CURRICULUM FOR
DIPLOMA OF
ASSOCIATE ENGINEER
IN
FOOD PROCESSING
&PRESERVATION
TECHNOLOGY
(3-YearsCourse)
# DAE FOOD PROCESSING AND PRESERVATION TECHNOLOGY
## SCHEME OF STUDIES

### FIRST YEAR

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**Total** | **15** | **21** | **22**

### SECOND YEAR

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**Total** | **17** | **24** | **24**

### THIRD YEAR

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**Total** | **14** | **27** | **23**
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**DAE Technology**
قرآن مجيد

(1)

enumerate

(2-1)

زمر

(3)

نال بالر حتي نفقوا مانحبون واعتصموا ابجبل الله جميعا وانفقو ولا يج ممنكم شان قوم على ان لنعلوا

(4-1)

أن الله ياوا مركم ان تدولا مانات الي أهلها

(5-1)

أن الله ياوا بر العدل ولاحسن

(6-1)

أن الصلوته ننهي عن الفحشاء وامنكر

(7-1)

لقد كان لكم في رسول الله سوة حسناء

(8-1)

أن أكر مكم عند الله نفاككم

(9-1)

وقلوا يا أياكم وما آتاكم من رسول الله فخر وعإنهم عنونا

(10-1)

واقولوا بالمعبد وما هر في المعرف

(11-1)

بمحم الله الرحمن بلي الصدقات

(12-1)

واصر على ماصابك

(13-1)

وقولوا علمنا أدنى

(14-1)

أن هد الله عن ولد الله السلام

(15-1)

(ب)

(1-1)

وين في إمام مع تزج وبكاء

(2-1)
DAE Technology

评判工作

1. 真主的法则
2. 信仰
3. 真主的圣诲
4. 真主的仆人
5. 真主的使者

6. 信仰
7. 真主的仆人
8. 真主的圣诲
9. 伊斯兰的教义
10. 伊斯兰的教义

11. 信仰
12. 真主的圣诲
13. 真主的仆人
14. 真主的圣诲
15. 伊斯兰的教义
16. 伊斯兰的教义
قرآن مجید

ا کتبہ مختصر طالب علمی گیا ہے چنان کہ کسی بھی اس میں قبضہ کا ہر رس خداوند نے نہیں رکھا ہے پر اس میں قبضہ کا ہر رس خداوند نے رکھا ہے۔

سندت

وقت ہے کہ عموماً طالب علمی گیا ہے چنان کہ کسی بھی اس میں قبضہ کا ہر رس خداوند نے نہیں رکھا ہے پر اس میں قبضہ کا ہر رس خداوند نے رکھا ہے۔
دوآین اسلام
عمومی مقاصد: دوآین اسلام کے ڈیور آئینی مقاصد فورملیہ میں مبینہ ہے میں حالانکہ آور بیان کر کے
خصوصی مقاصد
افزائش دوآین اسلام کے ڈیور اصطلاحی معیار بیان کر کے
دوآین فلسفی مقاصد کی ابتدائی بیان نے کے
دوآین کے ویژنی مقاصد سے انسان کی افرادی اور اجتماعی زندگی پر پینے والے ابلاغات بیان کر کے
علیّت کے انسانی اصطلاحی معیار بیان کر کے
عقیدہ کے اثرات کا فرق بیان کر کے
علیّت کے اثرات کا فرق بیان کر کے
علیّت از مذہب روحانی تجربہ کے فرمی اکثراً اور ادراکی زندگی پر منٹ کی اثرات بیان کر کے
سراجی مقاصد اور علیّت کے سراجی اپنی زندگی ذہن کر کے ایک اپنا سالم ہو کے
DAE Technology

تدریسی مقاصد

عنوان: دی اچ ائو تکنولوژی

نصب گذاری چاپگری

متن:

- مقدماتی
- تکنیکی
- عملی

مطالعات کا مطلب بائیں کر کے

- نظری
- عملی

- مثال

- مثال

- مثال

- مثال

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DAE Technology
مطالعہ پاکستان (تعبد ورغم)
تہمینہ مقدمہ
تربیت افراد

عوامی مقدمہ
طلاب کے عہد میں لکھ اسلام میں اور سلطنت قوم میں اور آزادی قدر کا یکادمیہ نہ

نامعلوم مقدمہ
تربیت افراد سے مقدمہ بھی کرے
آزادی قدر کا اور سلطنت قوم کا

خصوصی مقدمہ
اصحاب ہیں جو لوگوں اور سیاسات کی انسانیت میں نے
تربیت افراد سے مقدمہ بھی کرے

خصوصی مقدمہ
اصحاب ہیں جو لوگوں اور سیاسات کی انسانیت میں نے
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خصوصی مقدمہ
اصحاب ہیں جو لوگوں اور سیاسات کی انسانیت میں نے
تربیت افراد سے مقدمہ بھی کرے
DAE Technology

علیٰ تحریکین

عورت متعهد

پہلے کیلئے جب ہو گیا کہ

قومی مہارت:

پر مشیک ہو گیا کہ

فیکٹر- ہوئے تیاریات اختیارات اسلام ہے اسلام کے ہمیشہ کالم ہے اسلام کے نظام کے زریں سیاس

آزادی نہ ہے کہ نے ہوئے گریم کہ کہ چھوٹی ہے پر ہو گیا کہ
AIMS At the end of the course, the students will be equipped with cognitive skill to enable them to present facts in a systematic and logical manner to meet the language demands of dynamic field of commerce and industry for functional day-to-day use and will inculcate skills of reading, writing and comprehension.

COURSE CONTENTS

ENGLISH PAPER "A"
1. PROSE/TEXT 16 hrs
   1.1 First eight essays of Intermediate. English Book-II

2. CLOZE TEST 4 hrs
   1.2 A passage comprising 50-100 words will be selected from the text. Every 11th word or any word for that matter will be omitted. The number of missing word will range between 5-10. The chosen word may or may not be the one used in the text, but it should be an appropriate word.

ENGLISH PAPER "B"

3. GRAMMAR 26 hrs
   3.1 Sentence Structure.
   3.2 Tenses.
   3.3 Parts of speech.
   3.4 Punctuation,
   3.5 Change of Narration.
   3.6 One word for several
   3.7 Words often confused

4. COMPOSITION 8 hrs
   4.1 Letters/Messages
   4.2 Job application letter
   4.3 For character certificate/for grant of scholarship
   4.4 Telegrams, Cablegrams and Radiograms, Telexes, Facsimiles
   4.5 Essay writing
   4.6 Technical Education, Science and Our life, Computers,

Environmental Pollution, Duties of a Student. 4 hrs

5. TRANSLATION 6 hrs
   5.1 Translation from Urdu into English.
   For Foreign Students: A paragraph or a dialogue.

RECOMMENDED BOOKS
1. Technical English developed by Mr. Zia Sarwar, Mr. Habib-ur –Rehman, Evaluated by Mr.Zafar Iqbal Khokhar, Mr. Zahid Zahoor, Vol - I, National Book Foundation
INSTRUCTIONAL OBJECTIVES

PAPER-A

1. DEMONSTRATE BETTER READING, COMPREHENSION AND VOCABULARY
   1.1 Manipulate, skimming and scanning of the text.
   1.2 Identify new ideas.
   1.3 Reproduce facts, characters in own words
   1.4 Write summary of stories

2. UNDERSTAND FACTS OF THE TEXT
   2.1 Rewrite words to fill in the blanks recalling the text.
   2.2 Use own words to fill in the blanks.

PAPER-B

3. APPLY THE RULES OF GRAMMAR IN WRITING AND SPEAKING
   3.1 Use rules of grammar to construct meaningful sentences containing a subject and a predicate.
   3.2 State classification of time, i.e. present, past and future and use verb tense correctly in different forms to denote relevant time.
   3.3 Identify function words and content words.
   3.4 Use marks of punctuation to make sense clear.
   3.5 Relate what a person says in direct and indirect forms.
   3.6 Compose his writings.
   3.7 Distinguish between confusing words.

4. APPLY THE CONCEPTS OF COMPOSITION WRITING TO PRACTICAL SITUATIONS
   4.1 Use concept to construct applications for employment, for character certificate, for grant of scholarship.
   4.2 Define and write telegrams, cablegrams and radiograms, telexes, facsimiles
   4.3 Describe steps of a good composition writing.
   4.4 Describe features of a good composition.
   4.5 Describe methods of composition writing.
   4.6 Use these concepts to organize facts and describe them systematically impractical situation;

5. APPLIES RULES OF TRANSLATION
   5.1 Describe confusion.
   5.2 Describe rules of translation.
   5.3 Use rules of translation from Urdu to English in simple paragraph and sentences.
Comp-122  COMPUTER APPLICATIONS

Total contact hours
Theory  32Hour  TPC
Practical  96Hours  1  3 2
Pre-requisite  None

AIMS This subject will enable the student to be familiar with the operation of a computer. He will also learn DOS, BASIC language and word processing to elementary level.

COURSE CONTENTS

1. ELECTRONIC DATA PROCESSING (EDP)  6Hours
   - Basics of computers
   - Classification of computers
   - Block diagram of a computer system
   - Binary number system
   - BIT, BYTE, RAM, ROM, EROM, EPROM
   - Input and output devices
   - Secondary storage media details
   - Processors and types
   - Using computer for system software
   - Using computer for application software
   - Common types of software and their application.

2. DISK OPERATING SYSTEM (DOS)  6Hours
   2.1 Internal commands
   2.2 External commands
   2.3 Batch files
   2.4 Advance features.

3. BASIC LANGUAGE  10Hours
   - Introduction to high level languages
   - Introduction to BASIC
   - REM Statement
   - Assignment statement
   - Input statement
   - Read-Data statement
   - IF-THEN statement
   - IF-THEN Else statement
   - FOR-NEXT statement
DIM statement
LPRINT statement
STOP statement
END statement
Logic of a BASIC Programme
Running a BASIC Programme
Saving and Retrieving a Programme
Advance features

4. WORDPROCESSING 7 Hours
Starting word processor session
Opening a document
Saving a document
Ending word processor session (Temporarily)
Retrieving a document
Spell check
Margins and tab setting
Aligning paragraph
Printing a document
Advance features

5. COMPUTER GRAPHIC IN BASIC 3 Hours
Graphic fundamentals
Points and lines
Dots in space
Alighting blot
Shapes
Expanding circles and rectangles

RECOMMENDED BOOKS
1. Ron S. Gottfrid, Programming with BASIC,
2. Any Word Processor Latest Release (e.g., Word, Word-Perfect etc).
3. ABC’S of DOS (latest release).
4. Judd Robbins, Mastering DOS 6.0 and 6.2
Comp-122  COMPUTER APPLICATIONS

INSTRUCTIONAL OBJECTIVES

1. UNDERSTAND ELECTRONIC DATA PROCESSING (EDP).
   - Describe basics of computers.
   - Enlist different classification of computers.
   - Explain block diagram of a computer system.
   - Describe binary numbers system.
   - State the terms used in computers such as BIT, BYTE, RAM, ROM, EROM, EPROM.
   - Identify input and output devices.
   - Describe secondary storagemedia.
   - Explain processor.
   - Name different types of processors.
   - Explain the use of computer for system software.
   - Explain the use of computer for application software.
   - Enlist common types of software and their application.
   - Explain various applications of above software mentioned in 1.12

2. UNDERSTAND DISK OPERATING SYSTEM (DOS).
   - Explain the use of various internal command of DOS.
   - Explain the use of various external command of DOS.
   - Describe batch files.
   - Identify advanced features

3. UNDERSTAND BASIC LANGUAGE.
   - Explain high level languages.
   - Explain Basic language.
   - Describe Rem statement
   - Describe assignment statement
   - Explain Input statement
   - Explain Read-Data statement
   - Explain If-Then Statement
   - Explain If-then-Else Statement
   - Explain For-Next Statement
   - Explain Dim Statement
   - Explain LPRINT statement
   - Explain stop statement
   - Explain end statement
   - Describe Logic of Basic program
   - Describe running a Basic program
   - Describe saving & retrieving Basic program
   - Describe some Advanced features of Basic program
4. UNDERSTANDWORDPROCESSINGSESSION
4.1. Describe word-processing
NamecommandtobeenteredonDos-prompttoloadword-processor
Identifyinitialscreen
Describesethecommandtoopenadocument
Describesetheprocedurefornamingthedocument
Explainimportanceofgivingextensiontoadocument
Describesavingandretrievingadocument
Explainimportanceofsavingthe workatregularintervals
State.temporarilyEnding word-processingsession&documentretrieval
StatetemporaryEnding word-processingsession&documentretrieval
StatetemporaryEnding word-processingsession&documentretrieval
StatetemporaryEnding word-processingsession&documentretrieval
Stateproceduretore-enter wordprocessor
Stateproceduretore-openthedocumentandediting
Describespell-checkfacility
DescribeMargins&TabSetting
Describetoalignparagraph
DescribeRe-editingtechniques
Describeproceduretuset-upprinter
Describecommandforprintouts
Explainmultiple-copyprintoutprocedure
Explainadvancefeatures
Describeprocedureofcondensedprinting
Describeprocedureforchangeoffonts

5. UNDERSTANDPROGRAMMINGINSTRUCTIONSFORCOMPUTERGRAPHIC
INBASICLANGUAGE
Identifygraphicfundamentalsinbasiclanguage
Explaintodrawpointsandlines
Explaintodrawdotinspace
Explaintodrawlightingblot
Explaintodrawshapes
Explaintodrawexpandingcirclesand rectangles
Comp-122  COMPUTER APPLICATIONS

LIST OF PRACTICALS  96 hours

DOS
1. Identify keyboard, mouse, CPU, disk drives, disks, monitor & printer
2. Practice for booting up of a computer system with DOS system disk and power off system at DOS prompt
3. Practice forCLS, VER, VOL, DATE & TIME commands
4. Practice for COPY, REN commands
5. Practice for DEL, TYPE, PATH, PROMPT, COPYCON, MD, CD, RD commands
6. Practice of the practicals at S. No. 3, 4, 5
7. Practice for FORMAT command with /s, /4, /u switches
8. Practice for DISKCOPY, DISKCOMP commands
9. Practice for SCANDISK, XCOPY, DELTREE, TREE, LABEL commands
10. Practice for PRINT, UNDELETE commands
11. Practice for the practicals at S. No. 8, 9, 10, 11
12. Practice for creating a batch file

BASIC
1. Practice for loading & unloading BASIC software and identify role of function keys in Basic
2. Identify role of various keys in continuation with ALT key in BASIC programming
3. Practice for CLS, LOAD, SAVE, FILE, RENUM command by loading any existing BASIC Program
4. Practice for editing any existing BASIC Program
5. Prepare BASIC Program to display sum of two numbers using INPUTS
6. Prepare BASIC Program to display sum of two numbers using READ-DATA
7. Prepare BASIC Program to multiply two numbers
8. Prepare BASIC Program to calculate Area of Rectangle, when length and width are given
9. Prepare BASIC Program to calculate area of a circle when radius/diameter is given
10. Prepare very simple BASIC Programs using IF-THEN-ELSE and FOR-NEXT statement
11. Identify DIM statement
12. Practice for LPRINT statement for various Program sh hard-copy output

WORD PROCESSING
1. Practice for loading & unloading a word processor
2. Practice for creating a document & saving it
3. Practice for spell check facility of the word processor
4. Practice for editing an existing document
5. Practice for various word-processing Menu Options
6. Practice for printing a document
7. Practice for margin and TAB setting and document alignment
8. Practice for some advance features
AIM  After studying this course the students will be able to:

a. Understand the significance and role of chemistry in the development of modern technology.

b. Know the basic principles of chemistry as applied in the study of this technology.

c. Understand the scientific methods for production, properties and use of materials of industrial and technological significance.

d. Gain skill for efficient conduct of practical in a chemistry lab.

COURSE CONTENTS

1. INTRODUCTION 3 hours
   Scope and significance.
   Orientation with reference to this technology.
   Terms used and units of measurements in the study of chemistry.

2. FUNDAMENTAL CONCEPTS OF CHEMISTRY 3 hours
   Symbols, valency, radicals, formulas.
   Chemical reactions and their types.

3. ATOMIC STRUCTURE 4 hours
   Sub-atomic particles.
   Architecture of atoms of elements, Atomic No. and Atomic Weight.
   Periodic classification of elements and periodic law.

4. CHEMICAL BOND 3 hours
   Nature of chemical bond.
   Electrovalent bond with examples.
   Covalent bond (polar and non-polar) sigma and pi bond with examples.
   Co-ordinate bond with examples.

5. GASES AND LIQUIDS 4 hours
   Liquid and gaseous state.
   Liquids and their general properties (density, viscosity, surface tension, capillary action etc).
   Gases and their general properties.
   Gas laws (Boyle's law, Charle's law, and Graham law of diffusion etc).
   Problems involving gas laws.
6. WATER. 4 hours
   Chemical nature and properties.
   Impurities.
   Hardness of water (types, causes and removal).
   Scales of measuring hardness (degrees Clark, French, ppm, mg/liter).
   Boiler feed water, scales and treatment.
   Sea-water desalination, sewage treatment.
   Sterilization of water.

7. ACIDS, BASES AND SALTS. 3 hours
   Definitions with examples.
   Properties, their strength, basicity and acidity.
   Salts and their classification with examples.
   pH-value and scale.

8. OXIDATION AND REDUCTION. 3 hours
   The process, definition and scope with examples.
   Oxidizing and reducing agents.
   Oxides and their classifications.

9. NUCLEAR CHEMISTRY. 3 hours
   Introduction and.
   Radioactivity (alpha, beta and gamma rays).
   Half-life process.
   Nuclear reaction and transformation of elements.
   Radiations and food preservation.

10. CORROSION. 3 hours
    Introduction with causes.
    Types of corrosion.
    Rusting of iron.
    Protective measures against corrosion.

11. FOOD PRESERVATIVES. 3 hours
    Nature of food preservatives.
    Some important food preservatives.
    Classification of preservatives.
    Uses of preservatives.

12. ALLOYS. 3 hours
    Introduction with need.
    Preparation and properties.
    Some important alloys and their composition.
    Uses.
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<td>Introduction</td>
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<td>Polymerization and its</td>
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<td>Uses of polymers</td>
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<td>15. Dyes and Colours</td>
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<td>Colouring agents for food</td>
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<td>3 hours</td>
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<td>The problems and its</td>
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<td>17. Introduction to Organic</td>
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<td>20. Fats and Oils</td>
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<td>Sources and properties</td>
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<td>Importance as food</td>
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INSTRUCTIONAL OBJECTIVES

1. **UNDERSTAND THE SCOPE, SIGNIFICANCE AND ROLE OF THE SUBJECT.**
   - Define chemistry and its terms.
   - Define units of measurements in the study of chemistry.
   - Explain the importance of chemistry in various fields of specialization.
   - Illustrate the role of chemistry in this technology.

2. **UNDERSTAND THE LANGUAGE OF CHEMISTRY AND CHEMICAL REACTIONS.**
   - Define symbol, valency, radical, formula with examples of each.
   - Write chemical formula of common compounds.
   - Define chemical reaction and equations.
   - Describe types of chemical reactions with examples.
   - List chemical formula of common substances used in the respective subject.

3. **UNDERSTAND THE STRUCTURE OF ATOMS AND ARRANGEMENT OF SUB ATOMIC PARTICLES IN THE ARCHITECTURE OF ATOMS.**
   - Define atom.
   - Describe the fundamental subatomic particles.
   - Distinguish between atomic No., mass No. and between isotope and isobars.
   - Explain the arrangement of electrons in different shells and subenergy levels.
   - Explain the grouping and placing of elements in the periodic table.
   - State the periodic law of elements.
   - Describe the trend properties of elements based on their position in the periodic table.
   - Describe general characteristics of a period and a group.
4. UNDERSTAND THE NATURE OF CHEMICAL BOUNDS.
   Define chemical bond.
   Describe the nature of chemical bond.
   Differentiate between electrovalent and covalent bonding.
   Explain the formation of polar and nonpolar sigma and pi-bond with examples.
   Explain the nature of coordinate bond with examples.

