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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**THIRD YEAR**

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## SUBJECTS

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**DAE Technology**
قد كان لكم في رسول الله سوته حسنات
وأكرم عند الله اتقاكم
وأنا آتكم الرسول فخر رومنى عندهم إما
وأوصى بالعهد
وماشروهن بالمعروف
لمحق لله الروم بربى الصمادقات
واصر على ماصبباك
وقولونا مدين
إن للدين عند الله السلام
سنت
حتى كله
ورب مغبظ غزى مع تزمح وتطعه
DAE Technology
1. قرآن مجید

قرون وسطی خصوصاً توسط علماء کی کئی تعلیم کے ذرائع میں کامیاب ہو گئی تھی۔ اس کے لئے تعلیم کا اہمیت حاصل ہے۔

2. سنہت

کوئی مقدمہ، طالب علم کی ایجاد اور ضرورت کو انجام دینے کے لئے تعلیم کے قسم بھی گا۔

لحاظ مخصوص:

1. قرآن کی تعلیم کا خاص کرکے
2. انسانیت کی تعلیم کا واسطہ
3. تعلیم کے ذرائع کے

3. تعلیم کے ذرائع کے دو ہمین انسانیت کے

4. تعلیم کے ذرائع کے
دوہرہ اسلام

عمومی مقاصد: دوہرہ اسلام کے بارے میں ماہرین کے تماشہ کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میں مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میمن مہماج کے بارے میم
DAE Technology

موضوِعَات

نَبَت سْلِمٌ طَيْبَاءَةَ سَلَّمَ

GEN III

صلِب انتخابات سلم قلَّم

هند وسُلُفُوِّنَاءَ بَعْضَانَ

الثَّقَافَةَ كَثَّرَ فَادِرَةَ

انتِقايت كَاسِمَانَ (فعَّالٌ عَمٍّ مَّيْتٌ)
دائری مقاصد

شاعر کا شعار: انجام اخلاق کی وظیفے میں کل پوزیشن کے

خدمت مقاصد بدل سے اس طرح سے اس کا کام کیا جا کر

موہومات کا متخلص قانون کی ہدف کیڑے

کر

کیا زندگی کے شاخص نیا ہدف کیڑے

ایشی ہے۔ اور معیار نے موہومات کے فہرست انواعی۔ پر ایک ہی کے طریقہ بیان کر ہے

پورات دائرین کی کیہتے ہیں کہ ہیں

وٹورنگ کی کیہتے ہیں کہ ہیں

کم ہے کیہتے ہیں کہ ہیں

صدی بیان کی ضرورت بیان ہے

دوسرے میں کے فوائدہ کیے

دوسرے کی پاہوڑی کے فوائدہ بیان ہے

صلاحت کے فوائدہ بیان ہے

 Replica of the technology
DAE Technology

10

DAE Technology

Graff III

نام ورود 

موجبیت

مربوط 12 گام

عیان تفر: سامان تری کریکت از نواحی منطقه بیش از این که نیازی کاست نیازی کاست نیازی کاست نیازی کاست نیازی کاست نیازی کاست

جای: تصویر یک تحقیق

کل: تحقیق

کلام: همگی در اساس داریم از این که قبیل باشگاهی در کلید دارد. همگی نگم کرده پاسخگویی در وضعیت. همگی با توجه اکثر محسوب اکثریت با توجه اکثریت با توجه اکثریت با توجه اکثریت با توجه اکثریت با توجه

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DAE Technology
DAE Technology

علمی تحریکین

عورت آموز

پرستاری کیت تحریک سے اگری عورت اور یہ

قیصر محمد رحمان

تولیکہ - دو دسر خورت اعتبار سے مادر بنت، پرستاری کلیت، ایک کامل ایک?

شجور مسلمین معاشرت حاصل کرنے کے

آزاد ہے نظر کے لئے، نظریہ تحریک مسلمین کے ہمکاروں کے
Total contact hours
Theory 64 T P C
Practical 0 2 0 2

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.

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  COMPUTERAPPLICATIONS

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 microcomputer. He will also learn DOS, BASIC language and word processing to an elementary level.

COURSE CONTENTS

1. ELECTRONIC DATAPROCESSING (EDP)  6Hours
   Basicsofcomputers
   Classificationofcomputers
   Blockdiagramofacomputersystem
   Binarynumbersystem
   BIT, BYTE, RAM, ROM, EROM, EPROM
   Inputandoutputdevices
   Secondarystoragemediadetails
   Processorsandtypes
   Usingcomputerforsystemsoftware
   Usingcomputersforapplicationsoftware.
   Commonstypesofsoftwareandtheirapplication.

2. DISKOPERATING SYSTEM (DOS)  6Hours
   2.1 Internal commands
   2.2 External commands
   2.3 Batchfiles
   2.4 Advance features.

3. BASIC LANGUAGE  10Hours
   Introductiontohighlevellanguages
   IntroductiontoBASIC
   REMStatement
   Assignmentstatement
   Inputstatement
   Read-Datastatement
   IF-THENstatement
   IF-THENElsestatement
   FOR-NEXTstatement
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 wordprocessorsession
Openingadocument
Savingadocument
Endingwordprocessorsession(Temporarily)
Retrievingadocument
Spellcheck
Margins and tabsetting
Aligning Paragraph
Printingadocument
Advance features

5. COMPUTERGRAPHICINBASIC 3hours
Graphic fundamentals
Points and lines
Dots in space
Lightening 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
INSTRUCTIONAL OBJECTIVES

