

S-01 & 02 June, 2016 AC after Circulars from Circular No.100 & onwards - 19 -

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY**CIRCULAR NO. SU/Sci./B.Voc. Syllabi/11/2016**

It is hereby notified for information to all concerned that, on the recommendation of the Ad-hoc Board in Centre for Vocational Education and Training, the **Academic Council at its meeting held on 01 & 02 June, 2016** have accepted the syllabi of

[1] Bachelor of Vocation Multimedia & Animation and
[2] Bachelor of Vocation Food Processing Technology under the Faculty of Science.

This is effective from the **Academic Year 2016-2017** and onwards.

This syllabus are available on the University website www.bamu.ac.in

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
 Aurangabad-431 004.
 REF.NO. SU/2016/
A.C.M.A.I.No.449-[38]

Date:- 12-07-2016.

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 Director, 13/7/16,
 Board of College and
 University Development.

Copy forwarded with compliments to :-

**1] The Principals, affiliated concerned College,
 Dr. Babasaheb Ambedkar Marathwada University.**

Copy to :-

- 1] The Controller of Examinations,
- 2] The Section Officer, [B.C.S. Unit],
- 3] The Programmer [Computer Unit-1] Examinations,
- 4] The Programmer [Computer Unit-2] Examinations,
- 5] The In-Charge, E-Suvidha Kendra, [Professional Unit], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr. Babasaheb Ambedkar Marathwada University,
- 6] The Record Keeper,
 Dr. Babasaheb Ambedkar Marathwada University.

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Curriculum for Bachelor of Vocational Education (B. Voc.) in Food Processing Technology

The Bachelor in Vocation program Food Processing Technology is divided into six semester having 180 credits. Each semester will have courses based on General Education Components and Skill Development Components, out of which six subject will be dedicated for theory (each theory course will have inbuilt practical / tutorial/ skill development components) and Food Processing Technology courses will be devoted to Laboratory Work / Project / Industrial Training / In-plant Internship. This program offers following **General Education Components** which include communication skill, computer fundamental, Environment Science, Personality development, Economics & Management etc. whereas **Skill Development Components** includes Food chemistry, biochemistry, Microbiology and Biotechnology, human Nutrition, Processing Technology of Fruits & Vegetables, Cereals, Legumes, oil seeds, spices and condiments , Meat, fish and poultry, milk and milk products, Bakery and confectionary technology. Food analysis, food safety, Regulations and quality management, special implant training, seminar and project etc.

Preamble:

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad is offering a three year Bachelor Program in Vocational Education (B. Voc.) in Food Processing Technology from Academic year 2016-17. The curriculum design of this program is undertaken in the following framework (Preamble).

- a) Although there has been remarkable progress in all sectors of education in last couple of decades, the less regulated area of the education sector—vocational training—seems to have lost its significance/importance. This has led to the widening gap between the supply and demand for skilled manpower across various food processing industries and R&D organizations. This shortage of skills has translated directly into unemployment among an increasing number of graduates who pass-out every year and are forced to bare- trained in order to become marketable. This program is designed to produce a skilled manpower so that wide variety of options in different sectors of Food Processing would be available and it will improve the opportunities for the unemployed youths in the country in both the private and public sectors.

- b) According to recent survey of FICCI (Federation of Indian Chambers of Commerce & Industry) on skill demand in food processing industries, it has been observed that a majority percentage of organizations are dissatisfied with the skills of the available trained manpower. For instance, 58% of the respondents were dissatisfied with technical skills and knowledge needed for the job. Also 72% showed discontent with employees' ability to use appropriate and modern tools, equipment, and technologies specific to their job roles. This programme aims to provide some solution for this problem and this would facilitate to improve:
- (i) Quality of training
 - (ii) High drop-out rates
 - (iii) Linkages with Universities and industry
 - (iv) Inadequacy of resources
- c) This program is intended to offer practical, hands on training and skills needed to pursue an occupation. It will provide options to the students to select the courses of their choice which are directly aligned to land a job in a chosen profession or a skilled trade. The end result of this program is to enable an individual to at train self-employment.

Program Outcomes:

Vocational Education is education that prepares the students for specific job role in various sectors in food processing industries and Professional organization. It trains the students from a trade, technician or professional position in R & D organizations for specific job roles.

The program outcomes are the skills and knowledge which the students have at each exit level/at the time of graduation. These outcomes are generic and are common to all exit levels mentioned in the program structure.

- i. Students with vocational training can find work in several state and central government organizations, non-profit groups, and academic institutions and in private sectors as well.
- ii. This program prepares students for specific types of occupations and

frequently for direct entry into the market.

- iii. After completion of this program students will have enough competences, to get benefit from market opportunities.
- iv. This program would enable students to update their knowledge and professional skills for entering the work force executing income generating activities or occupying better positions
- v. At each exit level of this program, students will be able to
 - a) Apply knowledge of general education subjects and skill development subjects to the conceptualization of food processing technologies.
 - b) Designing and formulation of new food products, on the basis of consumers demands, development of methodology/technologies of food processing, design that meet solutions needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
 - c) Conduct and undertake investigations of problems of including design of processing technology for various type food, food analysis, food quality and safety aspects and interpretation of data in order to provide valid conclusions.
 - d) Create, select and apply appropriate processing technology/techniques, resources, modern processing tools in order to improve the quality, safety and the shelf life fresh and process food.
 - e) Communicate effectively on minimal processing activity and value addition to the farmers/producers/grower at large, such as being able to comprehend and write effective reports, design documentation and make effective presentations.
 - f) Demonstrate understanding of the social, health, safety, legal and cultural issues and the consequent responsibilities relevant to Food processing.
 - g) Understand and commit to professional ethics and responsibilities and norms/regulation for manufacturing of process food and its effects on health.
 - h) Understand the impact of food processing technologies solutions in a societal context and demonstrate technical know-how and understanding of food safety, quality for sustainable development.

Exit Options:

Bachelor of Vocation (B. Voc.) is launched under the scheme of University Grants Commission for skill development based on higher education leading to Bachelor of Vocation (B. Voc.) Degree with multiple exits as Diploma/Advanced Diploma under the National Skill Qualification Framework (NSQF). The B. Voc. programme incorporates specific job roles and their National Occupational Standards along with broad based general education.

1. B. Voc. Programme has been designed as per National Skill Qualification Framework emphasizing on skill based education.

