ANNA UNIVERSITY, CHENNAI
UNIVERSITY DEPARTMENTS
REGULATIONS – 2015
CHOICE BASED CREDIT SYSTEM

B. E. AGRICULTURAL AND IRRIGATION ENGINEERING

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

i) To train and educate students with general knowledge and skills in agricultural water management, agricultural production process, farm machinery and farm management.

ii) To provide a sound theoretical knowledge in engineering principles applied to water resources and agricultural engineering.

iii) To prepare students for successful agricultural water management carrier integrating agriculture and irrigation technology.

iv) To develop innovative capacity of students for increasing agricultural production with scarce water resources available.

v) To impart positive and responsive out-reach attitudes, initiative and creative thinking in their mission as engineers.

vi) To understand ethical issues and responsibility of serving the society and the environment at large.

PROGRAM OUTCOMES (POs)

Graduates of Agricultural and Irrigation Engineering will have

a) Ability to apply the knowledge of mathematics, science and engineering in agriculture.

b) Ability to design and conduct experiments, analyze and interpret data to prepare farm specific reports.

c) Ability to design an irrigation system to meet the desired needs within realistic constraints such as economic, environmental, social, political, ethical, and sustainability.

d) Ability to think creatively, to formulate problem statements, to communicate effectively, to synthesize information, and to evaluate agricultural systems.

e) Ability to function in interdisciplinary teams within the Institute and also with other organizations at National/International level while planning the research projects.

f) Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

g) Will develop competencies in computer and automatic control systems, information systems, mechanical systems, natural resource systems to solve engineering problems.

h) Graduates will be able to express themselves clearly in oral and verbal communication needs.

i) Ability to devise a strategy or action plan to utilize the acquired knowledge of irrigation engineering in increasing water-use-efficiency and farm mechanization for reducing cost of cultivation.

j) Graduates will be capable of self-education in emerging water resources problems and understand the value of lifelong learning.
## PEOs and POs – Agricultural and Irrigation Engineering

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*The Contact periods will not appear in the slot time table.
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## EMPLOYABILITY ENHANCEMENT COURSES (EEC)

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## SUMMARY

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*Attendee*

Centre For Academic Courses
Anna University, Chennai-600 025
COURSE DESCRIPTION:
This course aims at developing the language skills necessary for the first year students of Engineering and Technology.

OBJECTIVES:
- To develop the four language skills – Listening, Speaking, Reading and Writing.
- To improve the students’ communicative competence in English.
- To teach students the various aspects of English language usage.

CONTENTS

UNIT I  GREETING AND INTRODUCING ONESELF  12
Listening - Types of listening – Listening to short talks, conversations; Speaking – Speaking about one’s place, important festivals etc. – Introducing oneself, one’s family/ friend; Reading – Skimming a passage – Scanning for specific information; Writing - Guided writing - Free writing on any given topic ( My favourite place/ Hobbies/ School life, writing about one’s leisure time activities, hometown, etc.); Grammar – Tenses (present and present continuous) - Question types - Regular and irregular verbs; Vocabulary – Synonyms and Antonyms.

UNIT II  GIVING INSTRUCTIONS AND DIRECTIONS  12
Listening – Listening and responding to instructions; Speaking – Telephone etiquette - Giving oral instructions/ Describing a process – Asking and answering questions; Reading – Reading and finding key information in a given text - Critical reading - Writing –Process description( non-technical); Grammar – Tense (simple past & past continuous) - Use of imperatives – Subject – verb agreement – Active and passive voice; - Vocabulary – Compound words – Word formation – Word expansion ( root words).

UNIT III  READING AND UNDERSTANDING VISUAL MATERIAL  12
Listening- Listening to lectures/ talks and completing a task; Speaking – Role play/ Simulation – Group interaction; Reading – Reading and interpreting visual material; Writing- Jumbled sentences – Discourse markers and Cohesive devices – Essay writing (cause & effect/ narrative); Grammar – Tenses (perfect), Conditional clauses – Modal verbs; Vocabulary – Cause and effect words; Phrasal verbs in context.

UNIT IV  CRITICAL READING AND WRITING  12
Listening- Watching videos/ documentaries and responding to questions based on them; Speaking Informal and formal conversation; Reading –Critical reading (prediction & inference); Writing–Essay writing ( compare & contrast/ analytical) – Interpretation of visual materials; Grammar – Tenses (future time reference);Vocabulary – One word substitutes (with meanings) – Use of abbreviations & acronyms – Idioms in sentences.

UNIT V  LETTER WRITING AND SENDING E-MAILS  12
Listening- Listening to programmes/broadcast/ telecast/ podcast; Speaking – Giving impromptu talks, Making presentations on given topics- Discussion on the presentation; Reading –Extensive reading; Writing- Poster making – Letter writing (Formal and E-mail) ;Grammar – Direct and Indirect speech – Combining sentences using connectives; Vocabulary – Collocation;

TEACHING METHODS:
Interactive sessions for the speaking module.
Use of audio – visual aids for the various listening activities.
Contextual Grammar Teaching.

EVALUATION PATTERN:
Internals – 50%
End Semester – 50%

TOTAL:60 PERIODS

OUTCOMES:
- Students will improve their reading and writing skills
- Students will become fluent and proficient in communicative English
- Students will be able to improve their interpersonal communication

TEXTBOOK:

REFERENCES:
3. Redston, Chris & Gillies Cunningham Face2Face (Pre-intermediate Student’s Book & Workbook) Cambridge University Press, New Delhi: 2005

MA7151 MATHEMATICS – I
(Common to all branches of B.E./ B.Tech. Programmes in I Semester)

OBJECTIVES:
- The goal of this course is for students to gain proficiency in calculus computations.
  In calculus, we use three main tools for analyzing and describing the behavior of functions: limits, derivatives, and integrals. Students will use these tools to solve application problems in a variety of settings ranging from physics and biology to business and economics.
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I DIFFERENTIAL CALCULUS
Representation of functions - New functions from old functions - Limit of a function - Limits at infinity - Continuity - Derivatives - Differentiation rules - Polar coordinate system - Differentiation in polar coordinates - Maxima and Minima of functions of one variable.
UNIT II  FUNCTIONS OF SEVERAL VARIABLES  12

UNIT III  INTEGRAL CALCULUS  12
Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT IV  MULTIPLE INTEGRALS  12

UNIT V  DIFFERENTIAL EQUATIONS  12
Method of variation of parameters – Method of undetermined coefficients – Homogenous equation of Euler’s and Legendre’s type – System of simultaneous linear differential equations with constant coefficients.

TOTAL : 60 PERIODS

OUTCOMES:
• Understanding of the ideas of limits and continuity and an ability to calculate with them and apply them.
• Improved facility in algebraic manipulation.
• Fluency in differentiation.
• Fluency in integration using standard methods, including the ability to find an appropriate method for a given integral.
• Understanding the ideas of differential equations and facility in solving simple standard examples.

TEXTBOOKS:

REFERENCES:
PH7151  ENGINEERING PHYSICS  L T P C
(Common to all branches of B.E. / B.Tech. Programmes)  3 0 0 3

OBJECTIVE:
- To introduce the concept and different ways to determine moduli of elasticity and applications.
- To instill the concept of sound, reverberation, noise cancellation, and ultrasonic generation, detection and applications
- To inculcate an idea of thermal properties of materials, heat flow through materials and quantum physics
- To promote the basic understanding of interferometers, principles and applications of lasers, optical fibers and sensors
- To establish a sound grasp of knowledge on the basics, significance and growth of single crystals

UNIT I  PROPERTIES OF MATTER

UNIT II  ACOUSTICS AND ULTRASONICS

UNIT III  THERMAL AND MODERN PHYSICS

UNIT IV  APPLIED OPTICS

UNIT V  CRYSTAL PHYSICS
Single crystalline, polycrystalline and amorphous materials – Single crystals: unit cell, crystal systems, Bravais lattices, ditections and planes in a crystal, Miller indices - interplanar distance for
a cubic crystal - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - structure and significance of NaCl, CsCl, ZnS and graphite - crystal imperfections: point defects, line defects – Burger vectors, dislocations and stacking faults – Growth of single crystals: Bridgman and Czochralski methods.

TOTAL: 45 PERIODS

OUTCOME:
- The students will understand different moduli of elasticity, their determination and applications.
- The students will gain knowledge on the properties of sound, noise cancellation, and production, detection and applications of ultrasonics.
- The students will acquire sound knowledge on thermal expansion and thermal conductivity of materials. Further they will gain an idea of quantum physics.
- The students will gain knowledge on crystal imperfections: point defects, line defects – Burger vectors, dislocations and stacking faults.
- The students will secure knowledge on the basics of crystal structures and their significance.

TEXTBOOKS:

REFERENCES:

CY7151

ENGINEERING CHEMISTRY

L T P C
3 0 0 3

OBJECTIVE:
- To develop an understanding about fundamentals of polymer chemistry.
- Brief elucidation on surface chemistry and catalysis.
- To develop sound knowledge photochemistry and spectroscopy.
- To impart basic knowledge on chemical thermodynamics.
- To understand the basic concepts of nano chemistry.
UNIT I POLYMER CHEMISTRY
Introduction: Functionality-degree of polymerization. Classification of polymers- natural and synthetic, thermoplastic and thermosetting. Types and mechanism of polymerization: addition (free radical, cationic, anionic and living); condensation and copolymerization. Properties of polymers: Tg, tacticity, molecular weight-weight average, number average and polydispersity index. Techniques of polymerization: Bulk, emulsion, solution and suspension.

UNIT II SURFACE CHEMISTRY AND CATALYSIS

UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY

UNIT IV CHEMICAL THERMODYNAMICS
Second law: Entropy-entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Free energy and work function: Helmholtz and Gibbs free energy functions; Criteria of spontaneity; Gibbs-Helmholtz equation; Clausius Clapeyron equation; Maxwell relations-Van’t Hoff isotherm and isochore. Chemical potential; Gibbs-Duhem equation- variation of chemical potential with temperature and pressure.

