

Curriculum and Credit Framework for Undergraduate Programme (Single Major) as per NEP-2020

B.Sc. Food Science & Technology (Four-Year Undergraduate Programme)

3rd & 4th Semesters

For Batch W.e.f Session: 2022-23



University School for Graduate Studies,
Chaudhary Devi Lal University
Sirsa-125055, Haryana
2023

Exit options and Credit requirements

SINGLE-MAJOR

| Exit with | Credit requirement |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| Certificate in Food Science & Technology: After successful completion of First year (Two semesters) of the Four- Year Undergraduate Degree Programme. | 48 (Including Internship of 4 Credits) |
| Diploma in Food Science & Technology: After successful completion of Two years (Four semesters) of the Four-Year Undergraduate Degree Programme. | 94 (Including Internship of 4 Credits) |
| Bachelor of Food Science & Technology: After successful completion of Three years (Six semesters) of the Four-Year Undergraduate Degree Programme. | 136 |
| Bachelor of Food Science & Technology (Honours/Honours with Research) After successful completion of Four Years (Eight semesters) of the Undergraduate Degree Programme. | 184 |

B.SC. FST – 3RD SEMESTER

| Sr. No. | Subject | Course ID | Credits | Contact Hours per week | Internal Assessment (IA)* | External Exam | Maximum Marks | Duration of Exam (hours) | |
|------------------------------------------------------------|------------------------------------------------------------|-----------------------|-----------|------------------------|---------------------------|---------------|---------------|--------------------------|--|
| 1 | Food Preservation (T) | BSc/FST/SM/3/DSC/201 | 3 | 3 | 25 | 50 | 75 | 3 | |
| | Food Preservation (P) | | 1 | 2 | 0 | 25 | 25 | 3 | |
| 2 | Basics Concepts of Food and Nutrition (T) | BSc/FST/SM/3/DSC/202 | 3 | 3 | 25 | 50 | 75 | 3 | |
| | Basics Concepts of Food and Nutrition (P) | | 1 | 2 | 0 | 25 | 25 | 3 | |
| 3 | Food Chemistry | BSc/FST/SM/3/MIC/201 | 4 | 4 | 30 | 70 | 100 | 3 | |
| 4 | A Grain Structure and Composition (T)/ | BSc/FST/SM/3/MIC/202A | 3 | 3 | 25 | 50 | 75 | 3 | |
| | A Grain Structure and Composition (P)/ | | 1 | 2 | 0 | 25 | 25 | 3 | |
| | OR | | | | | | | | |
| | B. Classification & Structure of Fruits and Vegetables (T) | BSc/FST/SM/3/MIC/202B | 3 | 3 | 25 | 50 | 75 | 3 | |
| B. Classification & Structure of Fruits and Vegetables (P) | 1 | | 2 | 0 | 25 | 25 | 3 | | |
| 5 | Food Adulteration | BSc/FST/SM/3/MDC/202 | 3 | 3 | 25 | 50 | 75 | | |
| 6 | Fermentation Technology | BSC//FST/SM/3/SEC/201 | 3 | 3 | 25 | 50 | 75 | 3 | |
| 7 | EVS | EVS/2/AECC3 | 4 | 4 | 30 | 70 | 100 | | |
| Total | | | 26 | | | | 750 | | |

B. Sc. Food Science and Technology (4th Semester) w.e.f. 2022-23 only

| Sr. No. | Subject | Course ID | Cred | Contact Hours | Intern Assessm (IA)* | Exte Ex | Maxim Mar | Duration Exam (ho |
|--------------|-----------------------------------------------------------|-----------------------|-----------|---------------|----------------------|---------|------------|-------------------|
| 1. | Basics of Oils and Fats (T) | BSc/FST/SM/4/DSC/203 | 3 | 3 | 25 | 50 | 75 | 3 |
| | Basics of Oils and Fats (P) | | 1 | 2 | 0 | 25 | 25 | 3 |
| 2. | Food Engineering (T) | BSc/FST/SM/4/DSC/204 | 3 | 3 | 25 | 50 | 75 | 3 |
| | Food Engineering (P) | | 1 | 2 | 0 | 25 | 25 | 3 |
| 3 | Food Safety & Food Laws (T) | BSc/FST/SM/4/DSC/205 | 3 | 3 | 25 | 50 | 75 | 3 |
| | Food Safety & Food Laws (P) | | 1 | 2 | 0 | 25 | 25 | 3 |
| 4. | Grain Storage & Handling (T) | BSc/FST/SM/4/MIC/203A | 3 | 3 | 25 | 50 | 75 | 3 |
| | Grain Storage & Handling (P)/ | | 1 | 2 | 0 | 25 | 25 | 3 |
| OR | | | | | | | | |
| | Postharvest Handling & Storage of Fruits & Vegetables (T) | BSc/FST/SM/4/MIC/203B | 3 | 3 | 25 | 50 | 75 | 3 |
| | Postharvest Handling & Storage of Fruits & Vegetables (P) | | 1 | 2 | 0 | 25 | 25 | 3 |
| 5. | Milling of Cereals & Millets (T) | BSc/FST/SM/4/MIC/204A | 3 | 3 | 25 | 50 | 75 | 3 |
| | Milling of Cereals & Millets (P) | | 1 | 2 | 0 | 25 | 25 | 3 |
| OR | | | | | | | | |
| | Unit Operations in Fruits & Vegetables Processing (T) | BSc/FST/SM/4/MIC/204B | 3 | 3 | 25 | 50 | 75 | 3 |
| | Unit Operations in Fruits & Vegetables Processing (P) | | 1 | 2 | 0 | 25 | 25 | 3 |
| 6. | Communication Skills | CDLU/VAC/101 | 2 | 2 | 15 | 35 | 50 | 2 |
| 7. | Professional Skills | CDLU/VAC/102 | 2 | 2 | 15 | 35 | 50 | 2 |
| Total | | | 24 | 39 | | | 600 | |

THIRD SEMESTER

BSc/FST/SM/3/DSC/201

Food Preservation (Theory)

Credit: 3

Periods per week: 3 Hrs

Internal Assessment: 25

Duration of Exam: 3 Hrs.

Max. Marks: 75

End Term Exam: 50

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt one compulsory question and four more questions selecting one question from each unit.