2. LEVELS OF AWARD:

The certification levels shall lead to certificate/Diploma/Advanced Diploma/ B. Voc. Degree in Food processing technology.

| Award | Duration | Corresponding NSQF level |
|--|-----------------|---------------------------------|
| Certificate in Food Processing Technology | 6 Month | 4 |
| Diploma in Food Processing Technology | 1 Year | 5 |
| Advanced Diploma in Food Processing Technology | 2 Year | 6 |
| B. VOC. Degree in Food Processing Technology | 3 Year | 7 |

The suggested credits for each of the years are as follows:

| NSQF level | Skill component credits | General education credits | Normal calendar duration | Exit point /awards |
|-------------------|--------------------------------|----------------------------------|---------------------------------|--|
| 6 Month | 18 | 12 | One Semester | Certification in Food Processing Technology |
| Year 1 | 36 | 24 | Two Semesters | Diploma in Food Processing Technology |
| Year 2 | 36 | 24 | Four Semesters | Advanced Diploma in Food Processing Technology |
| Year 3 | 36 | 24 | Six Semesters | Degree in Food Processing Technology |
| Total | 108 | 72 | | |

Eligibility criteria for Admission:

1. A candidate will be eligible to join 1st semester of B. Voc. Food Processing Technology course, if he/she has passed 10+2 examination (Science Stream) or 10+2 vocational stream related to Food Production/Food Processing of recognized Board/university, or any other examination recognized as equivalent thereto.
2. The course of study of B. Voc. shall be divided in to six semesters and university examination will be held at the end of every semester in the months of November/December (for semester I, III & V) and May/June (for semester II, IV & VI) or as fixed by the University.
3. Semester examination will be open to regular candidates who have been on the rolls of a college affiliated to this University and meet the attendance and other requirements.

Admission, Registration and Promotion Process:

Admission will be done on the basis of Percent mark obtained by candidate in Twelfth science or Common entrance test conducted by college or admission criteria as decided by the authority for first semester.

The students will have to clear / qualify at least 50% of theory papers / courses from second semester and all papers / courses (inclusive of theory and practical) from first semester for getting promoted to second year. Similarly the students will have to clear / qualify at least 50% of theory papers / courses from fourth semester and all papers / courses (inclusive of theory and practical) from third semester for getting promoted to third year.

Dropout students will be allowed to register for second or third year as and when the concerned courses are offered by the College, however he/she should not exceed more than twice the duration of the course from the date of first registration at the Centre. Therefore, for obtaining B. Voc. degree a student will have to complete all semesters successfully within 6 years/12 semesters.

Admission fees: The admission fees for B. Voc. (Food Processing Technology) would be as decided by the University.

Vocational Educational Programme Implementation Committee (VEPIC):

The Vocational Educational Programme Implementation Committee (VEPIC) will consist of the Principal as a Chairman, course coordinator and two faculty of the concern course/specialization as members. The Committee will monitor the smooth functioning and implementation of the B. Voc. program in Food Processing Technology.

Choice Based Credit and Grading System (CBCS):

The choice based credit and grading system has been adopted. This provides flexibility to make the system more responsive to the changing needs of our students, the professionals and society. It gives greater freedom to students to determine their own pace of study.

- Students will have to earn 30 credits for the award of Six Month Certificate in Vocation in Food Processing Technology.
- Students will have to earn 60 credits for the award of one year Diploma in Vocation (D. Voc.) in Food Processing Technology.
- Students will have to earn 120 credits for the award of two year Advance Diploma in Vocation (Adv. D. Voc.) in Food Processing Technology.
- Students will have to earn 180 credits for the award of three year Bachelor Degree in Vocation (B. Voc.) in Food Processing Technology.

Credit-to-contact hour Mapping:

- One Credit would mean equivalent of 15 periods of 60 minutes each for theory lecture.
- For laboratory course/ workshops/internship/field work/project, the credit weightage for equivalent hours shall be 50% that for lectures.
- For self-learning, based on e-content or otherwise, the credit weightage for equivalent hours of study should be 50% or less of that for lectures.

Attendance:

Students must have 75 % of attendance in each course for appearing examination otherwise he / she will not be strictly allowed for appearing the examination of each course. However, students having 65 % attendance may request Head of the concerned Institution for the condonance of attendance on medical ground.

Evaluation Methods:-

The assessment will be based on Continuous Internal Assessment (CIA) and semester end examination (SEE).

There shall Continuous Internal Assessment for each theory paper. In each semester, 20% (i.e. 15) marks shall be for CIA and 80% (i.e. 60) marks for ESE. Marks obtained by the student in all heads viz. CIA and ESE shall be added while declaring the final result.

Continuous Internal Assessment (CIA):- The internal marks shall be assigned on the basis of tutorials/home assignment/seminar presentation and weekly tests/class test/ preliminary examination to be conducted by the concerned college. These marks shall be communicated to the University before commencement of semester end examination.

End Semester Examination (ESE):

- The end semester examination for each theory and practical paper shall be conducted by the University at the end of each semester.
- Duration of theory examination shall be of three hours for a paper of 75 marks and two and half hour for a paper of 60/40marks. Practical examinations shall be of three hour duration for every semester end examinations respectively.
- The respective college is advised to arrange maximum number of experiments from the list of experiments provided with the syllabus or experiments based on theory syllabus.
- Assessment of laboratory courses and project will also have 50 % internal and 50 % semester end assessment. Semester end practical examination will be of 25 marks and 25 marks will be for internal examination. Student must perform at least eight experiments from each laboratory course. The semester end practical examination will be conducted at the end of each semester along with the theory examination.
- Students without certified journal shall not be allowed to appear for the practical examination.

Examination Scheme

- A student shall be evaluated for his/her academic performance in a course through class tests, tutorials, practicals, homework assignments, term papers, field work, seminars, quizzes, Test examinations, teachers assessments and the End-Semester Examination as applicable.
- At the end of the semester, there would be an End Semester Examination as per syllabus. For the examination of First Year for the academic year 2016-2017, the minimum percentage for passing for each course code, practical examination and ESE is 40 %, failing which he/she will get F grade for that course code. This rule will be progressively applicable for higher classes in next consecutive years.
- The project work shall be evaluated by midterm seminar(s), quality of work carried out, project report submission and the viva-voce examinations.
- The industrial/field training shall be evaluated through the quality of work carried out, the report submission and presentation(s).

Rule for combined passing:

- To pass the examination a candidate must obtain minimum 40% of Marks in each End Semester Examination & CIA taken together, however the candidate must obtain minimum 35% of Marks at the End Semester Examination.
- To pass a subject where there is no provision of class test, the candidate must obtain 40% of Marks in the End Semester Examination.
- If the candidate remains absent for CIA, his performance should be treated as “Zero” Marks.

Results Grievances / Redressal :-

Grievances / redressal committee will be constituted in the college to resolve all grievances relating to the evaluation. The committee shall consist of the Principal of the college, the concerned teacher of a particular course and senior faculty member. The decision of Grievances / redressal committee will have to be approved by Competent Authority.

Earning Credits:

At the end of every semester, a letter grade will be awarded in each course for which a student had registered. A student's performance will be measured by the number of credits that he/she earned by the weighted Grade Point Average (GPA). The SGPA (Semester Grade Point Average) will be awarded after completion of respective semester and the CGPA (Cumulative Grade Point Average) will be awarded by the university at the respective exit point.