1. UNDERSTANDELECTRONICDATA PROCESSING (EDP).
   - Describe basics of computers.
   - Enlist different classification of computers.
   - Explain block diagram of a computer system.
   - Describe binary number system.
   - State the terms used in computers such as BIT, BYTE, RAM, ROM, EROM, EPROM.
   - Identify input and output devices.
   - Describe secondary storage media.
   - 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. UNDERSTANDDISK 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 EN D statement
   - Describe Logic of Basic program
   - Describe running a Basic Program
   - Describe saving & retrieving Basic Program
   - Describe some advance features of Basic program
4. UNDERSTAND WORDPROCESSING SESSION
   4.1. Describe word-processing
       Name command to be entered on Dos-prompt to load word-processor
       Identify initial screen
       Describe the command to open a document
       Describe the procedure for naming the document
       Explain importance of giving extension to a document
       Describe saving and retrieving a document
       Explain importance of saving the work at regular intervals
       State temporarily Ending word-processing session & document retrieval
       State procedure to re-enter word processor
       State procedure to open the document and editing
       Describe spell-check facility
       Describe Margins & Tab Setting
       Describe to align paragraph
       Describe Re-editing techniques
       Describe procedure to set-up printer
       Describe command for printouts
       Explain multiple copy printout procedure
       Explain some advance features
       Describe procedure of condensed printing
       Describe procedure for change of fonts

5. UNDERSTAND PROGRAMMING INSTRUCTIONS FOR COMPUTER GRAPHIC
   IN BASIC LANGUAGE
       Identify graphic fundamentals in basic language
       Explain to draw points and lines
       Explain to draw dot in space
       Explain to draw lighting blot
       Explain to draw shapes
       Explain to draw expanding circles and 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 for CLS, 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 Programs hard-copy output

WORD PROCESSING
1. Practice for loading & unloading a word processor
2. Practice for creating 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
   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
   Symbols, valency, radicals, formulas.
   Chemical reactions and their types.

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

4. CHEMICAL BOND
   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
   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, Charles' law, and Graham's law of diffusion etc).
   Problems involving gas laws.
6. WATER.  
   Chemical nature and properties. 
   Impurities. 
   Hardness of water (types, causes and removal). 
   Scales of measuring hardness (degrees Clark, French, ppm, mg/liter). 
   Boiler feedwater, scales and treatment. 
   Sea-water desalination, sewage treatment. 
   Sterilization of water. 

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

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

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

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

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

12. ALLOYS.  
    Introduction with need. 
    Preparation and properties. 
    Some important alloys and their composition. 
    Uses.
13. **CHEMICAL ASPECTS OF FOOD.**
   - Introduction.
   - Essential food ingredients
   - Carbohydrates
   - Proteins
   - Fats.

14. **PLASTICS AND POLYMERS.**
   - Introduction.
   - Polymerization and its mechanism.
   - Synthetic fibers.
   - Uses of polymers.

15. **DYES AND COLOURS.**
   - General Introduction.
   - Chemical nature of dye-stuffs.
   - Classification of dyes and their uses.
   - Colouring agents for food.

16. **POLLUTION.**
   - The problems and its dangers.
   - Causes of environmental pollution.
   - Common pollutants.
   - Remedies to combat the hazards of pollution.

17. **INTRODUCTION TO ORGANIC CHEMISTRY.**
   - Introduction and significance.
   - Classification of organic compounds.
   - Nomenclature of organic compounds.

18. **CARBOHYDRATES.**
   - Introduction.
   - Classification.
   - Properties and uses.

19. **PROTEINS.**
   - Introduction.
   - Chemical nature and sources.
   - Properties and uses.

20. **FATS AND OILS.**
   - Introduction.
   - Chemical nature.
   - Sources and properties.
   - Importance as food.
INSTRUCTIONAL OBJECTIVES

1. **UNDERSTAND THE SCOPE, SIGNIFICANCE AND ROLE OF THE SUBJECT.**
   - Define chemistry and its terms.
   - Define units of measurement 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 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 fundamentals of 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 ionic and covalent bonding.
   Explain the formation of polar and nonpolar sigma and pi bonds with examples.
   Explain the nature of coordinate bonding 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' 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 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/ per litre, p.p.m, degrees clark and degrees fahrenheit.
   Describe the formation and nature of scales in boiler feed water.
   Explain the methods 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 the 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 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 uses 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 textile industry.
15. **UNDERSTAND THE CHEMICAL NATURE OF DYES AND COLOURS.**
   Definedyesandcolours.
   Describecheumaticnatureofthedayestuffs.
   Classifydyesandstatetheiruses.
   Enlistthecolouringagentsforfood.

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

17. **UNDERSTAND THE NATURE AND SIGNIFICANCE OF ORGANIC CHEMISTRY.**
   Definedorganic chemistry.
   Statetheusesoforganic chemistryinmodernworld.
   Classifytheorganiccompounds.
   Explainfunctionalgroup.
   NameorganiccompoundsonthebasisofU.P.A.C.system