5. UNDERSTAND THE STATES OF MATTER AND APPLY GAS LAWS TO SOLVE ALLIED PROBLEMS.
   Describe the liquid and gaseous states of matter.
   Describe the general properties of liquid.
   Describe the general properties of gases.
   State Boyle's law, Charles's law, Graham's law of diffusion, Dalton's law of partial pressure.
   State the mathematical forms of these laws.
   Derive gas equation.
   Solve problems on gas laws and gas equations.

6. UNDERSTAND THE CHEMICAL NATURE OF WATER.
   Describe the chemical nature of water with its formula.
   Describe the general impurities present in water.
   Explain the causes and methods to remove hardness of water.
   Express hardness in different units like mg/litre, p.p.m, degrees clark, and degrees french.
   Describe the formation and nature of scales in boiler feed water.
   Explain the method for the treatment of scales.
   Explain the sewage treatment and desalination of sea water.
   Describe methods of sterilization of water.

7. UNDERSTAND THE NATURE OF ACIDS, BASES AND SALTS.
   Define acids, bases and salts with examples.
   Describe general properties of acids and bases.
   Define and differentiate between acidity and basicity and use the terms.
   Define salts and give their classification with examples.
   Explain pH value of solution and pH scale.

8. UNDERSTAND THE PROCESS OF OXIDATION AND REDUCTION.
   Define oxidation.
   Explain the oxidation process with examples.
   Define reduction.
   Explain the reduction process with examples.
   Define oxidizing and reducing agents and give at least six examples of each.
   Define oxides.
Classify the oxides with examples.

9. UNDERSTAND THE FUNDAMENTALS OF NUCLEAR CHEMISTRY.
   - Define nuclear chemistry and radioactivity.
   - Differentiate between alpha, beta, and gamma particles.
   - Explain half-life process.
   - Explain at least six nuclear reactions resulting in the transformation of some elements.
   - Give six important uses of isotopes.
   - Explain the use of radiations in food preservation.

10. UNDERSTAND THE PROCESS OF CORROSION WITH ITS CAUSES AND TYPES.
    - Define corrosion.
    - Describe different types of corrosion.
    - State the causes of corrosion.
    - Explain the process of rusting of iron.
    - Describe methods to prevent/control corrosion.

11. UNDERSTAND THE CHEMICAL NATURE AND USE OF IMPORTANT PRESERVATIVES USED IN FOOD INDUSTRY.
    - Define a preservative.
    - List some important preservatives with their chemical formula.
    - Explain general uses of preservatives.
    - Classify food preservatives.
    - Explain action and specific use of some preservative agents.

12. UNDERSTAND THE NATURE OF ALLOYS OF ALLOYS USED IN RESPECTIVE TECHNOLOGY.
    - Define an alloy.
    - Explain methods for the preparation of alloys.
    - Describe important properties of alloys.
    - Explain common properties and uses of alloys.

13. UNDERSTAND THE NATURE OF FOOD.
    - Define food.
    - Describe food ingredients like carbohydrates, proteins, and fats.
    - Explain importance, properties, and uses of food ingredients.

14. UNDERSTAND THE NATURE OF PLASTICS AND POLYMERS.
    - Define plastics and polymers.
    - Explain the mechanism of polymerization.
    - Explain the preparation and uses of synthetic fibre.
    - List some important synthetic fibres used in the textile industry.
15. **UNDERSTAND THE CHEMICAL NATURE OF DYES AND COLOURS.**
   - Definedyesandcolours.
   - Describechemicalnatureofthedyestuffs.
   - Classifydyesandstatetheiruses.
   - Enlissthecolouringagentsforfood.

16. **KNOW THE NATURE OF POLLUTION.**
   - Definedpollution(air, water, food).
   - Describecausesof environmentalpollution.
   - Enlistsomecommon pollutants.
   - Describemethodstopreventpollution.

17. **UNDERSTAND THE NATURE AND SIGNIFICANCE OF ORGANIC CHEMISTRY.**
   - Defineorganic chemistry.
   - Statetheusesoforganic chemistryinmodernworld.
   - Classifytheorganiccompounds.
   - Explainfunctionalgroup.
   - NameorganiccompoundsonthebasisofI.U.P.A.C.system

18. **UNDERSTAND CARBOHYDRATES AS A CHEMICAL CLASS**
   - Definedcarbohydratesandgiveexamples.
   - Explaintheirostructure.
   - Classifycarbohydrates.
   - Statesomeimportantchemicalandphysicalproperties.
   - Give usesofcarbohydrates.

19. **EXPLAIN THE CHEMICAL NATURE, IMPORTANCE AND USES OF PROTEINS.**
   - Definedproteinandciteexampleswithsources.
   - Definedaminoacidsandgiveexamples.
   - ExplainsomeimportantChemicalandPhysicalpropertiesofproteins.
   - Explainusesasfoodingredients.

20. **EXPLAIN THE CHEMICAL NATURE AND USES OF FATS AND OILS.**
   - Definedfatandoilwithexamples.
   - Describechemicalnatureandsourcesoffatsandoils.
   - Differentiatefatsfromoils.
   - Givesome importantphysicalandchemicalpropertiesoffats.
   - Explaintheiruseandsignificanceasfood.
LIST OF PRACTICALS

1. To introduce the common apparatus, glassware and chemical reagents used in the chemistry lab.
2. To purify a chemical substance by crystallization.
3. To separate a mixture of sand and salt.
4. To find the melting point of a substance.
5. To find the pH of a solution with pH paper.
6. To separate a mixture of inks by chromatography.
7. To determine the coefficient of viscosity of benzene with the help of Ostwald vasomotor.
8. To find the surface tension of a liquid with a styalagmometer.
9. To perform electrolysis of water to produce hydrogen and oxygen.
10. To determine the chemical equivalent of copper by electrolysis of CuSO.
11. To introduce with the scheme of analysis of salts for basic radicals.
12. To analyze 1st group radicals (Ag+ - Pb++ - Hg+).
13. To make practice for detection 1st group radicals.
14. To introduce with the scheme of II group radicals.
15. To detect and confirm II-A radicals (Hg++, Pb++++, Cu++, Cd++, Bi+++).
16. To detect and confirm II-B radicals (Sn+++, Sb++, As+++).
17. To introduce with the scheme of III group radicals (Fe+++ - Al+++).
18. To detect and confirm Fe+++ and Al+++.
19. To get introduction with the methods/apparatus of conducting volumetric estimations.
20. To prepare standard solution of a substance.
21. To find the strength of a given alkali solution.
22. To estimate HCO'3 content in water.
23. To find out the %age composition of a mixture solution of KNO3 and KOH volumetrically.
24. To find the amount of chloride ions (Cl') in water volumetrically.

RECOMMENDED BOOKS

1. Textbook of Intermediate Chemistry (Part I and II)
4. Qammar Iqbal, Chemistry for Engineers and Technologists.
Phy-113   APPLIED PHYSICS

Total Contact Hours

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AIMS: The students will be able to understand the fundamental principles and concepts of physics, use these to solve problems in practical situations/technological courses and understand concepts to learn advanced physics/technical courses.

COURSE CONTENTS

1 MEASUREMENTS. 2 Hours.
- Fundamental units and derived units
- Systems of measurement and S.I. units
- Concept of dimensions, dimensional formula
- Conversion from one system to another
- Significant figures

2 SCALARS AND VECTORS. 4 Hours.
- Revision of head-to-tail rule
- Laws of parallelogram, triangle, and polygon of forces
- Resolution of a vector
- Addition of vectors by rectangular components
- Multiplication of two vectors, dot product and cross product

3 MOTION 4 Hours.
- Review of laws and equations of motion
- Law of conservation of momentum
- Angular motion
- Relation between linear and angular motion
- Centripetal acceleration and force
- Equations of angular motion

4 TORQUE, EQUILIBRIUM AND ROTATIONAL INERTIA. 4 Hours.
- Torque
- Centre of gravity and centre of mass
- Equilibrium and its conditions
- Torque and angular acceleration
- Rotational inertia

5 WORK, POWER & ENERGY. 5 Hours.
- Work
- Power
- Energy & its type.
5.3.1 Kinetic Energy (K.E), Potential Energy (P.E)

6. **FRICTION.**
   4 Hours
   Friction, Types of Friction, Limiting Friction, Angle of Friction.
   Law of Friction.
   Advantages & Disadvantages of Friction.

7. **WAVE MOTION.**
   5 Hours
   Review Hooke's law of elasticity
   Motion under a non-linear restoring force
   Characteristics of simple harmonic motion
   Simple pendulum
   Waveform of S.H.M.
   7.7 Resonance
   7.8 Transverse vibration of a stretched string

8. **SOUND.**
   5 Hours
   Longitudinal waves
   Intensity, loudness, pitch and quality of sound
   Units of Intensity of Level and Frequency Response of Ear
   Interference of sound waves, silence zones, beats
   Acoustics
   Doppler effect.

9. **LIGHT.**
   3 Hours
   Review laws of reflection and refraction, Image formation by lenses
   Optical instruments
   Wave theory of light
   Interference, diffraction, polarization of light waves

10. **OPTICAL FIBER.**
    4 Hours
    Optical communication and problems
    Review total internal reflection and critical angle
    Structure of optical fiber
    Fiber material and manufacture
    Optical fiber uses.

11. **LASERS.**
    3 Hours
    Corpuscular theory of light
    Emission and absorption of light
    Stimulated absorption and emission of light
    Laser principle
12 HEAT. 4 hours.
12.1 Review of calorimetry and gas laws and mode of transfer of heat
12.2 Thermal expansion of solids, liquids, and gases
12.3 Heat of fusion, vaporization
12.4 Law of cooling
12.5 Thermoelectricity
12.6 Thermocouple.

13 THERMODYNAMICS. 4 Hours
Heat energy and internal energy
First law of thermodynamics and applications
Efficiency of heat engine
Second law of thermodynamics (both statements)
Heat engine and refrigerator.

14 MODERN PHYSICS 5 Hours
Relative Motion
Einstein Postulates
Black Body Radiation’s
Photo-electric Effect
x-rays, Production, Properties and uses.

15 MAGNETIC MATERIALS. 2 Hours
Magnetism
Domain theory
Para, dia, and ferromagnetism and magnetic materials
B.H. curve and hysteresis loop.

16 SOLID STATE PHYSICS 6 Hours
Crystal structure of solids
Band theory of solids
Conductors, semiconductors, insulators
P-type and N-type materials
P-N junction and P-N junction as a diode
Semiconductor devices:
  Light emitting diodes
  Photodiodes
  Solar cell
**RECOMMENDED BOOKS**

1. Fundamentals of Physics Vol-I and II for intermediate classes
2. Farid Khawaja, Fundamentals of Physics Vol-I and II
3. Wells and Slusher, Schaum's Series Physics.
4. Nelkon and Oyborn, Advanced Level Practical Physics
5. Mehboob Ilahi Malik and Inam-ul Haq, Practical Physics
6. Wilson, Lasers - Principles and Applications
7. M. Aslam Khan and M. Akram Sandhu, Experimental Physics Note Book
INSTRUCTIONAL OBJECTIVES

1 USE CONCEPTS OF MEASUREMENT TO PRACTICAL SITUATIONS AND TECHNOLOGICAL PROBLEMS.
   - Write dimensional formulae for physical quantities
   - Derive units using dimensional equations
   - Convert measurement from one system to another
   - Use concepts of measurement and significant figures in problems solving.

2 USE CONCEPTS OF SCALARS AND VECTORS IN SOLVING PROBLEMS INVOLVING THESE CONCEPTS.
   - Explain laws of parallelogram, triangle and polygon of forces
   - Describe method of resolution of a vector into components
   - Describe method of addition of vectors by head & tail rule
   - Differentiate between dot product and cross product of vectors
   - Use the concepts in solving problems involving addition resolution and multiplication of vectors.

3 USE THE LAW OF CONSERVATION OF MOMENTUM AND CONCEPTS OF ANGULAR MOTION TO PRACTICAL SITUATIONS.
   - Use law of conservation of momentum to practical/technological problems.
   - Explain relation between linear and angular motion
   - Use concepts and equations of angular motion to solve relevant technological problems.

4 USE CONCEPTS OF TORQUE, EQUILIBRIUM AND ROTATIONAL INERTIA TO PRACTICAL SITUATION/PROBLEMS.
   - Explain Torque
   - Distinguish between Centre of gravity and Centre of mass
   - Explain rotational equilibrium and its conditions
   - Explain rotational inertia giving examples
   - Use the above concepts in solving technological problems.

5 APPLY CONCEPT OF WORK, POWER AND ENERGY TO PRACTICAL SOLUTIONS AND TECHNOLOGICAL PROBLEMS
   - Explain work and derive expressions in different conditions
   - Explain power, I.H.P, B.H.P
   - Solve technological problems relating to work and power
   - Explain energy and its types and various sources
   - Explain and derive the expression for K.E & P.E and interconversion.
   - Solve problem
   - Law of conservation of momentum
6 UNDERSTAND THE CONCEPT OF FRICTION AND APPLY TO SOLVE THE TECHNOLOGICAL PROBLEMS
   Describe friction and how it is developed
   Describe static and dynamic friction, co-eff. Of friction, limiting friction and angle of repose
   Explain the laws of friction
   Describe advantages and disadvantages of friction
   Use the above concepts in solving the technological problems

7 USE CONCEPTS OF WAVE MOTION IN SOLVING RELEVANT PROBLEMS.
   Explain Hook's Law of Elasticity
   Derive formula for Motion under an elastic restoring force
   Derive formula for simple harmonic motion and simple pendulum
   Explain waveform with reference to S.H.M. and circular motion
   Explain Resonance
   Explain Transverse & longitudinal waves.
   Use the above concepts and formulae of S.H.M. to solve relevant problems.

8 UNDERSTAND CONCEPTS OF SOUND.
   Explain the concepts: Intensity, loudness, pitch and quality of sound
   Explain units of Intensity level and frequency response of ear
   Explain phenomena of silence zones, beats
   Explain Acoustics of buildings
   Explain Doppler effect giving mathematical expressions and its application

9 USE THE CONCEPTS OF GEOMETRICAL OPTICS TO LEARN.
   Explain laws of reflection and refraction and draw the images by ray diagrams
   Use the concept of image formation by mirrors and lenses to describe working of optical instruments, e.g. microscopes, telescopes, cameras.
   Understand wave theory of flight
   Explain wave theory of flight
   Explain phenomena of interference, diffraction, and polarization of light waves
   Describe uses of polarization

10 UNDERSTAND THE STRUCTURE, WORKING AND USES OF OPTICAL FIBER.
    Explain the structure of the Optical Fiber
    Explain the principle of working
    Describe use of optical fiber in industry and medicine.

11 UNDERSTAND THE STRUCTURE, WORKING AND USES OF Lasers.
    Explain the stimulated emission of radiation
    Explain the laser principle
    Describe the structure and working of lasers
    Distinguish between types of lasers
    Describe the applications of lasers in the fields mentioned in the course contents.
12 **UNDERSTAND CONCEPTS OF HEAT.**
- Explain calorimetry and modes of transfer of heat
- Explain Gas law giving mathematical expressions
- Explain Thermal expansion of solids, liquids and gases
- Distinguish between heat of fusion, vaporization
- Explain Law of cooling and describe latent heat
- Explain basic concepts of Thermoelectricity
- Describe Thermocouple, giving its principle, structure and working.

13 **UNDERSTAND LAWS OF THERMODYNAMICS.**
- Distinguish between heat energy and internal energy
- Explain first law of thermodynamics giving its applications by defining Isothermal and adiabatic process
- Explain second law of thermodynamics describing alternate statements
- Distinguish between work of heat engine and refrigerator.

14 **UNDERSTAND THE CONCEPT OF MODERN PHYSICS.**
- Describe Einstein postulates
- Describe relativistic motion
- Describe blackbody radiation
- Describe the Photoelectric effect
- Explain the production, properties and uses of X-rays

15 **UNDERSTAND BASIC CONCEPTS AND CLASSIFICATION OF MAGNETIC MATERIALS.**
- Explain domain theory of magnetism
- Distinguish between para, dia and ferromagnetism and magnetic materials
- Distinguish between B and H
- Describe B-H Curve
- Describe hysteresis loop.

16 **UNDERSTAND BASIC CONCEPTS OF SOLID STATE PHYSICS.**
- Explain crystalline structure of solids
- Describe band theory of solids
- Distinguish between conductors, semiconductors and insulators
- Describe semiconductors giving examples with reference to their structure
- Distinguish between P-type and N-type materials
- Explain working of P-N junction as a diode
- Explain working of solar, cell, light emitting diodes and photodiodes
**Phy-113 APPLIED PHYSICS**

**LIST OF PRACTICALS.**

1. Find the volume of a given solid cylinder using vernier callipers.
2. Find the area of cross-section of the given wire using micrometers screw gauge.
3. Prove that force is directly proportional to (a) mass, (b) acceleration, using Fletcher's trolley.
5. Verify law of triangle of forces and Lami's theorem.
6. Determine the weight of a given body using:
   a) Law of parallelogram of forces
   b) Law of triangle of forces
   c) Lami's theorem
7. Find Young's Modulus of Elasticity of a metallic wire.
9. Study resonance of air column in resonant tube and find velocity of sound.
10. Find the frequency of the given tuning fork using resonant tube.
11. Find velocity of sound in rod by Kundt's tube.
12. Find the refractive index between glass and air by prism.
13. Find focal length of converging lens by displacement method.
14. Find focal length of diverging lens using converging lens.
15. Find angular magnification of a astronomical telescope.
16. Find angular magnification of a simple microscope (magnifying glass).
17. Determine the specific heat of lead shots.
18. Find the coefficient of linear expansion of a metallic rod.
19. Find the heat of vaporization.
20. To find the co-eff. of friction between glass and wood by using incline plane.
21. Study an optical fiber.
Math-123   APPLIED MATHEMATICS-I

Total Contact Hours

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AIMS  After completing the course, the students will be able to solve problems of Algebra, Trigonometry, Vectors, Boolean Algebra, Complex numbers and Analytic Geometry, develop skills in the use of mathematical instruments and acquire mathematical clarity and insight in the solution of technical problems.

COURSE CONTENTS

1. **QUADRATIC EQUATIONS**  6 hours
   1.1 Standard Form
   1.2 Solution
   1.3 Nature of roots
   1.4 Sum and product of roots
   1.5 Formation
   1.6 Problems

2. **BINOMIAL THEOREM**  6 hours
   2.1 Factorials
   2.2 Binomial expression
   2.3 Binomial co-efficient
   2.4 Statement
   2.5 The general term
   2.6 The binomial series
   2.7 Problems.