Grading System:

- The grading reflects a student-own proficiency in the course. A ten point rating scale shall be used for the evaluation of the performance of the students to provide letter grade for each course and overall grade for the B. Voc. Program. Grade points are based on the total number of marks obtained by him / her in all heads of the examination of the course. The grade points and their equivalent range of marks are shown in Table-I

Table I: Ten point grade and grade description

| Marks Obtained (%) | Grade Point | Letter Grade | Description |
|--------------------|-------------|-----------------|------------------------|
| 90-100 | 9.00- 10 | O | Outstanding |
| 80-89 | 8.00-8.90 | A ⁺⁺ | Exceptional |
| 70-79 | 7.00-7.90 | A ⁺ | Excellent |
| 60-69 | 6.00-6.90 | A | Very Good |
| 55-59 | 5.50-5.90 | B ⁺ | Good |
| 50-54 | 5.00-5.40 | B | Fair |
| 45-49 | 4.50-4.90 | C ⁺⁺ | Average (Above) |
| 41-44 | 4.1-4.49 | C | Average |
| 40 | 4.0 | P | Pass |
| < 40 | 0.0 | F | Fail (Unsatisfactory) |
| | 0.0 | AB | Absent |

- Non-appearance in any examination / assessment shall be treated as the students have secured zero marks in that subject examination / assessment.
- Minimum P grade (4.00 grade points) shall be the limit to clear / pass the course / subject. A student with F grade will be considered as “failed” in the concerned course and he / she has to clear the course by appearing in the next successive semester examinations. There will be no revaluation or recounting under this system.
- Every student shall be awarded grade points out of maximum 10 points in each subject (based on 10 point scale). Based on the grade points obtained in each subject, Semester Grade Point Average (SGPA) and then Cumulative Grade Point Average (CGPA) shall be computed. Results will be announced at the end of each semester and CGPA will be given at respective exit point.

Computation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average)

Grade in each subject / course will be calculated based on the summation of marks obtained in all modules.

The computation of SGPA and CGPA will be as below

- Semester Grade Point Average (SGPA) is the weighted average points obtained by the students in a semester and will be computed as follows

$$\text{SGPA} = \frac{\text{Sum (Course Credits) X Number of Grade Points in concerned Course Gained by the Student}}{\text{Sum (Course Credits)}}$$

The SGPA will be mentioned on the grade card at the end of every semester.

- The Cumulative Grade Point Average (CGPA) will be used to describe the overall performance of a student in all semester of the course and will be computed as under.

$$\text{CGPA} = \frac{\text{Sum (All six Semester SGPA)}}{\text{Total Number of Semester}}$$

The SGPA and CGPA shall be rounded off to the second place of decimal.

Grade Card

Results will be declared and the grade card (containing the grades obtained by the student along with SGPA) will be issued by the university after completion of every semester. The grade card will be consisting of following details.

- Title of the courses along with code opted by the student.
- Credits associated with the course.
- Grades and grade points secured by the student.
- Total credits earned by the student in a particular semester.
- Total credits earned by the students till that semester.
- SGPA of the student.
- CGPA of the student (at respective exit point).

Cumulative Grade Card

The grade card showing details grades secured by the student in each subject in all semesters along with overall CGPA will be issued by the University at respective exit point.

Paper Code Description:

- The course offered by the university shall have an alphanumeric course code consisting of a string of six characters. The first three characters in a course code shall be capital letters identifying the responsible general component (BVG) and skill development components in Food Processing Technology (FPT) of the B. Voc. course. The next three numerical digits give the following information. The first digit specifies the first semester of first year of the UG course. Second and third digit specifies the serial number of the general and skill development component.

**Course Structure of F.Y. B. Voc. (Food Processing Technology)
B. Voc. Semester I & II**

| Semester-I | | | | Marks | | |
|-------------------------------------|---|----------------|------------|----------------|----------------|------------|
| Paper Code | Title | No. of credits | Hrs. /week | Internal (CIA) | External (ESE) | Total |
| General Education Components | | | | | | |
| BVG-101 | Communication Skill-I | 2 | 2 | 10 | 40 | 50 |
| BVG-102 | Environmental Science | 2 | 2 | 10 | 40 | 50 |
| BVG-103 | Computer Fundamentals-I | 2 | 2 | 10 | 40 | 50 |
| BVG-104 | Lab- Communication Skill –I | 2 | 4 | 25 | 25 | 50 |
| BVG-105 | Lab- Environmental Science | 2 | 4 | 25 | 25 | 50 |
| BVG-106 | Lab- Computer Fundamentals-I | 2 | 4 | 25 | 25 | 50 |
| Skill Development Components | | | | | | |
| FPT-111 | General Biochemistry and Microbiology | 3 | 3 | 15 | 60 | 75 |
| FPT-112 | Fundamentals of Food and Nutrition | 3 | 3 | 15 | 60 | 75 |
| FPT-113 | Principles of food preservation | 3 | 3 | 15 | 60 | 75 |
| FPT-114 | Lab- General Biochemistry and Microbiology | 3 | 6 | 25 | 25 | 50 |
| FPT-115 | Lab- Fundamentals of Food and Nutrition | 3 | 6 | 25 | 25 | 50 |
| FPT-116 | Lab- Principles of food Preservation | 3 | 6 | 25 | 25 | 50 |
| Total | | 30 | 45 | 225 | 450 | 675 |
| Semester-II | | | | Marks | | |
| Paper Code | Title | No. of credits | Hrs. /week | Internal (CIA) | External (ESE) | Total |
| General Education Components | | | | | | |
| BVG-201 | Communication Skill-II | 2 | 2 | 10 | 40 | 50 |
| BVG-202 | Personality Development | 2 | 2 | 10 | 40 | 50 |
| BVG-203 | Computer Fundamentals-II | 2 | 2 | 10 | 40 | 50 |
| BVG-204 | Lab- Communication Skill- II | 2 | 4 | 25 | 25 | 50 |
| BVG-205 | Lab- Personality Development | 2 | 4 | 25 | 25 | 50 |
| BVG-206 | Lab- Computer Fundamentals-II | 2 | 4 | 25 | 25 | 50 |
| Vocation Education Component | | | | | | |
| FPT-211 | Food Biochemistry | 3 | 3 | 15 | 60 | 75 |
| FPT-212 | Food Microbiology | 3 | 3 | 15 | 60 | 75 |
| FPT-213 | Processing Technology of Fruits & Vegetables | 3 | 3 | 15 | 60 | 75 |
| FPT-214 | Lab- Food Biochemistry | 3 | 6 | 25 | 25 | 50 |
| FPT-215 | Lab- Food Microbiology | 3 | 6 | 25 | 25 | 50 |
| FPT-216 | Lab- Processing Technology of Fruits & Vegetables | 3 | 6 | 25 | 25 | 50 |
| Total | | 30 | 45 | 225 | 450 | 675 |

