

# **SHIVAJI UNIVERSITY, KOLHAPUR**



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**Faculty of Interdisciplinary Studies  
Structure, Scheme and Syllabus for  
Bachelor of Vocation (B. Voc.)**

**Food Processing Technology  
Part III-Sem. V & VI**

**CBCS PATTERN  
Syllabus to be implemented from**

(Subject to the modifications that will be made from time to time)  
Syllabus to be implemented from June, 2022 onwards.

**SHIVAJI UNIVERSITY, KOLHAPUR**  
**STRUCTURE AND SYLLABUS OF B.VOC.**  
**Bachelor of Vocation (B.Voc.) – Food Processing Technology**

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>TITLE</b>                   | : B.Voc. (Food Processing Technology)<br>Syllabus (Semester Pattern)<br>Under Faculty of Interdisciplinary Studies                                                                                                                                                                                                                                                                                                                                                          |
| <b>YEAR OF IMPLEMENTATION</b>  | : Syllabus will be implemented from August, 2020                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>DURATION</b>                | : B. Voc. Part I, II and III (Three Years)<br>B. Voc. Part I - Diploma (One Year)<br>B. Voc. Part II - Advanced Diploma (Second Year)<br>B. Voc. Part III – Degree (Third Year)                                                                                                                                                                                                                                                                                             |
| <b>PATTERN OF EXAMINATION</b>  | : Semester Pattern                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| • <b>Theory Examination</b>    | - At the end of semester as per Shivaji University Rules                                                                                                                                                                                                                                                                                                                                                                                                                    |
| • <b>Practical Examination</b> | - i) In the 1 <sup>st</sup> , 3 <sup>rd</sup> and 5 <sup>th</sup> semester of B.Voc. there will be internal assessment of practical record, related report submission and project reports at the end of semester<br>ii) In the second semester of B. Voc. I, there will be internal practical examination at the end of semester<br>iii) In the 4 <sup>th</sup> and 6 <sup>th</sup> semester of B. Voc. there will be external practical examination at the end of semester |
| <b>MEDIUM OF INSTRUCTION</b>   | : English/ Marathi.                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>STRUCTURE OF COURSE</b>     | : B. Voc. Part – I, II and III.<br>Two Semester per Year, Two General Papers per year / semester three Vocational Papers per Year<br>/ Semester three Practical papers per Year / Semester.                                                                                                                                                                                                                                                                                 |

## **SCHEME OF EXAMINATION:**

### **A) THEORY-**

- The theory examination shall be at the end of the each semester.
  - All the general theory papers shall carry 40marks and all vocational theory papers shall carry 50marks.
  - Evaluation of the performance of the students in theory shall be on the basis of semester examination as mentioned above.
  - Question paper will be set in the view of entire syllabus preferably covering each unit of the syllabus.
  - **Nature of question paper for Theory examination** (Excluding Business Communication Paper)
    - i) There will be seven questions carrying equal marks.
    - ii) Students will have to solve any five questions
- Que. No. 1 Short answer type question with internal choice (Two out of three)
- Que. No. 2 Question No. 6: Long answer type questions.
- Que. No. 7 Short Notes with internal choice (Two out of three)

### **B) PRACTICALS:**

Evaluation of the performance of the students in practical shall be on the basis of semester examination. Internal assessment at the end of Semester I, II and III and V and external examination at the end of Semester IV and VI as mentioned separately in each paper

### **Standard of Passing:**

As per the guidelines and rules for B. Voc. (Attached Separately – Annexure I)

### **Eligibility Criteria:**

1. The Eligibility for admission is 10+2 or equivalent, in any stream (Arts/Commerce/Science) from any recognized board or University.
  2. The candidates after with 10+2 year ITI course/ in any branch/trade also eligible for course.
  3. The candidates graduate from any faculty or engineering degree/diploma holders are also eligible.
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**Structure of the Course:****B. Voc. –III          Semester –V**

| <b>Sr.<br/>No.</b> | <b>Paper<br/>No.</b> | <b>Title</b>                                   | <b>Theory/<br/>Practical<br/>/Project</b> | <b>Marks<br/>(Total)</b> | <b>Distribution of<br/>Marks</b> |           |
|--------------------|----------------------|------------------------------------------------|-------------------------------------------|--------------------------|----------------------------------|-----------|
|                    |                      |                                                |                                           |                          | Theory                           | Practical |
| 1                  | XXXVII               | Food Biotechnology                             | Theory/<br>Practical                      | 50                       | 40                               | 10        |
| 2                  | XXXVIII              | Unit Operations in Food Processing             | Theory/<br>Practical                      | 50                       | 40                               | 10        |
| 3                  | XXXIX                | Bakery and Confectionary                       | Theory                                    | 50                       | 50                               | --        |
| 4                  | XXXX                 | Meat, Fish, poultry Technology                 | Theory                                    | 50                       | 50                               | --        |
| 5                  | XXXXI                | Fermentation Technology                        | Theory                                    | 50                       | 50                               | --        |
| 6                  | XXXXII               | Laboratory Work-Bakery and Confectionary       | Practical                                 | 50                       | --                               | 50        |
| 7                  | XXXXIII              | Laboratory Work-Meat, Fish, poultry Technology | Practical                                 | 50                       | --                               | 50        |
| 8                  | XXXXIV               | Laboratory Work-Fermentation Technology        | Practical                                 | 50                       | --                               | 50        |
| 9                  | XXXXV                | Internship                                     |                                           | 50                       | --                               | 50        |