3. **PARTIAL FRACTIONS**  6 hours
   3.1 Introduction
   3.2 Linear distinct factors case I
   3.3 Linear repeated factors case II
   3.4 Quadratic distinct factors case III
   3.5 Quadratic repeated factors case IV
   3.6 Problems

4. **FUNDAMENTALS OF TRIGONOMETRY**  6 hours
   4.1 Angles
   4.2 Quadrants
   4.3 Measurements of angles
   4.4 Relation between sexagesimal and circular system
   4.5 Relation between length of a circular arc and the radian measure of its central
angle

4.6 Problems

5. TRIGONOMETRIC FUNCTIONS AND RATIOS 6 hours
5.1 Trigonometric functions of any angle
5.2 Signs of trigonometric functions
5.3 Trigonometric ratios of particular angles
5.4 Fundamental identities
5.5 Problems

6. GENERAL IDENTITIES 6 hours
6.1 The Fundamental Law
6.2 Deductions
6.3 Sum and difference formulae
6.4 Double angle identities
6.5 Half angle identities
6.6 Conversion of sum or difference to products
6.7 Problems

7. SOLUTION OF TRIANGLES 6 hours
7.1 The law of Sines
7.2 The law of Cosines
7.3 Measurement of heights and distances
7.4 Problems

8. VECTORS AND PHASORS 12 hours
8.1 Scalars and Vectors
8.2 The unit Vectors i, j, k
8.3 Direction Cosines
8.4 Dot product
8.5 Cross product
8.6 Analytic expressions for dot and cross products
8.7 Phasors
8.8 Significance of j operator
8.9 Different forms
8.10 Algebraic operations
8.11 Problems

9. COMPLEX NUMBERS 9 hours
9.1 Introduction and properties
9.2 Basic operations
9.3 Conjugate
9.4 Modulus
10. BOOLEAN ALGEBRA AND GATE NETWORKS 15 hours
   10.1 Concept and basic laws
   10.2 Sums of product and product of sums
   10.3 Binary, decimals and octals, presentation of decimal numbers in BCD
   10.4 Interconversion of numbers
   10.5 OR Gates and AND Gates
   10.6 Logical Expressions and their simplification
   10.7 Demorgan's theorems
   10.8 NAND Gates and NOR Gates
   10.9 Problems

11. PLANE ANALYTIC GEOMETRY AND STRAIGHT LINE 6 hours
   11.1 Coordinate system
   11.2 Distance formula.
   11.3 Ratio formulas.
   11.4 Inclination and slope of line.
   11.5 Slope formula.
   11.6 Problems.

12. EQUATIONS OF THE STRAIGHT LINE 6 hours
   12.1 Some important forms
   12.2 General form
   12.3 Angle formula.
   12.4 Parallelism and perpendicularity
   12.5 Problems

13. EQUATIONS OF THE CIRCLE. 6 hours
   13.1 Standard and Central forms of equation.
   13.2 General form of equation.
   13.3 Radius and coordinates of center.
   13.4 Problems

RECOMMENDED BOOKS
INSTRUCTIONAL OBJECTIVES

1.2 USE DIFFERENT METHODS FOR THE SOLUTION OF QUADRATIC EQUATION
1.1 Define a standard quadratic equation.
1.2 Use methods of factorization and method of completing the square for solving the equations.
1.3 Derive quadratic formula.
1.4 Write expression for the discriminant.
1.5 Explain nature of the roots of a quadratic equation.
1.6 Calculate the sum and product of the roots.
1.7 Form a quadratic equation from the given roots.
1.8 Solve problems involving quadratic equations.

2. APPLY BINOMIAL THEOREM FOR THE EXPANSION OF BINOMIAL AND EXTRACTION OF ROOTS.
2.1 State binomial theorem for positive integral index.
2.2 Explain binomial coefficients: (n,0), (n,1), ..., (n,r), ..., (n,n)
2.3 Derive expression for the general term.
2.4 Calculate the specified terms.
2.5 Expand a binomial of a given index.
2.6 Extract the specified roots.
2.7 Compute the approximate value to a given decimal place.
2.8 Solve problems involving binomials.

3. APPLY DIFFERENT METHODS FOR RESOLVING A SINGLE FRACTION INTO PARTIAL FRACTIONS USING DIFFERENT METHODS
3.1 Define a partial fraction, a proper and an improper fraction.
3.2 Explain all the four types of partial fractions.
3.3 Set up equivalent partial fractions for each type.
3.4 Explain the methods for finding constants involved.
3.5 Resolve a single fraction into partial fractions.
3.6 Solve problems involving all the four types.

4. UNDERSTAND THE SYSTEMS OF MEASUREMENT OF ANGLES.
4.1 Define angles and the related terms.
4.2 Illustrate the generation of an angle.
4.3 Explain sexagesimal and circular systems for the measurement of angles.
4.4 Derive the relationship between radian and degree.
4.5 Convert radians to degrees and vice versa.
4.6 Derive a formula for the circular measure of a central angle.
4.7 Use this formula for solving problems.

5. UNDERSTAND BASIC CONCEPTS AND PRINCIPLES OF TRIGONOMETRIC FUNCTIONS.
5.1 Define the basic trigonometric functions/ratios of an angle as ratios of the sides of a right triangle.
5.2 Derive fundamental identities.
5.3 Find trigonometric ratios of particular angles.
5.4 Draw the graph of trigonometric functions.
5.5 Solve problems involving trigonometric functions.

6. USE TRIGONOMETRIC IDENTITIES IN SOLVING TECHNOLOGICAL PROBLEMS.
6.1 List fundamental identities.
6.2 Prove the fundamental law.
6.3 Deduce important results.
6.4 Derive sum and difference formulas.
6.5 Establish half angle, double and triple angle formulas.
6.6 Convert sum or difference into product and vice versa.
6.7 Solve problems.

7. USE CONCEPT, PROPERTIES AND LAWS OF TRIGONOMETRIC FUNCTIONS FOR SOLVING TRIANGLES.
7.1 Define angle of elevation and angle of depression.
7.2 Prove the law of sines and the law of cosines.
7.3 Explain elements of a triangle.
7.4 Solve triangles and the problems involving heights and distances.

8. UNDERSTAND PRINCIPLES OF VECTORS AND PHASORS
8.1 Define unit vectors i, j, k.
8.2 Express a vector in the component form.
8.3 Explain magnitude, unit vector, direction cosines of a vector.
8.4 Explain dot product and cross product of two vectors.
8.5 Deduce important results from dot and cross product.
8.6 Define phasor and operator j.
8.7 Explain different forms of phasors.
8.8 Perform basic Algebraic operation on phasors.
8.9 Solve problems on phasors.
9. **USE PRINCIPLES OF COMPLEX NUMBERS IN SOLVING TECHNOLOGICAL PROBLEMS.**
   9.1 Define a complex number and its conjugate.
   9.2 State properties of complex numbers.
   9.3 Give different forms of complex numbers.
   9.4 Perform basic algebraic operations on complex numbers.
   9.5 Solve problem involving complex numbers.

10. **SOLVE TECHNICAL PROBLEMS USING PRINCIPLES OF BOOLEAN ALGEBRA**
    10.1 Explain fundamental concepts of boolean algebra
    10.2 Explain binary numbers, octal numbers, decimal numbers and their interconversion.
    10.3 Explain digital addition and multiplication and its applications to OR gates and AND Gates
    10.4 Illustrate complimentation and inversion
    10.5 Evaluate logical expression
    10.6 List basic Laws of Boolean Algebra
    10.7 Explain De-Morgan's theorem
    10.8 Explain basic duality of boolean algebra
    10.9 Derive boolean expression
    10.10 Explain combination of GATES
    10.11 Illustrate sum of products and product of sum
    10.12 Derive product of sum expression
    10.13 Explain NAND Gates and NOR Gates
    10.14 Use the map methods for simplifying expressions
    10.15 Explain sub-cubes and covering

11. **UNDERSTAND THE CONCEPT OF PLANE ANALYTIC GEOMETRY**
    11.1 Explain the rectangular coordinate system.
    11.2 Locate points in different quadrants.
    11.3 Derive distance formula.
    11.4 Describe the ratio formula
    11.5 Derive slope formula
    11.6 Solve problems using the above formulae.

12. **USE EQUATIONS OF STRAIGHT LINE IN SOLVING PROBLEMS.**
    12.1 Define equation of a straight line.
    12.2 Derive slope intercept and intercept forms of equations of a straight line.
    12.3 Write general form of equations of a straight line.
    12.4 Derive an expression for angle between two straight lines.
    12.5 Derive conditions of perpendicularity and parallelism of two straight lines.
    12.6 Solve problems using these equations/formulae.

13. **SOLVE TECHNOLOGICAL PROBLEMS USING EQUATIONS OF CIRCLE**
    13.1 Define a circle.
13.2 Describe standard, central and general forms of the equation of a circle.
13.3 Convert general form to the central form of equation of a circle.
13.4 Deduce formula for radius and coordinates of the center of a circle.
13.5 Derive equation of the circle passing through three points.
13.6 Solve problems involving these equations.
MTF111 ENGINEERINGDRAWING

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AIM: To acquaint the students with the basic knowledge and practice in engineering drawing necessary for a food technologist to communicate meaningfully with equipment and plant designer

LIST OF PRACTICALS

1. Introduction and importance of the course
2. Lettering and practice from A-Z in capital slants
3. Lettering and practice from A-Z in capital verticals
4. Lettering and practice from A-Z in small cases vertical
5. Lettering and practice from A-Z in small cases slants
6. Practice in lettering and figures
7. Familiarization with withdrawing instruments
8. Use of drawing instruments in simple part drawing
9. Practice in alphabet of lines
10. Drawing of a simple part to show the use of engineering lines
11. Simple geometry construction of acute, obtuse, straight, reflex and right angles
12. Geometrical figure, i.e. polygons, circles, inscribed and circumscribed
13. Types and construction of ellipses in various modes, i.e. simple, tangent, and parallel logram methods
14. Introduction to geometrical solids, cubes, prisms, pyramids and cones
15. Conic sections: circle, ellipse, parabola, hyperbola
16. Construction of parabolay basic and tangent methods
17. Introduction to dimensioning
18. Practice in dimensioning in a simple part drawing
19. Projection and projector
20. Introduction to 3-dimensional figures, i.e. block, V-block, cylinder
21. Introduction to perspective plan
22. Introduction to dihedral angle placement of object in first and third angle
23. Orthographic projections with the help of drawing of a simple object-glass box method
24. Practice in drawing of an object
25. Drawing of a slotted block
26. Drawing of a gland for stuffing box
27. Introduction to pictorial drawing
28. Pictorial block
29. Isometric, oblique and perspective projections
30. Isometric scale and isometric drawings of a V-block
31. Pictorial and orthographic drawings of different machine parts
32. Terminology and types of threads
33. Drawing of a square thread single and double start
34. Drawing of a square and hexagonal nut and bolt

RECOMMENDED BOOKS

1. A.C. Parkinson, First Year Engineering Drawing
2. Luzadar, Fundamentals of Engineering Drawing
MTF121 WORKSHOP PRACTICE

Total Contact Hours

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AIM: To equip the students with the basic knowledge of workshop practice necessary for smooth running of food machinery and equipment.

LIST OF PRACTICALS

Metal Work-Shop Orientation
1. Laying out and measuring tools
2. Use of measuring instruments and gauges
3. Use of micrometer
4. Use of vernier caliper
5. Metal sawing practice
6. Use of chisels,
7. Chipping straight grooves in steel
8. Metal filling practice
9. Pipethreading practice
10. Drilling holes with hand, portable electric and electric drill press
11. Use of screw pitch gauge for checking number of thread on nuts and bolts
12. Making stud bolts and nuts
13. Practice on riveting
14. Practice of grinding drills
15. Practice on sheet metal
16. Making of paper weight, hammer, and square piece according to size, legs of inside caliper

Welding Shop Orientation
1. Familiarization and use of gas welding plant
2. Familiarization and operation of arc welding plant
3. Soldering and brazing materials

Machine Shop-Shop Orientation
1. Practice of using measuring scales in
2. Practice of fixing job, cutting tools on lathe and taking simple cuts
3. Grinding practice of lathe tools
4. Grinding practice of drills
5. Practice of simple and step turning
6. Practice of knurling
7. Practice of drilling reaming on lathe
8. Simple boring practice
9. Taper turning practice by the use of tool post and tail stock
10. Practice of cutting simple screw thread on lathe
11. Practice of cutting internal threads
12. Practice of rapid and plain indexing
13. Indexing practice in spur gear cutting

RECOMMENDED BOOKS
1. Luding, Metal Work
2. R. E. Smith, Forging and Welding Part I,
3. H. D. Burhardt, Machine Tool Operation Part I,
FPPT-113  INTRODUCTION TO FOOD SCIENCE

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AIM The student will be able to attain the knowledge of basic food science and technology and visualize the need and importance of subject.

COURSE CONTENTS

1. INTRODUCTION 
   - Food Science
   - Food Technology
   - Food Processing and Preservation
   - Differentiation between Food Science and Technology
   - Inter-disciplinary relationship
   - Career opportunities

2. FOOD SOURCES AND SUPPLY IN PAKISTAN

3. DEVELOPMENTS IN FOOD INDUSTRY
   - Food preservation in ancient/prehistoric times
   - Developments in other techniques

4. FOOD INDUSTRY IN PAKISTAN

5. SIGNIFICANCE OF FOOD SCIENCE & TECHNOLOGY
   - Regulating food supply
   - Consumer convenience
   - Economic gains

6. FOOD CONSTITUENTS
   - Water
   - Proteins
   - Lipids
   - Carbohydrates
   - Vitamins
   - Minerals
   - Other constituents (color, flavor, organic acids, toxicants)

7. CLASSIFICATION OF FOODS
   - Based on origin
   - Based on perishability
   - Based on pH value
8. **FOOD SPOILAGE**
   - Spoilage of stable foods
   - Spoilage of semi-perishable foods
   - Spoilage of perishable foods
   - Spoilage agents
   - Spoilage by autolysis

9. **SPOILAGE AGENTS**
   - Enzymes
   - Microorganisms
   - Factors affecting growth of microorganisms
   - Insects, rodents, and birds
   - Physical factors
FPPT-113  INTRODUCTION TO FOOD SCIENCE

INSTRUCTIONAL OBJECTIVES

On completion of this course, the students will be able to:

1. UNDERSTAND THE ROLE OF FOOD SCIENCE, TECHNOLOGY AND RELATED DISCIPLINES
   Define Food Science, Food Technology, Food Processing and Preservation
   Differentiate between Food Science and Technology.
   Explain relationship of food science with other disciplines, physics, chemistry, biology, engineering and computer science.
   Explain career opportunities in food industry, food service organizations, teaching institutions, research organizations and other potential openings.

2. KNOW THE FOOD SOURCES AND SUPPLY IN PAKISTAN
   Explain food and its supply in Pakistan
   Food related nutrition and health conditions.

3. UNDERSTAND THE DEVELOPMENTS IN FOOD INDUSTRY
   Describe the developments in food processing and preservation in ancient/prehistoric/modern times.
   Describe the developments in techniques like cold storage, freezing, drying and dehydration, flour milling, dairy, irradiation etc.

4. KNOW THE FOOD INDUSTRY IN PAKISTAN
   Name the location and distribution of the following industry in Pakistan.
   Fruit and vegetable processing, Beverage industry, Wheat and grain milling industry, Baking industry, Snack food industry, Vegetable ghee and oil industry, Sugar industry, Confectionery industry, Dairy industry, Ice cream manufacturing, Meat and poultry processing, Fish processing.

5. UNDERSTAND THE SIGNIFICANCE OF FOOD SCIENCE & TECHNOLOGY
   Describe the significance of food science and technology in regulating food supply
   Explain consumer convenience
   Explain the economic gains to the general public and government.
6. UNDERSTAND THE FOOD CONSTITUENTS
Define water and the nature of water in food.
Describe the role of water in foods and human body.
Classify carbohydrates.
Discuss role of carbohydrates in human nutrition.
Define proteins and its importance.
Describe the formation and function of protein.
Define lipids and its application.
Explain the application of lipids its nutritional significance
Describe the classification of vitamins with examples.
Define vitamins and role of vitamins in human nutrition.

6.13 Describe mineral elements in food and their importance in the body.
Explain the functions and types of colors.
What are flavors and state their functions.
Discuss various flavoring compounds in foods.
State the role of flavor enhancer in food.
Differentiate between various aromatic compounds components in foods.
Describe the nature of organic acids in foods and their functions.
Discuss toxicants present in food and their effects on the body.

7. UNDERSTAND THE CLASSIFICATION OF FOODS
List various classes of foods.
Enumerate classes of foods based on their origin
Classify food on perishability
Define stable, semi perishable and perishable foods
Classify food on the basis of pH value and explain each category in detail.

8. UNDERSTAND THE SPOILAGE OF FOODS
Define food deterioration and spoilage
Describe mode of spoilage of stable, semi perishable and perishable foods.
Explain autolysis. Give examples of spoilage by autolysis
Define enzyme. Give its classification and nomenclature.
Explain the uses of enzymes.
Describe factors affecting enzyme activity.
Develop relationship between enzymes and preservation.
Explain the microbial activities resulting in food spoilage
Describe how insects, rodents and birds deteriorate foods
Explain how physical factors cause deteriorative changes in foods.

9. UNDERSTAND CHARACTERISTICS OF SPOILAGE AGENTS
Enlist food spoilage agents
State the role of enzyme in food spoilage
Name the microorganisms associated with food spoilage
List factors effecting growth of microorganisms.
Name important pests.
LISTOFPRACTICALS

1. Visit to food technology section of a national research institute.
2. Visit to food industry.
3. Visit to cold storage.
4. Visit to food technology department of a university.
5. Visit to dehydration unit.
6. Visit to nuclear research facility in the region.

96 hours
AIM The student will be able to understand and use the scientific basis of food processing and preservation.

1. **PRINCIPLES OF FOOD PRESERVATION** 5 hours
   - Prevention or delay of autolysis
   - Prevention or delay of microbial activity
   - Control of pest activities
   - Reduction in physical defects
   - Application of preservation techniques in food industry

2. **PREPARATORY OPERATIONS IN FOOD PROCESSING** 5 hours
   - Handling and transportation of raw materials
   - Cleaning
   - Sorting and grading
   - Peeling, shelling, skinning,
   - Removal of inedible constituents
   - Size reduction,
   - Mixing, filtration,
   - Prevention of enzymatic browning

3. **USE OF HIGH TEMPERATURE** 8 hours
   - Cooking
   - Blanching
   - Pasteurization
   - Sterilization and commercial sterilization
   - Canning

4. **USE OF LOW TEMPERATURE** 8 hours
   - Equipment and procedure
   - Refrigeration systems
   - Use of above freezing temperature
   - Use of below freezing temperature

5. **REMOVAL OR BINDING OF MOISTURE** 8 hours
   - Role of water in food
   - Forms of water in food
   - Advantages of dried foods
   - Sundrying
   - Dehydration
   - Evaporation and concentration
   - Freeze-drying
Dehydro-freezing
Intermediatemoisturefoodstechnology

6. **USE OF CHEMICALADDITIVES** 8 hours
   - Definition
   - Functions of food additives
   - Chemical additives as nonpreservatives
   - Chemical additives as preservatives
   - Effectiveness of chemical preservatives
   - Food laws

7. **USE OF FERMENTATIONS** 8 hours
   - Fermented foods
   - Objects of fermentation
   - Types of fermentation
   - Changes in foods

8. **USE OF IRRADIATIONS** 6 hours
   - Units of measurement
   - Characteristics of electromagnetic waves
   - Sources of electromagnetic radiations
   - Use of ultraviolet radiation
   - Use of ionizing radiation
   - Commercial application of irradiation
   - Effect of irradiation on foods

9. **FOOD PACKAGING** 8 hours
   - Characteristics of a package
   - Packaging materials
   - Rigid and flexible metals
   - Glass
   - Flexible and rigid cellulosics & plastics
   - Flexible and rigid paper products
   - Laminates and multilayer material
   - Protective packaging in tropical environments
   - Food labeling
RECOMMENDED BOOKS


PRACTICAL MANUAL

1. UNDERSTAND PRINCIPLES OF FOOD PRESERVATION
   Explain the principle of food preservation by preventing or delaying autolysis.
   Explain the principle of food preservation by preventing or delaying microbial activity.
   Explain the principles of food preservation by preventing or controlling pest activities.
   Explain the principles of food preservation by preventing or reducing Physical defects.

2. UNDERSTAND PREPARATORY OPERATIONS IN FOOD PROCESSING
   Discuss technology of harvesting raw materials.
   Enlist the preparatory operations performed during food processing.
   Explain how cleaning of raw materials take place during processing.
   Describe the categories of sorting and grading of raw materials with example.
   Explain peeling, shelling, skinning and removal of inedible contents of raw materials take place.
   Discuss size reduction of raw material during processing and its importance in food industry.
   Discuss the mixing unit operation during food processing.
   Describe filtration operation in food processing industry.
   Explain how enzymatic browning is prevented through blanching and by use of chemicals.