UNIT-I

Food Microbiology: Principles of Food Preservation, microorganisms associated with foods- bacteria, yeast and mold, Importance of bacteria, yeast and molds in foods. Classification of microorganisms based on temperature, pH, water activity, nutrient and oxygen requirements, typical growth curve of micro-organisms. Classification of food based on pH, Food infection, food intoxication, definition of shelf life, perishable foods, semi perishable foods, shelf stable foods.

UNIT-II

Food Preservation by Moisture control: Drying and Dehydration - Definition, drying as a means of preservation, differences between sun drying and dehydration (i.e. mechanical drying), heat and mass transfer, factors affecting rate of drying, normal drying curve, names of types of driers used in the food industry.

Evaporation – Definition, factors affecting evaporation, names of evaporators used in food industry.

UNIT-III

Thermal Processing- Commercial heat preservation methods: Sterilization, commercial sterilization, Pasteurization, and blanching. Introduction, units of radiation, kinds of ionizing radiations used in food irradiation, mechanism of action, uses of radiation processing in food industry, concept of cold sterilization.

Recommended Books:

1. B. Srilakshmi, Food science, New Age Publishers, 2002
2. Meyer, Food Chemistry, New Age, 2004
3. Bawa, A.S, Chauhan, O.P et. al., Food Science. New India Publishing agency, 2013
4. Frazier, W.C. and Westhoff, D.C., Food Microbiology, TMH Publication, New Delhi, 2004

BSc/FST/SM/3/DSC/201
Food Preservation (Practical)

Credits: 01
Periods per week: 02 Hrs

Duration of exam: 03 Hrs.
Max. Marks: 25

1. Methods of Sampling.
2. Concept of shelf life of different foods.
3. To study the concept of Asepsis and sterilization.
4. Determination of pH of different foods using pH meter.
5. Study quality characteristics of foods preserved by drying/dehydration/freezing.
6. To perform pasteurization of fluids using different methods.
7. To perform blanching of different plant foods.

BSc/FST/SM/3/DSC/202

Basics Concepts of Food and Nutrition (Theory)

Credit: 3

Periods per week: 3 Hrs

Internal Assessment: 25

Duration of Exam: 3 Hrs.

Max. Marks: 75

End Term Exam: 50

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt one compulsory question and four more questions selecting one question from each unit.

UNIT-I

Basic terminologies- nutrition, health, RDA (recommended dietary allowance), diet, hunger, satiety, BMR (basal metabolic rate), BMI (body mass index). Food and nutrients- basic definitions, function of food and nutrients, Water and its role in human health and nutrition. Obesity- it causes, body composition, weight for height measure, health implication of obesity. BMI and factor affecting BMI.

UNIT-II

Carbohydrates- classification, dietary importance and function of carbohydrates. Fat- functions of fats, cholesterol, LDL & HDL and their health importance. Protein - nature and function of proteins, biological value, net protein utilization, protein efficiency ratio, applications of amino acids.

UNIT-III

Vitamins- sources and requirements of vitamins, functions of vitamin- A, D, E, K, C and vit. B complex.

Minerals- minerals in human health, macro and micro minerals, food sources and requirements of minerals.

Functional foods- concept and categories of functional foods and their importance.

Recommended Books:

1. Food Nutrition: M. Swami Nathan Vol. I, II.
2. Food Science, Nutrition and Safety: Sukhneet Suri and Anita Malhotra. Pearson India Education Services Pvt. Ltd., India.
3. Essentials of Food and Nutrition: Swaminathan
4. Food Science and Nutrition: Sunetra Roday

BSc/FST/SM/3/DSC/202
Basic Concepts of Food and Nutrition (Practical)

Credits: 01

Periods per week: 02 Hrs

Duration of exam: 03 Hrs

Max. Marks: 25

1. Identification of food sources for various nutrients using food composition tables.
2. Record diet of self-using 24 hour dietary recall and its nutritional analysis.
3. Introduction to meal planning, concept of food exchange system.
4. Planning of meals for adults of different activity levels for various income groups.
5. Planning of nutritious snacks for different age and income groups.
6. Preparation of nutritious snacks using various methods of cooking.
7. Nutritional labeling of food products.
8. Estimation of BMI and other nutritional status parameters.

BSc/FST/ SM /3/MIC/201
Food Chemistry (Theory)

Credit: 4
Periods per week: 3 Hrs
Internal Assessment: 30

Duration of Exam: 3 Hrs.
Max. Marks: 100
End Term Exam: 70

Note for the paper setter: The question paper will consist of 9 questions in all. The first question will be compulsory and will consist of 7 short questions of 2 marks each covering the whole syllabus. In addition eight more questions of 14 marks is will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt one compulsory question and four more questions selecting one question from each unit.

UNIT-I

Introduction to Food Chemistry: Composition of food, the definition of water in food, Structure of water and ice, Types of water, Role of water activity.

Lipids: Classification of lipids, Physical and chemical characteristics, Chemical deterioration of fats and oils (auto-oxidation, rancidity, lipolysis, flavor reversion).

UNIT-II

Carbohydrates: Classification, Structure and Chemical reactions of carbohydrates.

Protein: classification and structure, types of food proteins (plant and animal proteins), Physicochemical and functional properties of proteins.

UNIT-III

Natural Food Pigments: Introduction and classification, Types of food pigments (chlorophyll, carotenoids, anthocyanin and flavonoids, beet pigments, caramel).

Food Flavors: Definition and basic tastes, Description of some common food flavors.

Minerals: Major and minor minerals, Toxic minerals in food.

UNIT-IV

Vitamins: Types (Water soluble vitamins and Fat soluble vitamins).

Enzymes: Introduction, classification, General characteristics, Important enzymes in food processing. Physico-chemical and nutritional changes occurring during food processing.

Browning Reactions in Food: Types, Enzymatic and Non enzymatic Browning and their control measure.

Recommended Readings:

1. Fennema, Owen R1996. Food Chemistry, 3rd Ed., Marcell Dekker, NewYork,
2. Whitehurst and Law.2002. Enzymes in Food Technology, CRC Press,Canada
3. Potter, N.N. and Hotchkiss,J.H.1995. Food Science5th Ed., Chapman &Hall

BSc/FST/SM/3/MIC/202 A

Grain Structure and Composition (Theory)

Credit: 3

Periods per week: 3 Hrs

Internal Assessment: 25

Duration of Exam: 3 Hrs.