**B. Voc. –III****Semester –VI**

| <b>Sr.<br/>No.</b> | <b>Paper<br/>No.</b> | <b>Title</b>                                          | <b>Theory/<br/>Practical<br/>/Project</b> | <b>Marks<br/>(Total)</b> | <b>Distribution of<br/>Marks</b> |           |
|--------------------|----------------------|-------------------------------------------------------|-------------------------------------------|--------------------------|----------------------------------|-----------|
|                    |                      |                                                       |                                           |                          | Theory                           | Practical |
| 1                  | XXXXVI               | Technology of Beverages                               | Theory/<br>Practical                      | 50                       | 40                               | 10        |
| 2                  | XXXXVII              | Food Extrusion<br>Technology                          | Theory/<br>Practical                      | 50                       | 40                               | 10        |
| 3                  | XXXXVIII             | Food Laws and<br>Regulations                          | Theory                                    | 50                       | 50                               | --        |
| 4                  | XXXXIX               | Food Packaging<br>Technology                          | Theory                                    | 50                       | 50                               | --        |
| 5                  | XXXXX                | Food Quality & Waste<br>Management                    | Theory                                    | 50                       | 50                               | --        |
| 6                  | XXXXXI               | Laboratory Work-Food<br>Laws and Regulations          | Practical                                 | 50                       | --                               | 50        |
| 7                  | XXXXXII              | Laboratory Work-Food<br>Packaging Technology          | Practical                                 | 50                       | --                               | 50        |
| 8                  | XXXXXIII             | Laboratory Work-Food<br>Quality & Waste<br>Management | Practical                                 | 50                       | --                               | 50        |
| 9                  | XXXXXIV              | Project                                               |                                           | 50                       | --                               | 50        |

**Scheme of Teaching: B.Voc.– Part III Semester–V**

| Sr. No. | Paper No. | Title                                           | Distribution of workload (Per Week) |           |       |
|---------|-----------|-------------------------------------------------|-------------------------------------|-----------|-------|
|         |           |                                                 | Theory                              | Practical | Total |
| 1       | XXXVII    | Food Biotechnology                              | 4                                   | 2         | 6     |
| 2       | XXXVIII   | Unit Operations in Food Processing              | 4                                   | 2         | 6     |
| 3       | XXXIX     | Bakery and Confectionary                        | 4                                   | -         | 4     |
| 4       | XXXX      | Meat, Fish, poultry Technology                  | 4                                   | -         | 4     |
| 5       | XXXXI     | Fermentation Technology                         | 4                                   | -         | 4     |
| 6       | XXXXII    | Laboratory Work- Bakery and Confectionary       | -                                   | 4         | 4     |
| 7       | XXXXIII   | Laboratory Work- Meat, Fish, poultry Technology | -                                   | 4         | 4     |
| 8       | XXXXIV    | Laboratory Work - Fermentation Technology       | -                                   | 4         | 4     |
| 9       | XXXXV     | Internship                                      | -                                   | -         | -     |
|         |           |                                                 | 20                                  | 16        | 36    |

**Scheme of Teaching :B.Voc.–Part III–VI**

| Sr. No. | Paper No. | Title                                            | Distribution of workload (Per Week) |           |       |
|---------|-----------|--------------------------------------------------|-------------------------------------|-----------|-------|
|         |           |                                                  | Theory                              | Practical | Total |
| 1       | XXXXVI    | Technology of Beverages                          | 4                                   | 2         | 6     |
| 2       | XXXXVII   | Food Extrusion Technology                        | 4                                   | 2         | 6     |
| 3       | XXXXVIII  | Food Laws and Regulations                        | 4                                   | -         | 4     |
| 4       | XXXXIX    | Food Packaging Technology                        | 4                                   | -         | 4     |
| 5       | XXXXX     | Food Quality & Waste Management                  | 4                                   | -         | 4     |
| 6       | XXXXXI    | Laboratory Work- Food Laws and Regulations       | -                                   | 4         | 4     |
| 7       | XXXXXII   | Laboratory Work- Food Packaging Technology       | -                                   | 4         | 4     |
| 8       | XXXXXIII  | Laboratory Work -Food Quality & Waste Management | -                                   | 4         | -     |
| 9       | XXXXXIV   | Project                                          | -                                   | -         | -     |
|         |           |                                                  | 20                                  | 16        | 32    |

|                                              |                                                                                                                                                                                                                                                |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Eligibility for Admission</b>             | : 10 + 2 from any faculty or equivalent Diploma /Advanced Diploma in any related stream                                                                                                                                                        |
| <b>Eligibility for Faculty</b>               | : M. Sc. (Food Science and Nutrition / Food Processing/Food Science and Technology/Home-Science/ Food Science and Quality Control with NET / SET M. Tech. (Food Tech. /Food processing) M. A (English) with NET/SET for Business Communication |
| <b>Eligibility for Laboratory Assistant:</b> | B. Tech (Food Tech. / Food processing)/B. Sc. (Food Science and Nutrition / Food Processing/ Food Science and Technology/Home-Science/ Food Science and Quality Control)/ B.A. Home Science.                                                   |
| <b>Staffing Pattern</b>                      | : In 1 <sup>st</sup> Year of B. Voc. - 1 Full Time and 1 Part Time Lecturer and 1 CHB Lecturer for Business Communication                                                                                                                      |
| <b>Laboratory Assistant</b>                  | : For 1 <sup>st</sup> Year of B. Voc. - 1 Part-time<br>-----                                                                                                                                                                                   |

**SHIVAJI UNIVERSITY, KOLHAPUR**

**B. Voc. Part – III, Semester –V**

**Food Processing Technology**

**Paper – XXXVII Food Biotechnology**

**Distribution of Workload:**

**Total Marks:** 50 Marks

Theory : 04 lectures per week

Theory 40M

Practical : 02 lectures per week per batch

Practical 10M

Total Workload: 06 lectures per week of 60min.

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**Objectives:**

- To study applications of Biotechnology in food production and processing
- To study genetic engineering, enzymes in food production and processing

**Unit-I:Biotechnology**

Scope & Importance Definition Traditional & Modern biotechnology, Biotechnology of India & Global trends Prevention of misuse of biotechnology, Potential of biotechnology.

**Unit – II Tools of genetic engineering**

Basic requirement Cutting & Joining of DNA Cloning vectors Techniques of genetic engineering, cloning methods & DNA analysis genetically modified food.

**Unit – III – Single cell protein & mushroom cultivation**

Microorganisms used in SCP. Substrates used nutritional value cultivation & uses  
Historical Background & present status of Mushroom cultivation

**Unit – IV Enzyme Biotechnology**

Definition & Properties of enzymes Factors affecting activation & inhibition of enzymes, Isolation of enzymes producing microorganisms, strain development Formulation & inoculums preparation.