3. UNDERSTAND USE OF HIGH TEMPERATURE IN FOOD PRESERVATION
   State main objectives of cooking.
   Describe blanching.
   Describe pasteurization.
   Differentiate between pasteurization, sterilization and commercial sterilization.
   Explain the methods of pasteurization and sterilization.
   Describe unit operations in canning.
   Discuss the factors affecting heat processing of food during canning.

4. UNDERSTAND PRESERVATION BY USE OF LOW TEMPERATURE
   State objectives of cooling foods.
Diagrammatic representation of mechanical refrigeration system
Explain the use of above freezing temperature
Explain the principle and procedure of cold storage.
Discuss the factors affecting cold storage.
Explain the use of below freezing temperature
Describe types of freezers and methods of food freezing.
Explain the effect of low temperature on foods.
Explain the storage life of frozen foods.
State the effect of thawing on the quality of frozen foods.
Discuss the effect of freezing on microorganisms.

5. UNDERSTAND REMOVAL AND BINDING OF MOISTURE FOR FOOD PRESERVATION

State the functions of water in food
Describe the methods of sun drying
Describe dehydration procedures and equipment.
Discuss special drying techniques.
Explain evaporation and concentration processes for food preservation
State procedure for freeze drying
Explain dehydrofreezing
Describe intermediate moisture foods technology.

6. UNDERSTAND THE APPLICATIONS OF CHEMICAL ADDITIVES

Differentiate between chemical/food additive, food adulterant and food contaminant.
Explain the use of chemical additives for non preservative applications.
Explain the use of chemical additives for preservation of foods.
Explain the factors affecting the effectiveness of chemical preservatives.
Discuss how food laws aim in setting guidelines for the quality of processed foods.

7. UNDERSTAND THE USE OF FERMENTATION FOR PRESERVATION

Define fermentation
List important fermented foods
Explain objectives of fermentation
List types of fermentations
Describe the use of alcoholic fermentations and its use in industry
Describe the production of vinegar by fermentation
Describe the use of lactic acid fermentations in industry
16.7 Explain the changes caused by desirable fermentations in foods.

8. UNDERSTAND THE USE OF IRRADIATIONS
List the units of irradiation measurement
Describe the characteristics of electromagnetic waves.
Explain the sources of electromagnetic radiation.
Describe the use of ultraviolet and ionizing radiation in food preservation.
Discuss the commercial applications of irradiation.
Explain the effect of irradiation of foods.

9. UNDERSTAND FOOD PACKAGING
Define packing and packaging
Differentiate between packing and packaging
Explain reasons for packing foods
Enlist important characteristics of a package
Enlist types of packaging materials
Identify and explain conventional packaging materials
Identify and explain modern packaging materials
Define aseptic packaging
Explain the manufacture of aseptic packaging paper
Explain the working of an aseptic filling machine (TetraPack)
Classify into rigid and flexible
Explain the principle of package design
Enlist the information considered mandatory to appear on the label of prepared food.
Describe the characteristics and properties of rigid and flexible metals used as food packaging material.
Discuss advantages and disadvantages of flexible metal contents in food packaging.
LIST OF PRACTICALS

1- State the mode of food spoilage
2- Study the spoilage of foods by enzymes
3- Study the pasteurization of milk
4- Canning of some typical fruits
5- Canning of some seasonal vegetables
6- Cold storages of some fruits and vegetables
7- Freezing of difficult vegetables
8- Sun-drying of some fruits
9- Sun-drying of some vegetables
10- Dehydration of some fruits
11- Dehydration of selected vegetables
12- Use of evaporation for concentrating milk
13- Preservation of fruit juice by the use of chemical additives
14- Production of bread by alcoholic fermentation
15- Preservation of fruits by lactic acid fermentation
موضوعات

1. نص اطار الفتح
2. نص اطار الفتح
3. نص اطار الفتح
4. نص اطار الفتح
5. نص اطار الفتح

صاروا آياً لبني آدم لاجعلوا تقدوا مثواً لزمن و فضوع
خيركم من تعليم القرآن و علمنه
لا إسنا لم ين لا إسنا لمولى دين لم عبدنا
وياكم ولظلن لمن أكرم الحديث
من حدث في أمر نابع ملك مفهووم
من حمل على السلاح فليس منا
لكل كافل السليم في الجنة
لا ضيور ولا ضرور في السلام
ككلكم الله وكلكم يراع وكلكم مسؤولاً عن رعاه

5-10

كي نقل اناس اشتهى انتربت
فبلي ذئت مسألة لا يطلبون من ( يا باب ومزَّ) صرح بمقربة بعيشة
فظل متحفظ نواب
حمر كأن دموع كثران
بالرغم أن ما فجر

لتم تقدير تنازلات كم تمسح مصائب ومصائب أخرى ميراء حبيبي في حكك
بكل كاب عز و شرف ( اللهم اغفر)
السلامات

تدريس مقاصد

زمین مقاصد دوبلوں کے کریات کریات کے رشیوں میں موسیقی کے اوصاف کا ایسے
کریات کریات کریات

فیصلہ مصداق:

قرآن کی ایک جانبی بین کرے
قرآن کی ایک جانبی بین کرے
قرآن کی ایک جانبی بین کرے
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قرآن کی ایک جانبی بین کرے

اطلاعات کے پورے شخصیات کے اصلاحی اخلاقی اقدار (انقراضی اخلاقی) کے اگھا ہو کے

اطلاعات مصداق:

اطلاعات کے پورے شخصیات کے اصلاحی اخلاقی اقدار (انقراضی اخلاقی) کے اگھا ہو کے

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اضموم مقام اسلامی معاشرہ کے اسلامی معاشرہ کی خصوصیت سے اقتباس کے مطالعے کے
خصوصی مقام

اسلامی معاشرہ کا منظم و ضرورت بیان کرے

اسلامی معاشرہ کی تقاریبی خصوصیتیں بیان کرے

اسلامی معاشرہ کی دوہر و اجتماعی تعلیم بیان کرے

کئیوں کے لئی مشترکہ بیان کرے

کئیوں کی آمیزش و ضرورت بیان کرے

چھڈ کے اجتماعی و اقتصادی طور پر بیان کرے

بجلی کی آمیزش بیان کرے

بجلی کی ضرورت بیان کرے

بجلی کی مقدار ایک بیان کرے

افض الگ کی تعریف کرے

صروف اس طرح کی ضرورت کو تحلل کرنے کے پاس کی اطفال کو کام کے

اسلامی ریاست

عمومی مقام

اسلامی ریاست کی خصوصیتیں بیان کرے

خصوصی مقام

ریاست کی تعریف بیان کرے

اسلامی ریاست سے طرف خصوصیتیں کے اقتباس حاصل کرے

اسلامی ریاست کی خصوصیتیں بیان کرے

اسلامی ریاست کے اشراف و مقامات کرے

اسلامی ریاست کے قوم کی بہترین حضرت کرے
نہ ہیں کے،
ستائے پاکستان
تدریس مقاصد
مخصوص مقاصد:

تدریس مقاصد
مخصوص مقاصد:

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تدریس مقاصد
مخصوص مقاصد:

تدریس مقاصد
مخصوص مقاصد:
نسل انسانیت سال ۲۰۰۰ میلادی

موضوعات

سیاست و تحریک

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۲۰۰۰ میلادی

کل رقم: ۲۰ میلیون
MGM221 BUSINESS MANAGEMENT AND INDUSTRIAL ECONOMICS

Total Contact Hours

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AIMS The students will be able to develop management skills, get acquainted with the principles of management and economics relations and develop commercial/economic approach to solve the problems in the industrial set-up.

COURSE CONTENTS

1. ECONOMICS 2 Hours
   - Definition: Adam Smith, Alfred Marshall, Prof. Robins.
   - Nature and scope
   - Importance for technicians.

2. BASIC CONCEPTS OF ECONOMICS 1 Hour
   - Utility
   - Income
   - Wealth
   - Saving
   - Investment
   - Value.

3. DEMAND AND SUPPLY 2 Hours
   - Definition of demand.
   - Law of demand.
   - Definition of supply.
   - Law of supply.

4. FACTORS OF PRODUCTION 2 Hours
   - Land
   - Labour
   - Capital
   - Organization.

5. BUSINESS ORGANIZATION 3 Hours
   - Sole proprietorship.
   - Partnership
   - Joint stock company.

6. ENTREPRENEURIAL SKILLS 4 Hours
   - Preparing, planning, establishing, managing, operating and evaluating relevant resources in small business.
Business opportunities, goal setting.
Organizing, evaluating and analyzing opportunity and risk tasks.

7. **SCALE OF PRODUCTION.**
   Meaning and its determination.
   Large scale production.
   Small scale production.

8. **ECONOMIC SYSTEM**
   Free economic system.
   Centrally planned economy.
   Mixed economic system.

9. **MONEY.**
   Barter system and its inconveniences.
   Definition of money and its functions.

10. **BANK.**
    Definition
    Functions of a commercial bank.
    Central bank and its functions.

11. **CHEQUE**
    Definition
    Characteristics and kind of cheque.
    Dishonour of cheque.

12. **FINANCIAL INSTITUTIONS**
    IMF
    IDBP
    PIDC

13. **TRADE UNION**
    Introduction and brief history.
    Objectives, merits and demerits.
    Problems of industrial labour.

14. **INTERNATIONAL TRADE.**
    Introduction
    Advantages and disadvantages.

15. **MANAGEMENT**
    Meaning
    Functions
16. ADVERTISEMENT
   The concept, benefits and drawbacks.
   Principal media used in business world.

17. ECONOMY OF PAKISTAN
   Introduction
   Economic problems and remedies.

BOOKS RECOMMENDED
1. Nisar-ud-Din, Business Organization, Aziz Publisher, Lahore
1. UNDERSTAND THE IMPORTANCE OF ECONOMICS.
   StatedefinitionofeconomicsgiventoAdamSmith,AlfredMarshalland
   ProfessorRobins.
   Explainednatureandscopeofeconomics.
   Describetheimportanceofstudyofeconomicsfortechnicians.

2. UNDERSTAND BASIC TERMS USED IN ECONOMICS.
   Definedbasicterms,utility,income,wealth,saving,investmentandvalue.
   Explainedthebasictermswithexamples.

3. UNDERSTAND LAW OF DEMAND AND LAW OF SUPPLY.
   Definedemand.
   Explainlawofdemandwiththelpofscheduleanddiagram.
   Stateassumptionsandlimitationsoflawofdemand.
   DefinedSupply.
   ExplainedlawofSupplywiththelpofscheduleanddiagram.
   Stateassumptionsandlimitationsoflawofsupply.

4. UNDERSTAND THE FACTORS OF PRODUCTION.
   Definedthefourfactorsofproduction.
   Explainedlabouranditsfeatures.
   Describedcapitalanditspeculiarities.

5. UNDERSTAND FORMS OF BUSINESS ORGANIZATION.
   Describesoleproprietorship,itsmeritsanddemerits.
   Explainedpartnership,itsadvantagesanddisadvantages.
   Describejointstockcompany,itsmeritsanddemerits.
   Distinguishpubliclimitedcompanyandprivatelimitedcompany.

6. UNDERSTAND ENTREPRENEURIAL SKILLS.
   Explainedpreparing,planning,establishingandmanagingsmallbusinesssetup.
   Explainedevaluatingallrelevantresources.
   Describedorganizinganalyzingandinnovationofriskoftask.

7. UNDERSTAND SCALE OF PRODUCTION.
   Explainedscaleofproductionanditsdetermination.
   Describedlargescaleproductionanditsmerits.
   Explainsmallscaleofproductionanditsadvantagesanddisadvantages.

8. UNDERSTAND DIFFERENT ECONOMIC SYSTEMS.
   Describedfreeeconomicsystemanditscharacteristics.
   Explainedcentrallyplannedeconomicssystem,itsmeritsanddemerits.
   Statedmixedeconomicssystemanditsfeatures.

9. UNDERSTAND WHAT IS MONEY
Definemoney
Explainbarter system and its inconveniences.
Explainfunctionsofmoney.

10. UNDERSTAND BANK AND ITS FUNCTIONS.
   Definebank.
   Describecommercialbank and its functions.
   Statecentralbank and its functions.

11. UNDERSTAND CHEQUE AND DISHONOR OF CHEQUE.
   Definecheque.
   Enlistthecharacteristicsof cheque.
   Identifythekindsofcheque.
   Describethecausesofdishonor ofacheque.

12. UNDERSTAND FINANCIAL INSTITUTIONS.
   ExplainIMF and itsobjectives.
   Explainorganisationalset up and objectivesofDBP.
   Explainorganisationalset up and objectivesofPIDC.

13. UNDERSTAND TRADE UNION, ITS BACKGROUND AND FUNCTIONS.
   Describebriefhistoryoftradeunion.
   Statefunctionsoftradeunion.
   Explainobjectives, merits and demeritsoftradeunions.
   Enlist problemsofindustriallabour.

14. UNDERSTAND INTERNATIONAL TRADE.
   Explain international trade.
   Enlistitsmeritsanddemerits.

15. UNDERSTAND MANAGEMENT
   Explainmeaningofmanagement.
   Describefunctionsofmanagement.
   Identifytheproblemsofbusinessmanagement.

16. UNDERSTAND ADVERTISEMENT.
   Explaintheconcept of advertisement.
   Enlist benefits and drawbacks of advertisement.
   Describeprincipal media of advertisement used in business world.

17. UNDERSTAND THE ECONOMIC PROBLEMS OF PAKISTAN.
   DescribeeconomyofPakistan.
   Explaineconomicproblems of Pakistan
   Explain remedial measures for economic problems of Pakistan.
MATH-233  APPLIED MATHEMATICS-II

Total Contact Hours

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Pre-requisite: Must have completed Mathematics-I.

AIMS At the end of the course, the students will be able to:

- Solve problems of Calculus, Laplace Transformation and Fourier Series, and develop mathematical skills and logical perceptions in the use of mathematical instruments.

COURSE CONTENTS

1. **FUNCTIONS & LIMITS.** 6 hours
   - Constant & Variable Quantities
   - Functions & their classification
   - The concept of Limit
   - Limit of a Function
   - Fundamental Theorem on Limit
   - Some Important Limits
   - Problems

2. **DIFFERENTIATION** 6 hours
   - Increments
   - Differential Coefficient or Derivative
   - Differentiation ab initio or by first principle
   - Geometrical Interpretation of Differential Coefficient
   - Differential Coefficient of $x^n$ and $(ax+b)^n$
   - Three important rules
   - Problems

3. **DIFFERENTIATION OF ALGEBRAIC FUNCTIONS** 9 hours
   - Explicit Functions
   - Implicit Functions
   - Parametric forms
   - Problems

4. **DIFFERENTIATION OF TRIGONOMETRIC FUNCTIONS** 6 hours
   - Differential Coefficient of Sin $x$, Cos $x$, Tan $x$ from first principle.
   - Differential Coefficient of Sec $x$, Cosec $x$, Cot $x$
   - Differential Coefficient of Inverse trigonometric functions.
   - Problems.
5. **DIFFERENTIATION OF LOGARITHMIC & EXPONENTIAL FUNCTIONS** 6 hours
   - Differentiation of \( \ln x \)
   - Differentiation of \( \log_a x \)
   - Differentiation of \( a^x \)
   - Differentiation of \( e^x \)
   - Problems

6. **RATE OF CHANGE OF VARIABLES** 6 hours
   - Increasing and decreasing functions
   - Maxima and Minima
   - Criteria for maximum & minimum values
   - Methods of finding maximum & minimum
   - Rate measure
   - Slope of a line
   - Velocity and acceleration
   - Problems

7. **INTEGRATION (SIMPLE BASIC RULES)** 9 hours
   - Concept
   - Fundamental Formulas
   - Important Rules
   - Problems

8. **METHODS OF INTEGRATION** 9 hours
   - Integration by substitution
   - Integration by parts
   - Problems

9. **DEFINITE INTEGRALS** 6 hours
   - Properties
   - Application to area
   - Problems

10. **DIFFERENTIAL EQUATIONS** 6 hours
    - Introduction
    - Order and Degree
    - First order Differential Equation of 1st degree
    - Solution of problems
    - Problems

11. **LAPLACE TRANSFORMATIONS** 9 hours
    - Laplace Transformations
    - Inverse Laplace Transformations
    - Problems.
12. **FOURIER SERIES.** 
   - Introduction
   - Periodic Functions
   - Even and Odd Functions
   - Problems

13. **STATISTICS** 
   - Concept of mean, median and mode
   - Standard Deviation
   - Laws of probability
   - Problems

**RECOMMENDED BOOKS**
1. Thomas Finny, *Calculus and Analytic Geometry*
INSTRUCTIONAL OBJECTIVES

1. USE THE CONCEPT OF FUNCTIONS AND THEIR LIMITS IN SOLVING SIMPLE PROBLEMS.
   - Define a function.
   - List all types of functions.
   - Explain the concept of limit and limits of a function.
   - Explain fundamental theorems on limits.
   - Derive some important limits.
   - Solve simple problems on limits.

2. UNDERSTAND THE CONCEPT OF DIFFERENTIAL COEFFICIENT.
   - Define differential coefficient.
   - Derive mathematical expression of a derivative.
   - Explain geometrically the meaning of differential coefficient.
   - Differentiate $a^n$ and $(ax+b)^n$.
   - Solve problems of these formulas.

3. USE RULES OF DIFFERENTIATION FOR SOLVING PROBLEMS OF ALGEBRAIC FUNCTIONS.
   - Derive product rule, quotient rule and chain rule.
   - Interpret the chain rule.
   - Differentiate explicit and implicit functions.
   - Find derivatives of parametric forms of a function w.r.t another function, by rationalization.
   - Use these important rules to find derivatives of relevant functions.

4. USE RULES OF DIFFERENTIATION TO SOLVE TRIGONOMETRIC FUNCTIONS.
   - Differentiate from first principles $\sin x, \cos x, \tan x$.
   - Derive formulas for derivatives of $\sec x, \cosec x, \cot x$.
   - Find derivatives of inverse trigonometric functions.
   - Solve problems based on these formulas.

5. USE RULES OF DIFFERENTIATION TO LOGARITHMIC AND EXPONENTIAL FUNCTIONS.
   - Derive formulas for differential coefficients of logarithmic and exponential functions.
   - Solve problems using these formulae.

6. UNDERSTAND RATE OF CHANGE OF ONE VARIABLE WITH ANOTHER
Derive formulas for velocity, acceleration, and slope of a line.
Use derivative as a measure of rate of change.
Explain an increasing and a decreasing function.
Show graphically maxima and minima values and point of inflexion.
Explain criteria for finding maxima and minima.
Solve problems based upon these topics.

7. USE PRINCIPLES OF INTEGRATION IN SOLVING RELEVANT PROBLEMS.
   - Explain concept of integration.
   - Write basic theorems of integration.
   - Define fundamental formulas of integration.
   - List some important rules of integration.
   - Solve problems based on these rules.

8. UNDERSTAND VARIOUS METHODS OF INTEGRATION
   - List standard formulas of integration.
   - Integrate a function by substitution method.
   - Use method of integration by parts for finding integrals.
   - Employ these methods to solve problems.

9. UNDERSTAND THE METHODS OF SOLVING DEFINITE INTEGRALS.
   - Define definite integral.
   - List properties of definite integrals.
   - Use definite integral in the computation of areas.
   - Solve problems involving definite integrals.

10. USE DIFFERENT METHODS OF INTEGRATION TO SOLVE DIFFERENTIAL EQUATIONS.
    - Define a differential equation, its degree and order.
    - Explain method of separation of variables for solving differential equations of first order and first degree.
    - Solve differential equations of first order and first degree.