UNIT V NANO CHEMISTRY
Basics-distinction between molecules, nanoparticles and bulk materials; size-dependent properties. Preparation of nanoparticles – sol-gel and solvothermal. Preparation of carbon nanotube by chemical vapour deposition and laser ablation. Preparation of nanowires by VLS growth, electrochemical deposition and electro spinning. Properties and uses of nanoparticles, nano clusters, nano rods, nanotubes and nanowires.

TOTAL: 45 PERIODS

OUTCOME
- Will be familiar with polymer chemistry, surface chemistry and catalysis.
- Will know the photochemistry, spectroscopy and chemical thermodynamics.
- Will know the fundamentals of nano chemistry.

TEXTBOOKS

REFERENCES
OBJECTIVES:
- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION)
Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLAN CURVES AND FREE HANDSKETCHING
Basic Geometrical constructions, Curves used in engineering practices-Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles – Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES
Orthographic projection- principles-Principal planes-First angle projection-Projection of points.Projection of straight lines (only First angle projections) inclined to both the principal planes- Determination of true lengths and true inclinations by rotating line method and trapezoidal method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to both the principal planes by rotating object method and auxiliary plane method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES
Sectioning of solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS
Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-Prisms pyramids and cylinders by visual ray method and vanishing point method.

COMPUTER AIDED DRAFTING (DEMONSTRATION ONLY)
Introduction to drafting packages and demonstration of their use.
L=45+T=30, TOTAL: 75 PERIODS
OUTCOMES:
- On Completion of the course the student will be able to
- Perform free hand sketching of basic geometrical shapes and multiple views of objects.
- Draw orthographic projections of lines, Planes and Solids
- Obtain development of surfaces.
- Prepare isometric and perspective views of simple solids.

TEXTBOOKS:

REFERENCES:

Publication of Bureau of Indian Standards:

Special points applicable to University Examinations on Engineering Graphics:
1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day.

AI7101 PRINCIPLES OF AGRICULTURAL AND IRRIGATION ENGINEERING L T P C 3 0 0 3

OBJECTIVES:
- To present the basic theory and practice for various areas of Agricultural Engineering, application of engineering to the problems of agricultural production.

UNIT I INTRODUCTION, SOIL & WATER CONSERVATION 6
UNIT II  IRRIGATION ENGINEERING AND FARM STRUCTURES  12
Farm stead, Farm Roads, Cattle sheds, Stanchion barn, Poultry shed, Hog housing, Machinery and implement shed, Storage structures for food grain, feed & forage - Structures for Plant environment - Green houses, Poly houses – Shade net.

UNIT III  FARM MACHINERY & EQUIPMENTS  7
Tractor and Power Tiller – Tillage equipments – Sowing, Planting, Fertilizer, application, Spraying, Mowing Equipments, Pumps

UNIT IV  AGRICULTURAL PROCESS ENGINEERING  10
Post harvest of crops, Unit operations in agricultural processing, Packing of agricultural produces – Material handling equipments – Milk processing and dairy products.

UNIT V  AGRO ENERGY  10

TOTAL : 45 PERIODS

OUTCOME:
- The knowledge gained on soil water conservation, irrigation engineering and farm structures provide a strong platform to understand the concepts on these subjects for further learning

TEXTBOOKS:

GE7162  ENGINEERING PRACTICES LABORATORY  L  T  P  C
(Common to all Branches of B.E. / B.Tech. Programmes)  0  0  4  2

OBJECTIVE:
- To provide exposure to the students with hands-on experience on various Basic Engineering Practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP – A (CIVIL & ELECTRICAL)

1. CIVIL ENGINEERING PRACTICES  15
PLUMBING
Basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings. Preparation of plumbing line sketches.
- Laying pipe connection to the suction side of a pump.
- Laying pipe connection to the delivery side of a pump.
• Practice in connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK
• Sawing, planning and making joints like T-Joint, Mortise and Tenon joint and Dovetail joint.

STUDY
• Study of joints in door panels and wooden furniture
• Study of common industrial trusses using models.

2. ELECTRICAL ENGINEERING PRACTICES
• Basic household wiring using Switches, Fuse, Indicator and Lamp etc.,
• Stair case light wiring
• Tube – light wiring
• Preparation of wiring diagrams for a given situation.
• Study of Iron-Box, Fan Regulator and Emergency Lamp

GROUP – B (MECHANICAL AND ELECTRONICS)

3. MECHANICAL ENGINEERING PRACTICES WELDING
• Arc welding of Butt Joints, Lap Joints, and Tee Joints
• Gas welding Practice.
• Basic Machining - Simple turning, drilling and tapping operations..
• Study and assembling of the following:
  a. Centrifugal pump
  b. Mixie
  c. Air Conditioner.

DEMONSTRATION ON FOUNDRY OPERATIONS.

4. ELECTRONIC ENGINEERING PRACTICES
• Soldering simple electronic circuits and checking continuity.
• Assembling electronic components on a small PCB and Testing.
• Study of Telephone, FM radio and Low Voltage Power supplies.

TOTAL : 60 PERIODS

OUTCOME:
• Ability to fabricate carpentry components and to lay pipe connections including plumbing works.
• Ability to use welding equipments to join the structures
• Ability to do wiring for electrical connections and to fabricate electronics circuits.

BS7161 BASIC SCIENCES LABORATORY
(LCommon to all branches of B.E. / B.Tech Programmes) 0 0 4 2

PHYSICS LABORATORY: (Any Seven Experiments)

OBJECTIVE:
• To inculcate experimental skills to test basic understanding of physics of materials including properties of matter, thermal and optical properties.
• To induce the students to familiarize with experimental determination of velocity of ultrasonic waves, band gap determination and viscosity of liquids.
1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of disc
2. Non-uniform bending - Determination of young’s modulus
3. Uniform bending – Determination of young’s modulus
4. Lee’s disc Determination of thermal conductivity of a bad conductor
5. Potentiometer-Determination of thermo E.M.F of a thermocouple
6. Laser- Determination of the wave length of the laser using grating
7. Air wedge - Determination of thickness of a thin sheet/wire
8. a) Optical fibre - Determination of Numerical Aperture and acceptance angle
    b) Compact disc- Determination of width of the groove using laser.
10. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
11. Post office box - Determination of Band gap of a semiconductor.
13. Viscosity of liquids - Determination of co-efficient of viscosity of a liquid by Poiseuille’s flow

OUTCOME:
Upon completion of the course, the students will be able
- To determine various moduli of elasticity and also various thermal and optical properties of materials.
- To determine the velocity of ultrasonic waves, band gap determination and viscosity of liquids.

CHEMISTRY LABORATORY:

(Minimum of 8 experiments to be conducted)

1. Estimation of HCL using Na₂CO₃ as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler’s method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by iodometry.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline/thiocyanate method).
10. Estimation of sodium and potassium present in water using flame photometer.
12. Pseudo first order kinetics-ester hydrolysis.
14. Determination of CMC.
15. Phase change in a solid.

TOTAL: 60 PERIODS

TEXTBOOKS:
OBJECTIVES:
- To enable students acquire proficiency in technical communication.
- To enhance their reading and writing skills in a technical context.
- To teach various language learning strategies needed in a professional environment.

CONTENTS

UNIT I  ANALYTICAL READING  12
Listening- Listening to informal and formal conversations; Speaking – Conversation Skills(opening, turn taking, closing )-explaining how something works-describing technical functions and applications; Reading –Analytical reading, Deductive and inductive reasoning; Writing- vision statement-structuring paragraphs.

UNIT II  SUMMARISING  12
Listening- Listening to lectures/ talks on Science & Technology; Speaking –Summarizing/ Oral Reporting, Reading – Reading Scientific and Technical articles; Writing- Extended definition –Lab Reports – Summary writing.

UNIT III  DESCRIBING VISUAL MATERIAL  12
Listening- Listening to a panel discussion; Speaking – Speaking at formal situations; Reading – Reading journal articles - Speed reading;Writing-data commentary-describing visual material-writing problem-process- solution-the structure of problem-solution texts- writing critiques

UNIT IV  WRITING/ E-MAILING THE JOB APPLICATION  12
Listening- Listening to/ Viewing model interviews; Speaking –Speaking at different types of interviews – Role play practice (mock interview); Reading – Reading job advertisements and profile of the company concerned; Writing- job application – cover letter –Résumé preparation.

UNIT V  REPORT WRITING  12
Listening- Viewing a model group discussion; Speaking –Participating in a discussion - Presentation; Reading – Case study - analyse -evaluate – arrive at a solution; Writing– Recommendations- Types of reports (feasibility report)- designing and reporting surveys- – Report format.- writing discursive essays.

TEACHING METHODS:
Practice writing
Conduct model and mock interview and group discussion.
Use of audio – visual aids to facilitate understanding of various forms of technical communication.
Interactive sessions.

EVALUATION PATTERN:
Internals – 50%
End Semester – 50%
TOTAL: 60 PERIODS

OUTCOMES:
- Students will learn the structure and organization of various forms of technical communication.
- Students will be able to listen and respond to technical content.
- Students will be able to use different forms of communication in their respective fields.

TEXTBOOK:
REFERENCES:

MA7251         MATHEMATICS – II
(Common to all branches of B.E / B.Tech. Programmes in I Semester)

OBJECTIVES:
- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To acquaint the student with the concepts of vector calculus needed for problems in all engineering disciplines.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow of the electric current.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT I         MATRICES

UNIT II        VECTOR CALCULUS
Gradient and directional derivative – Divergence and Curl – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green’s, Gauss divergence and Stoke’s theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III       ANALYTIC FUNCTION
Analytic functions – Necessary and sufficient conditions for analyticity - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions $w = z+c$, $az$, $\frac{1}{z}$, $z^2$ - Bilinear transformation
UNIT IV  COMPLEX INTEGRATION  12

UNIT V  LAPLACE TRANSFORMS  12

TOTAL : 60 PERIODS

OUTCOMES:
Upon successful completion of the course, students should be able to:

- Evaluate real and complex integrals using the Cauchy integral formula and the residue theorem
- Appreciate how complex methods can be used to prove some important theoretical results.
- Evaluate line, surface and volume integrals in simple coordinate systems
- Calculate grad, div and curl in Cartesian and other simple coordinate systems, and establish identities connecting these quantities
- Use Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.

