:** Food laws and regulations, Food safety issues Food safety system, Food safety system and the environment **12 hrs**

SCH 101: Spiritual and Cultural Heritage of India – I
1+0 = 1 Credits

Course Objectives: This course is designed to familiarize the students with Swami Vivekananda's comprehensive philosophy of education and its scope in its individual and social dimensions. The student will be exposed to the high ideals of education through selected teachings of Swami Vivekananda and guided to understand and approach their role as a citizen with the right attitude. The student would be given a clear picture of the challenges faced by the society and the effective method for addressing them. The course would cover in detail the idea of education in all its aspects– the effective method for acquiring knowledge, the way to apply education to solve the problems of an individual, and the role of education in addressing the short-term and long-term needs of the society.

Student Learning Outcomes:

On completion of this course, students should be able to:

- Embrace their role as a student and an individual-in-the-making holding immense promise to the society;
- Understand the problems faced by the society/nation and the effective approach for solving them;
- Develop a comprehensive idea of education in all its aspects in light of Swami Vivekananda's teachings;
- Understand how to apply education to solve the challenges faced in life;
- Develop an understanding of the effective method of acquiring and transferring knowledge.

Syllabus:

1. Shanti Mantras and some selected *Vedic* hymns. **(2 hours)**
2. Life of Swami Vivekanada (Journey from Narendranath Datta to Swami Vivekananda) and his speech at Parliament of Religion. **(4 hours)**
3. Swami Vivekananda on India: India's eminence, Life centre, Mission and Future. **(2 hours)**
4. India's decadence:
   (a) Its Causes - We are to blame, Ignoring the past, Narrowing our outlook, Perversion of religion, Tyranny over masses, Neglect of women. **(2 hours)**
   (b) Its symptoms and Cure – Cultural heresy and fanaticism, Physical weakness, Lack of faith in ourselves etc. **(2 hours)**
5. Essentials for Regeneration: Training Sincere Workers, Deluging the Land with Spiritual Ideals, Social Reform, and Its Method. **(3 hours)**
6. Education the Panacea of all social evils: The present system, True Education, Ideal Method – Concentration and Detachment, Brahmacharya, Shraddha, Character, Communion with Nature, Gurukula system, Psychological approach, Present Need and Swami's Plan. **(3 hours)**

Semester II [TOTAL 5(Th) +20(Pr)= 25 CREDITS]

PHT 201: FOOD PROCESSING AND FOOD ENGINEERING II

2 + 3 = 5 Credits

Theory : 2 Credits /36 hours

1. Application of Food Engineering in Heat Transfer, processing of food grains **8 hrs**

2. Various size reduction machineries and energy requirement ,Material handling, equipments, separating equipment based on size shape and surface characteristics of food material Heating and cooling of food products mode of heat transfer different types of heat exchangers Principles of drying and drying equipments **14 hrs**

3. Processing of food grains ,animal feed ,seeds, fruits and vegetables, flowers, spices, dairy products, egg and meat, various milling processes Rice wheat ,maize and pulse milling Parboiling of wheat and paddy, storage of grains. **14 hrs**

Practical: 3 Credits/54 Hours

1. Visits to local Rice mill, Flour Mill, Dal Mill, Oil Extraction Mill.
2. Hands on training on food processing **54 hrs**

PHT 202: INDUSTRIAL VISIT AND REPORT

0 + 4 = 4 Credits

PHT 203: PROJECT WORK AND PROJECT REPORT

0 + 10 = 10 Credits

PHT 204: ENTERPRENEURSHIP AND MANAGEMENT

3 + 0 = 3 Credits

Theory: 3 Credits/54 Hours

1. Basic introduction to Entrepreneurship and management of enterprise

Entrepreneurship - The concept of Entrepreneurship and the legal criteria for small and medium enterprise. The institutional frameworks various business structures Contacts with a focus on sales contract, contract of entrepreneurship, labour contract, Essential labour law, loans and charges. **10 hrs**

2. Essential elements of intellectual property and unfair competition Legal aspects of entrepreneurship –salient features ,Basic principles of tax Marketing-understanding marketing, the marketing environment information systems and marketing research, customer buying behavior ,segmentation, Target marketing and positioning. **12 hrs**

3. The Marketing mix (Product, Price, Place and Promotion) Strategic Planning **6 hrs**

4. Food Safety Management System (FSMS) and its application to Food Industry – (ISO – 22000 – 2005) and ISO-9001, Details and highlights of clauses of ISO – 22000-2005 and ISO - 9001. **14 hrs**

5. Importance of ISO – 22000 – 2005 and benefits of it to the industry. **6 hrs**

6. Definition of ISO – 22000 – 2005, ISO - 9001 and its difference with HACCP. **6 hrs**

PHT 205: SEMINAR

0 + 1 = 1 Credits

SCH 201: Spiritual and Cultural Heritage of India – II
0 + 1 = 1 Credits

Course Objectives: This course is designed to impart to the student a comprehensive understanding of various social challenges faced by modern India and its way forward in light of Swami Vivekananda's insightful study of these subjects. The course would familiarize the student with Swami Vivekananda's ideas on women empowerment combining ancient ideals of womanhood with scope for adapting to the needs of the modern society. The importance of improving the condition of the poorer classes, an essential feature of an enlightened society, will be discussed in detail. The greater role that an enlightened India would play in the modern world and the blueprint for its harmonious and beneficent relationship with the rest of the world will be discussed.

Student Learning Outcomes:
On completion of this course, students should be able to:

- Chant selected Vedic hymns that bring the student in touch with the ideas of traditional Indian knowledge;
- Understand the traditional Indian ideal of womanhood and the way to bring back a respectable position for women in the society compatible with both the ancient ideals and the modern needs;
- Recognize the importance of serving equally the whole society, especially the lower classes, and feel inspired to dedicate their knowledge and skills to this cause;
- Understand the great future role that India has to play in the world and her relationship with other nations involving both teaching and learning, to the mutual benefit of both.

Syllabus:

1. Selected Shlokas from Srimad Bhagavad Gita on shaping own destiny, secret of work and success, concentration of mind: Bhagavad Gita-6.5, Bhagavad Gita-6.6, Bhagavad Gita-2.3, Bhagavad Gita-2.47, Bhagavad Gita-2.48, Bhagavad Gita-6.38, Bhagavad Gita-6.35. **(3 hours)**
2. Swami Vivekananda's Message on the Uplift of the Masses: Dedicate yourself; develop faith in equality and oneness of man; educate the masses, solution to the caste problem. **(3 hours)**
3. Swami Vivekananda's view on caste problem and its solution: Caste is a social institution not a religious institution, Ideal of Brahmin-ness, Characteristics of noble minded man, Untouchability is form of mental disease, Uplifting all to the state of ideal Brahminhood. **(3 hours)**
4. Swami Vivekananda's Message on Women's Empowerment: The ideal of woman as mother; womanhood personified in Sita; as warrior; eligibility for the highest knowledge; common humanity grounds; respecting the women; all round education of women; develop their own solutions. **(3 hours)**
5. Swami Vivekananda's Message on Restoring our National Glory: India's ideal is spirituality, India's mission is spiritual regeneration of the world, India's solution to life's challenges, India must share the spiritual knowledge with the West and gain material knowledge from them, India is readying for its time under the sun. **(3 hours)**
6. Swami Vivekananda's thought on Karma Yoga: Karma in its effect on character is the most tremendous power that man has to deal with, what is duty, power of purity and chastity, How to make the duty sweeter in daily life. **(3 hours)**

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TOTAL CREDIT (THEORY + PRACTICAL)**: 45**