11. USE LAPLACE AND INVERSE LAPLACE TRANSFORMATION FOR SOLVING PROBLEMS.
    - Define Laplace and Inverse Laplace Transformation
    - List properties of Laplace Transformation
    - Solve problems using Laplace Transformations

12. EXPAND FUNCTIONS USING FOURIER SERIES
    - Define a Fourier series.
    - Write extended rule of integration by parts.
    - Illustrate periodic functions, even and odd functions.
    - Explain Fourier expansion and Fourier constants.
Expand the given functions of Fourier series.

13. UNDERSTAND THE BASIC CONCEPTS OF STATISTICS
   Define mean, median, and mode
   Explain standard deviation
   State laws of probability
   Calculate the above-mentioned quantities using the proper formula
AIM: At the end of the course, the students will be able to understand the technology involved in the food and vegetable processing industry.

1. INTRODUCTION 6 hours
   - History and growth of fruits and vegetables
   - Physical properties of fruit and vegetables
   - Post harvest handling and changes
   - Types of storage
   - Composition and nutritional value
   - Introduction to fruit and vegetable processing industry

2. PREPARATORY OPERATIONS 12 hours
   - Preparatory operations
   - Receiving
   - Washing
   - Sorting, grading, and suitability
   - Size reduction
   - Blanching
   - Sulphiting / sulphuring
   - Extraction
   - Pulping
   - Sedimentation
   - Crystallization

3. PROCESSING 14 hours
   - Canning
   - Dehydration
   - Pickling
   - Preserving by irradiation
   - Freeze dehydration (Lyophilization)

4. PRODUCTS 12 hours
   - Beverages
   - Preserves
   - Sauces
   - Pickles
   - Soups
5. SPOILAGE 6 hours
   Processed fruits
   Processed vegetables
   Chemical changes

6. NUTRITION OF PROCESSED FOODS 2 hours

7. RECENT TRENDS 8 hours
   Functional foods
   Manufacturing
   Introduction to Nutraceuticals

8. QUALITY CONTROL 2 hours
   Product quality

9. HYGIENE AND SANITATION 2 hours
   Personal hygiene
   Plant sanitation
   Waste management

RECOMMENDED BOOKS
INSTRUCTIONAL OBJECTIVES

At the end of the course, student will be able to

1. UNDERSTAND THE HISTORY AND GROWTH OF SELECTED FRUITS AND VEGETABLES.

   describe the physical properties of selected fruits
   Describe the physical properties of selected vegetables.
   Describe the post harvest handling and changes of fruits and vegetables.
   Describe the different types of storage of fruits and vegetables
   Describe the composition and nutritional value of fruits and vegetables
   Describe the present status of fruits and vegetable industry in the country
   Define texture.
   Describe the texture of fruits and vegetables.

2. UNDERSTAND THE PREPARATORY OPERATIONS OF FRUITS AND VEGETABLE

   Describe the importance of preparatory operations in the processing of fruits and vegetable.
   Enlist different preparatory operations
   Describe factors to be considered in the receiving of fruits and vegetable
   Describe the need for washing fruits and vegetable
   Enlist parameters for sorting and grading of fruits and vegetables
   Define size reduction
   Describe the importance of size reduction
   Define the blanching
   Describe the objectives and methods of blanching
   Define the need for sulphiting
   Understand the extraction and pulping
   Differentiate between extraction and pulping
   Explain the sedimentation
   Define crystallization.

3. UNDERSTAND THE PROCESSING OF FRUITS AND VEGETABLE

   define canning
   Describe the history of canned food.
   Describe the unit operations in the canning of fruits and vegetables.
   Define dehydration describe the method of dehydration
Describe the advantage of dehydration
Define pickling
Describe the method of pickling
Define irradiation
Effect of irradiation on fruits and vegetables
   Define freeze dehydration
Describe the method and advantage of freeze dehydration in fruits and vegetables

4. UNDERSTAND THE PRODUCTS OF FRUITS AND VEGETABLES

define beverages
describe the different types of beverages
describe the nutritional value of different beverages
define preserves
describe the preparation of different preserves
define sauces
describe the preparation of different pickels
define soups
describe the use of soups in our diet

5. UNDERSTAND THE SPOILAGE OF FRUITS AND VEGETABLES

describe the spoilage of processed fruits
Describe the factors involved in the spoilage of processed fruits.
Describe factors involved in the spoilage of vegetables
Describe chemical changes occurring in processed fruits and vegetables

6. UNDERSTAND THE NUTRITION OF PROCESSED FRUITS AND VEGETABLES

Describe the importance of nutritional value of processed fruits and vegetables
Describe the nutritional value of selected processed fruits and vegetables.

7. UNDERSTAND THE RECENT TRENDS

Define the functional foods.
Describe different types of functional foods
Describe the manufacturing of functional foods
Define nutraceuticals
8. UNDERSTAND THE QUALITY CONTROL

define quality and quality control
Describe the importance of quality controlling the product quality
Describe the techniques for controlling of products quality.

9. UNDERSTAND THE HYGEINE AND SANITATION

define hygiene and sanitation
define personal hygiene
describe the application of personal hygiene in the food industry.
define plant sanitation
describe the importance of plant sanitation in the food industry.
describe how waste management helps in maintaining good sanitation in the food.
LIST OF PRACTICALS:

1. Blanching of apples
2. Blanching of leafy vegetables
3. Pulping of mango
4. Canning of apples
5. Canning of peas
6. Preparation of apple jam
7. Preparation of orange marmalade
8. Visit to beverage plant
9. Preparation of mango juice
10. Preparation of lychee juice
11. Preparation of selected fruits.
12. Drying of seasonal vegetables
13. Preparation of mango pickles
14. Visit to nuclear research facility for purpose of fruits preservation
AIM: At the end of the course the students will be able to understand the technology involved in the processing of cereals.

COURSE CONTENTS

1. INTRODUCTION
   4 hours
   History and growth.
   Importance and production of cereal grains.
   Structure and composition of wheat grain.
   Structure and composition of rice grain.
   Structure and composition of maize grain.
   Grades and grading of Grains.

2. STORAGE OF CEREALS
   4 hours
   Types of storage.
   Role of moisture.
   Functional changes.

3. WHEAT MILLING
   20 hours
   Drymilling.
   Handling.
   Storage.
   Blending.
   Cleaning.
   Tempering.
   Conditioning.
   Removal of impurities.
   Grinding process.
   Types of grinding machines.
   Extraction rates of flour.
   Operation of roller mill.
   Grinding system.
   Reduction and tailings.
   Sieving process.
   Purification process.
   Flour handling and storage.
4. AIR CLASSIFICATION AND FINE GRINDING 8 hours
   Whole wheat products.
   Milling of soft and durum wheats.
   Developments in milling of cereal grains.

5. RICE MILLING 6 hours
   Par boiling process.
   Dry and wet milling of rice.

6. MAZE PROCESSING 8 hours
   Milling of corn
   Production of starch.
   Production of oil.
   Production of gluten.

7. BREAD 8 hours
   Types and formulation.
   Ingredients.
   Yeast function.
   Bread making processes.
   Baking process.

8. OTHER BAKED PRODUCT TECHNOLOGIES 6 hours
   Biscuits, cookies and crackers.
   Cakes.
   Wafers.
   Extrusion technology
BOOKS RECOMMENDED:
4- W.J. Sultan, Practical Baking, AVI, Westport.
INSTRUCTIONAL OBJECTIVES

At the end of course, student will be able to

1. DESCRIBE THE FUNDAMENTALS OF CEREALS

   describe history, growth and importance of cereal grains.
   explain structure and composition of wheat grain
   describe structure and composition of rice grain
   explain structure and composition of maize grain.
   describe grades and grading of cereal grains.

2. DESCRIBE STORAGE OF CEREALS, ROLE OF MOISTURE AND FUNCTIONAL CHANGES DURING STORAGE.

   enlist and describe types of storage for cereals.
   State role of moisture during storage of cereals
   Explain functional changes in cereals during storage.

3. EXPLAIN WHEAT MILLING PROCESS, SIEVING/PURIFICATION PROCESS AND FLOUR HANDLING.

   state dry milling of wheat.
   Explain handling, storage, blending and cleaning of wheat for milling. Being used in wheat milling.

   Differentiate between tempering and conditioning of wheat grains.
   Explain grinding process and types of grinding machines
   Describe extraction rates of flour.
   State operation of roller mill.
   Define and explain grinding systems, reduction and tailings of wheat.
   Describe sieving and purification process of wheat.
   Explain handling and storage of flour.
4. DESCRIBE WHEAT MILLED PRODUCTS, MILLING OF WHEAT, CORN, RICE AND DEVELOPMENTS IN MILLING OF CEREALS

Enlist whole wheat products.
Explain milling of soft and durum wheat
Describe recent developments in milling of cereals grains

5. DESCRIBE PARBOILING AND MILLING OF RICE

State parboiling process
Describe dry and wet milling of rice.

6. DESCRIBE PRODUCTS OF MAIZE PROCESSING.

Define milling of corn.
Explain production of starch from maize
Describe extraction of oil from maize germ.
Describe production of gluten from maize.

7. DESCRIBE TYPE, FORMULATION AND BREAD MANUFACTURING PROCESS.

Enlist types of bread and describe their formulation/recipe.
Explain ingredients of bread and their functions.
Describe bread processing
Describe baking process in detail.

8. EXPLAIN TECHNOLOGY OF BAKED PRODUCTS, PASTA, NOODLES AND EXTRUSION PRODUCTS.

Describe technology of biscuits, cookies and crackers.
Define and explain cakes and wafers.
Describe the technology of extruded products.
LIST OF PRACTICALS  

1  Fat and solids determination in cereals.
2  Determination of pH, moisture, fiber and nitrogen in cereals.
3  Visit to a flour mill.
4  Visit to a modern rice mill.
5  Manufacture of leavened bread.
6  Baking of biscuits.
7  Determination of wet and dry gluten.
8  Manufacture of a drum dried cereal.
9  Preparation of composite flour.
10 Visit to a baking industry.
11 Determination of test weight.
12 Preparation and sensory evaluation of cakes and cookies.
13 Preparation of Vermicelli.
14 Grading of grains.
15 Demonstration of flour quality.
16 Determination of moisture in flour.
17 Determination of protein in flour.
18 Determination of pH and ash in flour.
AIM: At the end of the course the students will be able to understand the technology involved in the processing of milk.

COURSE CONTENTS

1. **INTRODUCTION** 4 hours
   - Dairy industry in Pakistan
   - History and growth of dairy industry
   - Production of milk in Pakistan

2. **MILK SOURCES** 2 hours
   - Sources
   - Production
   - Handling
   - Distribution
   - Composition

3. **DAIRY INDUSTRY IN PAKISTAN** 4 hours
   - Method of procurement
   - Collection and Reception
   - Transportation

4. **MILK PROCESSING** 10 hours
   - Cream separation
   - Standardization
   - Homogenization
   - Pasteurization
   - UHT Technology
   - HTST Technology
   - Condensation
   - Unit operations in milk processing
   - Packaging
   - Recent advances

5. **MILK PRODUCTS TECHNOLOGY** 6 hours
   - Flavored milk
   - Evaporated milk
6. PROPERTIES OF MILK 2 hours
   Physical and Chemical properties of fresh milk
   Physical and Chemical properties of processed milk

7. CHEESE PROCESSING 6 hours
   Classification, Composition, and chemistry of cheese
   Processing of cheddar, cottage, soft, and Roquefort cheese
   Quality control in cheese making
   Discuss recent advances in cheese processing
   Packaging

8. CREAM AND ALLIED PRODUCTS PROCESSING 6 hours
   Classification and chemical composition of various types of creams
   Unit operations in processing of creams
   Quality control to reduce spoilage
   Recent advances in cream processing

9. YOGHURT 6 hours
   Chemistry and Microbiology of yoghurt
   Production of plain, fruit, frozen, and flavored yoghurts
   Unit operations in processing of yoghurt
   Recent advances in yoghurt processing

10. BUTTER 6 hours
    Composition
    Processing of butter
    Evaluation of keeping quality

11. FROZEN MILK PRODUCTS AND ICE CREAM 6 hours
    Classification
    Composition
    Chemical nature
    Flavouring agents
    Additives
    Processing of ice creams
    Recent advances in ice cream processing technology
12. **MILK BY-PRODUCTS**  
Utilization of whey, casein and butter milk  

13. **GENERAL**  
Quality control  
Packaging – faults, causes and remedies  
Planthygiene andsanitation

**BOOKS RECOMMENDED:**

DAIRY PROCESSING TECHNOLOGY

INSTRUCTIONAL OBJECTIVES FPPT-233 (Rev.)

1. UNDERSTAND THE HISTORY AND GROWTH

   explain dairy industry in Pakistan
   describe history and growth of dairy industry
   explain production of milk in Pakistan

2. UNDERSTAND ABOUT MILK SOURCES

   explains sources of milk
   describe production and handling of milk
   explain distribution of milk
   describe the composition of milk

3. UNDERSTAND DAIRY INDUSTRY IN PAKISTAN

   what is milk procurement and explain method of procurement
   describe collection and reception of milk
   explain transportation of milk

4. EXPLAIN THE MILK PROCESSING

   explain the separation process of milk
   describe the standardization of milk
   define and explain the homogenization of milk
   describe the pasteurization of milk
   enlist and describe the types of UHT milk
   define and explain the condensation process
   describe the unit operation involved in milk processing
5. EXPLAIN MILK PRODUCT TECHNOLOGY

- Define and explain the tetrapack milk packaging
- Describe the recent developments in milk processing

6. DESCRIBE PROPERTIES OF MILK

- Describe the physical and chemical properties of fresh milk
- Describe the physical and chemical properties of processed milk.

7. EXPLAIN CHEESE PROCESSING

- Explain the classification of cheese
- Describe the composition and chemistry of cheese
- Enlist the types of cheese and the major differences and describe processing of major types
- Explain the role of quality control in cheese processing
- Discuss recent developments in cheese processing
8. DESCRIBECREAMAND ALLIEDPRODUCTS PROCESSING

describe the classification, chemical composition of various types of cream

describe the unit operation involved in processing of cream.

Explain the role of quality control to reduce the spoilage

Discuss the recent developments in cream processing

9. YOGHURT PROCESSING

define yoghurt and explain the chemistry and microbiological aspects

enlist types of yoghurt and describe their production

describe the unit operations involved in yoghurt processing

discuss the recent developments in yoghurt processing

10. DESCRIBE BUTTER PROCESSING

explain the composition of butter

explain the processing of butter

explain the role of quality control in keeping quality

11. FROZEN MILK PRODUCTS AND ICE CREAM

explain the classification of frozen products.

Describe the composition and chemical nature of ice cream

Describe the use of flavouring agents in frozen products
Enlist all additives used in frozen products and their significance. Explain the unit operations involved in frozen products processing. Discuss the recent advances.

12. **MILK BY PRODUCTS**

Discuss the utilization of whey, casein and buttermilk.

13. **UNDERSTAND THE GENERAL ISSUES IN DAIRY PROCESSING**

Discuss the overall quality issues. Discuss the faults, causes and remedies of packaging. Discuss the dairy plant hygiene and sanitation.
FPPT 233(Rev.)  DAIRYPROCESSING TECHNOLOGY

LIST OF PRACTICALS  96 hours

1. Visit to dairy farm
2. Visit to milk processing plant
3. Solids not fat (SNF) determination in milk
4. Determination of pH, Specific gravity, acidity of raw and processed milk
5. Resasuring test for completeness of Pasteurization
6. Spray drying of milk
7. Manufacture of yogurt
8. Pasteurization of milk
9. Preparation of butter
10. Preparation of cheese
11. Phosphate test
12. Determine total plate count and coliform in milk and milk products
13. Preparation of flavored milk
14. Adulteration test of raw milk
15. Sensory evaluation of raw and processed milk
16. Determination of cheese faults and grading methods
AIM: At the end of the course the students will be able to understand the technology involved in the processing and preservation of fats and oils.

COURSE CONTENTS

1. INTRODUCTION 4 hours
   - History, growth and production
   - Lipids, oils and fats, ghee and wax
   - Importance
   - Sources
   - Uses

2. EXTRACTION AND PROCESSING OF OILS AND FATS 12 hours
   - Processing of oilseeds
   - Rendering
   - Expression
   - Solvent
   - Degumming
   - Refining
   - Bleaching
   - Deodorization
   - Fractionation
   - Winterization
   - Hydrogenation
   - Interesterification
   - Esterification
   - Emulsification
   - Packaging

3. CHARACTERISTICS OF OIL, FATS AND FATTY ACIDS 3 hours
   - Classification
   - Characteristics of edibles oil, fats and fatty acids
   - Physical and chemical properties

4. SPOILAGE 3 hours
   - Oxidative Rancidity
   - Hydrolytic Rancidity
   - Polymerization

5. MANUFACTURING 10 hours
Manufacture of vegetable ghee and oil
Manufacture of margarine
Manufacture of by-products
Manufacture of mayonnaise
Manufacture of frying oils

BOOKS RECOMMENDED:
1- S.A. Termazi, Vegetable Oils and Fats, Ferozesons, Lahore
2- T.J. Weiss, Food Oils and Their Uses, AVI, Westport
INSTRUCTIONAL OBJECTIVES

On completion of this course, the students will be able to:

1. **UNDERSTAND THE BASICS OF OILS AND FATS**
   - Describe the history, growth and production of oil and fat industry
   - Classify and differentiate between Lipids, oils, fats, ghee and wax
     - Describe the important sources of oils and fats
     - Discuss the important uses of oils and fats
     - Explain the differences in chemical nature of oil and fat, ghee and waxes
     - Differentiate animal and plant fat

2. **UNDERSTAND THE EXTRACTION AND PROCESSING OF OIL AND FATS**
   - Explain the extraction of oil from oilseeds
   - Discuss rendering, expression and solvent extraction of oil
   - Enlist various machines used in extraction of oils
   - Describe various unit operations involved in processing of oil and fat
   - Describe refining of vegetable oils
   - Explain removable of free fatty acids
   - Explain elimination of coloring matter in oil
   - Discuss the enrichment of oil and ghee with vitamins
   - Explain how unsaturated fatty acids are changed to saturated fatty acids
   - Discuss the use of catalyst during hydrogenation
   - Explain the change from sis to Trans fatty acids during interesterification
   - Discuss anti-nutritive value of transfatty acids

3. **UNDERSTAND THE CHARACTERISTICS OF OILS AND FATS**
   - Discuss the physical and chemical properties of oils and fats
   - Explain saturated and unsaturated fatty acids
   - Differentiate between sis and trans fatty acids

4. **UNDERSTAND THE SPOILAGE OF OILS AND FATS**
   - Explain oxidative and hydrolytic rancidity and its control
   - Define antioxidants and explain its mechanism
   - Explain polymerization
   - Explain changes during frying of oils
5. MANUFACTURING OF OIL, FATS AND PRODUCTS
   Describe commercial manufacturing of vegetable ghee and oil
   Differentiate between margarine and butter
   Explain manufacturing of margarine and spreads
   Explain the composition and processing steps of
   preparation of mayonnaise and salad oils
   Explain the chemistry of frying
   Identify oil and fat suitable for frying
   Explain the problems of flavor deterioration in storage of oil and fat
   Explain rendering of beef and mutton fat
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<td>Extraction of oils and fats</td>
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<td>Measurement of color</td>
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<td>Determination of melting point of oil</td>
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<td>5</td>
<td>Determination of melting point of butter</td>
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<td>Determination of specific gravity</td>
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<td>Determine the peroxide value of oil</td>
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<td>Determine the saponification value of oil</td>
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<td>9</td>
<td>Determine the iodine value of oil</td>
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<td>10</td>
<td>Visit to oil and fat industry</td>
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<td>11</td>
<td>Preparation of mayonnaise</td>
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<td>12</td>
<td>Study role of emulsifying agents</td>
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<td>Determine the quality of frying oils</td>
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AIM: At the end of the course the students will be able to understand the technology involved in the processing of sugar and confectionery.