TEXTBOOKS:

REFERENCES:

PH7253  PHYSICS FOR AGRICULTURAL AND IRRIGATION ENGINEERING  L T P C
3 0 0 3

OBJECTIVE:
- To make the students learn various physical properties of soil and methods for analyzing the physical properties of soil
- To make the students understand the detailed mechanism of photosynthesis in leaves
- To introduce the students about various biophysical methods employed in the field of agriculture
To instill knowledge on the fundamentals of electromagnetic radiation and remote sensing
To familiarize the students about preservation and processing of food with ionizing radiation

UNIT I  
SOIL PHYSICS  
9

UNIT II  
PHOTOSYNTHESIS  
9
Photosynthesis - Leaves and leaf structure - The nature of light - Chlorophyll and accessory pigments - The structure of the chloroplast and photosynthetic membranes - Stages of photosynthesis - The light reactions - Dark reaction - C-4 Pathway - The carbon cycle.

UNIT III  
BIOPHYSICS  
9

UNIT IV  
REMOTE SENSING IN AGRICULTURE AND IRRIGATION  
9
Electromagnetic spectrum: The photon and radiometric quantities - radiant energy - radiant flux density - radiant intensity - transmittance - absorptance - reflectance - distribution of radiant energies - spectral signatures - sensor technology - sensor types - passive and active - spatial resolution - processing and classification of remote sensed data - pattern recognition - approaches to data / image interpretation - use of remote sensing in agriculture and irrigation.

UNIT V  
FOOD IRRADIATION AND PRESERVATION  
9
Effects of ionizing radiation on biological organism - Effects of ionizing radiation on foods - applications of food irradiation - low dose - medium dose and high dose - Food irradiation using electron beams, X-rays - nuclear radiation - Processing of seeds, spices, fruits and vegetables.

TOTAL: 45 PERIODS

OUTCOME:
At the end of the course, the students will
- learn about physical properties of the soil and methods for analyzing the physical properties.
- understand the structure of the leaves and mechanism of photosynthesis in leaves
- acquire knowledge about various biophysical methods employed in the field of agriculture
- gain knowledge on the fundamentals of electromagnetic radiation and use of remote sensing in agriculture and irrigation
- familiarize with effects of ionizing radiation on foods, and processing of seeds, spices, fruits and vegetables

REFERENCES:
OBJECTIVES:
- To develop an understanding about the engineering materials.
- Brief elucidation on corrosion and its control.
- To develop sound knowledge about chemical toxicology and separation techniques.
- To impart basic knowledge on pesticides and fertilizers.
- To understand the basic concepts of green chemistry.

UNIT I ENGINEERING MATERIALS

UNIT II CORROSION CHEMISTRY

UNIT III PLASTICS AND PESTICIDES

UNIT IV IRRIGATION AND FERTILIZER CHEMISTRY

UNIT V CHEMICAL TOXICOLOGY AND SEPARATION TECHNIQUES

TOTAL: 45 PERIODS
OUTCOME:
• Will be competent in the knowledge of engineering materials, chemical toxicology and green chemistry.
• Will be familiar with fertilizers and pesticides.
• Will develop concern for protection of metals.
• Will be conversant with the knowledge of lubricants.

TEXTBOOKS:

REFERENCES:

GE7153 ENGINEERING MECHANICS

OBJECTIVES:
• The objective of this course is to inculcate in the student the ability to analyze any problem in a simple and logical manner and to predict the physical phenomena and thus lay the foundation for engineering applications.

UNIT I  STATICS OF PARTICLES


UNIT II  EQUILIBRIUM OF RIGID BODIES

UNIT III  DISTRIBUTED FORCES
Centroids of lines and areas – symmetrical and unsymmetrical shapes, Determination of Centroids by Integration , Theorems of Pappus-Guldinus, Distributed Loads on Beams, Center
of Gravity of a Three-Dimensional Body, Centroid of a Volume, Composite Bodies, Determination of Centroids of Volumes by Integration.
Moments of Inertia of Areas and Mass - Determination of the Moment of Inertia of an Area by Integration, Polar Moment of Inertia, Radius of Gyration of an Area, Parallel-Axis Theorem, Moments of Inertia of Composite Areas, Moments of Inertia of a Mass - Moments of Inertia of Thin Plates, Determination of the Moment of Inertia of a Three-Dimensional Body by Integration.

UNIT IV FRICTION 8

UNIT V DYNAMICS OF PARTICLES 12

TOTAL: 60 PERIODS

OUTCOMES:
- Upon completion of this course, students will be able to construct meaningful mathematical models of physical problems and solve them.

TEXTBOOKS:

REFERENCES:

GE7151 COMPUTING TECHNIQUES (Common to all branches of Engineering and Technology) 3 0 0 3

OBJECTIVE:
- To learn programming using a structured programming language.
- To provide C programming exposure.
- To introduce foundational concepts of computer programming to students of different branches of Engineering and Technology.

UNIT I INTRODUCTION 9
Introduction to Computers – Computer Software – Computer Networks and Internet - Need for logical thinking – Problem formulation and development of simple programs - Pseudo code - Flow Chart and Algorithms.
UNIT II            C PROGRAMMING BASICS

UNIT III            ARRAYS AND STRINGS

UNIT IV            POINTERS
Macros - Storage classes –Basic concepts of Pointers– Pointer arithmetic - Example Problems - Basic file operations

UNIT V            FUNCTIONS AND USER DEFINED DATA TYPES

TOTAL : 45 PERIODS

OUTCOME:
At the end of the course, the student should be able to:
• Write C program for simple applications
• Formulate algorithm for simple problems
• Analyze different data types and arrays
• Perform simple search and sort.
• Use programming language to solve problems

TEXTBOOKS:

REFERENCES:

CY7262            APPLIED CHEMISTRY LABORATORY FOR AGRICULTURAL ENGINEERS
L T P C
0 0 4 2
(Minimum of 8 experiments to be conducted)

OBJECTIVES:
• The students should be made to introduce different experiments to test basic understanding the applied chemistry concepts.

LIST OF EXPERIMENTS
1. Determination of Iodine value.
2. Determination of Acid value of resin
3. Estimation of aniline point.
5. Determination of Fe in Iron Ore
6. Determination of Ca in Limestone.
7. Identification of functional groups in organic compounds
8. Identification of monomers in polymers.
10. Determination of TGA of polymeric sample.

TOTAL : 60 PERIODS

OUTCOMES:
- The hands on exercises undergone by the students will help them to apply chemistry principles to evaluate agricultural engineering properties of materials

TEXTBOOKS:

REFERENCES:

GE7161 COMPUTER PRACTICES LABORATORY

OBJECTIVES:
- To understand the basic programming constructs and articulate how they are used to develop a program with a desired runtime execution flow.
- To articulate where computer programs fit in the provision of computer-based solutions to real world problems.
- To learn to use user defined data structures.

LIST OF EXPERIMENTS
1. Search, generate, manipulate data using MS office/ Open Office
2. Presentation and Visualization – graphs, charts, 2D, 3D
3. Problem formulation, Problem Solving and Flowcharts
4. C Programming using Simple statements and expressions
5. Scientific problem solving using decision making and looping.
6. Simple programming for one dimensional and two dimensional arrays.
7. Solving problems using String functions
8. Programs with user defined functions
9. Program using Recursive Function
10. Program using structures and unions.

TOTAL : 60 PERIODS

OUTCOME:
At the end of the course, the student should be able to:
- Write and compile programs using C programs.
- Write program with the concept of Structured Programming
- Identify suitable data structure for solving a problem
- Demonstrate the use of conditional statement.
LABORATORY REQUIREMENTS FOR BATCH OF 30 STUDENTS
30 Systems with C compiler

AI7301  SOIL SCIENCE AND ENGINEERING  L T P C
                          3 0 0 3

OBJECTIVE:
• To expose the students to the fundamental knowledge on Soil physical parameters,
  Permeability – Compaction, Bearing Capacity and types and methods of soil survey and
  interpretative groupings

UNIT I  INTRODUCTION AND PHYSICAL PROPERTIES  9
Soil - definition - major components – Soil forming minerals and processes- soil profile -
Physical properties - texture –density-porosity-consistence- colour- specific gravity - capillary and non-
capillary - plasticity. Soil air - soil temperature - soil water - classification of soil water- Movement
soil water. Soil colloids – organic and inorganic matter-ion exchange- pH – Plant nutrient
availability.

UNIT II  SOIL CLASSIFICATION AND SURVEY  9
Soil classification -soil taxonomy – Soils of Tamil Nadu and India. Soil survey - types and methods
of soil survey – Field mapping - mapping units - base maps - preparation of survey reports -
concepts and uses - land capability classes and subclasses - soil suitability -Problem soils –
Reclamation.

UNIT III  PHASE RELATIONSHIP AND SOIL COMPACTION  9
Phase relations- Gradation analysis - Atterberg Limits and Indices- Classification of soil – Soil
compaction- factors affecting compaction- field and laboratory methods.

UNIT IV  ENGINEERING PROPERTIES OF SOIL  9
Shear strength of cohesive and cohesion less - Mohr-Coulomb failure theory- Measurement of
shear strength, direct shear, Triaxial and vane shear test-Compressibility- Assessment of seepage
through flow net construction-Permeability- Coefficient of Permeability-Darcy’s law-field and lab
methods.