Max. Marks: 75

End Term Exam: 50

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt one compulsory question and four more questions selecting one question from each unit.

UNIT-I

Cereal, pseudocereals and millet grains and their classification. Legume grains and their classification.

Botanical aspects of cereal, pseudocereals and millets. Physical and thermal properties of different food grains.

Unit-II

Structure and chemical composition of different cereals, pseudoceals and millets. Structure and chemical composition of different legume grains.

Grain grading systems.

Unit-III

Nutritional significance of different cereals, pseudocereals, millets and legumes in human diet. Production and processing scenario of cereals, pseudocereals and legume grains.

Recommended Books:

1. Technology of Cereals: N.L. Kent, A.D. Evers. Elsevier Science Ltd.
2. Handbook of Postharvest Technology. Amalendu Chakraverty, Arun S. Mujumdar, G.S. Vijaya Raghavan. Hosahalli S. Ramaswamy. Marcel Dekker Inc., New York.

BSc/FST/SM/3/MIC/202A

Grain Structure and Composition (Practical)

Credits: 01

Periods per week: 02 Hrs

Duration of exam: 03 Hrs

Max. Marks: 25

1. Identification of different cereal grains grains.
2. Identification of different millets grains.
3. Identification of different legume grains.
4. Proximate analysis of different cereals, millets and leumes grains.
5. Preparation of charts for different cereals and legumes grain production.
6. Determination of physical properties of different food grains.

BSc/FST/SM/3/MIC/202B

Classification & Structure of Fruits and Vegetables (Theory)

Credit: 3

Periods per week: 3 Hrs

Internal Assessment: 25

Duration of Exam: 3 Hrs.

Max. Marks: 75

End Term Exam: 50

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt one compulsory question and four more questions selecting one question from each unit.

Unit-I

Introduction: Chemical composition and nutritive value of fruits. Basic differences between fruits and vegetables.

Classification of fruits and vegetables on the basis of region, structure and ripening behavior.

Unit-II

Sorting and grading of fruits and vegetables.

Maturity and quality grades for fruits and vegetables

Botanical aspects of fruits and vegetables.

Unit-III

Vegetables as a source of nutrients and bioactive compounds.

Aspects of genetically modified fruits and vegetables.

Recommended books:

1. Handbooks of Vegetable Preservation and Processing. Y.H. Hui and E. Ozgul Evranuz. CRC Press.
2. Processing Fruits. Diane M. Barrette, Laszlo Somogyi and Hosahalli Ramaswamy. CRC Press.
3. Handbook of Postharvest Technology. Amalendu Chakraverty, Arun S. Mujumdar, G.S. Vijaya Raghavan. Hosahalli S. Ramaswamy. Marcel Dekker Inc., New York.

BSc/FST/SM/3/MIC/202B

Classification & Structure of Fruits and Vegetables (Practical)

Credits: 01

Duration of exam: 03 Hrs.

Periods per week: 02 Hrs.

Max. Marks: 25

1. Identification and botanical description of different fruits.
2. Identification and botanical description of different vegetables.
3. Grading of fruits and vegetable according to their size and shape.
4. Identification of primary utilizable parts of fruits and vegetables according to their processing.
5. Identification of utilizable by waste parts of fruits and vegetables according to their processing.
6. Visit of fruits and vegetable processing industry.

Food Adulteration

BSC/FST/SM/3/MDC/201

Credit: 3
Periods per week: 3 Hrs
Internal Assessment: 25

Duration of Exam: 3 Hrs.
Max. Marks: 75
End Term Exam: 50

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition, six more questions of 14 marks is will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt one compulsory question and four more questions selecting one question from each unit.

Unit I

Introduction and concept: Food Adulteration – Definition, concept, classification of adulterants, Food Contaminants, difference between adulterants and contaminants

Common food adulterants: List of foods commonly adulterated, harmful effects of adulterants. Economic effect of adulteration.

Unit II

Adulteration in milk and milk products: Common adulterants in milk and milk products. Household and laboratory scale methods to detect adulterants in milk and milk products

Adulteration in spices and additives: Common adulterants in spices and food additives. Household and laboratory scale methods to detect adulterants in these commodities.

Unit III

Public health hazards and food safety: Foodborne illness, food poisoning, types of food poisonings, bacterial agents of foodborne illness,

Food poisoning: Food poisoning by *Clostridium*, *salmonella*, *E. coli*, *Staphylococcus*. etc.

References books:

1. N. Shakuntala Manay and M. Shadaksharaswamy (2008) Food Facts and Principles
2. [Edwin M. Bruce](#) Edwin M Bruce Detection of the Common Food Adulterants
3. Shyam Narayan Jha (2016) Rapid Detection of Food Adulterants and Contaminants

BSC/FST/SM/3/SEC/201
Fermentation Technology (Theory)

Credit: 3
Periods per week: 3 Hrs
Internal Assessment: 25

Duration of Exam: 3 Hrs.
Max. Marks: 75
End Term Exam: 50

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt one compulsory question and four more questions selecting one question from each unit.

UNIT-I

Introduction to fermentation, Fermentation an ancient tradition, Developments in fermentation technology, Scope and future prospects of fermentation microbiology, Gaden's fermentation classification, Rate of microbial growth and death, Rate of Product formation, Classification of food fermentations - Alcoholic, lactic and acetic acid fermentations

UNIT-II

General methods of fermentation – Aerobic fermentation, Anaerobic fermentation, Solid state fermentation, and submerged fermentation, Batch and continuous fermentation. Pre-requisite for Industrial fermentation process,

UNIT -III

Component parts of a fermentor and their functions, Peripheral parts and accessories of a fermentor, Online and off-line devices of fermentor, Biosensors in fermentation monitoring, Common measurement and control systems in fermentor, Contamination problems in fermentation process, Computer applications in fermentation process.

Recommended Books:

1. Principles of Fermentation Technology by Stanbury and Whittaker
2. Biotechnology: Food Fermentation by VK Joshi & Ashok Pandey
3. Comprehensive Biotechnology by Moo and young (4 volumes)

ENVIRONMENTAL STUDIES

EVS/2/AECC3

Credit: 4
Maximum Duration : 3Hours

Maximum Marks= 100
(Theory 70+ Internal 30 Marks)

Objective: The objective of this paper is to create the awareness among the students towards Environmental concepts and issues for smooth life of species and human at earth.