COURSE CONTENTS

1. GENERAL 2 hour
   - History and growth
   - Production statistics of sugar cane and sugar beet
   - Utilization of sugar
   - Composition and nutritional value

2. INDIGENOUS TECHNOLOGY -- SUGAR PROCESSING 2 hours
   - Small scale sugar production
   - Gur
   - Khund
   - Shakar

3. SUGAR MANUFACTURING 6 hours
   - Unit operations
   - Juice extraction
   - Purification
   - Heating
   - Evaporation
   - Crystallization
   - Crystallization in motion

4. REFINING 10 hours
   - Affination
   - Clarification
   - Carbonation
   - Sulphitation
   - Phosphitation
   - Crystallization
   - Centrifugation
   - Drying
   - Bagging
   - Storage
Factors affecting sugar processing
Recent advances in sugar technology
Packaging and storage of sugar
4.14 Properties of sugar
4.15 Quality control

5. CONFECTIONERY 12 hours

Confectionery industry in Pakistan
Ingredients & Classification, Composition and nutritional value
Sugar confectionery: formulation and manufacture
Processing of hard boiled sweets, toffee and fudge
Formulation and manufacture processes of gums and jellies
5.7 Formulation and manufacture of chocolate confectionery
5.8 Quality control

BOOKS RECOMMENDED:
FPPT 252  SUGARS AND CONFECTIONERY TECHNOLOGY.

INSTRUCTIONAL OBJECTIVES

On completion of this course, the students will be able to:

1. **UNDERSTAND THE FUNDAMENTALS OF SUGAR INDUSTRY**

   - Describe the history and growth of sugar processing industry
   - Describe the production statistics of sugar cane and sugar beet in Pakistan
   - Enlist major items for utilization of sugar
   - Explain the chemical composition and nutritional value of all sugar sources

2. **KNOW THE INDEGENOUS TECHNOLOGY**

   - Discuss the status of small-scale sugar production in Pakistan
   - Enlist the indigenous products and discuss their processing (gur, khund, shakar)

3. **UNDERSTAND MANUFACTURING OF SUGAR**

   - Discuss all the unit operations involved in sugar manufacturing

4. **UNDERSTAND THE REFINING PROCESS OF SUGAR**

   - Define affination and its significance
   - Define clarification and its role
   - Define carbonation and its significance
   - Define sulphitation, phosphitation
   - Explain the process of crystallization
   - What is the importance of centrifugation
   - Explain the role of drying
   - Define bagging, storage
   - Discuss the factors affecting the processing of sugars
     - Discuss the recent advances in sugar technology
     - Discuss packaging and storage of sugar
     - Describe properties of sugars
     - Discuss the role of quality control in sugar industry

5. **UNDERSTAND THE PROCESSING OF CONFECTIONS**

   - Discuss the status of confectionary industry in Pakistan
   - Describe classification, composition, and nutritional value
   - Discuss the formulation and manufacturing of sugar confectionary
describe the processing of hard boiled candies, toffee and fudges

describe the processing of gums and jellies

describe the processing of chocolate confectionary

describe the role of quality control in the confectionary industry.
LIST OF PRACTICALS

1. Analysis of sugar for TSS
2. Analysis of sugar for pH
3. Analysis of sugar for fiber
4. Analysis of sugar for ash
5. Analysis of sugar for polarization
6. Clarification of raw juice
7. Determine the density of juice by Picnometer
8. Determine the turbidity of juice by Turbidity meter
9. Determine total sugar of juice
10. Visit to sugar industry
11. Visit to confectionery unit
12. Preparation of candy, toffee and other sugar based confectionery
13. Determine inversion of sugar
AIM: The student will be able to understand the basic principles of general and food microbiology and the harmful and beneficial effects of microbial activities during processing and preservation.

COURSE CONTENTS

1 INTRODUCTION TO MICROBIOLOGY 4 hours
   Scope of microbiology
   Evolution of microbiology
   Classification of microorganisms
   Microorganisms important in food

2 CHARACTERISTICS OF MICROORGANISMS 6 hours
   Bacteria
   Moulds
   Yeasts
   Viruses

3 MICROORGANISMS AND DISEASE 6 hours
   Pathogens, virulence and infection
   Resistance and immunity
   Food and water-borne diseases

4 FOOD AS A SUBSTRATE FOR MICROORGANISMS 8 hours
   Nutrients
   Moisture
   Hydrogen ion concentration (pH)
   Oxidation reduction potential
   Inhibitory substances and biological structure

5 CONTAMINATION OF FOODS DURING PROCESSING AND PRESERVATION 8 hours
   From green plants and fruits
   From animals
   From sewage
   From soil
From water
From air
During handling and processing
During preservation
Harmful effects of microbes
Beneficial effects of microbes

6  GENERAL PRINCIPLES OF MICROBIAL SPOILAGE  
8 hours

- Microbial food spoilage
- Characteristics of some spoilage organisms
- Factors affecting kind and number of microorganisms in food
- Factors affecting the growth of microorganisms in food
- Chemical changes caused by microorganisms

7  CONTROL OF MICROORGANISMS  
8 hours

- Fundamentals of microbial control
- Control by physical means
- Control by chemical agents
- Antibiotics and other chemotherapeutic agents

8  PRODUCTION OF CULTURES FOR FOOD FERMENTATIONS  
8 hours

- General principles of culture preparation and maintenance
- Bacterial cultures
- Yeast cultures
- Mould cultures

9  FOOD BORNE DISEASES  
8 hours

- Foodborne infections
- Foodborne intoxications
- Nonbacterial food poisoning

RECOMMENDED BOOKS

INSTRUCTIONAL OBJECTIVES

On the completion of this course, the student will be able to:

1. UNDERSTAND THE HISTORICAL DEVELOPMENT OF MICROBIOLOGY
   - Enlist earliest scientists who discovered Microbiology
   - Describe the role of Leuwenhoek, Koch, Smith, Pasteur, Fleming and Lister
   - Define cell
   - Explain the difference between plant and animal cells with the help of diagrams
   - Differentiate between procaryotes and eucaryotes
   - Define species, genus, tribe, family, order, class, phylum and kingdom
   - Explain classification of microorganisms

2. UNDERSTAND THE CHARACTERISTICS OF MICROORGANISMS
   - Define and identify different types of bacteria
   - Describe the general characteristics of bacteria
   - Enlist important genera of bacteria useful in food microbiology
   - Explain the general characteristics of yeasts
   - Discuss the yeasts of industrial importance
   - Explain the general characteristics of moulds
   - Differentiate between bacteria, yeast and mould
   - State general characteristics of virus

3. UNDERSTAND THE RELATIONSHIP OF MICROORGANISMS AND DISEASE
   - Define pathogens, virulence, infection, resistance and immunity
   - Enlist types of immunity
   - Explain beneficial role of immunity in nature
   - Enlist different infectious diseases common in man

4. UNDERSTAND THE ROLE OF FOOD AS A SUBSTRATE FOR MICROORGANISMS
   - Define pH
   - Explain the importance of pH for the growth of microorganisms
   - Describe the concept of water activity
Explain the mechanism of oxidation-reduction potential
Discuss different inhibitory substances present in food
Describe the importance of biological structure of food

5 UNDERSTAND THE MECHANISM OF FOOD CONTAMINATION DURING FOOD PROCESSING AND PRESERVATION
Identify species of microorganisms contaminating fruits and vegetables
Enlist sources of contaminating microorganisms from animals
Explain the mechanism of foods getting contaminated by sewage
Describe contamination of foods from soil
Discuss water as a source of contamination
Explain how microorganism in air cause contamination of foods
Discuss how contamination takes place during handling, processing and preservation of different food commodities and its control
Explain the mechanisms, reactions and control of contamination.

6 UNDERSTAND PRINCIPLES OF MICROBIAL SPOILAGE
Define microbial spoilage
List of types of microbial spoilage
Classify foods on the basis of ease of spoilage
List main groups of micro-organisms
Explain the factors affecting the growth of microorganisms in food
Describe the chemical changes caused by microorganisms in food

7 UNDERSTAND CONTROL OF MICROORGANISMS
State three principal reasons for practicing methods of microbial control
State the physical methods applied to control microorganisms
Enlist major groups of chemical antimicrobial agents
Define antibiotics and chemotherapeutic agents
Explain the function of antibiotics

8 UNDERSTAND THE PRODUCTION OF CULTURES FOR FOOD FERMENTATIONS
State general principles of culture maintenance and preparation
Explain pure and mixed cultures
Explain the use of bacterial cultures in food industry
Explain the use of yeast for bread and malt beverages
Explain the use of mould cultures for cheese production

9 UNDERSTAND FOODS IN RELATION TO DISEASE
Classify foodborne diseases
Define food poisoning and infection
Give examples of bacteria for foodborne intoxications and infections
Explain Butulismand Salmonellosis
Describe non-bacterial foodborne diseases
Explain the significance of Aflatoxin

FPPT 273 GENERAL AND FOOD MICROBIOLOGY

LIST OF PRACTICALS 96 hours
1  Safety precautions in microbiology lab
2  Introduction to equipment in the microbiological lab
3  Demonstrate the use of microscope
4  Examination of plant and animal cells
5  Examination of yeasts, moulds and bacteria
6  Demonstrate the use of autoclave and hot air oven for sterilization
7  Preparation of culture media
8  Cultivation and isolation of bacteria
9  Examination of bacterial colonies
10 Determination of bacterial numbers
11 Staining reagents and procedures
12 Microbiological examination of important food microbes
13 Examination of spoiled canned foods for possible microorganisms
14 Find optimum growth temperature for an organism
15 Determination of microbial load in different food samples
16 Perform swab and dilution tests for assessing cleaning efficiency.
17 Visit the microbiology laboratory of a university / research institute
18 Visit to a food industry to observe role of microbiology
AIM: The student will be able to understand the food components in relation to food processing and preservation, and will be able to use the principles and procedures of analytical and instrumental techniques employed in food analysis.

COURSE CONTENTS

1. WATER 4 hours
   - Nature in foods
   - Water activity and food spoilage
   - Physical and chemical properties
   - Hard and soft waters
   - Water treatment process
   - Effect of water process on processed foods

2. CARBOHYDRATES 8 hours
   - Classification
   - Chemical structure
   - Physical and chemical properties
   - Effect of processing
   - Qualitative tests for carbohydrates
   - Quantitative tests for sugars
   - Estimation of starch

3. LIPIDS 8 hours
   - Classification
   - Fatty acids
   - Physical properties
   - Chemical properties
   - Autooxidation and rancidity
   - Functional properties in foods
   - Effect of processing
   - Physical constants of fat
   - Chemical constants of fat

4. PROTEINS 8 hours
   - Classification
   - Amino acids
   - Physical and chemical properties
   - Functional properties in foods
   - Effect of processing
   - Quantitative determination of protein

5. VITAMINS 4 hours
Classification
Functional properties in foods
Effect of processing
Determination of Vitamin-C

6. OTHER CONSTITUENTS 8 hours
   Mineral elements
   Pigments
   Aromatic compound
   Antinutritional compounds
   Organic acids
   Enzymes

7. SAMPLING TECHNIQUES 4 hours
   Perfect and composite sample
   Sampling procedure
   Sampling instruments
   Sample grinding
   Sample storage

8. PROXIMATE ANALYSIS 12 hours
   Introduction
   Determination of moisture
   Determination of ash
   Determination of crude protein
   Determination of crude fat
   Determination of crude fiber
   Determination of nitrogen

9. PRINCIPLES OF INSTRUMENTATION 4 hours
   Introduction to
   Electromagnetic spectrum, Radiant energy, Light transmission
   Principles of emission and absorption of light, Absorption spectrum

10. INTRODUCTION TO INSTRUMENTAL TECHNIQUE 4 hours
    Introduction
    Principles and types of chromatography
    pH
    Polarimetry
    Refraction of light
    Flame-photometry
RECOMMENDED BOOKS

12. Iqtedar Ahmad Khalil and Fazil Manan, Chemistry - Bio-analytical Chemistry.
13. H.H. Baner et al., Instrumental Analysis.
INSTRUCTIONAL OBJECTIVES

On completion of this course, the students will be able to:

1. UNDERSTAND THE NATURE AND PROPERTIES OF WATER
   - Explain the nature of water as it exists in foods
   - Explain the relationship between water activity and food spoilage
   - State the physical properties
   - State the chemical properties
   - Explain the nature of hard and soft waters
   - Explain the role of hard and soft waters
   - Describe the methods of water treatment
   - Explain the role of water on the quality and shelflife of foods.

2. UNDERSTAND THE NATURE AND PROPERTIES OF CARBOHYDRATES
   - Distinguish between various classes of carbohydrates
   - Explain various physical properties of each
   - Discuss the chemical structure of each
   - Explain various chemical properties of each
   - Discuss the role of physical and chemical properties in food processing
   - Discuss the effect of processing on carbohydrates

3. UNDERSTAND THE NATURE AND PROPERTIES OF LIPIDS
   - Describe the structure of fatty acids
   - Explain the classifications
   - Describe the physical properties
   - Describe chemical properties
   - Explain the functional properties
   - Explain the effect of processing
   - Explain deteriorative changes.

4. UNDERSTAND THE NATURE AND PROPERTIES OF PROTEINS
   - Describe the structure of amino acids
   - Explain classification
   - Discuss physical properties
   - Discuss chemical properties
   - Explain Millard reaction
   - Discuss functional properties of various proteins especially gluten, casein and albumin
   - Discuss effect of processing.
5. UNDERSTAND THE NATURE AND PROPERTIES OF VITAMINS
   Explain classification
   Discuss functions of fat-soluble vitamins in food processing
   Discuss functions of water-soluble vitamins in food processing
   Discuss effect of processing on their nature and properties

6. UNDERSTAND THE NATURE AND PROPERTIES OF OTHER CONSTITUENTS
   Describe effect of mineral elements on food
   Differentiate between types of pigments
   Differentiate between various aromatic compounds
   Describe anti-nutritional compounds in selected foods
   Describe the nature of organic acids in foods
   Describe the classification and properties of enzymes.

7. UNDERSTAND SAMPLING TECHNIQUES
   Illustrate the significance of food analysis in the food industry
   Define quantitative and qualitative analysis
   Define perfect and composite sample
   Explain sampling procedure and enlist sampling instruments
   Explain procedure for sample grinding
   Describe procedure for sample storage

8. KNOW THE PROXIMATE ANALYSIS
   Define proximate analysis
   State methods of analysis for moisture
   State methods of analysis for crude fat
   State methods of analysis for ash
   State methods of analysis for crude fiber
   State methods of analysis for nitrogen-free extract

9. UNDERSTAND INSTRUMENTATION PRINCIPLES
   Describe the importance, need and scope of instrumentation
   Define electromagnetic spectrum
   Define the nature of radiant energy
   Define transmission of light through solutions and solids
   Define transmission of white light
   State the principle of emission and absorption of light
   Describe the process of absorption by molecules
   Define absorption spectrum
   Define principles of spectrophotometry.

10. UNDERSTAND INSTRUMENTAL TECHNIQUES
    Illustrate the importance of instrumental techniques
State the principles of chromatography
Enlist types of chromatography
Describe HPLC, gas chromatography, TLC and paper chromatography
State principles and application of pH meter
Define polarized light
Discuss principles and application of polarimeter
Define refractive index
Explain the working of refractometer
Explain principles of flame photometry
Describe instrumental methods for texture measurement
Define viscosity
Discuss measurement of viscosity
**FPPT-283 FOOD CHEMISTRY AND INSTRUMENTATION**

**LIST OF PRACTICALS**

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<td>1</td>
<td>Study water activity in foods</td>
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<td>Visit to water treatment plant</td>
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<td>3</td>
<td>Study the effect of reducing sugars on color of potato chips</td>
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<td>4</td>
<td>Study the effect of reducing sugars and amino acid content on browning in potato chips</td>
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<td>Preparation of invert sugar by acid hydrolysis</td>
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<td>Acid hydrolysis of starch</td>
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<td>7</td>
<td>Maillard reaction</td>
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<td>8</td>
<td>Demonstration of heat denaturation of various proteins</td>
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<td>Physical and chemical properties of lipids</td>
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<td>Demonstration of effect of baking on browning and flavor</td>
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<td>Determination of moisture by different methods</td>
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<td>15</td>
<td>Determination of ash and mineral matter</td>
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<td>Determination of nitrite and nitrate</td>
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<td>Determination of sodium, potassium, and calcium by flame</td>
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<td>Physical and chemical analysis of fats and oils</td>
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<td>24</td>
<td>Determination of vitamin C</td>
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<td>25</td>
<td>Visit to a research laboratory</td>
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لا يخرج من جامعك
لا يدخل الجاهلي فاغض
بأله غرم عذابكم عقوبتهم واذباعهم الصلب
ليس ولن تنصر ولا تصرف
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fois فين الذكر لا الهالله
فترة مؤقتة
ينصل فيه أيضاً وكالله ولكفله الخلق والشمسية في الكلاس
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117
تدریس مقتصر

عمور مقامی قیام پاکستان کے بعد ورثین مساکن کے اصل عمل کے لیے بوراپا کے خصوصی متقاضی ہوئے تھے۔

اس وظیفے کے لیے بوراپا
 تشکیل سازمان

علی خان

دریس مقاومت

عمری سند: پیام دیجیتال که از اولی توصیف که مختلف محیط زیستی که

حضور نشان دهنده طول این تجربه بوده است.

موارد کا مطلب یا کار

علی گریزی سے دریافت کی تجربات کر کے

موارد کی انتخاب کر کے

کچھ نیشن اور محاورات کے موضوعات پر کار کے کر کے نتیجہ بیان کر کے

کچھ تربیت کے موضوع کام کر کے

علی و اشارات کے اور همیشہ درس زمین کی

نامعلوم کا عالمی طور پر پیش کر

کامکیا کی بنا نظیر دل بیان کر کے

کامکیا شن اشکال کر کے

لیا احتمال کی بھی کا انتخاب کر کے
MGM-321 BUSINESS COMMUNICATION

Total contact hours
Theory: 32 Hrs.
Pre-requisites: The students shall already be familiar with the language concerned.

AIMS The course has been designed to enable the student to:
1. Develop communication skills.
2. Understand basic principles of good and effective business writing in commercial and industrial fields.
3. Develop knowledge and skill to write technical report with confidence and accuracy.

COURSE CONTENTS

1. COMMUNICATION PROCESS.
   6 Hours
   Purposes of communication
   Communication process
   Distortions in communication
   Consolidation of communique
   Communication flow
   Communication for self-development

2. ORAL COMMUNICATION SKILLS.
   6 Hours
   Significance of speaking.
   Verbal and non-verbal messages.
   Strategic steps of speaking.
   Characteristics of effective oral messages.
   Communication Trafficking.
   Oral presentation.

3. QUESTIONING SKILLS.
   3 Hours
   Nature of question.
   Types of questions.
   Characteristics of a good question.
   Questioning strategy

4. LISTENING SKILLS.
   5 Hours
   Principles of active listening.
   Skill of active listening.
   Barriers to listening.
   Reasons of poor listening.
   Giving feedback.
5. INTERVIEWING SKILLS. 3 Hours
   Significance of interviews.
   Characteristics of interviews.
   Activities in an interviewing situation
   Types of interviews.
   Interviewing strategy.

6. REPORT WRITING. 3 Hours
   Goals of report writing
   Report format.
   Types of reports.
   Report writing strategy.

7. READING COMPREHENSION. 2 Hours
   Reading problems.
   Four reading skills.

8. GROUP COMMUNICATION. 4 Hours
   Purposes of conducting meetings.
   Planning a meeting.
   Types of meetings.
   Selection for group form meeting.
   Group leadership skills.
   Running a successful meeting.
   Active participation techniques.