UNIT V  BEARING CAPACITY AND SLOPE STABILITY  9
Bearing capacity of soils - Factors affecting Bearing Capacity- Shallow and Pile foundations-
Terzaghi’s formula - BIS standards - Slope stability-Analysis of infinite and finite slopes- friction
circle method-slope protection measures.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the student will be able to understand
• Fundamental knowledge of soil physical parameters.
• The procedures involved in soil survey, soil classification.
• The phase relationship and soil compaction.
• Concepts of bearing capacity and slope stability.

TEXTBOOKS:
   Distributors, New Delhi, 2007.
REFERENCES:

CE7251 STRENGTH OF MATERIALS

OBJECTIVE:
- To understand the stresses developed in bars, compounds bars, beams, shafts, cylinders and spheres.

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS

UNIT II TRANSVERSE LOADING ON BEAMS AND STRESSES IN BEAM

UNIT III TORSION
Torsion formulation stresses and deformation in circular and hollows shafts – Stepped shafts – Deflection in shafts fixed at the both ends – Stresses in helical springs – Deflection of helical springs, carriage springs.

UNIT IV DEFLECTION OF BEAMS
Double Integration method – Macaulay’s method – Area moment Theorems for computation of slopes and deflections in beams - Conjugate beam and strain energy – Maxwell’s reciprocal theorems.

UNIT V THIN CYLINDERS, SPHERES AND THICK CYLINDERS
Stresses in thin cylindrical shell due to internal pressure circumferential and longitudinal stresses and deformation in thin cylinders – spherical shells subjected to internal pressure – Deformation in spherical shells – Lame’s theory – Application of theories of failure.

TOTAL: 45 PERIODS

OUTCOMES:
- Upon completion of this course, the students can able to apply mathematical knowledge to calculate the deformation behavior of simple structures.
- Critically analyse problem and solve the problems related to mechanical elements and analyse the deformation behavior for different types of loads.

TEXT BOOKS:
**REFERENCES:**


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**CE7351 FLUID MECHANICS L T P C**

3 0 0 3

**OBJECTIVES:**

- To introduce the students to the mechanics of fluids through a thorough understanding of the properties of the fluids, behaviour of fluids under static conditions. The dynamics of fluids is introduced through the control volume approach which gives an integrated understanding of the transport of mass, momentum and energy.
- To expose to the applications of the conservation laws to a) flow measurements b) flow through pipes (both laminar and turbulent) and c) forces on vanes.

**UNIT I FLUIDS PROPERTIES AND FLUID STATICS**

Scope of fluid mechanics - Definitions of a fluid - Methods of analysis - Dimensions and units - viscosity, density, perfect gas, vapour pressure and surface tension - Basic equation of fluid statics - Pressure measurements - Manometers. - Forces on plane and curved surfaces - Buoyancy and floatation - Stability of floating bodies - Relative equilibrium.

**UNIT II BASIC CONCEPTS OF FLUID FLOW**

(a) Kinematics – Methods of describing fluid motion - Classification of flows - Streamline, streak-line and path-lines - Stream function and velocity potentials - Flow nets; (b) Dynamics - Dimensional Concepts of System and Control volume - Application of control volume to continuity, energy and momentum - Euler’s equation of motion along a stream line - Bernoulli’s equation - Applications to velocity and discharge measurements - Linear momentum equation and moment-of-momentum equations and their applications.

**UNIT III DIMENSIONAL ANALYSIS AND MODEL STUDIES**

Fundamental dimensions - dimensional homogeneity - Rayleigh’s method and Buckingham Pi-Theorem - Dimensionless parameters - Similitude and model studies - Distorted Models.

**UNIT IV INCOMPRESSIBLE VISCOUS FLOW**

Laminar flow between parallel plates, and pipes - Development of laminar and turbulent flows in pipes - Reynolds experiment - Darcy-Weisbach equation - Moody diagram - Major and minor losses of flow in pipes - Pipes in series and in parallel.

**UNIT V BOUNDARY LAYERS AND TRANSPORT BY ADECTION AND DIFFUSION**

Definition of boundary layers - Displacement, momentum and energy thickness - Laminar and turbulent boundary layers - Momentum integral equation – Steady molecular diffusion and conduction – Turbulent transport equations – Channel diffusion and Dispersions and Applications.

**TOTAL : 45 PERIODS**
OUTCOMES:

- The students will be able to get a basic knowledge of fluids in static, kinematic and dynamic equilibrium.
- They will also gain the knowledge of the applicability of physical laws in addressing problems in hydraulics.

TEXTBOOKS:


REFERENCES:


CE7353 PLANE AND GEODETIC SURVEYING

OBJECTIVES:

- To introduce the rudiments of plane surveying and geodetic principles to Geo informatics Engineers.
- To learn the various methods of plane and geodetic surveying to solve the real world problems.
- To introduce the concepts of Control Surveying
- To introduce the basics of Astronomical Surveying

UNIT I FUNDAMENTALS OF CONVENTIONAL SURVEYING

Classifications and basic principles of surveying – Equipment and accessories for ranging and chaining – Methods of ranging – Chain traversing – Basic principles and applications of Plane Table and Compass - Levels and staves - Methods of levelling - Booking -Reduction - Curvature and refraction - Contouring.

UNIT II THEODOLITE SURVEYING

Horizontal and vertical angle measurements - Temporary and permanent adjustments – Heights and distances–Tacheometric surveying – Trigonometric levelling – Horizontal curves in route surveying – classification, functions and requirements - methods of setting out simple curves - setting out transition curves by offsets and angles

UNIT III CONTROL SURVEYING AND ADJUSTMENT


UNIT IV ASTRONOMICAL SURVEYING

Astronomical terms and definitions - Motion of sun and stars - Celestial coordinate systems – different time systems - Nautical Almanac - Apparent altitude and corrections - Field observations and determination of time, longitude, latitude and azimuth by altitude and hour angle method.
UNIT V  MODERN SURVEYING

Total Station: Advantages - Fundamental quantities measured – Parts and accessories – working principle – On board calculations – Field procedure – Errors and Good practices in using Total Station

GPS: System components – Signal structure – Selective availability and antispooing – receiver components – Planning and data acquisition – Data processing - Errors in GPS - Applications

OUTCOMES:
At the end of the course the student will be able to understand

- The use of various surveying instruments in mapping
- The error and adjustments procedures associated with surveying and mapping
- The methods used for establishment of horizontal and vertical control
- Concepts of astronomical surveying and methods to determine time, longitude, latitude and azimuth

TEXTBOOKS:

REFERENCES:

MA7358  TRANSFORM TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS

OBJECTIVES:
- To introduce the effective mathematical tools for the solutions of partial differential equations that model physical processes;
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems;
- To acquaint the student with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic;
- To develop Z- transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems.

UNIT I  PARTIAL DIFFERENTIAL EQUATIONS

UNIT II  FOURIER SERIES
Dirichlet’s conditions – General Fourier series – Odd and even functions – Half-range Sine and cosine series – Complex form of Fourier series – Parseval’s identity – Harmonic Analysis.

UNIT III  APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATION
Method of separation of variables – Solutions of one dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions in cartesian coordinates.

UNIT IV  FOURIER TRANSFORM

UNIT V  Z – TRANSFORM AND DIFFERENCE EQUATIONS

OUTCOMES:
- The students can able to solve the partial differential equations, find the Fourier series analysis and solve the problems by using Fourier transform and Z transform techniques.

TEXTBOOKS:

REFERENCES:

ME7353  MECHANICS OF MACHINES
L T P C
3 0 0 3

OBJECTIVE:
- To understand the principles in the formation of mechanisms and their kinematics.
- To understand the effect of friction in different machine elements.
- To analyze the forces and torque acting on simple mechanical systems
- To understand the importance of balancing and vibration.

UNIT I  KINEMATICS OF MECHANISMS
UNIT II  GEARs AND GEAR TRAINS

UNIT III  FRICTION IN MACHINE ELEMENTS
Surface contacts – Sliding and Rolling friction – Friction drives – Friction in screw threads – Bearings and lubrication – Friction clutches – Belt and rope drives – Friction aspects in brakes– Friction in vehicle propulsion and braking.

UNIT IV  FORCE ANALYSIS

UNIT V  BALANCING AND VIBRATION

TOTAL: 45 PERIODS

OUTCOME:
• The course will enable the student to understand the forces and torque acting on simple mechanical systems and also the importance of balancing and vibration and the effect of friction in different parts of practical significance.

TEXTBOOK:

REFERENCES:
OBJECTIVE:
- To familiarize with the various surveying instruments and methods.

EXERCISES:
1. Determination of area of polygon by base line method using chain
2. Chain traversing
3. Fly levelling
4. Check levelling
5. Study of theodolite and its accessories
6. Measurement of horizontal and vertical angles using theodolite
7. Determination of tacheometric constants
8. Determination of elevation of an object using single plane method when base is accessible/ inaccessible
9. Determination of distance and difference in elevation between two inaccessible points using double plane method.
10. Heights and distances by stadia tacheometry
11. Heights and distances by tangential tacheometry
12. Study of Total station and GPS(demonstration only)

TOTAL: 60 PERIODS

OUTCOMES:
- At the end of the course the student will be able to use various surveying instruments like chain, level and theodolite for mapping.

REFERENCES:

OBJECTIVES:
- To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic pumps. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering.

UNIT I  UNIFORM FLOW
Definition and differences between pipe flow and open channel flow - Types of Flow - Properties of open channel - Fundamental equations - Velocity distribution in open channel - Steady uniform flow: Chezy equation, Manning equation - Best hydraulic sections for uniform flow - Computation in Uniform Flow - Specific energy and specific force.
UNIT II  
**VARIED FLOWS**
12

UNIT III  
**RAPIDLY VARIED FLOWS**
12
Application of the energy equation for RVF - Critical depth and velocity - Critical, Sub-critical and Super-critical flow - Application of the momentum equation for RVF - Hydraulic jumps - Types - Energy dissipation - Surges and surge through channel transitions.