Purification of enzymes & their immobilization – Different type, Advantages & Disadvantages

Industrial production of protease, amylase & cellulose

**Reference Books:**

1. Knorr, D, 1982. Food biotechnology, Masel Dekker
2. Joshi V. K. & Pandey, A. Ed 1999 Biotechnology, Food Fermentation
3. Crueger, W & Crueger A 1984 Biotechnology - A Text book of Industrial Microbiology
4. Banis W. 1993 Biotechnology from A to Z Oxford Univer. Press. Oxford



## **Food Biotechnology**

### **Laboratory work**

**Total Marks: 10**

- 1) Study of lab instruments
- 2) Mushroom Cultivation
- 3) Isolation of DNA
- 4) Study of SPC
- 5) Study the Gel Filtration Technique
- 6) Study the TLC Method.
- 7) Visit to Biotechnology Institute

### **Scheme of Internal Practical Evaluation**

**10 marks**

- 1) Submission of Record book
- 2) Viva – Voce

5 marks

5 marks

### **Pattern of a Question paper**

#### **Food Biotechnology**

#### **B. Voc. Part – III, Semester – V**

### **Time: 2 hours**

**Total Marks: 40**

|                                           |    |
|-------------------------------------------|----|
| Q.1 Multiple type Question                | 08 |
| Q.2 Long answer Question(Any 2 out3)      | 16 |
| Q.3 2 Long answer Question                | 08 |
| Q.4 Short Type Questions (any 2 out of 3) | 08 |

### **Practical Evaluation:**

Oral and presentation based on units prescribed

**10 Marks**

**SHIVAJI UNIVERSITY, KOLHAPUR**

**B. Voc. Part – III, Semester – V**

**Food Processing Technology**

**Paper –XXXVIII Unit Operations in Food Processing**

**Distribution of Workload:**

**Total Marks:** 50 Marks

Theory : 04 lectures per week

Theory 40M

Practical : 02 lectures per week per batch

Practical 10M

Total Workload: 06 lectures per week of 60min.

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**Objectives:**

- To study applications of Size reduction equipment mixing equipment Agitators, powder Liquids and pastes.
- To study theory centrifugation, liquid-liquid centrifugation, liquid-solid centrifugation, clarifiers, desludging machines

**Unit–I: Size reduction**

Benefits, classification, sieve/screen analysis, principle and mechanisms of combination of food

**Unit – II Size reduction equipment**

Principal types, hammer mills and impacts, attrition mills, buhr mill, tumbling mills, Tumbling mills, colloid mill, cutting machines (slicing, dicing, shredding, pulping)

**Unit – III Mixing:**

Theory of solids mixing, criteria of mixer effectiveness and mixing indices, rate of mixing, Theory of liquid mixing, power requirement for liquids mixing.

Mixing equipment: Mixers for low- or medium-viscosity liquids (paddle agitators, impeller Agitators, powder-liquid contacting devices, and other mixers), Mixers for high viscosity Liquids and pastes, mixers for dry powders and particulate solids;

**Unit – IV Mechanical Separations**

Theory, centrifugation, liquid-liquid centrifugation, liquid-solid centrifugation, clarifiers, desludging machines

Filtration: theory of filtration, rate of filtration, pressure drop during filtration, applications Filtration equipment; plate and frame filter press, rotary filters, centrifugal filters and air Filters, filter aids.

**Reference Books:**

1. Unit Operations of Chemical Engineering Warren LM, Julian Smith, Peter Harriott 7 th Ed. McGraw-Hill, Inc., NY, USA. 2004
2. Transport Processes and Separation Process Principles Christie John Geankoplis 4 th Ed. Prentice-Hall, NY, USA. 2003
3. Handbook of Food Processing Equipment Saravacos GD and Athanasios EK Springer ScienceBusiness Media, New York, USA. 2002

## **UNIT OPERATIONS IN FOOD PROCESSING**

### **Laboratory work**

**Total Marks: 10**

1. Study of Principle, working and demonstration of hammer mill and crushing.
2. Study of Principle, working and demonstration of attrition mill.
3. Study of different disintegration operations (slicing, dicing, shredding and pulping).
4. Study of centrifugal separation (centrifugal cream separation, centrifugal machine).
5. Study on osmosis of fruit.
6. Study of principle and working of roller dryer, cabinet dryer

### **Scheme of Internal Practical Evaluation**

**10 marks**

- |                              |         |
|------------------------------|---------|
| 1) Submission of Record book | 5 marks |
| 2) Viva – Voce               | 5 marks |

### **Pattern of a Question paper**

## **UNIT OPERATIONS IN FOOD PROCESSING**

### **B. Voc. Part – III, Semester – V**

**Time: 2 hours**

**Total Marks: 40**

- |                                           |    |
|-------------------------------------------|----|
| Q.1 Multiple type Question                | 08 |
| Q.2 Long answer Question(Any 2 out3)      | 16 |
| Q.3 2 Long answer Question                | 08 |
| Q.4 Short Type Questions (any 2 out of 3) | 08 |

### **Practical Evaluation:**

Oral and presentation based on units prescribed

**10 Marks**

**SHIVAJI UNIVERSITY, KOLHAPUR**  
**B. Voc. Part – III Semester -V**  
**Food Processing Technology**  
**Paper –XXXIX Bakery and Confectionary**

**Distribution of Workload:**

**Total Marks:** 50 Marks

Theory : 04 lectures per week  
Total Workload : 04 lectures per week

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**Objectives:**

- To study the different bakery product.
- To study role of ingredients and processing technology of confectionery products.