RECOMMENDED BOOKS
INSTRUCTIONAL OBJECTIVES

1. UNDERSTAND THE COMMUNICATION PROCESS.
   - State the benefits of two-way communication.
   - Describe a model of communication process.
   - Explain the major communication methods used in an organization.
   - Identify the barriers to communication and methods of overcoming these barriers.
   - Identify misconceptions about communication.

2. UNDERSTAND THE PROCESS OF ORAL.
   - Identify speaking situations with other peoples.
   - Identify the strategies for speaking.
   - Identify the characteristics of effective speaking.
   - State the principles of one-way communication.
   - State the principles of two-way communication.
   - Identify the elements of oral presentation skills.
   - Determine the impact of non-verbal communication on oral communication.

3. DETERMINE THE USES OF QUESTIONING SKILLS TO GATHER AND CLARIFY INFORMATION IN THE ORAL COMMUNICATION PROCESS.
   - Identify different types of questions.
   - Determine the purpose of each type of question and its application.
   - Identify the hazards to be avoided when asking questions.
   - Demonstrate questioning skills.

4. DEMONSTRATE THE USE OF ACTIVE LISTENING SKILLS IN THE ORAL COMMUNICATION PROCESS.
   - State the principles of active listening.
   - Identify skills of active listening.
   - Identify barriers to active listening.
   - State the benefits of active listening.
   - Demonstrate listening skills.
   - Explain the importance of giving and receiving feedback.

5. Determine the appropriate interview type for the specific work-related situation and conduct a work-related interview.
   - State the significance of interviews.
   - State the characteristics of interviews.
   - Explain the activities in an interviewing situation.
   - Describe the types of interviews.
   - Explain the interviewing strategy.
   - Prepare an instrument for a structured interview.
6. **PREPARE A REPORT OUT-LINE, BASED ON SUBJECT MATTER AND AUDIENCE.**
   - Identify the different types of reports.
   - Determine when to use an informal or formal report presentation.
   - Identify the stages of planning a report.
   - Identify the parts of a report and choose the parts appropriate for each type of report.
   - Draft a report outline.

7. **DEMONSTRATE READING COMPREHENSION.**
   - Identify major reading problems.
   - Identify basic reading skills.
   - State methods of previewing written material.
   - Identify methods of concentration when reading.
   - Demonstrate reading comprehension.

8. **UNDERSTAND THE PRINCIPLES OF GROUP COMMUNICATIONS.**
   - State the purpose and characteristics of major types of meeting.
   - Explain responsibilities of a meeting/committee.
   - Identify problems likely to be faced at meeting and means to overcome these problems.
   - Distinguish between content and process at meetings.
   - Explain the key characteristics of a good group facilitator.
MGM-311    INDUSTRIAL MANAGEMENT AND HUMAN RELATIONS.

Total Contact Hours

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AIMS The study of this subject will enable the student to develop the management skill, acquaint him with the principles of management and human relations and develop psychological approaches to solve the labour problems.

COURSE CONTENTS

1. INDUSTRIAL PSYCHOLOGY. 2 Hours
   - History and definition.
   - Nature and scope.

2. LEADERSHIP 1 Hour
   - Definition and types.
   - 2.3 Qualities of a good leader.

3. MOTIVATION 2 Hours
   - Definition.
   - Types (Financial and nonfinancial motives).
   - Conflict of motives.

4. MORALE 1 Hour
   - Importance.
   - Development.
   - Measurement.

5. HUMAN ENGINEERING. 1 Hour
   - Importance of human factor in industry.
   - Man-machine system.
   - Strategy for making allocation decisions.

6. INDUSTRIAL FATIGUE AND BOREDOM. 2 Hours
   - Definition and distinction.
   - Psychological causes.
   - Objective causes.
   - Prevention

7. INDUSTRIAL ACCIDENTS 2 Hours
   - Psychological causes.
   - Objective causes.
   - Prevention
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<td><strong>JOB EVALUATION</strong></td>
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17. **ROLE OF FOREMAN IN MANAGEMENT.**

   Foreman's abilities.
   Duties and functions.

**BOOKS RECOMMENDED:**

MGM-311 INDUSTRIAL MANAGEMENT AND HUMAN RELATIONS.

INSTRUCTIONAL OBJECTIVES

At the completion of this course, the students will be able to:

1. KNOW INDUSTRIAL PSYCHOLOGY.
   Describe brief history of industrial psychology.
   Describe in detail definition of industrial psychology.
   State nature and scope of industrial psychology.

2. KNOW LEADERSHIP.
   Define leadership.
   Describe types of leadership.
   State qualities of a good leader.

3. UNDERSTAND MOTIVATION.
   Define motivation.
   Describe financial and non-financial motives.
   Explain conflict of motives.

4. KNOW MORALE.
   State importance of morale.
   Describe development of morale.
   State the method of measurement of morale.

5. UNDERSTAND HUMAN ENGINEERING.
   Explain importance of human engineering in the industry.
   Explain man-machine system.
   Explain strategy for making allocation decisions.

6. UNDERSTAND INDUSTRIAL FATIGUE AND BOREDOM.
   Define fatigue and boredom.
   Describe psychological causes of fatigue and boredom.
   Describe objective causes of fatigue and boredom.
   Explain measures to prevent fatigue and boredom.

7. UNDERSTAND INDUSTRIAL ACCIDENTS.
   Explain psychological causes of industrial accidents.
   Explain objective causes of industrial accidents.
   Explain measures to prevent industrial accidents.

8. UNDERSTAND INDUSTRIAL PREJUDICE.
   Define prejudice.
   Explain causes of industrial prejudice.
   Explain remedies of industrial prejudice.
9. **UNDERSTAND THE SIGNIFICANCE OF PUBLIC RELATIONS.**
   Explain importance of public relations.
   Explain functions of public relations.

10. **UNDERSTAND THE NEED FOR GUIDANCE AND COUNSELING.**
    State importance of guidance and counselling.
    Explain the role of guidance and counselling in choosing the job.
    Describe help of guidance and counselling during service.

11. **UNDERSTAND JOB EVALUATION.**
    Explain importance of job evaluation.
    Explain methods of job evaluation.
    Explain job satisfaction.
    Explain work simplification.

12. **UNDERSTAND INDUSTRIAL MANAGEMENT.**
    Define management.
    State functions of management.
    Enlist subdivision of management.
    Explain objectives of industrial management.

13. **UNDERSTAND TRAINING AND ITS EFFECTS.**
    Describe the recruitment procedure of employees in an industrial concern.
    Explain training.
    Identify the kinds of training.
    Explain the effects of training on production and product cost.

14. **UNDERSTAND THE EFFECT OF WORKING CONDITION ON EFFICIENCY.**
    Explain importance of working condition.
    Describe air-conditioning, ventilation, lighting, and noise.
    State the effects of good working conditions on efficiency and per unit cost.

15. **UNDERSTAND TIME AND MOTION STUDY.**
    Explain the concept.
    Describe the importance of work study.
    Explain the sequence of motion study.
    State the principles of motion study.
    Describe the steps for carrying out time study.
    Explain the method of determination of operations time.

16. **UNDERSTAND THE METHODS OF QUALITY CONTROL.**
    Define quality control
16.2 Explain methods of quality control.

17. UNDERSTAND THE ROLE OF FOREMAN IN AN INDUSTRIAL UNDERTAKING.
   - Explain ability of the foreman.
   - Enlist duties of foreman.
   - Describe functions of foreman as middle management.
AIM: The student will be able to understand the general principles of meat, poultry, and fish processing technology.

COURSE CONTENTS

1. **MEAT AND MEAT PRODUCTS PROCESSING**
   40 hours
   - Types, composition
   - Slaughtering, cutting, and dressing of animals
   - Postmortem changes
   - Composition and grading of meat
   - Processing and preservation
   - Canning
   - Freezing
   - Salting
   - Smoking
   - Dehydration
   - Spoilage and its control
   - Cooked meat products
   - Sausages
   - Cured and smoked meats
   - Reduced and low fat meat products
   - Canned meat formulations
   - Restructured meat products

2. **POULTRY PROCESSING**
   30 hours
   - Classes of poultry meat
   - Nutritive value of poultry meat
   - Commercial methods of slaughtering and dressing
   - Post slaughter handling
   - Storage and preservation of poultry meat
   - Freezing of poultry meat
   - Spoilage and its control

3. **EGGS**
   10 hours
   - Composition
   - Handling
   - Candling and washing
   - Coating
3.5 Packaging and storage
3.6 Egg processing
3.7 Spoilage and its control

4. FISH
4.1 Fish industry in Pakistan
4.2 Fresh water and marine fish
4.3 Classification of fish meat
4.4 Quality characteristics
4.5 Commercial handling
4.6 Criteria for freshness
4.7 Fish processing
4.8 Canning
4.9 Freezing
4.10 Drying
4.11 Spoilage and its control

RECOMMENDED BOOKS
INSTRUCTIONAL OBJECTIVES

On completion of this course, the students will be able to:

1. **UNDERSTAND MEAT AND MEAT PRODUCTS PROCESSING**
   - Give the composition of beef and mutton
   - Explain factors affecting the composition of muscle
   - Explain slaughtering, cutting and dressing of animals
   - Explain the composition and grading of meat in general
   - Discuss processing and preservation of meat
   - Explain the processes for canning and freezing
   - Describe special processing techniques for chilling, salting, braining, smoking, curing, drying, freezing and canning of meat
   - Explain the spoilage of meat and its control
   - Discuss how sausages are prepared
   - Explain how low-fat meat products are produced
   - Explain the some formulation of canned meat products
   - Discuss the processing of restructured meat products
   - Enlist meat by-products
   - Describe preparation and utilization of meat by-products

2. **UNDERSTAND POULTRY PROCESSING**
   - Describe commercial methods of dressing
   - Explain postslaughter handling and storage of poultry meat
   - Give the composition and classification of poultry
   - Describe processing techniques for freezing and canning of poultry meat
   - Discuss how to control spoilage
   - Enlist poultry by-products
   - Describe preparation and utilization of poultry by-products

3. **UNDERSTAND EGG PROCESSING**
   - Explain nutritive values of eggs
   - State methods of egg handling
   - Explain grading of eggs
   - Describe suitable storage techniques of egg
   - Explain quality control in egg and egg products.

4. **UNDERSTAND FISH PROCESSING**
   - 4.1. Describe commercial catching methods, handling and processing of fish
   - 4.2. Discuss the criteria for freshness
   - 4.3. Give the composition and classification of fish meat
   - 4.4. Explain the processing of fish meat
   - 4.5. Discuss how spoilage is controlled
   - 4.6. Enlist fish by-products
   - Describe preparation and utilization of fish by-products
LIST OF PRACTICALS

1  Visit to a slaughter house
2  Visit to a poultry farm
3  Visit to a fish harbor site
4  Identification of freshness of meat
5  Identification of freshness of poultry
6  Identification of freshness of fish
7  Identification of freshness of eggs
8  Preparation of sausages
9  Salting and freezing of fish
10 Preservation of poultry meat
11 Preservation of fish meat
12 Preservation of eggs
13 Preservation of meat by smoking and curing
14 Determination of chemical composition of meat
15 Meat preservation by canning
16 Meat preservation by freezing
17 Meat product preparation
AIM: At the end of the course the students will be able to understand the processing and preservation technologies involved in the beverage industry

COURSE CONTENTS

1. GENERAL 6 hour
   - Introduction
   - History
   - Classification
   - Beverage industry in Pakistan
   - Nutritional status

2. INGREDIENTS FOR BEVERAGES PRODUCTION 16 hours
   - Water, sources and purification
   - Types of water purification systems
   - Fruit pulps
   - Juices
   - Concentrates and other additives
   - Sweeteners
   - Sugar and artificial sweeteners
   - Colors
   - Flavors
   - Preservatives

3. BEVERAGES PROCESSING 30 hours
   - Unit operations in production
   - Raw material handling and storage
   - Fruit based beverages
   - Types, composition and nutritional value
   - Nectar
   - Cordial
   - Squash
   - Syrup
   - Juice concentrates
   - Fruit flavored powders
   - Barley water
   - Carbonated beverages
   - Synthetic beverages
Lowcalorie beverages
Drymixbeverages
Formulations
Tea processing
Bottled water manufacturing
Traditionalbeverages production
Vegetable juice
Trouble shooting in beverage industry
Quality control in beverage industry
Plant sanitation
Fermented beverages

4. RECENT ADVANCES IN BEVERAGE TECHNOLOGY 12 hours

Recent developments in beverage technology
Role of bio technology in beverage technology.
Dietetic drinks
Energy drinks

BOOKS RECOMMENDED:
INSTRUCTIONAL OBJECTIVES

On completion of this course, the students will be able to:

1. UNDERSTAND BEVERAGE INDUSTRY

   - Describe the history and growth of beverage industry
   - Give a brief introduction to beverage industry in Pakistan
   - Explain the classification of beverage industries as hot or cold, carbonated or non-carbonated, alcoholic and non-alcoholic
   - Explain the importance of beverages in various climatic conditions
   - Explain the nutritional status of beverages

2. UNDERSTAND THE INGREDIENTS USED IN BEVERAGES PRODUCTION

   - Explain the importance of water in beverage industry
   - Discuss the different sources
   - Explain purification systems
   - Discuss nutritional status of mineral water
   - Explain each step of processing of mineral water and its standards
   - Give a brief introduction to fruit drinks as juices, sherbats, etc.
   - Explain the composition of some common fruit juices
   - Explain the processing of fruit juice
   - Discuss the various steps in processing and the machinery involved in fruit drink preparation
   - Explain the composition of some common vegetables (tomatoes, carrots, cucumber) suitable for juice making
   - Explain the common steps used in processing of vegetable juice
   - Describe how the enzymes are inactivated
   - Discuss use of sugar and artificial sweeteners
   - Explain the use of different flavours and colors and their chemical nature and function
   - Explain the use of preservatives in increasing shelf life of beverages and juices
   - Explain the harmful effects of beverages.

3. UNDERSTAND THE TECHNOLOGY INVOLVED IN PROCESSING OF BEVERAGES

   - Explain each unit operation involved in production of beverages
Givedetails of the technology involved in processing and the various machines used in beverage processing
Give a brief introduction and history of the soft drink industry
Explain the variety of soft drinks, squashes, citrus drinks, lemonade and cordials
Explain the formulation and functions of ingredients used in common soft drinks.
Explain the role of the components of the soft drinks
Describe the kinds of additives used in beverages
Explain the enrichment of drinks
Describe the nutraceuticals
Explain the history and production of tea and coffee.
Describe the varieties of tea and give differences in black, green, fruit, Chinese tea, and herbal tea.
Describe the composition of various teas and also explain which component of the tea is useful
Explain the fermentation process in the tea industry
Explain the chemical changes brought in and their effect on flavor and color of tea and coffee during processing
Give a review of troubleshooting in the beverage industry
Discuss the processes involved in traditional beverage production
Discuss in detail the quality control in the beverage industry
Discuss the role of plant sanitation in the beverage industry
Discuss raw material handling and storage of the beverage industry.

4. UNDERSTAND THE RECENT ADVANCES IN BEVERAGE TECHNOLOGY
4.1 Discuss in detail the advancements made in beverage technology
4.2 Discuss the role of bio technology in advancement of beverage industry
FPPT 323(Rev.)  BEVERAGES PROCESSING TECHNOLOGY.

LIST OF PRACTICALS  96 hours

1  Water treatment
2  Preparation of fruit juices
3  Preparation of vegetable juices
4  Preparation of tea
5  Preparation of carbonated beverages
6  Preparation of non-carbonated beverages
7  Preparation of fermented beverages
8  Chemical analysis of beverages
9  Visit to beverage industry
10 Carbonation of juice
11 Bottling of juice
12 Determination of water quality
FPPT 332 FOOD PACKAGING

Total Contact Hours

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AIM: The student will be able to understand various types of packaging material and the use in food processing and preservation industry.

COURSE CONTENTS

1. INTRODUCTION
   4 hours
   - Historical background
   - Reasons for packaging
   - Graphics and design

2. FUNCTIONS OF PACKAGING
   10 hours
   - Transportation
   - Protection
   - Identification
   - Nature of product

3. TYPES OF PACKAGING
   10 hours
   - Conventional
   - Modern
   - Aseptic packaging
   - Types of packaging materials
   - Principles of packagedesign

4. RECENT TRENDS IN PACKAGING
   8 hours
   - Retortable packaging
   - Aseptic packaged food
   - Free oxygen scavenging packaging
   - Frozen food and oven proof trays
   - Gas exchange packaging
   - Vacuum packaging
   - Lamination and coating technology
RECOMMENDED BOOKS
1 S. Sacharow and R. C. Griffin Jr., Principles of Food Packaging, AVI, Westport
2 R. C. Griffin and S. Scharow, Principles of Package Development, AVI, Westport
INSTRUCTIONAL OBJECTIVES

On completion of this course, the students will be able to:-

1. UNDERSTAND HISTORY OF FOOD PACKAGING
   - Define packing and packaging
   - Differentiate between packing and packaging
   - Describe historical background of food packaging
   - Explain reasons of packaging foods

2. UNDERSTAND FUNCTIONS OF PACKAGING
   - Enlist important functions of packaging
   - Describe functions of packaging
   - Explain the role of packaging as a means of identification, consumer appeal and information
   - Explain the effect of nature of product on marketing arrangements and form of packaging material.

3. UNDERSTAND THE TYPES OF PACKAGING MATERIALS
   - Enlist types of packaging materials
   - Describe properties of packaging materials
   - Identify conventional packaging materials
   - Explain conventional packaging materials
   - Identify modern packaging materials
   - Explain modern packaging materials
   - Define aseptic packaging
   - Explain the characteristics of aseptic packaging paper
   - Explain the working of aseptic filling machine (TetraPak)
   - Explain bag-in-box system of packaging
   - Enlist types of packages and classify them into rigid, semi-rigid, and flexible
   - Explain principles of packaging designs used in food industry
   - Illustrate the economy of packaging
   - Describe the harmful effects of packaging materials.

4. UNDERSTAND THE RECENT TRENDS IN PACKAGING
   - Explain what are the various techniques of packaging
   - Explain Retort able packaging
   - Explain Aseptic packaged food
   - Explain Free oxygen scavenging packaging
   - Explain Frozen food and ovenproof trays
   - Explain Gas exchange packaging
   - Explain Vacuum packaging
   - Explain Lamination and coating technology
LIST OF PRACTICAL 96 hours

1. Visit to a can manufacturing plant
2. Visit to a paper packaging production unit
3. Visit to a multi-layer packaging production unit
4. Visit to a glass manufacturing plant
5. Visit to a large food warehouse
6. Familiarization with can testing equipment
7. Examination of can seams
8. Examination of cans for defects
9. Collection of various types of packages and materials
10. Examine laminates
11. Read information on the label
12. Testing materials and packages
13. Preparation of tin can
14. Estimation of shelf life of fresh and preserved food using various packages
15. Prepare vacuum packaging of any food
Total Contact Hours

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**AIM:** The student will be able to understand the general principles of quality control and quality management in the food processing industry.