**Teaching and Examination Scheme for
F. Y. B. Voc. (Food Processing Technology)**

| Semester-I | | | | Marks | | |
|-------------------------------------|---|----------------|------------|----------------|----------------|------------|
| Paper Code | Title | No. of credits | Hrs. /week | Internal (CIA) | External (ESE) | Total |
| General Education Components | | | | | | |
| BVG-101 | Communication Skill-I | 2 | 2 | 10 | 40 | 50 |
| BVG-102 | Environmental Science | 2 | 2 | 10 | 40 | 50 |
| BVG-103 | Computer Fundamentals-I | 2 | 2 | 10 | 40 | 50 |
| BVG-104 | Lab- Communication Skill –I | 2 | 4 | 25 | 25 | 50 |
| BVG-105 | Lab- Environmental Science | 2 | 4 | 25 | 25 | 50 |
| BVG-106 | Lab- Computer Fundamentals-I | 2 | 4 | 25 | 25 | 50 |
| Skill Development Components | | | | | | |
| FPT-111 | General Biochemistry and Microbiology | 3 | 3 | 15 | 60 | 75 |
| FPT-112 | Fundamentals of Food and Nutrition | 3 | 3 | 15 | 60 | 75 |
| FPT-113 | Principles of food preservation | 3 | 3 | 15 | 60 | 75 |
| FPT-114 | Lab- General Biochemistry and Microbiology | 3 | 6 | 25 | 25 | 50 |
| FPT-115 | Lab- Fundamentals of Food and Nutrition | 3 | 6 | 25 | 25 | 50 |
| FPT-116 | Lab- Principles of food Preservation | 3 | 6 | 25 | 25 | 50 |
| Total | | 30 | 45 | 225 | 450 | 675 |
| Semester-II | | | | Marks | | |
| Paper Code | Title | No. of credits | Hrs. /week | Internal (CIA) | External (ESE) | Total |
| General Education Components | | | | | | |
| BVG-201 | Communication Skill-II | 2 | 2 | 10 | 40 | 50 |
| BVG-202 | Personality Development | 2 | 2 | 10 | 40 | 50 |
| BVG-203 | Computer Fundamentals-II | 2 | 2 | 10 | 40 | 50 |
| BVG-204 | Lab- Communication Skill- II | 2 | 4 | 25 | 25 | 50 |
| BVG-205 | Lab- Personality Development | 2 | 4 | 25 | 25 | 50 |
| BVG-206 | Lab- Computer Fundamentals-II | 2 | 4 | 25 | 25 | 50 |
| Vocation Education Component | | | | | | |
| FPT-211 | Food Biochemistry | 3 | 3 | 15 | 60 | 75 |
| FPT-212 | Food Microbiology | 3 | 3 | 15 | 60 | 75 |
| FPT-213 | Processing Technology of Fruits & Vegetables | 3 | 3 | 15 | 60 | 75 |
| FPT-214 | Lab- Food Biochemistry | 3 | 6 | 25 | 25 | 50 |
| FPT-215 | Lab- Food Microbiology | 3 | 6 | 25 | 25 | 50 |
| FPT-216 | Lab- Processing Technology of Fruits & Vegetables | 3 | 6 | 25 | 25 | 50 |
| Total | | 30 | 45 | 225 | 450 | 675 |

Course Structure for F. Y. B. Voc. (Food Processing Technology)

| Code No | Subject Title | Credits |
|---|---|-----------------|
| Semester-I | | |
| General Education Components | | |
| BVG-101 | Communication Skill-I | 2 |
| BVG-102 | Environmental Science | 2 |
| BVG-103 | Computer Fundamentals-I | 2 |
| BVG-104 | Lab- Communication Skill –I | 2 |
| BVG-105 | Lab- Environmental Science | 2 |
| BVG-106 | Lab- Computer Fundamentals-I | 2 |
| | Total credit (T+P) | 12 |
| Skill Development Components | | |
| FPT-111 | General Biochemistry and Microbiology | 3 |
| FPT-112 | Fundamentals of Food and Nutrition | 3 |
| FPT-113 | Principles of food preservation | 3 |
| FPT-114 | Lab- General Biochemistry and Microbiology | 3 |
| FPT-115 | Lab- Fundamentals of Food and Nutrition | 3 |
| FPT-116 | Lab- Principles of food Preservation | 3 |
| | Total credit (T+P) | 18 |
| Total credits for Semester-I (General Education Component + Skill Development Component) | | 12+18=30 |
| Semester-II | | |
| General Education Components | | |
| BVG-201 | Communication Skill-II | 2 |
| BVG-202 | Personality Development | 2 |
| BVG-203 | Computer Fundamentals-II | 2 |
| BVG-204 | Lab- Communication Skill- II | 2 |
| BVG-205 | Lab- Personality Development | 2 |
| BVG-206 | Lab- Computer Fundamentals-II | 2 |
| | Total credit (T+P) | 12 |
| Vocation Education Component | | |
| FPT-211 | Food Biochemistry | 3 |
| FPT-212 | Food Microbiology | 3 |
| FPT-213 | Processing Technology of Fruits & Vegetables | 3 |
| FPT-214 | Lab- Food Biochemistry | 3 |
| FPT-215 | Lab- Food Microbiology | 3 |
| FPT-216 | Lab- Processing Technology of Fruits & Vegetables | 3 |
| | Total credit (T+P) | 18 |
| Total credits for Semester-II (General Education Component + Vocation Education Component) | | 12+18=30 |

General Education Components

Semester-I BVG-101 Communication Skill -I

Credits- 2

Learning Objectives:

1. To facilitate the students to understand the fundamental of communicative English.
2. To facilitate the students to develop skills of communication in English.

Learning Outcomes:

1. Expression power and communication skill of the students in English will improve.
2. Students will be able to identify the necessities of behavioral and expressive attitudes as per situations.

Unit-I

Grammar:

- i. Parts of speech
Nouns, Kinds of Nouns, Pronoun, Verb, Adjectives Adverb, Prepositions, Conjunctions and Interjections

Unit-II

Tenses & Articles:

- i. Tenses
Present tense, Past tense, Future tense.
- ii. Articles
Use of A, An, The

Unit-III

Process of Communication:

- i. Attributes of Communication: Sender, Receiver, Medium, and Channel
Message Feedback.
- ii. Objectives of communication, why communication is necessary?
- iii. Communication in Business

Reference Books:

1. Business Communication, by Urmila Rai & S. M. Rai. Himalaya Pub.
2. Communication Skill for Effective Management by Dr. Anjali Ghanekar. Everest Pub. House.
3. Developing Communication Skill by Krishna Mohan, Meera Banerji. McMillan

BVG 104: Practicals based on Communication Skills-I**Simple conversation**

- Meeting people, pictorial conversation, identifying objects, handling situation. Vocabulary building Conversation with seniors and peers.

BVG-102 Environmental Science**Credits-2****Learning objectives:**

1. As we aware, the world environmental problems, students should acquaint basic knowledge of environment and its components.
2. To solve the environmental problems, it is necessary to develop and invent new advanced technologies to control environmental pollution.

Learning Outcomes:

Student will possess the intellectual flexibility necessary to view environmental question from multiple perspectives, prepared to alter their understanding as they learn new ways of understanding.

Unit-I**Multidisciplinary nature of environmental studies**

Definition, scope and importance, need for public awareness.

Natural Resources: Renewable and non-renewable resources:

Natural resources and associated problems

- i. Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
- ii. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

- iii. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- iv. Food resources: World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- v. Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, Case studies.
- vi. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- vii. Role of an individual in conservation of natural resources.
- viii. Equitable use of resources for sustainable lifestyles.