**Unit – I Introduction of Bakery raw material**

Essential & optional ingredients Role of ingredient Baking principle -Caramelisation, Millard browning, Introduction of bakery products & equipment

**Unit - II Processing of Bakery Products**

Cake: Types, formulation & process, Principle of cake characters of cake

Bread: Formulation & process, principle of Bread preparation,

Biscuits & cookies: Definition, difference, between biscuits & cookies, types of cookies & biscuits, Cracker & general defects

**Unit – III Confectionary products**

Introduction to Confectionary Ingredients

Sugar boiled Confectionary – a) Crystalline b) Amorphous

Indian Confectionary

**Unit – IV – Processing Confectionary Products**

**Chocolate based confectionery:** History and development, cocoa processes, cocoa butter, emulsifiers used in chocolate confectionery coatings and cocoa, chocolate manufacture, chocolate bars and covered confectionery

**Indian Confectionary:** Burfi, Pedha preparation

**Recommended Books -**

- Technology of Confectionary, Chocolate, Toffee, Candy, Chewing gum, Lollipop, Jelly production
- Food production operation - Ravindra Bali
- International Cuisine and Food Production management – Parvindarbali
- Bakery Science & Cereal technology - Neelam khetorpaul, Raj Grewal Sudesh wood
- The Complete technique book on bakery production by Niir Board

**SHIVAJI UNIVERSITY, KOLHAPUR**  
**B. Voc. Part – III, Semester – V**  
**Food Processing Technology**  
**Paper – XXXX Meat, Fish, Poultry Technology**

**Distribution of Workload:**

Theory : 04 lectures per week  
Practical : 02 lectures per week per batch  
Total Workload: 06 lectures per week of 60min.

**Total Marks:** 50 Marks

Theory 40M  
Practical 10M

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**Objectives:**

- To study structure , composition and slaughtering operations of meat, poultry
- To study Postmortem changes and major quality attributes
- Processing of meat, fish and poultry products

**Unit – I Importance of meat products**

Introduction & Importance of meat products in India, Chemical Composition & microscopic structure of meat Pre-slaughter inspection of animal, Transportation, feeding of animal before slaughtering

**Unit – II Stunning & slaughter operations**

Slaughtering of animal, Bones & cuts of Carcass, Quality and grading of meat, Post Mortom inspections Meat tenderization, aging curing & rigour mortis, preservation of meat & Poultry products. Meat plant sanitation & safety

**Unit –III Egg & Egg**

Structure, composition, Nutritive value & functional properties of egg  
Processing of Egg, Quality of egg & Egg Products  
Effects of heat on egg proteins

**Unit – IV- Seafood**

Classification of Seafood, Types of fish, Composition and structure of Fish, Postmortem changes in Fish, Canning, smoking freezing & dehydration of fish

**Recommended Books –**

1. Technology of Meat Fish & Poultry products
2. Lawrie, R. A. 1975 meat science 2nd ed
3. Lavie. a. 1980 Meat handbook 4th edition AVI west port
4. Portsmouth J.I. 1979 Commercial Rabbit meat production by Saiga Survey England
5. Stadelmen W.J Cotterill O.1977. Egg Science & Technology

**SHIVAJI UNIVERSITY, KOLHAPUR**

**B. Voc. Part –III Semester V**

**Food Processing Technology**

**Paper-XXXXI Fermentation Technology**

**Distribution of Workload:**

**Total Marks:** 50 Marks

|                |                        |
|----------------|------------------------|
| Theory         | : 04 lectures per week |
| Total Workload | : 04 lectures per week |

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**Objective:**

- To study Fermentation- bacterial, yeast and fungal
- To study biochemistry of fermentation
- To Study Fermented products.

**Unit - I Basic of Fermentation**

Introduction to Fermentation, Basic Structure of Fermentation

Fermentation media – a) Constituents b) Design of fermentation

Types of Fermentation process – Batch, Continuous & Dual

Factors affecting Fermentation process, Control of contamination in Fermentation

**Unit – II Beneficial aspects for Fermentation**

Benefits of Fermentation, Microorganism involved in Fermentation, Microbial activities with specific role in Fermentation. Significance of Fermentation food in Indian diet Factors influence growth & Metabolic activities of microbes in food Fermentation Purity & Nature of food Fermentation.

**Unit – III Fermented Foods**

Fermented Milk – Curd, Yoghurt, Buttermilk

Fermented Cereals – Idli, Dhokla, Bread, Soyasause, Miso, Tempeh

Fermented Beverages - Wine, Beer, Sake, Distilled Liquors

Fermented Vegetables – Sauerkraut, Pickles, Green Olives

Fermentation of Cocoa, Tea, Coffee

Fermentation of Acetic acid, Vitamin B12 & Glutamic acid

**Unit – IV – Down Stream Processing**

Introduction to downstream processes

Criteria of selection of recovery process

Removal of Microbial cells – a) Foam Separation b) Precipitation, Filtration & Centrifugation

Cell Disruption – a) Physic mechanical b) Chemical method

Extraction & Drying

**Recommended Books:-**

- Biotechnology – Food Fermentation - Dr. S. K. Singh
- Industrial Biotechnology - M. S. Rangannath & Shriram Shridhin
- Food Microbiology - William Frazier, Dannise Westhoff
- Food Biotechnology –S.N. Tripathy

**SHIVAJI UNIVERSITY, KOLHAPUR**

**B. Voc. Part – III Semester -V**  
**Food Processing Technology**  
**Paper-XXXXII Bakery and Confectionary**  
**Laboratory work**

**Total Workload: 04**

**Total Marks: 50 Marks**

Practical - 04 lectures/week/ Batch

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**Objectives:**

- To study the different bakery product.
- To study role of ingredients and processing technology of confectionery products.

**Practical:**

- 1) Preparations of Biscuits
- 2) Preparation of Cake
- 3) Preparation of Cherry
- 4) Preparation of Chocolate
- 5) Preparation of Chikki
- 6) Preparation of Amla Candy
- 7) Preparation of Cookies
- 8) Visit to Bakery Industry

**Scheme of practical evaluation**

|                                         |                 |
|-----------------------------------------|-----------------|
| <b>Internal practical examination</b>   | <b>50 marks</b> |
| i)Preparation of any product            | 15 marks        |
| ii) Submission of practical record book | 15 marks        |
| iii) Submission of visit report         | 10 marks        |
| iv) Viva – Voce                         | 10 marks        |

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**B. Voc. Part – III Semester -V**  
**Food Processing Technology**  
**Paper-XXXXIII Meat, Poultry and Fish Technology**  
**Laboratory work**

**Total Workload: 04**

**Total Marks: 50 Marks**

**Practical - 04 lectures/week/ Batch**

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**Objectives:**

- To study structure , composition and slaughtering operations af meat, poultry
- To study Postmortem changes and major quality attributes
- Processing of meat, fish and poultry products

**Practical:**

- 1) Determination of pH if meat, poultry and fish
- 2) Slaughtering of meat.
- 3) Identification of physical characteristics of meat.
- 4) Determination of MSC of meat.
- 5) Identification of meat, poultry cuts.
- 6) Qualitative identification of fish.
- 7) Curing of Fish.
- 8) Evaluation of Egg quality.