UNIT I

Introduction to Environment: The multidisciplinary nature of environmental studies: Definition, Scope and importance, need for public awareness. Environmental Ethics: anthropocentric and eco-centric perspective.

Natural resources: Renewable and non-renewable resources: Natural resources and associated problems. Forest resources: use and over-exploitation, Deforestation, Timber extraction, mining, dams and their effects on forests and tribal people. Water resources: Use and over-utilization of surface and ground water, floods, drought, dams- conflicts over water and problems. Minerals resources: Use and exploitation, environmental effects of extracting and using minerals resources. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer pesticide problems, water logging, salinity, Energy resources; Growing energy needs, renewable and non-renewable energy resources. Land resources: Land as resource: land degradation man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable life style. Sustainable development: concept, initiatives for sustainable development: regional, state and global

UNIT II

Ecosystem: 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, characteristics features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, desert ecosystem, Aquatic ecosystem(Ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its conservation: Introduction-Definition: Genetic, species and Ecosystem diversity, Bio-geographical classification of India. Value of Biodiversity: consumptive use, productive use, social, ethical; aesthetic and optional. Biodiversity at local, National and Local levels. India as Mega-diverse a Nation. Hot spots of Biodiversity. Threats to biodiversity, Habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and Endemic species, conservation of biodiversity: In situ and Ex-situ, conservation of biodiversity.

UNIT III

Water pollution: Natural and anthropogenic sources of water pollution and their effects. Marine pollution, Thermal pollution, Eutrophication, Ground water pollution. **Air pollution:** Sources, Classification and properties of air pollutants (Particulate matter, Inorganic gaseous pollutants, Organic gaseous pollutants), Effects of air pollution on Human health. **Soil pollution:** Soil pollution from the use of agrochemicals (viz. Fertilizers and Pesticides), Heavy metals, Industrial effluents and Detrimental effects of soil pollutant, Remedial measures for soil pollution. Types and sources Solid waste, Electronic waste **Radioactive and Noise pollution:** Definition Sources of radioactive pollution, Radioactivity, effects of

radioactive pollution, Sound pressure level, Frequency, noise monitoring and sound level meter, Sources and effects of noise pollution, Effects of noise pollution on human health. Role of individual in prevention of pollution. **Disaster Management:** floods, earthquake, cyclone and landslides, **Natural Disaster Management:** Causes, effects and control measures of natural disasters.

Social issue and the Environment: From Unsustainable to sustainable development. Urban problem related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and Rehabilitation of people; its problems and concerns. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Wasteland reclamation, Consumerism and waste products. **Environmental legislation:** Air (Prevention and control of pollution) Act, water (Prevention and control of pollution) Act, Wildlife Protection Act, Forest conservation Act. Issues involved in the enforcement of environmental legislation Public awareness.

UNIT IV

Demography: Human population and the Environment: Population Growth, variation among nations. Population explosion- family Welfare Programme. Human rights, Value Education. HIV/AIDS. Women and Child welfare. Role of information technology in environment and Human health.

Suggested Readings

1. Agarwal K.C (2001) Environmental Biology. Nidhi Pub.Ltd Bikaner
2. C.P Kaushik & Anubha Kaushik . Perspective in Environmental Studies. New Age International limited Publishers. New Delhi
3. Text book of Environmental Studies for Undergraduates courses.(2021) Erach Bharucha.Orient Blackswan Pvt.Ltd.
4. R.J Ranjit Daniels, Jagdish Krishnaswamy(2013).Publisher Wiley
5. Text book of Environmental Studies (2022).

Note for the Paper Setter: The question paper will consist of **nine** questions in all. The **first** question will be compulsory and will consist of **seven** short questions of **2** marks each covering the whole syllabus. In addition, **eight** more questions of **14** marks each will be set unit-wise comprising of **two** questions from each of the **four** units. The candidates are required to attempt **one** compulsory question and **four** more questions selecting at least **one** question from each unit.

**FOURTH
SEMESTER**

BSc/FST/SM/4/DSC/203
Basics of Oils & Fats (Theory)

Credit: 3
Periods per week: 3 Hrs
Internal Assessment: 25

Duration of Exam: 3 Hrs.
Max. Marks: 75
End Term Exam: 50

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt one compulsory question and four more questions selecting one question from each unit.

UNIT-I

Introduction to oils and fats and their nomenclature. Physical and chemical Properties of fats and oils. Nutritional importance of oils and fats.

Source and physico-chemical properties of following oils:-

- a) Animal – Butter oil, lard and tallow.
- b) Plant – Groundnut, Sunflower, Soybean and Coconut oil.

Extraction of oils/fats.

UNIT-II

Problems during storage – rancidity, reversion.

Refining: degumming, choice of alkali, batch and continuous refining.

Bleaching: choice of adsorbent, batch and continuous bleaching.

Deodorization: process parameters: batch and continuous processing.

UNIT-III

Hydrogenation of oils: mechanism, process parameters and batch processing.

Fractionation and winterization of oils.

Functions of oils and fats in foods processing: Frying, Cooking, Baking.

By products of oil processing: soap and lecithin.

Recommended Books:

1. Food Chemistry by Meyer LH, 2006, CBS Publisher, New Delhi
2. Food Science by Potter NN, 5th Ed, 2006, CBS Publisher, New Delhi
3. Food Oils & Fats: Technology, Utilization and Nutrition by Lawson H, 1995, CBS Publisher, New Delhi.

BSc/FST/SM/4/DSC/203
Basics of Oils & Fats (Practical)

Credits: 01

Periods per week: 02 Hrs

Duration of exam: 03 Hrs

Max. Marks: 25

1. To determine moisture content of oilseeds.
2. To determine FFA of oil.
3. Determination of Iodine Value, R.M. Value and Polenske Value.
4. To determine Saponification value, anisidine value and peroxide value of oil.
5. Determination of melting point of fats.
6. Detection of sesame oil in vanaspati by furfural test.
7. Detection of adulteration with mineral oil, Cotton seed oil or Ground nut oil.
8. Organoleptic evaluation of fats and oils.
9. Visit to vegetable oils industry.

BSc/FST/SM/4/DSC/204

Food Engineering (Theory)

Credit: 3

Periods per week: 3 Hrs

Internal Assessment: 25

Duration of Exam: 3 Hrs.