Unit-II

Ecosystems: • Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the following ecosystems :- a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its conservation : Introduction – Definition : genetic, species and ecosystem diversity, Biogeographically classification of India , Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

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

Unit-III

Social Issues and the Environment: From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns. Case Studies, Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies, Wasteland reclamation, Consumerism and waste products, Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act , Wildlife Protection Act , Forest Conservation Act , Issues involved in enforcement of environmental legislation, Public awareness.

Human Population and the Environment: Population growth, variation among nations, Population explosion – Family Welfare Programme, Environment and human health, Human Rights, Value Education, HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environment and human health, Case Studies.

Field work

- i. Visit to a local area to document environmental assets river/ forest/grassland/hill/mountain.
- ii. Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- iii. Study of common plants, insects, birds.
- iv. Study of simple ecosystems-pond, river, hill slopes, etc. (Field work Equal to 5 lecture hours)

Reference Books:

1. Agarwal, K.C. (2001). Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad –380 013, India, Email:mapin@icenet.net (R)
3. Brunner R.C. (1989), Hazardous Waste Incineration, McGraw Hill Inc. 480p
4. Clark R.S., Marine Pollution, Clarendon Press Oxford (TB)
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment (R)
8. Gleick, H.P. (1993). Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
9. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
10. Heywood, V.H & Waston, R.T. (1995). Global Biodiversity Assessment. Cambridge Univ. Press 1140p.

BVG 105: Assignments based on Environmental Science**BVG-103 Computer Fundamentals-I****Credits- 2****Learning Objectives:**

1. To facilitate the students to study Instructional Designing theories, basic IT skills using application software tools.
2. To facilitate the students to make functional use of IT skills in teaching – learning process.

Learning Outcomes:

1. Students will have command on basic IT skills
2. Students will be able to use computer and internet facilities for their academic and holistic development purpose

Unit-I

Information Concepts and Processing: Evolution of information processing, Data, Information language and communication. Elements of a computer processing system: Hardware-CPU, storage devices and media. VDU, Input-output devices, data communication equipment. Software-System software, Application software.

Operating Systems: Concept as resource manager and coordinator of processor, devices and memory. Command interpreter, typical commands of DOS/ UNIX/ Netware, GUI-Windows.

Computers and Communication: Single user, multi-user, workstation, and client server systems. Computer networks, Network protocols. LAN, WAN, Services offered by Internet.

Unit-II

Problem analysis, flow charts, decision tables & algorithms. Algorithmic Programming Language: Representation of integers, characters, constants and variables, arithmetic expressions and their evaluation using rules of hierarchy. Assignment statements, logical constants, variables and expression.

Unit-III

Control structures—sequencing, alteration, iteration, arrays, manipulating vector and matrix. Subroutines and linkage. Data management. Sample I/O statements, Documentation, Debugging. Examples illustrating structured program development methodology. C should be used as the teaching language.

Reference Books:

1. Fundamentals of Information Technology by Chetan Srivastava, Kalyani Publishers
2. Fundamentals of Computers by V. Rajaraman, PHI Publication, IVth Edition.
3. Fundamentals of Programming by Raj K. Jain, S. Chand Publication
4. Let Us C by Yashwant Kanitkar
5. Programming with C - 2nd Edition - Byron Gottfried

BVG 106: Practical Assignments Based on Computer Fundamentals-I.**Skill Development Components:****Semester –I****FPT – 111: General Biochemistry and Microbiology****Credit: 3****Learning Objectives:**

1. To learn and understand the chemistry with respect to role and functionality of constituents of the food.
2. Students will develop knowledge and understanding of different food microorganisms and know different techniques used to detect microorganisms.

Learning Outcome:

1. Student will able to understand basic chemistry of carbohydrates, lipids and proteins.
2. Student will enable to know the basics of microbiology.

Unit-I**Carbohydrates**

- i. Definition and classification.
- ii. Properties –optical and chemical.
- iii. Structure of glucose: ring structure, Haworth & fisher's projection, pyranoses, furanoses, isomers, mutarotation.
- iv. Triose, pentose, hexose, heptoses - examples & structures.
- v. Derived monosaccharides: glycosides, furano acids, sugar phosphates, uronic acids, sugar alcohol.
- vi. Disaccharides, glycoside linkage, lactose, maltose, sucrose.
- vii. Oligosaccharides – Trisaccharides, structure of raffinose.
- viii. Polysaccharides – Homo andheteropoly saccharides, structures starch, cellulose, mucopolysacchrides.
- ix. Biological significance

Unit-II**Lipids**

- i. Classification simple compounds.
- ii. Chemistry of fatty acids, unsaturated and saturated fatty acids, triglycerides, saponification alkyl ether phospho glycerides, sterols, cholesterol, protaglandins, glycol lipids.
- iii. Functions of lipid.

Proteins

- i. Classification based on properties of solubility & heat. coagulability. Fibrous, globular proteins and functions.
- ii. Protein structures: conformation and configuration, primary structure determination, secondary structure p - helix & b -pleated sheet, tertiary & quaternary structure.
- iii. Classification of amino acids: based on acid – base properties.
- iv. Properties of amino acids – solubility, ampholyte, Zwitterions isoelectric pH.
- v. Peptide bonds – Concepts of biological peptide bond formation,types.
- vi. Enzymes – Concepts, definition, nature, active site, properties, physico-chemical factors contributing to catalytic efficiency of enzymes.

Unit-III**Nucleic acids**

- i. Structure of nitrogen bases & base pairing.
- ii. Structure of nucleosides & nucleotides, ribose, deoxyribosesugars.
- iii. DNA: properties, forms, structure, function as genetic material.Types of DNA
- iv. RNA : Structure, function, types (r-RNA, m-RNA, t-RNA)
- v. Comparative account of DNA & RNA.

PH & buffers - pH titration curve, PK value.

Unit-IV

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

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

Unit-V

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

Staining techniques: Principle and types of staining

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

Unit-VI

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

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

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

Reference Books for Biochemistry:

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

Reference Books for Microbiology:

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

FPT – 114: Lab. - General Biochemistry and Microbiology

Credit: 3

1. Qualitative tests for:
 - i. Carbohydrates – Benedict’s test.
 - ii. Protein – Biuret test.
 - iii. Nucleic acid – Diphenylamine(DNA) and orcinol (RNA)tests
2. Preparation of various solutions and buffers.
3. Qualitative identification of proteins / amino acids
4. Determination of crude lipids, physicochemical constants.
5. To measure pH and Temperature of given sample.
6. Microscopy:
 - i. Different parts of a compound microscope.
 - ii. Use and care of compound microscope.
 - iii. Visit to see an electron microscope.