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

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

20. **EXPLAIN THE CHEMICAL NATURE AND USE OF FATS AND OILS.**
   Definedfatandoilwithexamples.
   Describechemicalnatureandsourceoffatsandoils.
   Differentiatefatsfromoils.
   Give some 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's viscometer.
8. To find the surface tension of a liquid with a stalagmometer.
9. To introduce a scheme of analysis of salts for basic radicals.
10. To analyse 1st group radicals (Ag\(^+\)-Pb\(^{2+}\)-Hg\(^{2+}\)).
11. To make practice for detection 1st group radicals.
12. To introduce a scheme of 2nd group radicals.
13. To detect and confirm 2nd-\(A\) radicals (Hg\(^{2+}\), Pb\(^{4+}\), Cu\(^{+}\), Cd\(^{2+}\), Bi\(^{3+}\)).
14. To detect and confirm 2nd-\(B\) radicals (Sn\(^{4+}\), Sb\(^{3+}\), As\(^{3+}\)).
15. To introduce a scheme of 3rd group radicals (Fe\(^{3+}\)-Al\(^{3+}\)-Cr\(^{3+}\)).
16. To detect and confirm Fe\(^{3+}\), Al\(^{3+}\), and Cr\(^{3+}\).
17. To introduce a scheme of 4th group radicals.
18. To detect and confirm An\(^{2+}\) and Mn\(^{2+}\) radicals of 4th group.
19. To detect and confirm Co\(^{2+}\) and Ni\(^{2+}\) radicals of 4th group.
20. To introduce the method/apparatus of conducting volumetric estimations.
21. To prepare a standard solution of a substance.
22. To find the strength of a given alkali solution.
23. To estimate HCO\(^{3-}\) contents in water.
24. To find out the %age composition of a mixture solution of KNO\(_3\) and KOH volumetrically.
25. 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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<th>Theory 64</th>
<th>Practicals 96</th>
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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.**
   - 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.**
   - Revision of head-totail 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**
   - 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.**
   - Torque
   - Centre of gravity and centre of mass
   - Equilibrium and its conditions
   - Torque and angular acceleration
   - Rotational inertia

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

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

7. **WAVE MOTION.**
   - Review Hook’s law of elasticity
   - Motion under an elastic restoring force
   - Characteristics of simple harmonic motion
   - S.H.M. and circular motion
   - Simple pendulum
   - Waveform of S.H.M.
   - 7.7 Resonance
   - 7.8 Transverse vibration of a stretched string

8. **SOUND.**
   - 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.**
   - Review law of reflection and refraction, Image formation by lenses
   - Optical instruments
   - Wave theory of light
   - Interference, diffraction, polarization of light waves

10. **OPTICALFIBER.**
    - Optical communication and problems
    - Review total internal reflection and critical angle
    - Structure of optical fiber
    - Fiber material and manufacture
    - Optical fiber - uses.

11. **LASERS.**
    - Corpuscular theory of light
    - Emission and absorption of light
    - Stimulated absorption and emission of light
    - Laser principle
11.5 Structure and working of lasers
11.6 Types of lasers with brief description.
11.7 Applications (basic concepts)

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 & 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
Crystalline 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 dimensionalequations
   - Convert measurements from one system to another
   - Use concepts of measurement and significant figures in problem 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 the 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 problems
   - 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 wave form 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 SENSORS.

- 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 principle of working
- Describe uses 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 laws 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 relativemotion
- Describe black body 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 STATES 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 cells, light emitting diodes and photodiodes
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 Fletchers' 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 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 an incline plane.
21. Study an optical fiber.

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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
9.5 Different forms
9.6 Problems

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
Math-123  APPLIED MATHEMATICS-I

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 vector.
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

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 capital slants
3. Lettering and practice from A-Z capital verticals
4. Lettering and practice from A-Z small cases vertical
5. Lettering and practice from A-Z 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 figures, e.g. polygons, circles, inscribed and circumscribed
13. Types and construction of ellipses in various modes, i.e. simple, tangent, and parallelogram methods
14. Introduction to geometrical solids, cubes, prisms, pyramids and cones
15. Conic sections: circle, ellipse, parabola, hyperbola
16. Construction of parabola by 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 an object
25. Drawing of a slotted block
26. Drawing of a gland for a 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

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T P C
0 3 1

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 drill bits
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. Burghardt, Machine Tool Operation Part I,
FPPT-113  INTRODUCTION TO FOOD SCIENCE

Total contact hours

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**T P C** 2 3 3

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

**COURSE CONTENTS**

1. **INTRODUCTION**
   8 Hours
   - 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 hours

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

4. **FOOD INDUSTRY IN PAKISTAN**
   4 hours

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

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

7. **CLASSIFICATION OFFOODS**
   7 hours
   - 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

12 hours
8 hours
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 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 foods on the basis of pH value and explain each category in detail.

8. UNDERSTAND THE SPOILAGE OF FOODS
Define food deterioration and spoilage.
Describe modes 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 enzymes in food spoilage
Name the microorganisms associated with food spoilage
List factors affecting 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 a dehydration unit.
6. Visit to a nuclear research facility in the region.
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 and delay of autolysis
   Prevention and 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

INSTRUCTIONAL OBJECTIVES

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 handling and transportation of raw materials.
   - Explain how cleaning of raw materials takes 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.
   - 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 of 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 aseptic filling machine (TetraPack).
Classify into rigid and flexible.
Explain 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.
FUNDAMENTAL FOOD PROCESSING AND PRESERVATION

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 storage 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

١. دورة أمير المؤمنين
٢. تفتيح خبراء بين زيد و膊طع
٣. خياركم من تعليق القرآن وعلمه
٤. لا يعمان علم لا إجابة له ولا دين له لا عيبت
٥. وياكم ولطوف لن نمان أكرم الحديث منrip
٦. من حديث في أمرنا بناء مريم متعهود
٧. من حمل عليكم السلام فلما منا لعورًا في السماء في الدنيا
٨. لا ضرور ولا ضرر في إسلام
٩. كلكم قادرين وكلكم صالح وكلكم مسؤول عن رعيته

١٠. لا تخرقوا

١١. تقبل الله جرحاً وصبراً ومرضاً

١٢. شربت كل يوم ونظلت تشرب

١٣. أحبب كل يوم ونظرت

١٤. أسكن في一直到

١٥. نصيح الله يعلم ويرسل ويثبت وينطق 

١٦. رضي الله عنكم وعذركم
تدریس مقاصد

عمومی مقاصد: خطاب کننده بین قرآنی کی روشنی کردن ممکن کے اوصف کا پیش نہیں قرار دیتا کرکے قرآنی کی روشنی کردن