UNIT IV  
**ROTODYNAMIC PUMPS**
12
Centrifugal pumps - Minimum speed to start the pump - NPSH - Cavitations in pumps - Operating characteristics - Multistage pumps - Submersible pumps - Turbine Pumps.

UNIT V  
**POSITIVE DISPLACEMENT PUMPS**
12
Reciprocating pumps - Negative slip - Flow separation conditions - Air vessels, indicator diagrams and its variations - Savings in work done - Piston pumps - Rotary pumps: Gear pump - Jet pump - Air-lift pump - Hydraulic Ram.

TOTAL: 60 PERIODS

OUTCOMES:
- The students will be able to apply their knowledge of fluid mechanics in addressing problems in open channels.
- They will possess the skills to solve problems in uniform, gradually and rapidly varied flows in steady state conditions.
- They will have knowledge in hydraulic machineries (pumps and turbines).

TEXTBOOKS:

REFERENCES:

AI7402  
**PRINCIPLES AND PRACTICES OF CROP PRODUCTION**

OBJECTIVES:
- To introduce the students to principles of agricultural and horticultural crop production and to introduce the production practices of crops.
- To delineate the role of agricultural and irrigation engineers in relation to various crop production practices.

UNIT I  
**AGRICULTURE AND CROP PRODUCTION**
9+6
Introduction to agriculture and its crop production sub-sectors - field crop production and horticulture; Factors affecting crop growth and production: genetic (internal) and environmental (external) factors; Crop management through environmental modification and adaptation of crops to the existing environment through crop cultural practices.
UNIT II  CROP SELECTION AND ESTABLISHMENT  9+6
Regional and seasonal selection of crops; Systems of crop production; Competition among crop plants; Spacing and arrangement of crop plants; Field preparation for crops including systems of tillage; Establishment of an adequate crop stand and ground cover, including selection and treatment of seed, and nursery growing.

UNIT III  CROP MANAGEMENT  9+6
Crop water Management; Crop nutrition management - need for supplementation to soil supplied nutrients, sources, generalized recommendations, methods and timing of application of supplemental nutrients; Crop protection including management of weeds, pests and pathogens; Integrated methods of managing water, nutrients and plant protection; Types and methods of harvest.

UNIT IV  PRODUCTION PRACTICES OF AGRICULTURAL CROPS  9+6
Generalized management and cultivation practices for important groups of field crops in Tamil Nadu: cereal crops, grain legumes, oil seed crops, sugarcane, and fibre crops, and special purpose crops such as those grown for green manure.

UNIT V  PRODUCTION PRACTICES OF HORTICULTURAL CROPS  9+6
Important groups of horticultural crops in Tamil Nadu such as vegetable crops, fruit crops, flower crops; Cultivation practices of representatives of each group; Special features of production of horticultural crops - green house cultivation.

TOTAL (L: 45 + T: 15): 75 PERIODS

OUTCOMES:
- Students completing this course would have acquired knowledge on crop selection, crop production crop management.
- The students will have the required knowledge in the area of production of agricultural and horticultural crops.

TEXT BOOKS:

REFERENCES:
UNIT I  PRECIPITATION AND ABSTRACTIONS  10

UNIT II  RUNOFF  8
Watershed, catchment and basin - Catchment characteristics - factors affecting runoff - Runoff estimation using empirical - Strange’s table and SCS methods – Stage discharge relationships-flow measurements- Hydrograph – Unit Hydrograph – IUH

UNIT III  FLOOD AND DROUGHT  9
Natural Disasters-Flood Estimation- Frequency analysis- Flood control- Definitions of droughts- Meteorological, hydrological and agricultural droughts- IMD method-NDVI analysis- Drought Prone Area Programme (DPAP)

UNIT IV  RESERVOIRS  8
Classification of reservoirs, General principles of design, site selection, spillways, elevation – area - capacity - storage estimation, sedimentation - life of reservoirs – rule curve

UNIT V  GROUNDWATER AND MANAGEMENT  10
Origin- Classification and types - properties of aquifers- governing equations – steady and unsteady flow - artificial recharge - RWH in rural and urban areas

TOTAL: 45 PERIODS

OUTCOMES:
- The students gain the knowledge needed on hydrologic cycle, hydrometeorology and formation of precipitation.
- The students are able to apply the various methods of field measurements and empirical formulae for estimating the various losses of precipitation, stream flow, flood and flood routing.
- The students will know the basics of groundwater and hydraulics of subsurface flows

TEXTBOOKS:

REFERENCES:

GE7251  ENVIRONMENTAL SCIENCE AND ENGINEERING  L T P C  3 0 0 3

OBJECTIVES:
- To study the nature and facts about environment.
- To finding and implementing scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth” s interior and surface.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.
UNIT I  ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY  
Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – bio geographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. 
Field study of common plants, insects, birds
Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II  ENVIRONMENTAL POLLUTION  
Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.
Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III  NATURAL RESOURCES  
Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over- utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.
Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV  SOCIAL ISSUES AND THE ENVIRONMENT  

UNIT V  HUMAN POPULATION AND THE ENVIRONMENT  

TOTAL : 45 PERIODS
OUTCOMES:
- Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.
- Public awareness of environmental is at infant stage.
- Ignorance and incomplete knowledge has lead to misconceptions
- Development and improvement in std. of living has lead to serious environmental disasters

TEXTBOOKS:

REFERENCES:

MA7354  NUMERICAL METHODS  L T P C  4 0 0 4

OBJECTIVES:
- To provide the mathematical foundations of numerical techniques for solving linear system, eigenvalue problems, interpolation, numerical differentiation and integration and the errors associated with them;
- To demonstrate the utility of numerical techniques of ordinary and partial differential equations in solving engineering problems where analytical solutions are not readily available.

UNIT I  SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS

UNIT II  INTERPOLATION AND APPROXIMATION
Interpolation with unequal intervals - Lagrange interpolation – Newton’s divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton’s forward and backward difference formulae – Least square method - Linear curve fitting.

UNIT III  NUMERICAL DIFFERENTIATION AND INTEGRATION
UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS


UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS

Finite difference methods for solving two-point linear boundary value problems - Finite difference techniques for the solution of two dimensional Laplace’s and Poisson’s equations on rectangular domain – One dimensional heat-flow equation by explicit and implicit (Crank-Nicholson) methods - One dimensional wave equation by explicit method.

TOTAL: 60 PERIODS

OUTCOMES:
- Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions.
- Apply numerical methods to obtain approximate solutions to mathematical problems.
- Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
- Analyze and evaluate the accuracy of common numerical methods.

TEXTBOOKS:

REFERENCES:

SOIL SCIENCE AND WATER QUALITY LABORATORY

OBJECTIVE:
- Students should be able to verify various quality aspects of soil and water studied in theory by performing experiments in lab.

1. Identification of rocks and minerals 4
2. Conduct soil profile study 4
3. Collection and processing of soil samples 4
4. Determination of soil moisture, EC and pH 4
5. Field density determination by Core Cutter and Sand Replacement method 4
6. Specific gravity determination by Pycnometer 4

Director

Center For Academic Courses
Anna University, Chennai 600 025
7. Textural analysis of soil by International Pipette method 4
8. Grain size analysis by using Mechanical shaker 4
9. Identification of soil colour using Munsell chart 4
10. Determination Organic carbon 4
11. Estimation of Gypsum requirements 4
12. Collection of irrigation water and analysis for EC, pH, CO$_3$$_2$, HCO$_3$$_2$, Ca, Mg, K 8
13. Computation of salts in irrigation water and classification. 8

TOTAL: 60 PERIODS

OUTCOMES:
- Students know the techniques to determine various physical and chemical properties of soil that are applicable for agriculture and irrigation by conducting appropriate tests.

REFERENCES:

CE7361 FLUID MECHANICS AND MACHINERY LABORATORY  L T P C
                                                  0 0 4 2

OBJECTIVE:
- Students should be able to verify the principles studied in theory by performing the experiments in lab.

LIST OF EXPERIMENTS
1. Flow Measurement 32
   1. a. Calibration of Rotometer
   2. b. Flow through Venturimeter
   2. Flow through a circular Orifice
   3. Determination of mean velocity by Pitot tube
   4. Verification of Bernoulli’s Theorem
   5. a. Flow through a Triangular Notch
   6. b. Flow through a Rectangular Notch

2. Losses in Pipes 8
   6. Determination of friction coefficient in pipes
   7. Determination of losses due to bends, fittings and elbows

3. Pumps 16
   8. Characteristics of Centrifugal pumps
   9. Characteristics of Submersible pump
   10. Characteristics of Reciprocating pump

4. Determination of Metacentric height 4
   Demonstration Only

TOTAL: 60 PERIODS

OUTCOMES:
- The students will be able to measure flow in pipes and determine frictional losses.
- The students will be able to develop characteristics of pumps and turbines
REFERENCES:

OBJECTIVES
- To introduce the concepts of groundwater, its availability, assessment and utilization
- To understand the theory behind well design, construction and management of wells.

UNIT I  HYDROGEOLOGIC PARAMETERS

UNIT II  WELL HYDRAULICS

UNIT III  WELL DESIGN
Design characteristics – Design of wells - Well diameter, depth and Well screen design – Materials for well screens – Well casing – Design of collector wells and Infiltration gallery – Dug wells versus tube wells

UNIT IV  WELL CONSTRUCTION AND MAINTENANCE

UNIT V  SPECIAL TOPICS

OUTCOMES:
- Students know the technical aspects of groundwater, its availability, assessment and utilization
- Familiarized with the theory behind well design, construction and management of wells.

TOTAL: 45 PERIODS
TEXTBOOKS:

REFERENCES:

AI7502 IRRIGATION ENGINEERING FOR AGRICULTURAL ENGINEERS

OBJECTIVE:
• To introduce the student to the concept of soil-plant characteristics and their water requirements. At the completion of the course the students should be able to understand the necessity of planning an irrigation system to provide water at the right time and right place.