**Scheme of practical evaluation**

|                                         |                 |
|-----------------------------------------|-----------------|
| <b>Internal practical examination</b>   | <b>50 marks</b> |
| i)Preparation of any product            | 15 marks        |
| ii) Submission of practical record book | 15 marks        |
| iii) Submission of visit report         | 10 marks        |
| iv) Viva – Voce                         | 10 marks        |



**B. Voc. Part – III Semester -V**  
**Food Processing Technology**  
**Paper-XXXXIV Fermentation Technology**  
**Laboratory work**

**Total Workload: 04**

**Total Marks: 50 Marks**

**Practical - 04 lectures/week/ Batch**

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**Objectives:**

- To Study Fermented products

**Practical**

- 1) Preparation of Dahi
- 2) Preparation of Lassi
- 3) Preparation of Butter milk
- 4) Preparation of Dhokala
- 5) Preparation of Idli
- 6) Preparation of Sauerkraut
- 7) Preparation of Grape Wine
- 8) Visit to Wine Industry

**Scheme of practical evaluation**

**Internal practical examination**

**50 marks**

|                                         |          |
|-----------------------------------------|----------|
| i)Preparation of any product            | 15 marks |
| ii) Submission of practical record book | 15 marks |
| iii) Submission of visit report         | 10 marks |
| iv) Viva – Voce                         | 10 marks |

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**B. Voc. Part – III Semester -V**  
**Food Processing Technology**  
**Paper-XXXXV: Internship**

**Total Marks: 50 Marks.**

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Total Marks: 50 Marks.

**Preamble:**

Exposure of students to a particular job and a profession or industry is the major need of this internship. While they might have an idea about what a job is like, they won't know until they actually perform it, if students gain the training and learn skills to do the job it will benefit them.

The main objectives of this course is to gain practical insight of Industry/ Company/ Boutique/Retail Stores/ Malls The students will be:

- ☐ Expose the students to the work environment
- ☐ Familiarize and adapt to the workplace
- ☐ Understand the methods, techniques and practices followed in the place of training

Course Outcomes: After completion of the course, student will be able to:

- i. understand the working structure of the industry/ company
- ii. analyze the methods adopted in the training place
- iii. correlate to the theoretical knowledge gained in the college
- iv. recognize the challenges in the training place
- v. discover the nuances of the workplace and appreciate it

**Scheme of internship evaluation**

|                                       |                 |
|---------------------------------------|-----------------|
| <b>Internal internship evaluation</b> | <b>50 marks</b> |
| i) Submission of visit report         | 30 marks        |
| ii) Viva–Voce                         | 20 marks        |

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**SHIVAJI UNIVERSITY, KOLHAPUR**  
**B. Voc. Part – III Semester VI**  
**Food Processing Technology**  
**Paper XXXXVI Technology of Beverage**

**Distribution of Workload:**

Theory : 04 lectures per week  
Practical : 02 lectures per week per batch  
Total Workload: 06 lectures per week of 60min.

**Total Marks:** 50 Marks

Theory 40M  
Practical 10M

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**Objectives:**

- The aim of the course is to provide the students with general scientific knowledge.
- To Study processing of alcoholic and non- alcoholic beverages.

**Unit I: Introduction to beverages**

Types of beverages and their importance, status of beverage industry in India, Manufacturing technology for juice-based beverages, synthetic beverages; technology of still, carbonated, low-calorie and dry beverages, isotonic and sports drinks; role of various ingredients of soft drinks, carbonation of soft drinks.

**Unit II: Manufacturing process of beverages**

Beverages based on tea, coffee, cocoa, spices, plant extracts, herbs, nuts, Dairy-based beverages.

**Unit III: Types of coffee and tea**

Chemical composition and processing of tea and coffee and their quality assessment. Types of tea: black tea, green tea, oolong tea. Types of coffee: Vacuum coffee, drip coffee, iced coffee. Espresso coffee, instant coffee. Decaffeination of Coffee types of decaffeination: Roselius method, swiss water process, direct and indirect method, triglyceride method, carbon dioxide method.

**Unit IV: Alcoholic beverages**

Types, manufacture and quality evaluation; the role of yeast in beer and other alcoholic beverages, ale type beer, lager type beer, technology of brewing process, equipment's used for brewing and distillation, wine and related beverages, distilled spirits.

**Unit V: Packaged drinking water**

Definition, types, manufacturing processes, quality evaluation and raw and processed water, methods of water treatment, BIS quality standards of bottled water; mineral water, natural spring water, flavored water, carbonated water.

**Reference books:**

1. Manay, N.S, Shandaksharaswamy, M., (2004), "Foods- Facts and Principles", New Age International Publishers, New Delhi,
2. Potter, N.N, Hotchkiss, J.H.( 2000), "Food Science". CBS Publishers, New Delhi.
3. Srilakshmi, B. Food Science (3rd Edition) (2003), New Age International (p) Limited Publishers, New Delhi,
4. Nicholas Dege. (2011), "Technology of Bottled water". Blackwell publishing Ltd, UK.