فصولی مقاصد:

قرآنی کے کاس۔ بیان کردن کے
قرآنی آیات کی تفسیر کردن کے
قرآنی آیات کی روشنی کردن اور ایک معین کے اوصف بیان کردن کے
قرآنی آیات کے بیان کردن اور ممکن کے اوصف بیان کردن کے

اطلاعات نظر

عمومی مقاصد: خطاب کننده بین اسلامی احتجاز اور (افرادی و انتظام) سے آگاہ کردن

فصولی مقاصد:

اطلاعات کا ترتیب بیان کردن کے
اطلاعات کی تفسیر کردن کے
اطلاعات کی روشنی بین اسلامی احتجاز اور (افرادی و انتظام) سے آگاہ کردن

اطلاعات کی روشنی بین اسلامی احتجاز اور (افرادی و انتظام) سے آگاہ کردن

فصولی مقاصد:

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اضمین اسلامی الہاموی مسائل کی حاضرین کے لئے اسلامی معاشرات کی تفصیلات سے اطلاع ہائے کے
خصوصی مشاہدات:

اسلامی معاشرہ کا مختلف عوام برہنے کے
اسلامی معاشرہ کے اثرات تفصیلات بیان کرتے
اسلامی معاشرہ میں مسائل اور احکاماتی اہمیت بیان کر کے
تحریک کے لئے محاصل بیان کر کے
تعلیمی تربیت و اعلیٰ اطلاعاتی مٹی بیان کر کے
جلو گیاکی انتہائی بیان کر کے
جلو گیاکی عوام نے افسوس نہیں کیا کہ
جلو گیاکی انتہائی بیان کر کے
انٹی ہی کی تعلیم کے
سیاسی کی مصالح تربیت کے علاوہ کے بارہ تر انتہائی کو میں کےنے

اسلامی ریاست

عموی معاشرہ اسلامی ریاست کی تفصیلات بیان کر کے
خصوصی مشاہدات:

ریاست کی تعریف بیان کر کے
اسلامی ریاست سے طرز حکومت سے اطلاع جاں کر کے
اسلامی ریاست کی تفصیلات بیان کر کے
اسلامی ریاست کے اخلاقیات و مشاہدات بیان کر کے
اسلامی ریاست کے قومی کرۂ فتح جہوں بہر کے
تدریس مقاصد

ترجمہ پاکستان

علی مقصد: قیام پاکستان کے سواعد و نیوپریس کو سب میں کے

خصوصی مقاصد:

قومیت کے مقدمہ کو بیان کر کے

دو قوی تصور کی تعریف و توجیح کر کے

دو قوی تصور ایسی بیان کے

جب خلیل صفتی کی حضرت ہیل کو بیان کر کے

دوی تحقیق کو عمل و مکمل کر کے

علی مسلمین بندی مسافرین کر کے

نقوی محمد قطبی اور حضرت علی اور فیل اور علی اور غلامری مسافرین کرا کر

قومی پاکستان کے مختلف مسائل کے قیام کے لئے سلم عوام کو تعلیم کو بیان کر کے

مسلمی کے قیام پاکستان کے لئے جہاد کی بیان کر کے
(پری سفر ظلباء کے لئے)
AIMS
The students will be able to develop management skills, get acquainted with the principles of management and economic relations and develop a 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.
   Largescale production.
   Smallscale production.

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

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

10. **BANK.**
    Definition
    Function 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 draw-backs.  
   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
MGM-221 BUSINESSMANAGEMENT AND INDUSTRIAL ECONOMICS.

INSTRUCTIONAL OBJECTIVES

1. **UNDERSTAND THE IMPORTANCE OF ECONOMICS.**
   - Statedefinition of economics given by Adam Smith, Alfred Marshall and Professor Robins.
   - Explain nature and scope of economics.
   - Describe importance of study of economics for technicians.

2. **UNDERSTAND BASIC TERMS USED IN ECONOMICS.**
   - Define basic terms, utility, income, wealth, saving, investment and value.
   - Explain the basic terms with examples.

3. **UNDERSTAND LAW OF DEMAND AND LAW OF SUPPLY.**
   - Define Demand.
   - Explain law of demand with the help of schedule and diagram.
   - State assumptions and limitations of law of demand.
   - Define Supply.
   - Explain law of Supply with the help of schedule and diagram.
   - State assumptions and limitations of law of supply.

4. **UNDERSTAND THE FACTORS OF PRODUCTION**
   - Define the four factors of production.
   - Explain labour and its features.
   - Describe capital and its peculiarities.

5. **UNDERSTAND FORMS OF BUSINESS ORGANIZATION.**
   - Describe sole proprietorship, its merits and demerits.
   - Explain partnership, its advantages and disadvantages.
   - Describe joint stock company, its merits and demerits.
   - Distinguish public limited company and private limited company.

6. **UNDERSTAND ENTREPRENEURIAL SKILLS**
   - Explain preparing, planning, establishing and managing small business setup.
   - Explain evaluating all relevant resources.
   - Describe organizing, analyzing and innovation of risk of task.

7. **UNDERSTAND SCALE OF PRODUCTION.**
   - Explain scale of production and its determination.
   - Describe large scale production and its merits.
   - Explain small scale production and its advantages and disadvantages.

8. **UNDERSTAND DIFFERENT ECONOMIC SYSTEMS.**
   - Describe free economic system and its characteristics.
   - Explain centrally planned economic system, its merits and demerits.
   - State mixed economic system and its features.