UNIT I CROP WATER REQUIREMENT

UNIT II METHODS OF IRRIGATION

UNIT III DIVERSION AND IMPOUNDING STRUCTURES

UNIT IV CANAL IRRIGATION

UNIT V IRRIGATION MANAGEMENT, CLIMATE CHANGE & ADAPTATION

TOTAL: 45 PERIODS

OUTCOMES:
• The students will be able to understand the requirement of crop water.
• They will know about the methods of irrigation, various canal structures
• Concepts of Irrigation water management, impact of climate change and adaptation.
TEXT BOOKS:

REFERENCES:

AI7503 UNIT OPERATIONS IN AGRICULTURAL PROCESSING AND POST HARVEST TECHNOLOGY

OBJECTIVES:

- To expose the students to the fundamentals of various unit operations of Agricultural Processing
- To expose the students to different Post Harvest operations and processing methods of harvested crops
- To introduce material handling equipment, storage and waste utilization.

UNIT I EVAPORATION AND SIZE REDUCTION

UNIT II MECHANICAL SEPARATION, CRYSTALLIZATION AND DISTILLATION

UNIT III ENGINEERING PROPERTIES OF AGRICULTURAL MATERIALS

UNIT IV THRESHING AND GRADING
Threshing - traditional methods - mechanical threshers - principles and operation –, Cleaning and grading – principles - air screen cleaner – separators (cylinder, spiral, magnetic, inclined belt) - effectiveness of separation and performance index - color sorter - Groundnut decorticator - Maize Sheller
UNIT V PROCESSING OF CEREALS & PULSES, MATERIAL HANDLING AND STORAGE


TOTAL: 45 PERIODS

OUTCOMES:
At the end of the study the student will have knowledge on
• Fundamentals of various unit operations of Agricultural Processing.
• Material handling equipments
• Post Harvest operations and processing methods of harvested crops.

TEXTBOOKS:

REFERENCES:

ME7552 DESIGN OF MACHINE ELEMENTS L T P C 4 0 0 4

OBJECTIVES:
• To understand the various steps involved in the Design Process
• To understand the principles involved in evaluating the shape and dimensions of a component to satisfy functional and strength requirements.
• To learn the use of standard practices in design.

UNIT I FUNDAMENTAL CONCEPTS IN DESIGN 12
UNIT II SHAFTS AND COUPLINGS 12
Shafts and Axles - Design of solid and hollow shafts based on strength, rigidity and critical speed –
Keys and splines – Rigid and flexible couplings.

UNIT III TEMPORARY AND PERMANENT JOINTS 12

UNIT IV ENERGY STORING ELEMENTS AND ENGINE COMPONENTS 12
Types of springs, design of helical and concentric springs–surge in springs, Design of laminated springs - Flywheels considering stresses in rims and arms for engines and presses - Solid and Rimmed flywheels - Connecting Rods and crank shafts.

UNIT V BEARINGS 12
Sliding contact and rolling contact bearings - Hydrodynamic journal bearings, Sommerfeld Number, Raimondi & Boyd graphs, -- Selection of Rolling Contact bearings -Seals and Gaskets

OUTCOMES:
Upon completion of this course, the students will be able to:
- Appreciate the functions of various machine elements and assemblies
- Design various machine components according to the requirement as per the prescribed standards
- Use standard design data books.

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
- To conceive, design and draw the irrigation structures in detail showing the plan, elevation and sections.

UNIT I  TANK COMPONENTS  12
Fundamentals of design - Tank bunds – Tank surplus weirs – Tank sluice with tower head - Drawings showing foundation details, plan and elevation.

UNIT II  IMPOUNDING STRUCTURES  16
Design principles - Earth dams – Gravity Dams - Arch dams – Spill ways – Drawing showing plan, elevation, half sections including foundation details.

UNIT III  CROSS DRAINAGE WORKS  16

UNIT IV  CANAL REGULATION STRUCTURES  16
General Principles - Canal head works – Direct Sluice - Canal regulator – Canal escape – Drawing showing detailed plan, elevation and foundation details.

OUTCOME:
- At the end of the study, the student can able to design and draw the plan, elevation and sections of tank components, impounding structures, cross drainage works and canal regulation structures.

TEXTBOOKS:

REFERENCES:

OBJECTIVE:
- Students should be able to verify the principles studied in theory by performing the experiments in lab.

1. To study various instruments in the Meteorological Laboratory
2. Determination of infiltration rate using double ring infiltrometer
   Determination of infiltration rate using digital infiltrometer
3. Determination of soil moisture wetting pattern for irrigation scheduling
4. Measurement of flow properties in open irrigated channels (flumes, notches)
5. Estimation of Leaf Area Index
6. Evaluation of surface irrigation
7. Determination of uniformity coefficient for drip irrigation system
8. Determination of uniformity coefficient for sprinkler system (catch can method)
9. To conduct experiment on canopy analyzer
10. To conduct experiment on disc filter for micro irrigation systems

TOTAL: 60 PERIODS

OUTCOME:
- On the completion of the course the student will have the knowledge on various meteorological instruments and understanding the concept of different irrigational systems in the laboratory tests.

REFERENCES:
3. Laboratory Manual, Centre for Water Resources, Anna University, Chennai.

AI7601 DAIRY AND FOOD ENGINEERING L T P C
3 0 0 3

OBJECTIVES:
- To introduce the students to dairy industry, properties and processing of milk, manufacture of dairy products, sanitation and effluent treatment in dairy industry
- To expose the students to the fundamental knowledge of food, its properties and different methods of food processing

UNIT I PROPERTIES AND PROCESSING OF MILK

UNIT II DAIRY PRODUCTS

UNIT III FOOD AND ITS PROPERTIES, REACTION AND KINETICS
Constituents of food - thermal processing of foods - cooking, blanching, sterilization, pasteurization, canning - Interaction of heat energy on food components, reaction kinetics, Arrhenius equation, TDT curves - water activity, sorption behaviour of foods – isotherm models - monolayer value, BET isotherms, Raoult’s law, Norrish, Ross, Salwin - Slawson equations.
UNIT IV  PROCESSING AND PRESERVATION OF FOODS
Coffee, Tea processing - Concentration of foods, freeze concentration - osmotic and reverse osmotic concentration - drying and dehydration of food - Tray, tunnel, belt, vacuum and freeze dryers - rehydration of dehydrated foods - Fat and oil processing, sources, extraction, methods and equipment, refining of oils, hydrogenation, manufacture of margarine - Food preservation methods - preservation by irradiation, microwave and dielectric heating of food.

UNIT V  QUALITY CONTROL
Quality control of processed food products - Factors affecting quality - Food packaging, importance, flexible pouches - restorable pouches - aseptic packaging, granules, powder and liquid packaging machines - nanotechnology – principles - applications in food processing – food plant location

TOTAL: 45 PERIODS

OUTCOMES:
- The students will gain knowledge about Dairy and Food process engineering
- Understand the process of manufacturing of dairy products and thermal processing of food.
- Students will understand the importance of quality control and food preservation and packaging.

TEXTBOOKS:

REFERENCES:

AI7602  DRAINAGE ENGINEERING AND LAND MANAGEMENT  L T P C
3 0 0 3

OBJECTIVES:
- To understand the basic concepts for planning, design and management of land drainage works in cultivated areas
- To study the various methods of land drainage and its impact on environment

UNIT I  CONCEPTS OF DRAINAGE ENGINEERING
UNIT II  SURFACE DRAINAGE

UNIT III  SUBSURFACE DRAINAGE

UNIT IV  WATER BALANCE AND DRAINAGE CRITEREA

UNIT V  ENVIRONMENTAL ASPECTS OF DRAINAGE

TOTAL: 45 PERIODS

OUTCOME:
- The students shall be able to plan and design the drainage system in an efficient manner.

TEXTBOOKS:

REFERENCES:
2. Irrigation water Management, Training Manual No 6, Drainage of Irrigated Lands, Food and Agriculture Organisation, Rome 1996
OBJECTIVES:
- To introduce the students to the working principles of tractor, farm equipment, Power Tiller, makes of tractors and power tillers, tillage implements.
- To expose the students to farm mechanization benefits and constraints, Identification of components of primary and secondary tillage implements.
- To introduce the students to the working principles of tractor, farm equipment, Power Tiller, makes of tractors and power tillers, tillage implements.
- To expose the students to farm mechanization benefits and constraints, Identification of components of primary and secondary tillage implements.

UNIT I  TRACTORS
Farm mechanization in India - Makes of tractors, power tillers, earth moving machinery - Classification of tractors - Tractor engines – construction of engine blocks, cylinder head and crankcase - features of cylinder, piston, connecting rod and crankshaft – firing order- combustion chambers.

UNIT II  ENGINE SYSTEMS

UNIT III  TRANSMISSION SYSTEMS

UNIT IV  HYDRAULIC SYSTEMS
Hydraulic system - working principles, three point linkage - draft control - weight transfer, theory of traction - tractive efficiency – tractor chassis mechanics - stability - longitudinal and lateral. Controls - visibility - operators seat.

UNIT V  POWER TILLER AND TRACTOR TESTING

OUTCOME:
- At the end of the course, the students will have a thorough knowledge on various systems of tractors, power tillers and test procedures.

TEXTBOOKS:

REFERENCES:
OBJECTIVES:
- To learn the different principles and techniques of management in planning, organizing, directing and controlling.
- To study the historic development of Management thoughts.
- To learn the nature and purpose of planning, forecasting and decision making.
- To learn the concepts of organizing, delegation of authority and HRD concepts.

UNIT I  HISTORICAL DEVELOPMENT OF MANAGEMENT THOUGHTS  9

UNIT II  PLANNING  9

UNIT III  ORGANISING  9

UNIT IV  DIRECTING  9

UNIT V  CONTROLLING  9

OUTCOME:
- On completion of the course, students will have the knowledge on the managerial skills like organizing, planning, forecasting and decision making.
TEXT BOOKS:

REFERENCES:

AI7611 AGRICULTURAL PROCESSING AND FOOD ENGINEERING LABORATORY

L T P C
0 0 4 2

OBJECTIVE:
• To get hands on experience on various aspects of food science, agricultural processing, post harvest technology and food process engineering.