7. Construction, operation and utility of laboratory equipments
 - i. Autoclave
 - ii. Hot air oven
 - iii. Incubator
 - iv. pH meter
 - v. High speed centrifuge
 - vi. Colorimeter/ spectrophotometer
 - vii. Anaerobic jar
 - viii. Bacterial Filters
 - ix. Laminar air flow.
8. Demonstration of presence of bacteria from – soil/ water/ air/ milk
9. Demonstration of yeast, fungi, actinomycetes, algae, protozoa etc.
10. Microscopic examination of bacteria:
 - i. Monochrome staining
 - ii. Negative Staining
 - iii. Gram's staining
11. Hanging drop technique to demonstrate bacterial motility
12. Micrometry

FPT – 112: Fundamental of Food and Nutrition

Credit: 3

Learning Objective:

1. Student will enable to understand the importance of nutrient in our daily diet.
2. Student will enable to formulate nutritionally enriched food products as per the requirement.

Learning Outcome:

1. To develop proficiency skill in producing different nutritious food products.
2. Operating & management of balanced diets for different age groups
3. Make different processed food products with quality assurance.
4. Assessment of nutritional status of the women and children

Unit-I

Basic concept of Food: Nutrient, Nutrition, Classification of Food, Classification of Nutrients.

Food constituents - Definition, occurrence, properties and metabolism of Protein, Carbohydrate and Lipids.

Unit- II

Enzymes - Definition, classification, enzyme kinetics.

Browning reactions in foods:

- i. Non enzymic browning: Maillard reaction, browning of ascorbic acid, caramelization of sugars.
- ii. Enzymic browning: Definition, mechanism, control measures.

Unit-III

Biochemical changes in foods of plant and animal origin: fruits, vegetables, cereals, pulses, oilseeds, meat, poultry, seafood, dairy and their products)

Unit-IV

Concept of food and nutrition - Elements of nutrition, Food groups and role of nutrients. Energy metabolism - BMR

Unit-V

Recommended dietary allowances, Balanced diet for different age groups (Infancy to old age).

Unit- VI

Malnutrition-Causes, types, symptoms and prevention, Assessment of nutritional status of the community, National nutrition policy

Reference Books:

1. Biochemistry of Foods:- N.A.M. Eskin, H.M. Henderson, R. J. Townsend.
2. Introduction to the Biochemistry of Foods: Z. Berk.
3. Industrial Enzymes: Structure, Function and Applications - Julio Polaina and Andrew P. MacCabe.
4. Food and Nutrition: - M. Swaminathan.
5. Human Nutrition: - S. Mudambi.

FPT – 115: Lab. - Fundamentals of Food and Nutrition**Credit: 03**

1. Qualitative identification of carbohydrates.
2. Estimations of amino acids in foods.
3. Qualitative identification of lipids.
4. Qualitative & quantitative determination of vitamins.
5. Determination of auto oxidative rancidity of fat and oils.
6. Calculation of BMR and body surface area
7. Calculation of energy value of food.
8. Planning and calculation of nutritive value of balanced diet for different age groups.
9. Assessment of nutritional status of an individual by anthropometric method and diet survey.
10. Enrichment and fortification of daily diet.
11. Computation of energy requirement on the basis of physical activity
12. ACU units.

FPT – 113: Principles of Food Preservation**Credit: 3****Learning Objective:**

To acquaint the students with fundamental principles and various techniques of food preservation.

Learning Outcome:

1. Student will enable to understand different food preservation techniques, process.
2. Student will enable to extend shelf life of different food product by using the various methods of food preservation.

Unit-I

Introduction, sources of food, scope and benefit of industrial food preservation, perishable, non-perishable food, causes of food spoilage. Preservation by salt and sugar – Principle, method, equipment and effect on food quality

Unit-II

Thermal processing methods of preservation – Principle and equipments: Canning, blanching, pasteurization, sterilization, evaporation, etc.

Need and principle of concentration, methods of concentration – Thermal concentration, freeze concentration, membrane concentration, changes in food quality by concentration

Unit-III

Food preservation by use of low temperature – Principle, equipments and effect on quality (Chilling, cold storage, freezing etc.)

Unit-IV

Preservation by drying dehydration and concentration – Principle, Methods, equipment and effect on quality : Difference, importance of drying and dehydration over other methods of drying and dehydration, equipments and machineries, physical and chemical changes in food during drying and dehydration.

Unit-V

Preservation by radiation, chemicals and preservatives: Definition, methods of irradiation, direct and indirect effect, measurement of radiation dose, dose distribution, effect on microorganisms. Deterioration of irradiated foods- physical, chemical and biological, effects on quality of foods. Preservation of foods by chemicals: antioxidants, mold inhibitors, antibodies, acidulants etc.

Preservation by fermentation- Definition, advantages, disadvantages, types, equipments

Unit-VI

Recent methods in preservation: Pulsed electric field processing, High pressure processing, Processing using ultrasound, dielectric, Ohmic and infrared heating. Theory, equipments and effect on food quality.

Reference Books:

1. Food Processing and Preservation- Subbulaksmi G., and Udipi S.
2. Principles of Food Science, Vol. II- G. Borgstron, Mc. Millan Co. Ltd. London.
3. Principles of food preservation Part I& II- Owen R. Fenemma.
4. Food Science- Potter, CBS publishers.
5. Technology of Food Preservation - N.W. Desroiser and N.W. Desrosier
6. Introduction to Food Science & Technology- G.P. Stewart & M.A. Amerine
7. Food Processing Operations Vol. III -M.A. Joslyn and J.J. Heild.
8. Preservation of Fruits and Vegetables- Giridhari Lal, G.S. Siddappa, and G.L. Tondon

FPT – 116: Lab. - Principles of Food Preservation**Credit: 03**

1. Demonstration of various machineries used in food processing.
2. Demonstration on effect of blanching on quality of foods.
3. Demonstration on canning and bottling of fruits and vegetables.
4. Preservation of food by high concentration of sugar i.e. preparation of jam
5. Preservation of food by using salt e.g. Pickle
6. Preservation of food by using acidulants i.e. pickling by acid, vinegar or acetic acid
7. Preservation of food by using chemicals.
8. Preservation of coconut shreds using humectants.
9. Drying of fruit slices in cabinet drier
10. Demonstration on drying of green leafy vegetables
11. Osmotic dehydration of foods e.g. candy
12. Drying of foods using freeze-drying & spray drying process.
13. Preservation of milk by condensation/concentration.
14. Demonstration of preserving foods under cold v/s freezing process.
15. Preservation of food by fermentation (Sauerkraut, idli, tempeh, curd, dhokla etc.)
16. Visit to any food processing industry/unit.

General Education Components:

Semester-II
BVG-201 Communication Skill-II

Credits-2

Learning Objective:

To improve the writing skills of students.

Learning Outcomes:

1. Students will be able to write formal letters
2. Presentations skill of students will improve
3. Students will be able to face interviews

Unit-I**Modes of communication:**

- i. Conversation – orals, video conference, telephone.
- ii. Written – letters, formal letters, informal letters mails, texting

Unit-II

- i. Non-verbal communication- Body language , gestures, facial expressions

Unit-III**CS of good communication:**

Courtesy, Correctness, Cleanliness Concept Clarity

Reference Books

1. Business Communication, by Urmila Rai & S. M. Rai. Himalaya Pub.
2. Communication Skill for Effective Management by Dr. Anjali Ghanekar.
Everest Pub. House.
3. Developing Communication Skill by Krishna Mohan, Meera Banerji. McMillan

BVG 204: Practical Based On General Discussions: GDs, debate, overcoming stage fear Reading, pronunciation correction, Listening and answering questions.