9. **UNDERSTAND WHAT IS MONEY**
Define money
Explain barter system and its inconveniences.
Explain functions of money.

10. UNDERSTAND BANK AND ITS FUNCTIONS.
Define bank.
Describe commercial bank and its functions.
State central bank and its functions.

11. UNDERSTAND CHEQUE AND DISHONOR OF CHEQUE.
Define cheque.
Enlist the characteristics of cheque.
Identify the kind of cheque.
Describe the causes of dishonor of cheque.

12. UNDERSTAND FINANCIAL INSTITUTIONS.
Explain IMF and its objectives.
Explain organizational set up and objectives of IDBP.
Explain organizational set up and objectives of PIDC.

13. UNDERSTAND TRADE UNION, ITS BACKGROUND AND FUNCTIONS.
Describe brief history of trade union.
State functions of trade union.
Explain objectives, merits and demerits of trade unions.
Enlist problems of industrial labour.

14. UNDERSTAND INTERNATIONAL TRADE.
Explain international trade.
Enlist its merits and demerits.

15. UNDERSTAND MANAGEMENT
Explain meaning of management.
Describe functions of management.
Identify the problems of business management.

16. UNDERSTAND ADVERTISEMENT.
Explain the concept of advertisement.
Enlist benefits and drawbacks of advertisement.
Describe principal media of advertisement used in business world.

17. UNDERSTAND THE ECONOMIC PROBLEMS OF PAKISTAN.
Describe economy of Pakistan.
Explain economic problems 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 Theorems 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 $\cosec x, \sec x, \cot x$
   - 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 of 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 first 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 limit 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 a mathematical expression of a derivative.
   - Explain geometrically the meaning of differential Coefficient.
   - Differentiate ab-initio \( x^n \) 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 law 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 the fruit and vegetable processing industry
   - Texture of fruits and vegetables

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
   Processed fruits
   Processed vegetables
   Chemical changes

6. NUTRITION OF PROCESSED FOODS

7. RECENT TRENDS
   Functional foods
   Manufacturing
   Introduction to Nutraceuticals

8. QUALITY CONTROL
   Product quality

9. HYGIENE AND SANITATION
   Personal hygiene
   Plant sanitation
   Waste management

RECOMMENDED BOOKS
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
   - Define the importance of size reduction
   - Define the blanching
   - Describe the objectives and methods of blanching
     - Describe 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 and describe the methods 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
   Dry milling.
   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
   Parboiling 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.
   Baking 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 tailing 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.
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.
7. Determination of wet and dry gluten.
10. Visit to a baking industry.
11. Determination of test weight.
12. Preparation and sensory evaluation of cakes and cookies.
13. Preparation of Vermicelli.
15. Demonstration of Flour Quality.
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
   2.1 Sources
   2.2 Production
   2.3 Handling
   2.4 Distribution
   2.5 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
Powdered milk
Butter
Yoghurt
Cheese
Ice Cream
Khoya

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  
2 hours

13. GENERAL  
Quality control  
Packaging – faults, causes and remedies  
Plan hygiene and sanitation  
4 hours

BOOKS RECOMMENDED:

DAIRYPROCESSINGTECHNOLOGY

INSTRUCTIONALOBJECTIVES FPPT-233(Rev.)

1. UNDERSTANDTHEHISTORYANDGROWTH
   explainindairyindustryinPakistan
   describehistoryandgrowthofdairyindustry
   explainproductionofmilkandinPakistan

2. UNDERSTANDABOUTMILKsources
   explainsourcesofmilk
   describeproductionandhandlingofmilk
   explainedistributionofmilk
   describethecompositionofmilk

3. UNDERSTANDDAIRYINDUSTRYINPAKISTAN
   whatismilkprocurementandexplainmethodsofprocurement
   describecollectionandreceptionofmilk
   explaintransportationofmilk

4. EXPLAINTHEMILKPROCESSING
   explaintheseparationprocessofmilk
   describethestandardizationofmilk
   defineandexplainthehomogenizationofmilk
   describethepasteurizationofmilk
   enlistanddescribesothetypesofUHTmilk
   defineandexplainthecondensationprocess
   describetheunitoperationinvolvedinmilkprocessing
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 development in cheese processing
8. DESCRIBE CREAM AND ALLIED PRODUCTS 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 development 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 development 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 the freezing process.
Discuss the recent advances.

12. **MILK BYPRODUCTS**

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.
LIST OF PRACTICALS

1. Visit to a dairy farm
2. Visit to a milk processing plant
3. Solids not fat (SNF) determination in milk
4. Determination of pH, Specific gravity, acidity of raw and processed milk
5. Resuspending 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
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, FAT 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 OilsandTheirUses,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, oil and 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 oils and fats, 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 cis to Trans fatty acids during interesterification
   - Discuss anti-nutritive value of trans fatty 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 cis 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, FARMS 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
LIST OF PRACTICALS 96 hours

1. Extraction of oils and fats
2. Determination of refractive index
3. Measurement of color
4. Determination of melting point of oil
5. Determination of melting point of butter
6. Determination of specific gravity
7. Determine the peroxide value of oil
8. Determine the saponification value of oil
9. Determine the iodine value of oil
10. Visit to oil and fat industry
11. Preparation of mayonnaise
12. Study role of emulsifying agents
13. Determine the quality of frying oils
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 sugarbeet
   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 hardboiled 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 SUGARSANDCONFECTIONERYTECHNOLOGY.