A. Experiments on Engineering properties of agricultural materials
1. Determination of porosity of grains.
2. Determination of coefficient of friction and angle of repose of grains.
3. Evaluation of thin layer drier
4. Determining the efficiency of bucket elevator and screw conveyor

B. Experiments on Food Adulteration
1. Test for adulterant in Ghee
   Test for adulterants in oils and fats
2. Test for dye in tea
   Test for Non-Permitted colours in foods

C. Experiments on Macro & Micro Nutrients
1. Estimation of protein in foods
   Estimation of sugars in foods
   Estimation of fat in foods
2. Estimation of Calcium, Sodium, Potassium and Iron in foods
3. Estimation of Fortificants in food

D. Experiments on Food Processing & Preservation
1. Gluten in Wheat Flour and Maida
2. Brix values of fruit products
   Test for preservative in fruit products
   Estimation of preservative in fruit products
3. Estimation of Vitamin C in fruit juice
E. Experiments on Post Harvest Technology 8
1. Determination of Moisture in food grains, spices and condiments
2. Microscopic examination of Mould infestation in food grains and nuts
3. Visit to modern rice mill / pulse milling industry

F. Experiments on Food Process Engineering 8
1. Acid values and peroxide value of edible oils
2. Expansion and Oil Absorption characteristic of snacks on frying
   (Some experiments will be through demonstration / video presentation)

TOTAL: 60 PERIODS

OUTCOMES:
- On completion of the lab course, the students will be able to get experience on various aspects of food processing, preservation.
- The students will have knowledge on different engineering properties of agricultural materials and post harvesting technologies.

REFERENCES:
5. Laboratory Manual, Centre for Water Resources, Anna University, Chennai.

AI7612 CAD FOR AGRICULTURAL ENGINEERING L T P C 0 0 4 2

OBJECTIVE
- To draft the agricultural engineering related machineries and structures manually and also by computer aided methods.

1. Design and Drawing of Underground pipeline system 8
2. Design and Drawing of Check dam 6
3. Design and Drawing of Mould board plough 8
4. Design and Drawing of Disk plough 8
5. Design and Drawing of Post harvest technology units (threshers and winnowers) 8
6. Design and Drawing of Biogas plant. 6
7. Introduction & demonstration on 3D modeling softwares 16

TOTAL: 60 PERIODS

OUTCOMES:
- The student will be able to understand the plan and layout of underground pipes, post harvesting units and check dams.
- The students also will be able to design and draw the components using computer aided methods.
REFERENCES

AI7613 TECHNICAL SEMINAR

OBJECTIVE:
- To work on a specific technical topic in Agricultural and Irrigation Engineering and acquire the skill of written and oral presentation. To acquire writing abilities for seminars and conferences.

TOTAL: 30 PERIODS

STRATEGY:
The students will work for six hours per week guided by a group of staff members. They will be asked to talk on any topic of their choice and to engage in dialogue with the audience. A brief copy on their talk also should be submitted. Similarly, the students will have to present a seminar of not more than fifteen minutes on the technical topic. They should also answer the queries on the topic. The students as the audience also should interact. Evaluation will be based on the general and technical presentation and the report and also on the interaction shown during the seminar.

AI7701 FARM EQUIPMENT

OBJECTIVES:
- To introduce the students to the working principles of tractor, farm equipments, Power Tiller, makes of tractors and power tillers, tillage implements.
- To expose the students to farm mechanization benefits and constraints, Identification of components of primary and secondary tillage implements.

UNIT I FARM MECHANIZATION
UNIT II PRIMARY & SECONDARY TILLAGE IMPLEMENTS 9

UNIT III SOWING AND WEEDING EQUIPMENT 9

UNIT IV SPRAYERS AND DUSTERS 9

UNIT V FERTILIZER APPLICATION & OTHER FIELD CROP MACHINERY 9

TOTAL: 45 PERIODS

OUTCOMES:
- The students will be able to understand the mechanization and various equipment used in the farm.
- The students will have the knowledge on earth moving machineries and tillage implements.

TEXTBOOKS:

REFERENCES:

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UNIT I  SOIL EROSION PRINCIPLES

UNIT II  ESTIMATION OF SOIL EROSION

UNIT III  EROSION CONTROL MEASURES

UNIT IV  WATER CONSERVATION MEASURES

UNIT V  SEDIMENTATION

TOTAL: 45 PERIODS

OUTCOMES:
- The students will be able to gain fundamental knowledge on the concepts of erosion and sedimentation.
- They will have sufficient knowledge on soil and water conservation measures.

TEXTBOOKS:

REFERENCES:
COURSE DESCRIPTION:
- This course aims to help the students acquire the employability skills necessary for the workplace situations. It also attempts to meet the expectations of the employers by giving special attention to language skills, presentation skills, group discussion skills and soft skills. This will be achieved through expert guidance and teaching activities focusing on employability skills.

COURSE OBJECTIVES:
- To enhance the employability skills of students with a special focus on presentation skills, group discussion skills and interview skills
- To help them improve their reading skills, writing skills, and soft skills necessary for the workplace situations
- To make them employable graduates

CONTENTS

UNIT I  READING AND WRITING SKILLS  9
Reading: skimming & scanning strategies – note making skills – interpreting visual material (charts & tables) – critical reading – fast reading necessary for reading letters & files - preparing job applications - writing covering letter and résumé - applying for jobs online - email etiquette – writing official letters (placing an order, letters to consumers, etc.) writing reports – collecting, analyzing and interpreting data

UNIT II  SOFT SKILLS  9
Hard skills & soft skills – soft skills: self-management skills & people skills - training in soft skills - persuasive skills – sociability skills – interpersonal skills – team building skills – leadership skills – problem solving skills – adaptability - stress management – motivation techniques – life skills -

UNIT III  PRESENTATION SKILLS  9
Preparing slides with animation related to the topic – organizing the material - Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice – presenting the visuals effectively – 5 minute presentation

UNIT IV  GROUP DISCUSSION SKILLS  9
Participating in group discussions – understanding group dynamics - brainstorming the topic – questioning and clarifying – GD strategies (expressing opinions, accepting or refusing others opinions, turn taking) – activities to improve GD skills – viewing recorded GD – mock GD

UNIT V  INTERVIEW SKILLS  9

TOTAL: 45 PERIODS

LEARNING OUTCOMES:
- Students will be able to make presentations and participate in group discussions with high level of self-confidence.
- Students will be able to perform well in the interviews
- They will have adequate reading and writing skills needed for workplace situations
REFERENCES:

EXTENSIVE READING

WEB RESOURCES
1. www.humanresources.about.com
2. www.careerride.com

AI7711 CREATIVE AND INNOVATIVE PROJECT
(ACTIVITY BASED – SUBJECT RELATED)

OBJECTIVE:
- To use the knowledge acquired in Agricultural and Irrigation Engineering to do a mini project, which allows the students to come up with designs, fabrication or algorithms and programs expressing their ideas in a novel way.

STRATEGY:
To identify a topic of interest in consultation with Faculty/Supervisor. Review the literature and gather information pertaining to the chosen topic. State the objectives and develop a methodology to achieve the objectives. Carryout the design / fabrication or develop computer code. Demonstrate the novelty of the project through the results and outputs.

TOTAL: 60 PERIODS

AI7712 INDUSTRIAL TRAINING
(4 WEEKS DURING VI SEMESTER - SUMMER)

To train the students in field work by attaching to any industry / organization so as to have a first hand knowledge of practical problems and to gain working experience and skills in carrying out engineering tasks related to various fields of agriculture.

The students individually undertake training in reputed engineering companies for the specified duration. At the end of the training, a report on the work done will be prepared and presented. The students will be evaluated through a viva-voce examination by a team of internal staff.
OBJECTIVE:
- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

TOTAL: 300 PERIODS

STRATEGY
The student works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction. The student will be evaluated based on the report and the viva voce examination by a team of examiners including one external examiner.

OBJECTIVES:
- To introduce the importance of Agri-business management, its characteristics and principles
- To impart knowledge on the functional areas of Agri-business like Marketing management, Product pricing methods and Market potential assessment.

UNIT I  CONCEPTS OF AGRICULTURAL BUSINESS
Agri-business - scope, characteristics, types. Management - importance, definition, management and administration, management thoughts, Small business - characteristics and stages of growth - Management functions - planning, organizing, leading.

UNIT II  AGRI – BUSINESS ORGANIZATION

UNIT III  AGRICULTURAL MARKETING
Functional areas of Agri-business - Production and Operations management - functions, planning physical facilities and managing quality. Agro-inputs and products inventory management - raw material procurement, inventory types, and costs. Marketing management- Marketing environment, marketing mix - Agricultural input marketing firms.

UNIT IV  AGRICULTURAL BUSINESS FINANCE
UNIT V MARKET PROMOTION AND HUMAN RESOURCES


OUTCOME:
- The students shall be exposed to various trends in agricultural business management.

TEXTBOOKS:

REFERENCES:

UNIT I INTRODUCTION & SCOPE OF FARM MANAGEMENT

Farm Management - definition and scope - relationship between farm management and other sciences - Characteristics and significance. Farm management decision making process. Basic concepts in farm management. Factor and Farm layout - Farm records and Accounts - Farm Appraisal Techniques. Valuation and Depreciation – Factor

UNIT II LAWS OF ECONOMICS

UNIT III  COST CURVES

UNIT IV  MANAGEMENT OF RESOURCES
Types of uncertainty in agriculture - Managerial decisions to reduce risks in production process - Management of resources - Types of resources - land, labour, capital, and measurement of their efficiencies - mobilization of farm resources. Cost of maintenance of machinery and break even analysis - Estimation of cost of production - Dairy and poultry products - Investment analysis - Undiscounted and Discounted methods.