**COURSE CONTENTS**

1. **INTRODUCTION** 2 hours
   - Concept of quality control
   - Need for quality control and quality assurance
   - Sanitation and hygiene

2. **SENSORY EVALUATION** 4 hours
   - Principles of sensory evaluation
   - Methods of sensory evaluation
   - Selection and training of panelists
   - Purpose of panelists

3. **PHYSICAL AND CHEMICAL QUALITY** 4 hours
   - Physical quality and its parameters
   - Chemical quality and its parameters

4. **MICROBIOLOGICAL QUALITY OF FOODS** 8 hours
   - Microbiology of different foods
   - Hazard analysis critical control points (HACCP)

5. **QUALITY CONTROL DEPARTMENT** 8 hours
   - Functions of Quality Control Departments
   - Relationship between Quality Control and other Departments
   - Statistical methods for quality control and improvement
   - Benefits of statistical quality control

6. **QUALITY ASSURANCE STANDARDS** 6 hours
   - Total Quality Management
   - ISO-9000 Standards in Food Industry
   - New approaches to quality assurance
INSTRUCTIONAL OBJECTIVES

On completion of this course, the students will be able to:

1. **INSTRUCTIONAL OBJECTIVES.**
   - Describe the concepts of quality control
   - Illustrate the needs of quality control and quality assurance
   - Differentiate between quality control and quality assurance
   - Discuss good practices in maintaining sanitation and hygiene

2. **UNDERSTAND THE METHODS OF SENSORY EVALUATION**
   - Define sensory evaluation
   - State the principles of sensory evaluation
   - Describe the methods of sensory evaluation
   - Give the purpose of panelists

3. **UNDERSTAND PHYSICAL AND CHEMICAL PARAMETERS**
   - Describe the physical parameters of foods
   - Describe the chemical parameters of foods
   - Discuss the effects of processing on physical and chemical properties of foods

4. **UNDERSTAND MICROBIOLOGICAL QUALITY OF FOODS**
   - Describe the microbiology of milk and juices
   - Explain the importance of HACCP in the food industry
   - Explain the effect of employee’s health on the quality of product.

5. **UNDERSTAND THE FUNCTION OF QUALITY CONTROL DEPARTMENT**
   - Explain the responsibilities of quality control department
   - Enlist the functions of quality control department
     - Discuss the relationship of quality control department with other departments of the organization.
   - Describe the statistical methods of quality control
   - Explain the benefits of statistical methods in quality control.

6. **UNDERSTAND THE CONCEPTS OF QUALITY ASSURANCE STANDARD**
   - Describe the concept of total quality management
   - Explain ISO-9000 standards and their application
   - Describe the effects of total quality of foods
   - Explain how ISO-9000 can help to increase the export of food products
   - Discuss new approaches to quality assurance
LIST OF PRACTICALS

1. Determination of suspended and settleable wastes
2. Determination of BOD
3. Calculation of COD
4. Visit to biogas plant
5. Visit to a food plant to see waste treatment plant
6. Visit to local municipal wastewater facilities
7. Utilization of wastes for preparation of animal feed
8. Utilization of wastes for the preparation of fertilizer
AIM: The student will be able to understand food industry waste and methods employed in its treatment, utilization and disposal.

1. INDUSTRIAL WASTES 2 hours
   1.1 Definitions of wastes and by-products
   1.2 Nature and classification of wastes

2. SOLID WASTE MANAGEMENT 6 hours
   2.1 Characteristics
   5.2 Separation
   5.3 Recycling
   5.4 Utilization

3. LIQUID WASTE MANAGEMENT 4 hours
   3.1 Characteristics
       BOD, COD
       Toxic chemicals in effluents

4. METHODS OF LIQUID WASTE TREATMENT 12 hours
   Physical Methods
   Chemical Methods
   Biological Methods

5. ENVIRONMENTAL POLLUTION 8 hours
   5.1 Definition
       Air and noise pollution
       Land pollution
       Water pollution
       Role of Environmental Protection Agency
FPPT 392  WASTE MANAGEMENT

INSTRUCTIONAL OBJECTIVES

On completion of this course, the students will be able to

1. KNOW VARIOUS WASTES FROM FOOD INDUSTRY
   Define wastes and by-products
   Enlist types of wastes
   Classify wastes into solid and liquid

2. UNDERSTAND SOLID WASTE MANAGEMENT
   Describe characteristics of solid wastes
   Discuss separation of solid wastes
   Discuss utilization of wastes as food and feed through the production of biomass or single cell protein
   Discuss uses of wastes as fuel through the production of biogas
   Discuss uses of wastes as fertilizer
   Discuss uses of wastes for other purposes

3. UNDERSTAND THE MANAGEMENT OF LIQUID WASTE
   List different types of insoluble wastes
   Discuss the effect of insoluble wastes on the eco-system
   Discuss the methods of liquid waste disposal
   Estimate total organic matter in wastewater.
   Calculate B.O.D. and C.O.D.
   List possible chemical and biochemical toxic substances in effluents from food processing plants

4. UNDERSTAND THE METHODS OF LIQUID WASTE TREATMENT
   State the physical treatment by sedimentation, centrifugation, concentration, flotation, adsorption and ultra filtration
   Explain the physical treatment by each of the above methods.
   State the principle used in chemical treatment by coagulation, emulsion breaking, neutralization, precipitation and oxidation
   Explain the biological treatment by each of the above processes
   Explain the biological treatment by activated sludge process,
Explain the biological treatment by trickling filter.
Explain the biological treatment by aerated lagoons
Explain the biological treatment by stabilization ponds
Explain the biological treatment by anaerobic process.

5. **UNDERSTAND ENVIRONMENTAL POLLUTION**
   - Define and identify sources of environmental pollution
   - Enlist different types of pollutants
   - Discuss possible chemical and biological toxic substances in air
   - Describe methods of air pollution prevention
   - Enlist sources of noise pollution
   - Discuss effect of noise pollution on personnel
   - Describe control method for noise pollution
   - Discuss the sources of land pollution
   - Discuss the effect of pollution on eco-system
   - List water pollutants
   - Discuss effect of water pollution on aquatic life
   - Explain the role of EPA in controlling environmental pollution
FPPT392 WASTEMANAGEMENT

LISTOFPRACTICALS 96 hours

1. Setup of a qualitycontrol lab
2. Performanceof sensoryevaluation
3. Practice using different sensoryevaluation methods
4. Physical examination of selected foods
5. Examination of selected foods by chemical analysis
6. Microbiological analysis of water
7. Microbiological examination of selected foods
8. Practice of applying statistical methods in quality control parameters in any food processing industry
9. Visit to a food industry qualitycontrol lab
10. Quality control analysis of milk
FPPT 353  FOOD ENGINEERING

Total Contact Hours

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AIM: The course is aimed at enabling the students to develop proficiency in basic engineering involved in food processing and preservation industries.

COURSE CONTENTS

1. UNIT OPERATIONS

14 hours

Introduction to unit operations in food industry
Concept of each unit operations in food industry i.e. cleaning, sorting, separation, grading, centrifugation, filtration, crystallization, extraction, pressing, sterilization, evaporation, heat transfer, freezing, irradiation, mixing, etc.
Basic laws of energy and material balance
Generalized flow diagram of a food processing operation

2. FLUIDS

8 hours

Definition and types
Mechanism of fluid flow
Fluid statics, fluid dynamics
Reynolds number
Viscosity
Bernoulli’s theorem
Fluid heads, friction losses
Friction in pipes, enlargement and contraction losses

3. MEASUREMENT OF FLUIDS

6 hours

Types of manometers
Venturi-meters, orificemeter
Rotameters, pitot tubes and wiers
Displacement meters

4. PUMPS

10 hours

Terminology of pumps
Types of pumps
Theory of compression, compressor selection
Construction and working of compressors

5. HEAT TRANSFER

10 hours

Modes of heat transfer, Fourier law
Thermal conductivity, pipe insulation
Film coefficient
Heat transfer coefficient
Factors affecting heat transfer coefficients
Classification of heat transfer equipment
Heat exchangers

6. **EVAPORATORS** 8 hours
   - Basic principles of evaporation
   - Types of evaporators
   - Construction and working of evaporators
   - Methods of feeding
   - Evaporator accessories
   - Economy and capacity

7. **EVAPORATOR PROBLEMS** 4 hours
   - Scale formation and its removal
   - Steam tables and their use, choice of steam pressure
   - Trouble shooting

8. **PROPERTIES OF MATERIALS USED IN FOOD ENGINEERING** 4 hours
   - Metals/ Alloys (stainless steel, copper, aluminum)
   - Glass
   - Plastics
   - Polymers
   - Corrosion of metals and their protection

**RECOMMENDED BOOKS**

INSTRUCTIONAL OBJECTIVES

On completion of this course, the students will be able to:

1. UNDERSTAND UNIT OPERATIONS IN FOOD ENGINEERING
   - Define food engineering
   - Explain unit operations with examples
   - Explain examples of unit processes using flow diagrams
   - Identify the principle unit operations relative to handling and preparation of food raw materials
   - List and discuss the principles involved in preservation operation
   - Describe dry and wet cleaning operations in food industry
   - Discuss the principle of sorting machine
   - Describe the principles working of various machines used in separation and grading operations in food industry
   - Briefly discuss centrifugation
   - Discuss principles and application of various types of filters in food industry
   - Introduce the theory and function of crystallization in food industry
   - Discuss the theory and functions of various extractors used in food industry
   - Discuss theory, equipment and application of sterilization, evaporation, dehydration, freezing, lyophilization operation for preservation of foods
   - Explain different types of mixing techniques
   - Give a brief introduction to mixing equipments commonly used in food industry
   - Explain Laws of material and energy balance

2. UNDERSTAND FLUIDS
   - Define and state types of fluids
   - Differentiate between Newtonian and Non-Newtonian fluids
   - Define fluid statics
   - Derive relationship to calculate the pressure exerted by liquid column
Define fluid dynamics
Define viscosity and its units
Explain the mechanism of fluid flow by Reynolds experiment
Differentiate between laminar flow and turbulent flow
Explain critical velocity of flowing fluids
Differentiate between point velocity, maximum velocity and mean velocity of flowing fluids
Explain Bernoulli's Theorem
Develop mathematical equation for Bernoulli's Theorem
Explain fluid heads
Enlist friction losses and calculate the head loss due to friction, enlargement and contraction

3. UNDERSTAND THE MEASUREMENT OF FLUIDS
   Define measurement of fluids and enlist equipment
   Differentiate between various types of manometers
   Describe working of U-tube, differential and inclined manometers
   Calculate pressure drop from manometer readings
   Describe working installation method of Orifice meter, Venturimeter, pitch tube, Rotameter and Weirs.

4. UNDERSTAND THE WORKING OF PUMPS
   Define pumps
   Explain the terminology used in pumps
   Explain suction and discharge heads
   Enlist types of pumps
   Describe the working of centrifugal, positive displacement, reciprocating, plunger, diaphragm, gear, cycloidal and turbine pumps
   Enlist factors considered in the selection of a pump
   Enlist pump losses
   Define blowers
   List types of blowers
   Explain working of cycloidal, Nash Hytor an centrifugal blowers
   Define compressors
   Explain working principle of reciprocating and centrifugal compressors
   Enlist factors considered for the selection of a compressor

5. UNDERSTAND THE TRANSFER OF HEAT
   Define heat and enlist modes of heat transfer
   Explain conduction, convection and radiation
State Fourier's Law and gives its mathematical form. Give units of thermal conductivity.

Describe the effect of temperature on thermal conductivity.

State Newton's Law of heat convection.

Explain film coefficients.

Enlist factors affecting overall heat transfer coefficient.

Understand temperature drop inflowing fluids. Differentiate between co-current flow.

Make calculations related to conduction, convection and radiation.


Explain the construction and working of double pipe and plate heat exchangers.

6. **UNDERSTAND DIFFERENT TYPES OF EVAPORATORS**

   Define evaporation and enlist types of evaporators.

   Explain working of horizontal tube, climbing film, falling film and multiple effect evaporators.

   Describe evaporator accessories.

   Enlist types of condensers and explain the working of contact condenser.

   Explain the working of a steam ejector and entrainment separator.

   Explain economy and capacity of a multiple effect evaporator.

   Make calculations related to evaporator.

   Explain the use of steam table and calculate the amount of steam required for evaporating a given sample.

7. **UNDERSTAND EVAPORATOR PROBLEMS**

   List the problems of evaporators.

   Explain the effect of non-condensed gases and their removal.

   Explain scale formation, its effects and removal.

   Explain troubleshooting in the operation of evaporator and their remedies.

8. **UNDERSTAND FOOD ENGINEERING MATERIALS**

   Identify various metals used in food processing equipment.

   Define and differentiate between metal and alloy.

   Describe types of steel.

   Explain corrosion and its protection.

   Explain the properties of glass to be used for food.

   Explain the properties of plastics and polymers useful for food.
FPPT 353  FOOD ENGINEERING

LIST OF PRACTICALS

1  Draw flow diagrams of some food processing operations
2  Solving juice industry material balance problems
3  Solving dairy industry material balance problems
4  Solving sugar industry material balance problems
5  Solving cereals industry material balance problems
6  Solving fruits industry material balance problems
7  Solving vegetable industry material balance problems
8  Solution of energy balance and enthalpy problems
9  Operation of spray drier for fruit juice
10 Operation of spray drier for milk
11 Operation of spray drier for juice
12 Operation of spray drier for egg
13 Study the operating characteristics and performance of different pumps
14 Operation of drum drier for milk
15 Operation of drum drier for cereals
16 Visit to various food industries to observe the working of different unit operations involved in food processing and preservation
AIM: The students will grasp the techniques for undertaking a study in the discipline and preparing a final written report.

COURSE CONTENTS
Each student will be assigned a special topic for research in the library, industry, laboratory or the field. He will be assigned to a supervisor. At the end of the project, the student will submit a written report and deliver an oral presentation.
INSTRUCTIONAL OBJECTIVES

At the end of this course the student will be able to:

1 **APPLY KNOWLEDGE**
   Apply the knowledge from the study of the discipline into his practical life

2 **UNDERTAKE ASSIGNMENTS**
   Acquire the techniques to undertake assignments in his discipline.

3 **PRESENT REPORT**
   Present results of assignments in written as well as oral form
AIM: At the end of the course the students will be able to understand layout and hygiene of food processing plant and their environment.

COURSE CONTENTS

1. INTRODUCTION 10 hours
   - Significance.
   - Selection of site
   - Design and construction of building
   - Layout of equipment
   - Good Manufacturing Practices (GMP)
   - Microbiology in food plant sanitation

2. PLANT CLEANING 12 hours
   2.1 Need for cleaning
   - Dismantling cleaning
   - Requirements of aseptic packaging
   - Factors affecting degree of cleaning
   - Disinfectants and detergents

3. SANITARY FACILITIES 10 hours
   - Required facilities
   - Field sanitation
   - Food grade steam and water

RECOMMENDED BOOKS
INSTRUCTIONAL OBJECTIVES

On completion of this course, the students will be able to:

1. **UNDERSTAND THE IMPORTANCE OF PLANT LAYOUT**
   - State the importance of food plant layout and hygiene
   - Explain the factors considered for site selection
   - Discuss the demerits of unsuitable site
   - Enlist the requirements for the building design
   - Illustrate the requirements for building construction
   - Explain the layout of equipment
   - Discuss drawbacks of improper equipment layout
   - Explain good manufacturing practices and discuss their application
   - Identify microorganisms that can cause hazards
   - Explain the importance of microbiology in food plant sanitation
   - Discuss applications for maintaining good hygiene

2. **UNDERSTAND THE PLANT CLEANING**
   - State the need for cleaning
   - State cleaning demands of batch and continuous operations
   - Explain dismantling cleaning
   - Describe the procedure of cleaning-in-place (CIP)
   - Explain the requirements of aseptic packing
   - Enlist factors affecting the degree of cleaning
   - Explain the mode of action of detergents

3. **UNDERSTAND SANITARY FACILITIES**
   - Enlist the facilities required for maintaining good sanitation in a food plant
   - State the need for fields sanitation
   - Explain food grade steam and water
FPPT 262  FOOD PLANT LAYOUTSANDHYGIENE

LIST OF PRACTICALS 96 hours
1. Examinelab and commercial equipmentfor features of hygienic design
2. Examine Departmental building for sanitary design and construction faults
3. Determination of levels of various disinfectants
4. Determination of water hardness
5. Determination of the effect of water hardness and organic matter on cleaning efficiency
6. Estimation of microbial load before and after cleaning
7. Visit to a food factory for observing water treatment process
8. Visit to local waste disposal system
MINIMUM QUALIFICATION OF TEACHER/INSTRUCTOR

- **Gazetted Posts**
  Qualification:
  B.Sc (Hons.) Food Technology/ B.Sc (Hons.) Agri. Food Technology/
  B.Sc (Hons.) Dairy Technology.

- **Non-Gazetted Posts**
  Qualification: D.A.E. (Food Technology) / D.A.E. (Food Processing &
  Preservation Technology).
EMPLOYABILITY OF PASSOUTS

- **Dairy Industry:** (Nestle, Haleeb, Engro, Nirala, etc.)
- **Beverages:** (PepsiCola, Coca Cola, AmratCola, Shezan, Benz, Golden Juices, Maza, etc.)
- **Fats & Oils:** (Habeeb, Kashmir, Dalda, Manpasad, Tuloo, etc.)
- **Confectionary:** (Mitchell’s, Mayfair, Candy-land, Hillal, etc)
- **Meat Industry:** (K&NsFoods, FlouryMeat, Knoor, etc.)
- **Bread Industry:** (Vita, Dawn, Bunny, etc.)
- **Snack Industry:** (Lays, Golden, Triple EM, etc)
LIST OF MACHINERY/TOOLS AND EQUIPMENT:

FOOD PROCESSING AND PRESERVATION TECHNOLOGY (DAE 3 YEARS)

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<tr>
<th>S.NO</th>
<th>EQUIPMENTS/TOOLS/MACHINERY</th>
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<tr>
<td>1.</td>
<td>AUTOCLAVE</td>
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<tr>
<td>2.</td>
<td>AUTOMATIC KIELDHAL DIGESTION &amp; DISTILLATION APPARATUS</td>
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<td>3.</td>
<td>AUTOMATIC PIPETTORS WITH DISPENSORS</td>
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<td>4.</td>
<td>BOD APPARATUS WITH BOTTLES</td>
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<td>5.</td>
<td>BOD INCUBATORS</td>
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<tr>
<td>6.</td>
<td>CENTRIFUGE 100-5000 RPM</td>
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<td>7.</td>
<td>COD APPARATUS WITH HEATING DIGESTORS</td>
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<td>9.</td>
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<td>10.</td>
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<tr>
<td>11.</td>
<td>DIGITAL ELECTRONIC BALANCE 4 DIGITS</td>
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<td>15.</td>
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<td>HAND REFRACTOMETER</td>
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<td>TONGS</td>
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<td>TUBING CONNECTORS</td>
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<td>LACTOMETER</td>
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**LIST OF CONSUMABLE (GLASSWARE AND CHEMICALS)**

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<tr>
<td>1.</td>
<td>AERATION BOTTLES</td>
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<tr>
<td>2</td>
<td>BEAKERS (100 TO 1000ml) plastic + glass</td>
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<tr>
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<td>4</td>
<td>Burettes</td>
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<td>Coverslips</td>
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<td>7</td>
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<td>Depressionslides</td>
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<td>Desiccators</td>
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<td>Distilled water containers</td>
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<td>Filtration vacuum flask</td>
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<td>Flask 1000ml</td>
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<tr>
<td>13</td>
<td>Glass beads/ boiling chips</td>
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<td>14</td>
<td>Glass rods</td>
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<td>Glassware drying racks</td>
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<td>Measuring cylinders 50-500ml</td>
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<td>17</td>
<td>Microscopeslides</td>
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<tr>
<td>18</td>
<td>Microscopeslides (Prepared with yeast, bacteria and molds)</td>
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<td>Pipetteracks</td>
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<td>20</td>
<td>Pippetts (1-50ml)</td>
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<td>21</td>
<td>Reagent bottles (plain &amp; brown with glass stopers)</td>
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<td>22</td>
<td>Round bottom flask (100-500ml)</td>
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<td>23</td>
<td>Rubber bulbs 100ml</td>
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<td>24</td>
<td>Soxhlet glassware</td>
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<td>Testtubes(plain&amp;screwtype)</td>
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<td>Volumetricflasks(50-1000ml)</td>
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<td>CHEMICALS</td>
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<td>Calciumchloride</td>
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