BVG-202 Personality Development**Credits-2****Learning Objective:**

The objective of the subject is bring about personality development with regard to the different behavioral dimensions that have far reaching significance in the direction of organizational effectiveness.

Learning Outcome:

To create awareness in the participants with regard to the different aspects of Interpersonal relations based on the ideas envisaged in Transactional Analysis and their relative significance in the context of the functional effectiveness of organizations.

Unit-I**Self-Analysis**

SWOT Analysis, Who am I, Attributes, Importance of Self Confidence, Self Esteem.

Unit-II**Creativity**

Out of box thinking, Lateral Thinking.

Unit-III**Attitude**

Factors influencing Attitude, Challenges and lessons from Attitude, Etiquette.

Unit-IV**Motivation**

Factors of motivation, Self-talk, Intrinsic & Extrinsic Motivators.

Unit-V**Goal Setting**

Wish List, Smart Goals, Blue print for success, Short Term, Long Term, Life Time Goals. Time Management Value of time, Diagnosing Time Management, Weekly Planner to do list, Prioritizing work.

Reference Books:

1. SOFT SKILLS,(2015), Career Development Centre, Green Pearl Publications .
REFERENCE 1. Covey Sean, Seven Habits of Highly Effective Teens, New York, Fireside Publishers, (1998).
2. Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, (1998). 3. Thomas A Harris, I am ok, You are ok , New York-Harper and Row,
3. Thomas A Harris, I am ok, You are ok , New York-Harper and Row, (1972) 4. Daniel Coleman, Emotional Intelligence, Bantam Book, (2006)

BVG 205: Personality Development**ASSESSMENT**

1. A practical and activity oriented course which has continuous assessment for marks based on class room interaction, activities etc.
2. Extempore.
3. Technical Topic Presentation

BVG -203: Computer Fundamentals-II**Credit: 2****Learning Objectives:**

To introduce students with computer hardware system, troubleshooting techniques

Learning Outcomes:

1. Students can solve general hardware related issues
2. They can install various devices as well as operating system in the computer
3. Students can build their own computer system

Unit-I

Introduction to graphical user interface, window operating system, Anatomy of windows, organizing folders and files, multitasking, recycle bin, my computer.

Word Processing : Creation, editing, formatting of documents, global search and replacement of text, special print features, mail merge, spelling checker, MS-Word should be used as teaching tool.

Unit-II

Spread Sheet : Getting started with EXCEL, EXCEL worksheet, entering data into worksheet, editing, cell addressing, ranges and range names, commands, menus, copying and moving cell contents, Inserting and deleting rows and columns, column— width control, cell protection, printing reports, creating and displaying graphs, printing graphs, statistical functions.

Unit-III

MS-Power Point software for presentation.

Reference Book:

1. Beginning Microsoft Office 2010 by Guy Hart-Davis
2. Easy Computer Basics, Windows 8 Edition by Michael Miller

BVG 206: Practical Assignments Based on Computer Fundamentals - II

Skill Development Components:**Semester –II**
FPT – 211: Food Biochemistry**Credit: 03****Learning Objectives:**

To learn and understand the chemistry with respect to role and functionality of constituents of the food.

Learning Outcome:

1. To learn and understand the chemistry of various Food micronutrient used in foods along with their role and properties
2. Students will learn about basic reaction in food and their kinetics; nucleic acid, digestion and electrophoresis - protein electrophoresis, protein purification.

Unit-I

Nature scope and development of food Biochemistry, role of food chemist. Moisture in foods.

- i. Role and type of water in foods.
- ii. Functional properties of water, role of water in food spoilage and food safety.
- iii. Water activity and sorption isotherm.

Unit-II**Carbohydrates**

- i. Classification and nomenclature of carbohydrates
- ii. Functional characteristics of different carbohydrates (sugar- water relationship, sweetness).
- iii. Structure and function of carbohydrates: monosaccharide, oligosaccharide and polysaccharide.
- iv. Browning Reactions .Enzymatic and non-enzymatic browning reaction, Millard reaction, caramelization, method to control non enzymatic reaction
- v. Modification of carbohydrates- unmodified and modified starches, modified celluloses.
- vi. Dietary fibers NDF, ADF, Cellulose, hemicellulose, pectin and carbohydrates digestibility – sugars and starch and their energy values.

Unit-III**Protein in Food**

- i. Role of proteins in foods.
- ii. Classification and structure of amino acids, essential amino acids, classification and structural organization of proteins-primary structure, secondary structure and tertiary structure.
- iii. Physicochemical properties- ionic properties, protein denaturation, gelation and hydrolysis.
- iv. Protein content and composition in various foods- cereal grains, legumes and oilseed proteins, proteins of meat, milk, egg and fish.
- v. Functional properties of proteins in foods – water and oil binding, foaming, gelation, emulsification.
- vi. Effects of processing on functional properties of proteins-heat processing alkali treatments, chilling, freezing, dehydration and radiations
- vii. Unconventional sources of proteins- SCP fish protein concentrates, leaf proteins.

Unit-IV**Lipids in food**

- i. Role and use of lipids /fat, occurrence, fat group classification.
- ii. Physicochemical aspects of fatty acids in natural foods, hydrolysis, reversion, polymorphism and its application.
- iii. Chemical aspects of lipolysis, auto oxidation, antioxidants.
- iv. Technology of fat and oil processing
 - a. Refining
 - b. Hydrogenations
 - c. Inter esterification

Unit-V**Vitamin**

- i. Definition of vitamin, type of vitamin,
- ii. Water soluble (Vit B-1, B-2, B-3, C) and Fat soluble (Vit A, D, E, K)- their structure and functions.

Unit-VI
Enzyme

- i. General properties of enzymes, enzyme action, classification and nomenclature of enzymes, coenzymes enzyme inhibition, isozymes.
- ii. Carbohydrases (Amylases, cellulases, pectinases, vertases) Proteases, Lipases and oxidases in food processing.
- iii. Enzyme applications in food industry

Nucleotides and Nucleic acids:

Building blocks- bases, sugars and phosphates, structure and nomenclature of nucleosides and nucleotides, polynucleotides - DNA (A, B, Z, DNA) and RNA (rRNA, mRNA, tRNA)

Reference Books:

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

FPT – 214: Lab. - Food Biochemistry**Credit: 03**

1. Determination of moisture in food sample.
2. Determination of protein in food sample.
3. Determination of ash/minerals in food sample.
4. Determination of crude fat in food sample.
5. Determination of acidity & pH in food sample/beverages.
6. Determination of total, non-reducing and reducing sugars.
7. Determination of vitamin C content in food sample.
8. Determination of pigments in food sample.
9. Estimation of calcium, iron and zinc in food products.