INSTRUCTIONAL OBJECTIVES

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

1. UNDERSTAND THE FUNDAMENTAL 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 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 microorganisms 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 PRINCIPES 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 Butulism and Salmonellosis
Describe non bacterial foodborne diseases
Explain the significance of Aflatoxin

FPPT 273 GENERAL AND FOOD MICROBIOLOGY

LIST OF PRACTICALS

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. Demonstration 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
17. Visit to microbiology laboratory of a university / research institute
18. Visit to a food industry to observe role of microbiology
FPPT-283  FOOD CHEMISTRY AND INSTRUMENTATION

Total Control Hours

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**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**
   - Nature in foods
   - Water activity and food spoilage
   - Physical and chemical properties
   - Hard and soft waters
   - Water treatment process
   - Effect of water quality on processed foods

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

3. **LIPIDS**
   - 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**
   - 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. Iqtadar 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 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 principles 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
Statethe principlesof chromatography
Enlist types of chromatography
Describe HPLC, gas chromatography, TLC and paper chromatography
Stateprinciples and application of pHmeter
Define polarized light
Discuss principles and application of polarimeter
Define refractive index
Explain the working of refractometer
Explain principles of flamephotometry
Describe instrumental methods for texture measurement
Define viscosity
Discuss measurement of viscosity
LIST OF PRACTICALS

1. Study water activity in foods
2. Visit to water treatment plant
3. Study the effect of reducing sugars on color of potato chips
4. Study the effect of reducing sugars and amino acid content on browning in potato chips
5. Preparation of invert sugar by acid hydrolysis
6. Acid hydrolysis of starch
7. Maillard reaction
8. Demonstration of heat denaturation of various proteins
9. Physical and chemical properties of lipids
10. Demonstration of effect of baking on browning and flavor
14. Determination of moisture by different methods
15. Determination of ash and mineral matter
16. Determination of insoluble solids (fiber)
17. Determination of reducing sugars
18. Determination of total sugars
19. Determination of acidity
20. Determination of benzoic acid
21. Determination of nitrite and nitrate
22. Determination of sodium, potassium, and calcium by flame
23. Physical and chemical analysis of fats and oils
24. Determination of vitamin C.
25. Visit to a research laboratory.
للسعوديين ينتمون إلى الإسلام، ويدعون مجيء رضوان وتشهير فيه.

ليحسم عليه ثالثية وليسته علعاس وقصيده للاشتباه.

لا يكون من جناك.

لا بد من الحسن cata

إلى الله بحريهم عظيم عقوب لمهمه وضاعته للمل.

ليس ولا تعسر ولا تنفر،

دق طعم لا يمتن من مرضي بالله بالإسلام، بل بصحبه.

فвис الذكر لا اللهد

طوق وفراع

معنى ميعود عرسر، والرائي نور ولاد القلق وفأتم السجد كرد.

مئوما قليا في عرض أجر.

هجر نصيل، نحو كليب النواة حسن، عمر: ابن، تول:
مدرسة مراكز

ضر النبوي

تدرس مراكز

مرcona: تدريس النبوي، نور الكتب في ديني، مساعدة المبتدئين على الفهم الدقيق. واستعداد لجميع المبتدئين.

الوصول المنزلي: طالب طموح في مجال مراكز تدريس النبوي. واستخدام طرق منهجية لتعليم النبويات والتحقيقات على مستوى مراكز تدريس النبوي، استعداد لجميع المبتدئين.

فؤاد زكريا: فؤاد زكريا، النبوي، مساعد في مجال مراكز تدريس النبوي. واستخدام طرق منهجية لتعليم النبويات والتحقيقات على مستوى مراكز تدريس النبوي، استعداد لجميع المبتدئين.

سعد لطيف: سعد لطيف، النبوي، مساعد في مجال مراكز تدريس النبوي. واستخدام طرق منهجية لتعليم النبويات والتحقيقات على مستوى مراكز تدريس النبوي، استعداد لجميع المبتدئين.

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تفریحات متقاضی

محتوی مقاصف. قیام پاکستان کے بعد اور قومی سماک کے ساتھ عالم کے فریاد کر کے فریاد کر کے

خاصیتی牧憲

پاکستان کے کیمین کی فنکار لیس کے قانون میں جان کر ہی

ریز کلیر لیس کے اپنے ہاتھوں کے پرستھ میں نیا کر کے

پاکستان کے کیمین کی فنکاری کے ذریعہ میں جان کر کے

بنیاد رکھی ہوئی ہے ہمیشہ میں نیا کر کے

بنیاد رکھی ہوئی ہے ہمیشہ میں نیا کر کے

میجر جنرل کو اپنے مسائل پر اور قومی سماک کے کر کے

روایت کے اطفال کے پرستھ میں نیا کر کے

روایت کے اطفال کے پرستھ میں نیا کر کے

ضریبی کے بے نظیر کو اوری کر کے

قرار و متقاضی کی کتابدار کے نیا کر کے

22 سالوں سے بے نظیر کتابدار کے نیا کر کے

قیام پاکستان کے بعد اور قومی سماک کے کیئے کو اوری کر کے

قیام پاکستان کے بعد اور قومی سماک کے کیئے کو اوری کر کے

پاکستان کے کیمین کی فنکار لیس کے فنکاری کے نیا کر کے

پاکستان کے سماک کے اندر کیمین کی سماک کے

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(زیر مسلم علی کے عہد)

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Gen.311

کل وقت: 20
نسب انتخابات
علو مزرع
تدريس مقاصد
عمری مختصر: کچھ تیل کی لیگ ایک لیٹ مرحلے کے مطابق استعمال
خطوی مشترک: طالب علم اس تاجہ پوش گا
مسودات کا مطلب الیک سمجھ گیا
کمال زندگی پر تحقیق کی تحلیل کر کے
مسودات کی اجتناب پانا گا
اگر تعیین لگاتار مسودات کے موتوں اثرات بدیل کر کے طریقہ باند کر کے
شکل الزام کے ساتھ کام کر کے
علو واضح سے اور سمجھ درخواست نکلو اور بکر کے
نہایت کی بحث خوراکی نکلو بکر کے
کارکن کی بحث خوراکی نکلو بکر کے
کارکن کی انشا کر کے
لئی اہمیت کی بھیک سے اختیارات کر کے
AIMS The course has been designed to enable the student to:
1. Develop communications skills.
2. Understand basic principles of good and effective business writing in commercial and industrial fields.
3. Develop knowledge and skill to write technical reports 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.
   - Skills of active listening.
   - Barriers to listening.
   - Reasons of poor listening.
   - Giving feedback.