Max. Marks: 75

End Term Exam: 50

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt one compulsory question and four more questions selecting one question from each unit.

UNIT-I

Units and Dimensions: Fundamental and derived units, system of measurement, brief introduction to dimensions.

Material Balance & Energy Balance Calculations: General principles, steady state and unsteady state problems

Screening: Screening terminology, types of screens, effectiveness of screens

Material Handling Process: Introduction, Types of conveyors and application in food industry.

UNIT-II

Mixing: Theory, measurement of mixing, rates of mixing, types of mixers

Sedimentation: Theory, free and hindered settling, sedimentation equipments.

Filtration: Theory of filtration, filtration equations for constant pressure and constant rate filtration, filtration equipments

Size Reduction: General principles, size reduction equipments, modes of operation of size reduction plant, calculation of energy requirements for comminution of solids

UNIT-III

Heat Transfer: Conductive heat transfer-Fourier's law, conduction through rectangular slab, hollow cylinder, spherical shell, composite rectangular wall (series) and composite cylinder. Convective heat transfer-convective heat transfer coefficient, free and forced convection, overall heat transfer coefficient. Types of heat exchangers. Radiation: Stefan-Boltzmann law, Radiative heat transfer.

Thermal Process calculations: Concept of D, Z and F values, evaluation of process time in canned foods by graphical and formula methods.

Recommended books:

1. Fundamentals of Food Process Engineering by R.T. Toledo (3rd Edition), Springer (2008).
2. Introduction to Food Process Engineering by P.G. Smith, (2nd Edition), Springer, (2011).
3. Fundamentals of Food Engineering by D.G. Rao, (1st Edition) PHI Learning Pvt, Ltd, New Delhi (2010).
4. Introduction to Food Engineering by R.P. Singh & D.R. Heldman (4th Edition) Academic Press (2009).
5. Transport Processes and Unit Operations by C.J. Geankoplis (3rd Edition), Prentice Hall of India Pvt Ltd, New Delhi, (2009).
6. Food Engineering Operations by J.G. Brennan, J.R. Butters, N.D. Cowell and A.E.V. Lilley (3rd Edition, Elsevier Publication, USA (1990).

BSc/FST/SM/4/DSC/204
Food Engineering (Practical)

Credits: 1

Periods per week: 2 Hrs.

Duration of exam: 3 Hrs.

Max. Marks: 25

1. Calculation of mixing index for a given sample.
2. To study the working principle and operation of a hammer mill.
3. To study the working principle and operation of a roller mill.
4. Determination of particle size of given sample using Sieve analysis.
5. Calculation of refrigeration load of cold storage plant.
6. To study dehydration characteristics of food materials.
7. To study the boiling point elevation of liquid foods and water.
8. To study freezing point depression by changing salts concentration in liquid foods and water
9. Design calculations of belt conveyor, bucket elevator and screw conveyor.

BSc/FST/SM/4/DSC/205
Food Safety & Food Laws (Theory)

Credit: 3
Periods per week: 3 Hrs
Internal Assessment: 25

Duration of Exam: 3 Hrs.
Max. Marks: 75
End Term Exam: 50

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt one compulsory question and four more questions selecting one question from each unit.

UNIT-I

Introduction to food safety: Definition, Historical background of food safety, Factors affecting Food Safety, Importance of Safe Foods.

Food hazards of physical, chemical and biological origin: Introduction, Physical Hazards with common examples, Chemical Hazards (naturally occurring environmental and intentionally added and contaminants due to processing), Microbiological hazards (Bacterial and Fungal).

UNIT-II

Introduction to food acts, laws and standards: Food safety and standard act. Indian Standards: Agmark Standards. International Standards: Codex Standards, ISO Standards.

Regulatory agencies: Food Safety and Standards Authority of India (FSSAI), The Export Inspection Council, Food and Agriculture Organization (FAO),

UNIT-III

Food safety management tools: Prerequisites of food hygiene - GHPs, GMPs, HACCP, TQM – concept and need for quality, Microbiological tests for food safety related to (*Coliforms, Listeria, Staphylococci and Salmonella*), definition and principles of risk analysis.

Steps involved in implementation of food safety programme. New approaches and advancements in to food safety.

Recommended Books:

1. Adam MR and Moss MO. Food microbiology. New Age International (P) Ltd. ND.
2. Jay JM. Modern Food Microbiology. CBS publishers ND.
3. Potter NN. Food Science. CBS Publishers ND.
4. Bhunia AK. Food borne Microbial Pathogens (Mechanism and Pathogenesis). Food Science text series Springer. Food Safety by Ian C Shaw: Publisher Wiley Blackwell.

BSc/FST/SM/4/DSC/205
Food Safety & Food Laws (Practical)

Credits: 1
Periods per week: 2 Hrs.

Duration of exam: 3 Hrs.
Max. Marks: 25

1. Detection and estimation of food additives and adulterants.
2. Preparation of HACCP charts for meat industry.
3. Preparation of HACCP charts for dairy industry.
4. Preparation of HACCP charts for fruits and vegetable industry.
5. Preparation of HACCP charts for cereal industry.
6. Analysis of aflatoxins in fungal contaminated food product.
7. Visit to Food Industries.

BSc/FST/SM/4/MIC/203A
Grain Storage & Handling (Theory)

Credit: 3
Periods per week: 3 Hrs
Internal Assessment: 25

Duration of Exam: 3 Hrs.
Max. Marks: 75
End Term Exam: 50

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt one compulsory question and four more questions selecting one question from each unit.

UNIT-I

Pests of stored grains and their classification. General problems of grain storage. Sources of infestation in stored food grains and their detection. Causes, types and content deterioration in stored food grains and methods to check them.

UNIT-II

Internal feeders of stored grains and their management. External feeders of stored grains and their management.

Traditional and modern methods of bag and bulk storage. Chemical, non chemical and integrated methods of controlling stored grain insect pest.

UNIT-III

New methods employed in managing stored grain pests: insect proof bins, insect proof bags, traps, irradiation, nanoparticles, silos, microwave technology, controlled atmosphere, low and high temperatures.

Storage structures and their significance for different food grains.