## **Technology of Beverage**

### **Laboratory work**

**Total Marks: 10**

- 1) Preparation of Fruit Beverage from Any Fruit
- 2) Carbonation of Fruit Juice
- 3) Preparation of tea/coffee/cocoa/spices.
- 4) Preparation of Dairy-based beverages.
- 5) Determination of saccharine in beverages
- 6) Determination of benzoic acid in beverages
- 7) Determination of brix value, gas content, PH and acidity of beverages

### **Scheme of Internal Practical Evaluation**

**10 marks**

- |                              |         |
|------------------------------|---------|
| 1) Submission of Record book | 5 marks |
| 2) Viva – Voce               | 5 marks |

### **Pattern of a Question paper** **Technology of Beverage**

**B. Voc. Part – III, Semester – VI**

**Time: 2 hours**

**Total Marks: 40**

- |                                           |    |
|-------------------------------------------|----|
| Q.1 Multiple type Question                | 08 |
| Q.2 Long answer Question(Any 2 out3)      | 16 |
| Q.3 2 Long answer Question                | 08 |
| Q.4 Short Type Questions (any 2 out of 3) | 08 |

### **Practical Evaluation:**

|                                                 |                 |
|-------------------------------------------------|-----------------|
| Oral and presentation based on units prescribed | <b>10 Marks</b> |
|-------------------------------------------------|-----------------|

**SHIVAJI UNIVERSITY, KOLHAPUR**  
**B. Voc. Part – III Semester – VI**  
**Food Processing Technology**  
**Paper XXXXVII Food Extrusion Technology**

**Distribution of Workload:**

**Total Marks:** 50 Marks

|                                                |                                  |               |
|------------------------------------------------|----------------------------------|---------------|
| Theory                                         | : 04 lectures per week           | Theory 40M    |
| Practical                                      | : 02 lectures per week per batch | Practical 10M |
| Total Workload: 06 lectures per week of 60min. |                                  |               |

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**Objectives:**

- To understand the basic concept of Extrusion
- To Study the various Extrusion Process in food industry

**UNIT –I:Extrusion**

Definition, introduction to extruders, principles and types  
Uses of extruders in the food industry

**UNIT –II: Types of Extruders**

Single screw extruder: principle of working, net flow, factors affecting extrusion Process  
Twin screw extruder: counter rotating and co-rotating twin screw extruder

**UNIT –III: Breakfast Cereals**

Classification of breakfast cereals  
Raw materials, process and quality testing of vermicelli and spaghetti  
Raw materials, process and quality testing of pasta and macronic products

**UNIT –IV: Texturized vegetable Protein**

Definition, processing techniques

**Reference Books:**

1. Extruded foods Matza S. Springer, 2000
2. Technology of Extrusion Cooking N.D. Frame Springer, 2012
3. Extruders in Food Application Riaz M.N. CRC Press, 2000

**Food Extrusion Technology (Practical)**  
**Laboratory work**

**Marks: 10**

1. Physical properties of extruded foods (expansion, density, water absorption index, etc.)
2. Preparation of noodles/ vermicelli
3. Preparation of spaghetti
4. Preparation of weaning foods
5. Determination of water absorption capacity of noodles
6. Visit to extrusion industry

**Scheme of Internal Practical Evaluation**

**10 marks**

- |                              |         |
|------------------------------|---------|
| 1) Submission of Record book | 5 marks |
| 2) Viva – Voce               | 5 marks |

**Pattern of a Question paper**  
**Food Extrusion Technology**  
**B. Voc. Part – III, Semester – VI**

**Time: 2 hours**

**Total Marks: 40**

- |                                           |    |    |
|-------------------------------------------|----|----|
| Q.1 Multiple type Question                |    | 08 |
| Q.2 Long answer Question(Any 2 out3)      |    | 16 |
| Q.3 2 Long answer Question                | 08 |    |
| Q.4 Short Type Questions (any 2 out of 3) |    | 08 |

**Practical Evaluation:**

|                                                 |                 |
|-------------------------------------------------|-----------------|
| Oral and presentation based on units prescribed | <b>10 Marks</b> |
|-------------------------------------------------|-----------------|

**SHIVAJI UNIVERSITY, KOLHAPUR**  
**B. Voc. Part – I, Semester – II**  
**Food Processing Technology**  
**Paper-XXXVIII Food Laws and Regulations**

**Total Workload:** 04  
**Theory** - 04 lectures/week/ Batch

**Total Marks:** 50 Marks

**Objectives:**

- To learn and understand the Role and responsibilities of Quality control department of food industry
- To learn the Food Laws and food standards

**Unit-1: Food Quality:**

Introduction to food quality management Definition, quality concepts, quality perception, and quality attributes, safety, health, sensory, shelf life, convenience.

**Evaluation of Food quality:** Definition, Quality attributes of food, Sensory characteristics of Food, Sensory tests, Instruments used for color & texture evaluation, microbial quality of food.

**Unit-2: Quality control and Effect of processing and storage on quality of food:**

Quality control of food, Role and responsibilities of Quality control department of food industry, Effect of processing on Quality of Food, Effect of storage on Quality of Food.

**Unit-3: Food Laws and Standards:**

Food Standards and regulations in India, Prevention of Food Adulteration Act, Food Safety Standard Authority of India (FSSAI).

**Compulsory National Legislations:** Essential Commodities Act, Standards of Weights and Measures, Export (Quality control and Inspection) Act

**Voluntary based Product Certifications:** Bureau of Indian Standards Act, Agmark Grading and Marketing Act and Rules Nutritional Labeling & Education act

**Unit-4: Consumer Protection**

**Government agencies:** Municipal Laboratories, Food and Drug Administration, The central Food Testing Laboratory, Export Inspection Council Laboratory

**Voluntary Agencies:** Quality control laboratories of companies, Quality control laboratories of Consumer co-operatives, Private testing laboratories, Consumer Guidance Society

**International Organizations and Agreements in the area of Food Standardization and quality control:** Codex Alimentarius, Codex India, World Health Organization, International Organization for Standardization, Food and Agriculture Organization, Joint FAO/WHO Expert committee on food additives, British Retail Consortium(BRC) standard for Foods

**References**

1. Quality Control in Food Industry S.N. Herschdogrfer
2. B. Srilakshmi, Food science, New Age Publishers,2002
3. Tannenbaum, S.R. Ed. 1979. “Nutritional and Safety Aspects of Food Processing”, Marcel
4. Pieterneel A, Luning, Willem J. Marcelis, Food Quality Management Technological and Managerial principles and practices, Wageningen,2009.

**SHIVAJI UNIVERSITY, KOLHAPUR**  
**B. Voc. Part – III Semester – VI**  
**Food Processing Technology**  
**Paper XXXXIX Food Packaging Technology**

**Total Workload:** 04  
**Theory** - 04 lectures/week/ Batch

**Total Marks:** 50 Mark

**Objectives**

- To be familiar with different methods and materials used for packaging.
- To understand the technology behind packaging.