FPT – 212: Food Microbiology**Credit: 03****Learning Objectives:**

Students will develop knowledge and understanding of different food microorganisms and different techniques used in its detection.

Learning Outcome:

1. Students will understand causes of food spoilage of different foods and its type.
2. To enable the students to gain an insight into basic aspects of food microbiology.
3. To understand the advanced techniques in microbial analysis of food.

Unit-I

- i. Introduction- definition, history of microbiology of food. Types of microorganisms normally associated with food- bacteria, yeast and moulds.
- ii. Spoilage of food; factors affecting spoilage of foods and associated micro flora.
- iii. Biochemical changes caused by microorganisms- putrefaction, lipolysis, etc.

Unit-II**Factors affecting growth and survival of microorganisms:**

- i. Extrinsic factors- relative humidity, gaseous atmosphere.
- ii. Intrinsic factors- nutrient content, water activity, oxidation reduction potential.
- iii. Sources of contamination. Contamination of food-stuff, vegetables, fruits, cereals, pulses, oilseeds, milk and meat during handling and processing.

Unit-III**Deterioration and spoilage of various types of food products-**

- i. Fruits, vegetables, cereal and cereal products, meat and meat products, fish and other sea foods
- ii. Prevention of spoilage of these foods

Unit-IV**Food borne infections and food poisoning:**

- i. Bacterial with examples of infective and toxic types- *Clostridium*, *Salmonella*, *Shigella*, *Staphylococci*, *Compilobacter*, *Escherichia*, *Bacillu etc.*
- ii. Mycotoxins in food with reference to *Aspergillus species*. *Protozoe*.
Prevention of food borne diseases.

Unit-V**Principles of food preservation:**

- i. Control of microorganisms by asepsis, use of low and high temperatures, water activity, preservatives.
- ii. Preservation and maintenance of industrially important microorganisms- serial dilution, oil layer, lyophilization, liquid nitrogen, etc.

Unit-VI

Indicator organisms, microbiological quality assurance systems in food industry, GMP, use of HACCP to ensure microbiological safety of food, food regulations and standards.

Reference Books:

1. Food Microbiology by M.R. Adams and M.O. Moss
2. Food Microbiology by W.C. Frazier
3. Dairy Microbiology by E .M. Foster.
4. Modern food Microbiology by James M. Jay.
5. Food borne bacterial pathogens by M.P. Doyle
6. Basic Food Microbiology by G.J. Banwart

FPT – 215: Lab. - Food Microbiology**Credit: 03**

1. Study of compound microscope.
2. Study of autoclave/retort
3. Cleaning and sterilization of glassware
4. Preparation of nutrient broth, potato dextrose and nutrient agar media.
5. Pure culture techniques(Streak plate and pour plate)
6. Gram staining and study of morphology of bacterial cell
7. Microbial examination of table containers and packaging materials.
8. Microbial examination of cereal and cereal products
9. Microbial examination of meat and meat products
10. Assessment of quality of raw milk by MBRT
11. Bacteriological analysis (*Coliform* count) of water by MPN method
12. Estimation of *Salmonella* from food sample.
13. Estimation of *Staphylococcus* from food sample.

FPT – 213: Processing Technology of Fruits and Vegetables**Credit: 03****Learning Objective:**

To enable the students to know the post-harvest management systems and processing technologies for preservation of fruits & vegetables and various value added products.

Learning Outcome:

1. To develop proficiency skill in producing different types of processed fruits & vegetables products.
2. Operating & maintenance the modern processing equipments & machineries
3. To make different processed fruit & vegetable based products with quality assurance and safety.
4. Process of packaging, storing & marketing

Unit-I

An over view of production and processing scenario of fruits and vegetables in India and World. Post harvest management of fruits and vegetables-control of losses in harvesting, and handling operations. Scope of fruit and vegetable preservation industry in India. Present status, constraints and prospects.

Unit-II

Morphology, structure and composition of fruit and vegetable Maturity standards: Importance, methods of maturity determinations, maturity indices for selected fruits and vegetables. Harvesting of important fruits and vegetables. Fruit ripening: chemical changes, regulations, methods.

Unit-III

Storage practices: Modified & Controlled atmospheric storage, hypobaric storage, cool store.

Commodity treatments- chemicals, wax coating, pre-packaging.

Post Harvest handling, packaging & transport system for various fruits & vegetables and packaging house operations.

Unit-IV

Overview of principles and preservation methods of fruits and vegetables.
Commercial processing of major fruits and vegetables (jam, jellies, marmalade, purees, concentrates, preserve, candy, toffee/bar etc.)

Unit-V

Processing technology for manufacturing of fruit juices, pulp, RTS beverage, nectars, squash, syrups, cordials, Carbonated.

Unit-VI

Processing of Tomato: paste, ketchup, sauce, puree, soup, chutney etc.
Drying and dehydration technology of fruits and vegetables: preparation of raisins, anardana, dried fig, dried leafy vegetables, juice powders, flakes, wafers, chips etc.
Fermented fruits and vegetables products like sauerkraut, pickles, wines etc.
Utilization of By-products and wastes from fruits and vegetables processing industry

Reference Books:

1. Post Harvest Physiology, Handling and Utilization of Tropical and Subtropical Fruits and Vegetable- E. B. Pantastico, AVI Publishing Company, INC.
2. Post Harvest: An Introduction to the Physiology and Handling of Fruits and Vegetables- R.B. Wills, M.B. Mc Glasson, D. Graham, T.L. Lee and E.G. Hall.
3. Post Harvest Technology of Fruits and Vegetables: Handling, Processing, Fermentation and Waste Management Vol. I and II- Verma L. R. and Joshi V.K.
4. Fruit and Vegetable Preservation Principles and Practices -Srivastava R.P. and Sanjeev Kumar
5. Preservation of Fruits and Vegetables-Khader
6. Fruit and Vegetable Preservation -Bhutani R.C.
7. Principles of Fruit Preservation- Morris, Thomas Norman,.
8. Preservation of fruits and vegetables- Giridharilal, G.S. Siddappa and G.L. Tandon.
9. Fruit and Vegetable Technology- Duckworth.

FPT – 216: Lab. - Processing Technology of Fruits and Vegetables

Credit: 03

1. Studies on maturity indices of fruits and vegetables.
2. Studies on extension of shelf life.
3. Studies on use of chemicals for ripening of fruits and vegetables
4. Studies on pre-packaging.
5. Studies on physiological disorders - chilling injury of banana and custard apple
6. Canning/bottling of mango/guava/papaya fruits
7. Preparation of fruit jam: apple/mango/guava/ papaya/aonla/ strawberry.
8. Preparation of fruit jelly/marmalade: wood apple/ sweet orange/mandarin/guava/ tamarind.
9. Preparation of fruit preserve and candy
10. Preparation of fruit RTS beverage.
11. Preparation of carbonated beverage.
12. Preparation of fruit squash
13. Preparation of fruit syrup.
14. Preparation of pickle/ mixed pickle
15. Preparation of grape raisin/ anardana/ dried fig etc..
16. Preparation of dried ginger/ amchur/ onion and garlic

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