Recommended Books:

1. Introduction of Insect –By Metalf & Lukemann.
2. Pesticides and Pollution–By Mollan.

BSc/FST/SM/4/MIC/203A
Grain Storage & Handling (Practical)

Credits: 1
Periods per week: 2 Hrs.

Duration of exam: 3 Hrs.
Max. Marks: 25

1. To study various insect pests of grains.
2. To study the quality tests and physical parameters for grains.
3. To store the grains and check its shelf life.
4. To study the various pesticides used for grain storage.
5. To study the effect of moisture on spoilage of grains.
6. Visit to grain storage godowns.

BSc/FST/SM/4/MIC/203B

Post Harvest Handling & Storage of Fruits and Vegetables (Theory)

Credit: 3

Periods per week: 3 Hrs

Internal Assessment: 25

Duration of Exam: 3 Hrs.

Max. Marks: 75

End Term Exam: 50

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt one compulsory question and four more questions selecting one question from each unit.

UNIT-I

Introduction to Post Harvest Storage and Handling of Fruits and Vegetables: Definition and importance of post harvest storage and handling, Overview of the post harvest storage and handling industry

Pre-harvest factors affecting post harvest quality: Plant physiology and maturity, Harvesting techniques, Pre-harvest treatments

Post-harvest handling practices: Sorting and grading, Washing and cleaning, Cooling and temperature management.

UNIT-II

Controlled atmosphere storage: Definition and principles of controlled atmosphere storage, Types of controlled atmosphere storage, Management of controlled atmosphere storage

Modified atmosphere packaging: Definition and principles of modified atmosphere packaging, Types of modified atmosphere packaging, Management of modified atmosphere packaging

Cold storage: Definition and principles of cold storage, Types of cold storage, Management of cold storage

UNIT-III

Quality control in post harvest storage and handling: Importance of quality control, Factors affecting quality, Quality control methods

Market demand for fresh produce, Distribution channels for fresh produce, Value-added products

Food safety and regulations: Food safety principles, Regulations governing post harvest storage and handling, Hazard Analysis and Critical Control Points (HACCP)

Refernce books:

1. Florkowski, W. J., Banks, N. H., Shewfelt, R. L., & Prussia, S. E. (Eds.). (2021). *Postharvest handling: a systems approach*. Academic press.
2. Siddiqui, M. W. (Ed.). (2015). *Postharvest biology and technology of horticultural crops: principles and practices for quality maintenance*. CRC Press.
3. Chakraverty, A., Mujumdar, A. S., & Ramaswamy, H. S. (Eds.). (2003). *Handbook of postharvest technology: cereals, fruits, vegetables, tea, and spices* (Vol. 93). CRC press.
4. Sinha, N. K., Hui, Y. H., Evranuz, E. Ö., Siddiq, M., & Ahmed, J. (2010). *Handbook of vegetables and vegetable processing*. John Wiley & Sons.
5. Evans, E. A., Ballen, F. H., & Siddiq, M. (2020). Postharvest Handling, and Processing. *Handbook of Banana Production, Postharvest Science, Processing Technology, and Nutrition*,
6. Mitra, S. K. (1997). Postharvest physiology and storage of tropical and subtropical fruits.

BSc/FST/SM/4/MIC/203B

Post Harvest Handling & Storage of Fruits and Vegetables (Practical)

Credits: 1

Duration of exam: 3 Hrs.

Periods per week: 2 Hrs.

Max. Marks: 25

- 1) Comparison of different harvesting techniques (such as hand picking, machine harvesting, and mechanical shaking) on post harvest quality of fruits and vegetables
- 2) Evaluation of different sorting and grading methods (such as manual sorting, optical sorting, and weight grading) on post harvest quality of fruits and vegetables
- 3) Effect of different washing and cleaning methods (such as water washing, brushing, and air drying) on post harvest quality of fruits and vegetables
- 4) Comparison of different cooling and temperature management methods (such as forced air cooling, hydrocooling, and vacuum cooling) on post harvest quality of fruits and vegetables
- 5) Evaluation of different controlled atmosphere storage conditions (such as low oxygen and high carbon dioxide) on post harvest quality of fruits and vegetables
- 6) Comparison of different modified atmosphere packaging materials (such as plastic films and coatings) on post harvest quality of fruits and vegetables
- 7) Evaluation of different cold storage conditions (such as temperature and humidity) on post harvest quality of fruits and vegetables
- 8) Assessment of different quality control methods (such as visual inspection, sensory evaluation, and chemical analysis) on post harvest quality of fruits and vegetables
- 9) Investigation of the effect of transportation and distribution methods (such as refrigerated trucks and air cargo) on post harvest quality of fruits and vegetables.

BSc/FST/SM/4/MIC/204A

Milling of Cereals & Millets (Theory)

Credit: 3

Periods per week: 3 Hrs

Internal Assessment: 25

Duration of Exam: 3 Hrs.

Max. Marks: 75

End Term Exam: 50

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt one compulsory question and four more questions selecting one question from each unit.

UNIT-I

Wheat:

Wheat milling – general principles and operation; cleaning, conditioning and roller milling systems. Flour extraction rates and various flour grades. Criteria of flour quality. Modern and traditional mills. Wheat flour types and usage. Wheat Flour improvers and Bleachers: their principle and action. Quality criteria for wheat flour.

UNIT-II

Rice:

Milling of rice–types of rice mill; huller mill, Sheller-cum-cone polisher mill. Modern rice milling unit operation-dehusking, paddy separation, polishing and grading. Factors affecting rice yield during milling. By-products of rice milling. Rice parboiling technology. CFTRI process of parboiling. Properties of parboiled rice, Changes during parboiling. Advantages and disadvantages of parboiling

UNIT-III

Corn Technology: Wet and dry milling of corn, products of wet and dry milling of corn, Corn sweeteners and their uses.

Malt Technology: Malting of barley: steeping, germination and drying. Different types of malts and their food applications.