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Pre-requisites: The students shall already be familiar with the language concerned.
5. INTERVIEWING SKILLS.  
Significance of interviews.  
Characteristics of interviews.  
Activities in an interviewing situation  
Types of interviews.  
Interviewing strategy.  

6. REPORTWRITING.  
Goals of report writing  
Report format.  
Types of reports.  
Report writing strategy.  

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

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

RECOMMENDED BOOKS  
MGM-321  BUSINESSCOMMUNICATION
INSTRUCTIONALOBJECTIVES

1. UNDERSTANDTHECOMMUNICATIONPROCESS.
   - Statethebenefitsoftwo-waycommunication.
   - Describemodelofcommunicationprocess.
   - Explainederthecommuinationmethodsusedinorganization.
   - Identifythebarrierstoprocesscommunicationandmethodsovercoming
     thesebarriers.
   - Identifiymisconceptionaboutcommunication.

2. UNDERSTANDTHEPROCESSOFORAL.
   - Identifiyspeakingsituationswithotherpeople.
   - Identifythestagesteppspeakings.
   - Identifythecharacteristicsof effectivespeakings.
   - Statethepriniciplesof one-waycommunication.
   - Statethepriniciplesoftwo-waycommunication.
   - Identifiyelementsoforalpresentationskills.
   - Determine the impact of non-verbal communication on oral
     communication.

3. DETERMINETHEUSESOFQUESTIONINGSKILSTOGATHERAND
   CLARIFYINFORMATIONINTHEORALCOMMUNICATIONPROCESS.
   - Identifiendifferenttypesof questions.
   - Determinethepurposeof eachtypeof questionanditsapplication.
   - Identifiythehazardstobeadvoided whenaskingquestions.
   - Demonstratequestioningskills.

4. DEMONSTRATETHEUSEOFACTIVELISTENINGSKILLINTHE ORAL
   COMMUNICATIONPROCESS.
   - Statetheprinciplesof activelistening.
   - Identifiyskillsofactivelistening.
   - Identifybarriertoactivelistening.
   - Statethebenefitsofactivelistening.
   - Demonstratelistentingskills.
   - Explaiintheimportanceof givingandreceivingfeedback.

5. Determinetheappropriateinterviewtypeforthespecificwork-related
   situationandconductawork-relatedinterview.
   - Statethesignificanceofinterviews.
   - Statethecharacteriticsofinterviews.
   - Explaiintheactivitiesinaninterviewingsituation.
   - Describethetypesofinterviews.
   - Explaiintheinterviewingstrategy.
   - Prepareinstrumentforastructuredinterview.
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 meetings.
   - 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.

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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-machinesystem.
   - 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
8. **INDUSTRIAL PREJUDICE** 2 Hours
   - Causes
   - Remedies

9. **PUBLIC RELATIONS.** 2 Hours
   - Importance
   - Functions

10. **GUIDANCE AND COUNSELLING** 2 Hours
    - Importance
    - Choice of job.
    - Duringservice.

11. **JOB EVALUATION** 2 Hours
    - Importance
    - Methods
    - Job satisfaction
    - Work simplification.

12. **INDUSTRIAL MANAGEMENT** 2 Hours
    - Introduction
    - Functions of management.
    - Subdivisions of management
    - Objectives ofindustrialmanagement.

13. **PERSONNEL SELECTION.** 2 Hours
    - Recruitment of employees.
    - Training.
    - Effectsof trainingonproduction andproductcost.

14. **WORKING CONDITIONS.** 2 Hours
    - Importance and consideration.
    - Effectsonefficiencyand per unitcost.

15. **TIME AND MOTION STUDY.** 3 Hours
    - Concept and importance.
    - Sequence of motionstudy.
    - Principles of motionstudy.
    - Stepstotimestudy.
    - Determinationof operations time.

16. **QUALITY CONTROL.** 2 Hours
    - Concept and advantages
    - Methods.
17. **ROLE OF FOREMAN IN MANAGEMENT.**  
   Foreman's abilities. 
   Duties and functions. 

**BOOKS RECOMMENDED:**


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
Statethe advantages of 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 lowfat 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 of canning and freezing
   - Describe special processing techniques for chilling, salting, brining, 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 somewhat formulated 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 post-slaughter 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 value of eggs
   - State methods of egg handling
   - Explain grading of eggs
   - Describe suitable storage techniques of egg
   - Explain quality control of egg and egg products

4. UNDERSTAND FISH PROCESSING
   - Describe commercial catching methods, handling, and processing of fish
   - Discuss the criteria for freshness
   - Give the composition and classification of fish meat
   - Explain the processing of fish meat
   - Discuss how spoilage is controlled
   - 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 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 shootingin beverage industry
Qualitycontrol inbeverage industry
Plant sanitation
Fermentedbeverages

4. RECENT ADVANCES IN BEVERAGE TECHNOLOGY 12 hours

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

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 industry 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 the 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 the 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
Give details 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 kind 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 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

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

96 hours
AIM: The student will be able to understand various types of packaging material and their use in the 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 packaging design

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. SacharowandR.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 in rigid, semi-rigid and flexible
   - Explain principles of packaging designs used in the 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

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
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
   Concept of quality control
   Need for quality control and quality assurance
   Sanitation and hygiene

2. SENSORY EVALUATION
   Principles of sensory evaluation
   Methods of sensory evaluation
   Selection and training of panelists
   Purpose of panelists

3. PHYSICAL AND CHEMICAL QUALITY
   Physical quality and its parameters
   Chemical quality and its parameters

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

5. QUALITY CONTROL DEPARTMENT
   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
   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
   - 4.2 Explain the importance of HACCP in the food industry
   - 4.3 Explain the effect of employee’s health on the quality of the product.