**Unit I: Introduction to packaging**

Definition, Functions of packaging – Containment, Protection, Preservation, Promotion, Convenience, Communication. Requirements of effective package, Types of food packaging- primary, secondary and tertiary packaging.

**Unit II: Packaging Materials**

Origin of packaging materials, types, properties, advantages & disadvantages of packaging materials & Forms of packaging – box, bottle, tetra, pouch, shrink, vacuum, gas, CAP, MAP, aseptic etc.

**Unit III: Packaging Materials and their properties**

Rigid containers- Glass, Wooden boxes, metal cans- Aluminum and tin plate containers, Semi rigid containers- paperboard cartons, Flexible packaging- paper, plastic pouches- Low density polyethylene, High density polyethylene and Polypropylene Packaging materials for dairy products, bakery and confectionary, granular products, fruits and vegetables.

**Unit IV: Brief Introduction about test and Packaging Requirements**

Bursting Strength, Tensile Strength, Tearing Strength, Drop Test, Puncture Test, Impact Test etc., Packaging requirements and their selection for raw and processed foods Meat, fish, poultry, eggs, Milk and dairy products, Fruits and vegetables, Cereal grains and baked food products, Beverages & Snacks.

**References**

1. Gordon L. Robertson (2012), “Food Packaging: Principles and Practice”, Third Edition,
2. Takashi Kadoya (2012), “Food Packaging”, Academic press.
3. Richard Coles, Derek McDowell, Mark J. Kirwan (2003), “Food Packaging Technology”.



**SHIVAJI UNIVERSITY, KOLHAPUR**  
**B. Voc. Part – III Semester VI**  
**Food Processing Technology**  
**Paper XXXXX Food Quality & Waste Management**

**Total Workload: 04**

**Total Marks: 50 Marks**

**Theory - 04 lectures/week/ Batch**

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**Objectives:**

- To understand the Quality Evaluation Quality assurance in Food Services System
- To understand Waste Management and Effluent treatment.
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**Unit – I Introduction of Quality Control**

Definition and importance of Quality control, Principles of Quality Control  
, Quality attributes of Food – Nutritional quality, Microbial, Sensory Sample & Sampling  
Method of Quality Evaluation Quality assurance in Food Services System

**Unit – II – Sampling & analysis of Foods**

Sampling – Objectives, Guidelines, Methods

Hazards – Microbial, Physical, Chemical

Analysis of Food – Chemical: Moisture, Fat, Protein, Crude fiber, Microbial: DMC, Coliform  
determination 3.4 Ensuring safe Food

**Unit – III – Food Standard laws and safety management**

Waste Management and Effluent treatment of Food industry Introduction to Waste Management,  
Waste disposal – Types of Waste, Method of Waste disposal – Land filling, anaerobic,  
recycling digestion Measurement of BOD & COD

**Unit – IV Effluent treatment:**

Disposal in Sea, river, spray, Irrigation, land filling treatment, Trickling filters, Biological  
aerated filter, Fluidized bed system, Activated sludge process, aerobic & anaerobic digestion  
Safe disposal of waste

**Recommended Books:-**

1. An introduction to Food Science and Technology & Quality management Devendra Bhatt & Priyanka Tomar
2. Food Quality Management - Manoranjan Kalia
3. Hand book of analysis & Quality Control - Rannanganna

**SHIVAJI UNIVERSITY, KOLHAPUR**  
**B. Voc. Part – III Semester VI**  
**Food Processing Technology**  
**Paper-XXXXXI Food Laws and Regulations**  
**Laboratory work**

**Total Workload:** 04

**Total Marks:** 50 Marks

**Practical** - 04 lectures/week/ Batch

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**Objectives:**

- To learn the Licensing and registration process in food industry.

**Practical:**

1. Licensing and registration process
2. Examination of Cereals as per specifications
3. Examination of milk and milk products as per specifications
4. Examination of Oil and Oil products as per specifications
5. Examination of fruits and vegetable products as per regulations
6. Visit to FDA department

**Scheme of practical evaluation**

|                                        |                 |
|----------------------------------------|-----------------|
| <b>Internal practical examination</b>  | <b>50 marks</b> |
| 1. Preparation of any product          | 15marks         |
| 2. Submission of practical record book | 15 marks        |
| 3. Submission of visit report          | 10 marks        |
| 4. Viva – Voce                         | 10 marks        |

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**SHIVAJI UNIVERSITY, KOLHAPUR**  
**B. Voc. Part – III Semester VI**  
**Food Processing Technology**  
**Paper-XXXXXII Food Packaging Technology**  
**Laboratory work**

**Total Workload: 04**

**Total Marks: 50 Mark**

**Practical - 04 lectures/week/ Batch**

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**Objectives:**

- To be familiar with different methods and materials used for packaging.
- To understand the technology behind packaging.

**Practicals:**

1. Identification of different types of packaging and packaging materials
2. Determination of tensile strength of given material
3. Determination of tearing strength of paper
4. Determination of GSM.
5. Determination of bursting strength of packaging material
6. Determination of drop test of food package
7. Visit to relevant industries

**Scheme of practical evaluation**

|                                                  |                 |
|--------------------------------------------------|-----------------|
| <b>Internal practical examination</b>            | <b>50 marks</b> |
| i) Determination& Analysis of packaging Material | 15 marks        |
| ii) Submission of practical record book          | 15 marks        |
| iii) Submission of visit report                  | 10 marks        |
| iv) Viva – Voce                                  | 10 marks        |

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**SHIVAJI UNIVERSITY, KOLHAPUR**  
**B. Voc. Part – III Semester -VI**  
**Food Processing Technology**  
**Paper-XXXXXIII Food Quality and Waste Management**  
**Laboratory Work**

**Total Workload: 04**

**Total Marks:50**

**Objectives:**

- To study the waste Management Methods.
- To understand the technology Quality Control Techniques.