Recommended Books:

1. Samuel, A.M.(1996) “ The Chemistry and Technology of Cereals as Food and Feed “, CBS Publisher & Distribution, New Delhi.
2. Pomeranz, Y.(1998) “ Wheat : Chemistry and Technology”, Vol 1,3” Am. Assoc. Cereal Chemists. St. Paul, MN, USA.
3. Eliasson, A.C. and Larsson, K.(1993) “Cereals in Bread making”, Marcel Dekker. Inc. New York.
4. Honeney, R.C.(1986) “Principles of Cereal Science and Technology”, Am. Assoc. Cereal Chemists, St. Paul, MN, USA.
5. Pomeranz, Y. (1976) “Advances in Cereal Science and Technology”, Am. Assoc. Cereal Chemists St.Paul, MN, USA.
6. Juliano, B.O.(1985). “Rice Chemistry and Technology”, Am. Assoc. Cereal Chemists, St. Paul, MN, USA.
7. Blanshard J.M.V., Frazier, P.J. and Galliard, T. Ed. 1986. Chemistry and Physics of Baking. Royal Society of Chemistry, London.
8. Chakraverty, A. 1988. Postharvest Technology of Cereals, Pulses and oilseeds. Oxford and IBH, New Delhi.
9. Durbey, S.C. 1979. Basic Baking: Science and Craft. Gujarat Agricultural University, Anand (Gujrat).
10. Kent, N.L. 1983. Technology of Cereals. 3rdEdn. Pergamon Press, Oxford, UK.
11. Mathews, R.H. Ed. 1989. Legumes: Chemistry, Technology and Human Nutrition. Marcel Dekker, New York.
12. Salunkhe, D.K., Kadam, S.S. Ed. 1989. Handbook of World Food Legumes: Chemistry, Processing and Utilization, (3 vol. set). CRC Press, Florida.

BSc/FST/SM/4/MIC/204A
Milling of Cereals & Millets (Practical)

Credits: 1
Periods per week: 2 Hrs.

Duration of exam: 3 Hrs.
Max. Marks: 25

1. Experimental milling of rice and assessment of presence of head, broken and immature kernels and degree of polish.
2. Experimental parboiling of rice by different methods and evaluation of parboiled rice.
3. Determination of proximate analysis of wheat flour for moisture, ash, protein and fat contents.
4. Determination of wet gluten and dry gluten content of given sample of wheat Flour.
5. Determination of alpha-amylase activity in wheat flour by falling number apparatus.
6. Determination of amylose content of cereal and legume starches by iodine binding method.
7. Isolation of rice starch and its quantification.
8. Determination of different cooking parameters of various rice cultivars.
9. Visit to milling and bakery industry

BSc/FST/SM/4/MIC/204B

Unit operations in Fruits and Vegetable Processing (Theory)

Credit: 3

Periods per week: 3 Hrs

Internal Assessment: 25

Duration of Exam: 3 Hrs.

Max. Marks: 75

End Term Exam: 50

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UNIT-I

Introduction to fruit and vegetable processing:

Definition and importance of fruit and vegetable processing, Overview of the fruit and vegetable processing industry

Pre-processing operations: Sorting and grading, Washing and cleaning, Peeling and trimming

UNIT-II

Post-harvest handling: Harvesting techniques, Storage and transportation, Ripening and maturation

Processing Techniques for Fruits and Vegetables

Thermal processing: Blanching, Pasteurization, Sterilization

Non-thermal processing: Drying, Freezing, Fermentation

UNIT-III

Preservation techniques: Canning, Pickling, Jam and jelly making

Packaging and labeling: Types of packaging materials, Packaging equipment, Labeling requirements

Waste management and utilization of by-products from post-harvest handling processes.

Recommended Books:

1. Earle, R. L. (2013). *Unit operations in food processing*. Elsevier.
2. Jun, S., & Irudayaraj, J. M. (2008). *Food processing operations modeling: design and analysis*. CRC press.
3. Barrett, D. M., Somogyi, L., & Ramaswamy, H. S. (Eds.). (2004). *Processing fruits: science and technology*. CRC press.
4. Sinha, N. K., Hui, Y. H., Evranuz, E. Ö., Siddiq, M., & Ahmed, J. (2010). *Handbook of vegetables and vegetable processing*. John Wiley & Sons.
5. Srivastava, R. P., Srivastava, R. P., & Kumar, S. (2005). *Fruit and vegetable preservation: principles and practices*. International Book Distributing Company.
6. Smith, J. S., & Hui, Y. H. (Eds.). (2008). *Food processing: principles and applications*. John Wiley & Sons.

BSc/FST/SM/4/MIC/204B

Unit Operation in Fruits and Vegetables Processing (Practical)

Credits: 1

Periods per week: 2 Hrs.

Duration of exam: 3 Hrs.

Max. Marks: 25

1. Extraction of juice from fruits using a hydraulic press or centrifugal extractor.
2. Blanching of vegetables to preserve color and texture.
3. Drying of fruits and vegetables using a dehydrator or oven.
4. Pasteurization of fruit juices to extend shelf life.
5. Canning of fruits and vegetables using a pressure canner or boiling water bath.
6. Fermentation of vegetables to produce pickles or sauerkraut.
7. Freezing of fruits and vegetables using a freezer or liquid nitrogen.
8. Jam and jelly making using pectin and sugar.
9. Enzymatic browning prevention in fruits using ascorbic acid or citric acid.
10. Extraction of essential oils from fruits and herbs using steam distillation.

CDLU/VAC/101

Communication Skills

Credits: 2 (Theory)

Max. Marks: 50

Lectures: 30

Final Term Exam: 35

Duration of Exam: 2 Hrs.

Internal Assessment: 15

COURSE OBJECTIVES

- Identify common communication problems that may be holding learners back
- Perceive what the non-verbal messages are communicating to others
- Understand the role of communication in the teaching-learning process

LEARNING OUTCOMES

- Get a clear understanding of good communication skills.
- Know what they can do to improve their communication skills.

Unit-1

Listening: Techniques of Effective Listening, Listening and Comprehension, Probing Questions Barriers to Listening.

Speaking: Pronunciation, Enunciation, Vocabulary, Fluency, Common Errors.

Reading: Techniques of Effective Reading, Gathering Ideas and Information from a Given Text, evaluating these Ideas and Information, Interpreting the Text.

Writing and Different Modes of Writing: The Writing Process, Effective Writing Strategies, Different Modes of Writing.

Digital Literacy and Social Media: Basic Computer Skills, Introduction to Microsoft (MS) Office Suite, Open Educational Resources, Basic Virtual Platforms, Trending Technologies, Machine Learning, Artificial Intelligence (AI), Internet of Things (IoT), Social Media, Introduction to Social Media Websites, Advantages of Social Media, Ethics and Etiquettes of Social Media, How to Use Google Search Better?, Effective Ways of Using Social Media, Digital Marketing, Introduction to Digital Marketing, Traditional Marketing versus Digital Marketing, Digital Marketing Tools, Social Media for Digital Marketing, Digital Marketing Analytics.