5. **UNDERSTAND THE FUNCTION OF QUALITY CONTROL DEPARTMENT**
   - Explain the responsibilities of quality control department
   - Enlist functions of quality control department
     - Discuss the relationship of quality control department with other department of 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  96 Hrs.
1. Determination of suspended and settleable wastes
2. Determination of BOD
3. Calculation of COD
4. Visit to a biogas plant
5. Visit to a food plant to see a waste treatment plant
6. Visit to local municipal wastewater facilities
7. Utilization of wastes for the 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.

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<tr>
<td><strong>INDUSTRIAL WASTES</strong></td>
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<td>1.1 Definitions of wastes and by-products</td>
<td>1.2 Nature and classification of wastes</td>
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<td><strong>SOLID WASTE MANAGEMENT</strong></td>
<td>6 hours</td>
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<td>2.1 Characteristics</td>
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<td>2.2 Separation</td>
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<td>2.3 Recycling</td>
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<td>2.4 Utilization</td>
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<td><strong>LIQUID WASTE MANAGEMENT</strong></td>
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<td>3.1 Characteristics</td>
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<td>BOD, COD</td>
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<td>Toxic chemicals in effluents</td>
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<td><strong>METHODS OF LIQUID WASTE TREATMENT</strong></td>
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<td>Physical Methods</td>
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<td>Chemical Methods</td>
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<td>Biological Methods</td>
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<td><strong>ENVIRONMENTAL POLLUTION</strong></td>
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<td>5.1 Definition</td>
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<td>Air and noise pollution</td>
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<td>Water pollution</td>
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<tr>
<td>Role of Environmental Protection Agency</td>
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INSTRUCTIONAL OBJECTIVES

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

1. **KNOW VARIOUS WASTES FROM FOOD INDUSTRY**
   - Define waste 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 ecosystem
   - Discuss 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 the effect of noise pollution on personnel
   - Describe control methods for noise pollution
   - Discuss the sources of land pollution
   - Discuss the effect of pollution on eco-system
   - List water pollutants
   - Discuss the effect of water pollution on aquatic life
   - Explain the role of EPA in controlling the environmental pollution
FPPT392  WASTEMANAGEMENT

LISTOFPRACTICALS  96 hours

1. Setup of a quality control lab
2. Performance of sensory evaluation
3. Practice using different sensory evaluation 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 quality control lab
10. Quality control analysis of milk
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 the food industry
   - Concept of each unit operation in the food industry (e.g., 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 OFFLUIDS 6 hours
   - Types of manometers
   - Venturi-meter, 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
   - Corrosions 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 and 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 and 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 in flowing fluids. Differentiate between co-current flow.

Make calculations related to conduction, convection, and radiation.


Define and classify heat exchangers.

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 entainment 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.
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
FPPT 362  SPECIAL PROJECT

Total Contact Hours

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<td>Practical</td>
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Pre-requisite Qualified firstyear of study

**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 technique 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
   - 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 merits 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 field sanitation
   - Explain food-grade steam and water
FPPT 262 FOOD PLANT LAYOUTS AND HYGIENE

LIST OF PRACTICALS 96 hours
1. Examinelab and commercial equipment for 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:** (Habib, 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)
LISTOFMACHINERY/TOOLSANDEQUIPMENT:

FOODPROCESSINGANDPRESERVATIONTECHNOLOGY(DAE3YEARS)

<table>
<thead>
<tr>
<th>S.NO</th>
<th>EQUIPMENTS/TOOLS/MACHINERY</th>
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<tr>
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<td>2.</td>
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<td>3.</td>
<td>AUTOMATIC PIPETTORS WITH DISPENSORS</td>
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<td>BOD APPARATUS WITH BOTTLES</td>
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<td>BOD INCUBATORS</td>
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<td>6.</td>
<td>CENTRIFUGE 100-5000 RPM</td>
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<td>COD APPARATUS WITH HEATING DIGESTORS</td>
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<td>DIGITAL COLONY COUNTER</td>
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<td>11.</td>
<td>DIGITAL ELECTRONIC BALANCE 4 DIGITS</td>
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<td>ELECTRONIC TOP LOADING BALANCE (1 kg)</td>
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<td>FLAME PHOTOMETER (K, Ca, Br, Na filters)</td>
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<td>INCUBATOR HEATING TYPE (115 L CAPACITY)</td>
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<td>MAGNETIC STIRRER</td>
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<td>Glassbeads/boilingchips</td>
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<td>Microscopeslides</td>
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<td>Pipetteracks</td>
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<td>Pippetts(1-50ml)</td>
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<td>21</td>
<td>Reagentbottles/plain&amp;brownwithglassstopers</td>
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<td>Roundbottomflask(100-500ml)</td>
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<td>Rubberbulbs100ml</td>
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<td>Soxhletglassware</td>
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<td>Testtubes(plain&amp;screwtype)</td>
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