**Practicals:**

1. Determination of Titrable acidity and pH of milk and milk products
2. Determination of COD
3. Determination of BOD
4. Microbiological Analysis of air and water
5. Test for sanitization of dairy equipment (Swab method)
6. Study of solid waste disposal methods
7. Study of liquid waste disposal methods

**Scheme of practical evaluation**

|                                                   |                 |
|---------------------------------------------------|-----------------|
| <b>Internal practical examination</b>             | <b>50 marks</b> |
| i) Determination & Analysis of packaging Material | 15 marks        |
| ii) Submission of practical record book           | 15 marks        |
| iii) Submission of visit report                   | 10 marks        |
| iv) Viva – Voce                                   | 10 marks        |

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**SHIVAJI UNIVERSITY, KOLHAPUR**

**B. Voc. Part –III, Semester -VI**

**Food Processing Technology**

**Paper- XXXXXIV Project**

**Total Marks: 50 Marks.**

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**Paper-XXXXXIV: Project**

Total Marks: 50 Marks.

Students shall undertake project work related to development of innovative food product, its quality evaluation, packaging, labeling and shelf life testing under the supervision of a faculty member. In principle, the research /design work has to be carried out by the student himself taking advice from his supervisor when problem arises. The work will be allotted at the beginning of the fifth semester specifying the different aspects to be carried out by the student. At the end of the semester the student will submit an interim report on his/her work in typed form. Evaluation shall include oral presentation. ....

## **Annexure I**

### **Standard of Passing:**

- A.** For B.Voc Programme total credits shall be 180 with 30 Credits for each Semester. There shall be 12 Credits for theory and 18 credits for practical per semester.
- B.** Subject wise credits are mentioned in the concerned syllabus of every B.Voc. Program.
- C.** The standard of passing shall be 35% where the student will have to score 18 marks out of 50, 14 marks out of 40 and 4 marks out of 10.
- D.** Rules of ATKT are mentioned below:
  - I.** Internal examination will be compulsory for all students. If the student is absent/ fail in internal examination then he/ she will have to clear the Internal Examination. However, ATKT rules will be followed in respect of theory and practical papers only. Then students is allowed to keep term in the third and fifth semester even if he/ she has failed in the three or less than three heads (i.e. theory and practical) of passing each semester. However he/ she shall have to clear all the papers of semester I & II before taking admission to the fifth semester.
  - II.** In the B.Voc. Part – II, every student has to complete internship of concerned industry.

### **Award of Degree:**

- B.Voc. is a six semester integrated course spread over the period of 3 years. The course of B.Voc. will be 3 years integrated course commencing from the years as mentioned below:
  - a) B. Voc. Part – I : Semester I and II - Diploma
  - b) B. Voc. Part – II : Semester III and IV - Advanced Diploma
  - c) B. Voc. Part – III : Semester V and VI - B. Voc. Degree
- The candidate may take exit after one year of successful completion of the course. After successful completion of one year (Semester I to II) the candidate will get Diploma. After successful completion of two years (Semester III & IV), the candidate will get 'Advanced Diploma', The students those who have completed the entire three years (Semester V & VI) integrated course shall be awarded B.Voc. Degree programme, inclusive of Diploma and Advanced Diploma.
- The candidate admitted for direct 2<sup>nd</sup> year or 3<sup>rd</sup> year will got Class (First/ Second/ Pass Class) as per their performance for B.Voc.

**Scheme of Mark:****Grading Chart:****A. Grading Chart of 100 points:**

| Sr. No. | Marks Obtained | Numerical Grade (Grade Point) | CGPA        | Letter Grade     |
|---------|----------------|-------------------------------|-------------|------------------|
| 1       | Absent         | 0 (Zero)                      | -           | -                |
| 2       | 0 – 34         | 0 (Zero)                      | 0.0 – 4.99  | F (Fail)         |
| 3       | 35 – 44        | 5                             | 4.50 – 5.49 | C (Satisfactory) |
| 4       | 45 – 54        | 6                             | 5.50 – 6.49 | B (Average)      |
| 5       | 55 – 64        | 7                             | 6.50 – 7.49 | B+ (Good)        |
| 6       | 65 – 74        | 8                             | 7.50 – 8.49 | A (Very Good)    |
| 7       | 75 – 84        | 9                             | 8.50 – 9.49 | A+ ( Excellent)  |
| 8       | 85 - 100       | 10                            | 9.50 – 10.  | O (Outstanding)  |

**B. Grading Chart of 50 points:**

| Sr. No. | Marks Obtained | Numerical Grade (Grade Point) | CGPA        | Letter Grade     |
|---------|----------------|-------------------------------|-------------|------------------|
| 1       | Absent         | 0 (Zero)                      | -           | -                |
| 2       | 0 – 17         | 0 (Zero)                      | 0.0 – 4.99  | F (Fail)         |
| 3       | 18 – 22        | 5                             | 4.50 – 5.49 | C (Satisfactory) |
| 4       | 23 – 27        | 6                             | 5.50 – 6.49 | B (Average)      |
| 5       | 28 – 32        | 7                             | 6.50 – 7.49 | B+ (Good)        |
| 6       | 33 – 37        | 8                             | 7.50 – 8.49 | A (Very Good)    |
| 7       | 38 – 42        | 9                             | 8.50 – 9.49 | A+ ( Excellent)  |
| 8       | 43 - 50        | 10                            | 9.50 – 10.  | O (Outstanding)  |

**Note:**

- Marks Obtained  $\geq 0.5$  shall be rounded off to next higher digit.
- The SGPA & CGPA shall be rounded off to 2 decimal points.
- Marks obtained in 50 marks or 200 marks paper shall be converted to 100 marks.

**Calculation of SGPA & CGPA****1. Semester Grade Point Average (SGPA)**

$$\text{SGPA} = \frac{\sum (\text{Course Credits} \times \text{Grade Points Obtained}) \text{ of a semester}}{\sum (\text{Course Credits}) \text{ of respective Semester}}$$

**2. Cumulative Grade Point Average (CGPA)**

$$\text{CGPA} = \frac{\sum (\text{Total Credits of a semester} \times \text{SGPA of a respective semester}) \text{ of all semesters}}{\sum (\text{Total Course Credits}) \text{ of all Semester}}$$