Unit-2

Digital Ethics and Cyber Security: Digital Ethics, Digital Literacy Skills, Digital Etiquette, Digital Life Skills, Cyber Security, Understanding and introducing the environment of security, Types of attacks and attackers, the art of protecting secrets.

Nonverbal Communication: Meaning of nonverbal communication, Advantages of using nonverbal communication, Introduction to modes of nonverbal communication, Open and Closed body language, Eye contact and Facial expression, Hand gestures, Do's and Don'ts in NVC, Learning from experts, Activities-based learning.

Suggested Readings: Follow Curriculum and Guidelines for Life Skills (Jeevan Kaushal) 2.0 at UGC website: [https://www.cdlu.ac.in/assets/admin/miscellaneous/Implementation%20of%20Curriculum%20and%20Guidelines%20on%20Life%20Skills%20\(Jeevan%20Kaushal\)%202.0.pdf](https://www.cdlu.ac.in/assets/admin/miscellaneous/Implementation%20of%20Curriculum%20and%20Guidelines%20on%20Life%20Skills%20(Jeevan%20Kaushal)%202.0.pdf)

Note for the Paper Setter: The question paper will consist of **five** questions in all. The first question will be compulsory and will consist of **seven** short questions of **1** marks each covering the whole syllabus. In addition, **four** more questions of **14 marks each** will be set unit-wise comprising of **two** questions from each of the **two** units. The candidates are required to attempt **one compulsory question** and **two more questions** selecting at least one question from each unit.

CDLU/VAC/102

Professional Skills

Credits: 2 (Theory)

Max. Marks: 50

Lectures: 30

Final Term Exam: 35

Duration of Exam: 2 Hrs.

Internal Assessment: 15

COURSE OBJECTIVES

- Acquire career skills and fully pursue to partake in a successful career path
- Prepare a good resume
- Prepare for interviews and group discussions

LEARNING OUTCOMES

- Participate in a simulated interview.
- Actively participate in group discussions towards gainful employment.
- Capture a self-interview simulation video regarding the job role concerned.

Unit-1

Résumé Skills: Preparation and Presentation, Introduction of Résumé and Related Terms, Importance of Preparing a Good Résumé, Difference between a CV, Résumé, and Biodata, Essential Components of a Good Résumé, Résumé Skills: Common Errors, Common Errors, Guidelines for Résumé Preparation.

Interview Skills: Preparation and Presentation, Meaning of Interview, Types of Interview, STAR Approach for Facing an Interview, Interview Procedure, Do's and Don'ts, Important Questions Generally Asked in a Job Interview, Interview Skills: Common Errors, Common Errors, Interview Questions for Assessing Strengths and Weaknesses, Simulation, Job Simulation Formats, Comment Critically on Simulated Interviews, Demonstrate an Ideal Interview.

Group Discussion: Meaning of a Group Discussion, Importance of a Group Discussion, Types of Group Discussions, Procedure of a Group Discussion, Methodology, Ground Rules, Stages of group formations, Evaluation of Group Discussion, Common Errors, Simulation.

Process of Career Exploration: Knowing Yourself, Personal Characteristics, Knowledge about the World of Work, Requirements of Jobs Including Self-employment, Sources of Career Information, preparing for a Career Based on Potentials of Learners and Availability of Opportunities.

Cognitive Skills: Meaning, types of cognitive skills, and strategies, Critical Thinking Skills, Problem-solving Skills, Ability to Learn.

Non-cognitive Skills: Meaning, Types of Non-Cognitive skills and Strategies, Empathy, Teamwork, Creativity, Collaboration, Resilience, Interpersonal Skills, Perseverance, Self-Control, Social Skill, Peer Pressure, Stress and Stress Management.

Unit-2

Presentation Skills: Meaning and Types, Meaning of Presentation, Types of Presentations, Presentation for Internal and External Communication, Presentation Strategies, Ways to Improve Presentation Skills over Time.

Trust and Collaboration: Explain the importance of trust in creating a collaborative team, Definition of Trust, Importance of Trust in Creating a Collaborative Team, Strategies to Build Trust with Employees, Criteria for Evaluation of Trust and Collaboration in Teams, Agree to Disagree and Disagree to Agree– Spirit of Teamwork, Understanding Fear of Being Judged and Strategies to Overcome Fear, Understanding the Fear of Being Judged, Signs and Symptoms of Social Anxiety Disorder, Strategies to Overcome Fear or Social Anxiety.

Listening as a Team Skill: Listening Skill, Advantages of Effective Listening Skills, Types of Listening, Listening as a Team Member and Team Leader, Listening as a Team Leader, Listening as a Team Member, Improving Listening Skills, Uses of Active Listening Strategies to Encourage Sharing of Ideas, The

Importance of Active Listening in the Workplace, Strategies for Improving Active Listening Skills to Encourage Sharing of Ideas.

Brainstorming: The Meaning and Process, Procedure for Conducting Brainstorming, Importance of Using the Brainstorming Technique, Types of Brainstorming, Learning and Showcasing the Principles of Documentation of Team Session Outcomes.

Social and Cultural Etiquettes: Meaning, Need for Effective Interpersonal Relationships, Aspects of Social and Cultural/Corporate Etiquette in Promoting Teamwork, Social Etiquette, Cultural Etiquette and its role in promoting teamwork, Corporate/Professional Etiquette.

Internal Communication: Meaning, Need for Internal Communication, Use of Various Channels of Transmitting Information to Team Members including Digital and Physical.

Suggested Readings: Follow Curriculum and Guidelines for Life Skills (Jeevan Kaushal) 2.0 at UGC website: [https://www.cdlu.ac.in/assets/admin/miscellaneous/Implementation%20of%20Curriculum%20and%20Guidelines%20on%20Life%20Skills%20\(Jeevan%20Kaushal\)%202.0.pdf](https://www.cdlu.ac.in/assets/admin/miscellaneous/Implementation%20of%20Curriculum%20and%20Guidelines%20on%20Life%20Skills%20(Jeevan%20Kaushal)%202.0.pdf)

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