UNIT V  FINANCIAL ANALYSIS
Farm Financial Analysis - Balance sheet - Income statement - Cash flow analysis - Ratio analysis - Farm Investment Analysis - Time comparison principles - Discounted and undiscounted measures - Farm planning and control - Elements of planning - Farm level management information systems - Farm Budgeting partial, enterprise and complete budgeting - Preparation of Balance sheet and income statement - Preparation of cash flow statement and ratio analysis - Estimation of 3Rs of credit - Preparation of Farm plan Enterprise budgeting - Partial budgeting and complete budgeting.

OUTCOMES:
The students will have the knowledge on
- Basic concepts of economics and laws of economics.
- Familiarize with the financial analysis and will be able to manage the resources.

TEXTBOOKS:

REFERENCES:

AI7003  BIO - ENERGY RESOURCE TECHNOLOGY
L T P C 3 0 0 3

OBJECTIVES:
- To impart the fundamental knowledge on the importance of Bio resources, Bio energy and reactors.
- Alcohol and ethanol production and
- Energy and Environment
UNIT I BIO RESOURCE AN INTRODUCTION 9
Bio resource – origin – biomass types and characteristics- biomass construction technology-
Biodegradation - steps in biogas production- parameters affecting gas production- Types of biogas
plants- Construction details- operation and maintenance.

UNIT II BIO ENERGY 9
Slurry handling- enrichment and utilization – Biogas appliances- Biochemical characteristics of bio
resources- Bioenergetics –Biocatalysis –Kinetics of product formation.

UNIT III BIO REACTORS AND FERMENTORS 9
Bio reactors/ fermentors – Batch type – continuous stirred tank reactors- Biological waste water
treatment- Activated sludge process- Down stream processing-Recovery and purification of
products.

UNIT IV ALCOHOL PRODUCTION 9
Alcohol ethanol production - Acid hydrolysis - enzyme hydrolysis-Methanol synthesis - Antibiotics-
enzymes- principles of thermochemical conversion – combustion - pyrolysis- Gasification – types
of gasifiers.

UNIT V ENERGY AND ENVIRONMENT 9
Principles of operation- chemical reaction- cleaning and cooling - Utilization- Improved wood
burning stove - Energy plantations- Biomass briquetting - co generation- Impact on Environment –
Non renewable sources – solar & wind energy – concepts - applications.

TOTAL: 45 PERIODS

OUTCOME:
• The students will be able to understand the concepts of bio energy sources and its
applications.

TEXTBOOKS:
publishing company, Tokyo.1986

REFERENCE:

AI7004 ENVIRONMENT AND AGRICULTURE L T P C 3 0 0 3

OBJECTIVES
• To emphasize on the importance of environment and agriculture on changing global
scenario and the emerging issues connected to it.

UNIT I ENVIRONMENTAL CONCERNS 8
Environmental basis for agriculture and food – Land use and landscape changes – Water quality
issues – Changing social structure and economic focus – Globalization and its impacts – Agro
ecosystems.

UNIT II ENVIRONMENTAL IMPACTS 9
Irrigation development and watersheds – mechanized agriculture and soil cover impacts – Erosion
and problems of deposition in irrigation systems – Agricultural drainage and downstream impacts –
Agriculture versus urban impacts.

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UNIT III  CLIMATE CHANGE  8

UNIT IV  ECOLOGICAL DIVERSITY AND AGRICULTURE  10

UNIT V  EMERGING ISSUES  10
Global environmental governance – alternate culture systems – Mega farms and vertical farms – Virtual water trade and its impacts on local environment – Agricultural environment policies and its impacts – Sustainable agriculture.

TOTAL: 45 PERIODS

OUTCOMES:
- Students will appreciate the role of environment in the current practice of agriculture and concerns of sustainability, especially in the context of climate change and emerging global issues.
- Ecological context of agriculture and its concerns will be understood

TEXTBOOKS:

REFERENCES:
3. Environment and agriculture: environmental problems affecting agriculture in the Asia and Pacific region; World Food Day Symposium, Bangkok, Thailand. 1989

AI7005  GEOLOGY FOR AGRICULTURAL AND IRRIGATION ENGINEERS  L T P C 3 0 0 3

OBJECTIVES:
- To expose the students to the different types of soils, rocks, their characteristics, identification.
- To impart the fundamental knowledge of hydrogeology and geological investigation

UNIT I  MINEROTHERY  9

UNIT II  WEATHERING AND SOIL  9
UNIT III: SOIL TYPES

UNIT IV: HYDROGEOLOGY

UNIT V: GEOLOGICAL INVESTIGATION
Remote sensing methods -Methods of geological investigation – Classification of geophysical methods- electrical resistively, seismic refraction, gravity, magnetic and acoustic prospecting for mineral and groundwater – Application of geophysics in groundwater and mineral study-Geophysical logging.

OUTCOMES:
The students completing this course
- Will be able to understand the importance of geology by understanding the various soil formations.
- Will realize the importance of this knowledge in agriculture.

TEXTBOOKS:

REFERENCES

AI7006: IRRIGATION EQUIPMENT DESIGN

OBJECTIVES:
- To expose the students to the fundamental knowledge in Pumps for Irrigation use
- To introduce the concept of micro-irrigation
- To design a Sprinkler & Drip irrigation system

UNIT I: WATER LiftS AND Pumps
Pump classification Variable displacement pumps–Centrifugal pump- Submersible pump- Vertical Turbine pumps mixed flow – Jet and Airlift pumps-Pump selection and installation- Pump troubles and Remedies.
UNIT II    PUMP VALVE
Types of valves- Pressure relief valve- Gate valve-Isolated valve- Non return valve- Butterfly valve-Solenoid valves- Automated control valve- selection, repair and maintenance.

UNIT III    MICRO IRRIGATION CONCEPT AND APPLICATIONS

UNIT IV    DRIP IRRIGATION DESIGN
Drip irrigation - Components- Dripper- types and equations governing flow through drippers- Wetting pattern- Chemigation application- Pump capacity-Installation- Operation and maintenance of Drip irrigation system. - Design of surface and sub-surface drip irrigation.

UNIT V    SPRINKLER IRRIGATION DESIGN
Sprinkler irrigation- Components and accessories - Hydraulic design - Sprinkler selection and spacing- Capacity of sprinkler system - types - Sprinkler performance- Sprinkler discharge- Water distribution pattern- Droplet size, filtering unit, fertigation - System maintenance

OUTCOMES:
- At the completion of course the student will get the knowledge on concepts of micro irrigation.
- The students shall able to design drip and sprinkler irrigation system.

TEXTBOOKS:

REFERENCES

AI7007    IRRIGATION WATER QUALITY AND MODELING
L T P C
3 0 0 3

OBJECTIVES:
- To introduce the water quality concepts, its estimation and evaluation for irrigation purposes, besides relevant environmental problems and modeling of non-point pollution sources.
- To understand the importance of water quality for irrigation, the collection and use of water quality data.
UNIT I  WATER QUALITY PRINCIPLES  8
Water as a unique substance - Physical and chemical properties of water – Water quality parameters – Water cycle and water quality – Anthropogenic influences -Water quality problems..

UNIT II  WATER QUALITY ESTIMATION  8

UNIT III  EVALUATION OF WATER QUALITY  10

UNIT IV  WATER QUALITY MODELS  10

UNIT V  ENVIRONMENTAL ISSUES  9

TOTAL:  45 PERIODS

OUTCOMES:
• Students will understand the importance of water quality for beneficial uses, especially in irrigation and its management.
• Students will understand the role of environment in water quality and acquire skills in the use of tools available for modelling water quality.

TEXTBOOKS:

REFERENCES:

OBJECTIVES:
• To introduce the students to areas of agricultural systems in which IT and computers play a major role.
• To also expose the students to IT applications in precision farming, environmental control systems, agricultural systems management and weather prediction models.
UNIT I PRECISION FARMING
Precision agriculture and agricultural management – Ground based sensors, Remote sensing, GPS, GIS and mapping software, Yield mapping systems, Crop production modeling.

UNIT II ENVIRONMENT CONTROL SYSTEMS
Artificial light systems, management of crop growth in greenhouses, simulation of CO₂ consumption in greenhouses, on-line measurement of plant growth in the greenhouse, models of plant production and expert systems in horticulture.

UNIT III AGRICULTURAL SYSTEMS MANAGEMENT
Agricultural systems - managerial overview, Reliability of agricultural systems, Simulation of crop growth and field operations, Optimizing the use of resources, Linear programming, Project scheduling, Artificial intelligence and decision support systems.

UNIT IV WEATHER PREDICTION MODELS
Importance of climate variability and seasonal forecasting, Understanding and predicting world’s climate system, Global climatic models and their potential for seasonal climate forecasting, General systems approach to applying seasonal climate forecasts.

UNIT V E-GOVERNANCE IN AGRICULTURAL SYSTEMS
Expert systems, decision support systems, Agricultural and biological databases, e-commerce, e-business systems & applications, Technology enhanced learning systems and solutions, e-learning, Rural development and information society.

TOTAL: 45 PERIODS

OUTCOME:
- The students shall be exposed to IT applications in environmental control systems, precision farming, agricultural systems management and weather prediction models.

TEXTBOOKS:

REFERENCES:

Objective:
- To understand the fundamentals of minor irrigation, its types, operation and maintenance and people’s participation
- Command Area Development, On farm structures, policy, operation and maintenance

UNIT I MINOR IRRIGATION
Definition – Classification of minor irrigation- Minor irrigation through wells, tanks, ooranies and canals- Development of minor irrigation in India- Advantages.
UNIT II     **LIFT IRRIGATION**  
9  
Dug well and Tube well irrigation – Construction, operation and maintenance- Conjunctive use of ground water with surface water - Ground water market- Ground water estimation-norms – case studies.

UNIT III     **TANK IRRIGATION**  
9  
Concept of tank irrigation – Classification- components of tank irrigation- water distribution network- Cascade of tanks- People’s participation in tank irrigation system and its maintenance- Turn over – case studies.

UNIT IV     **COMMAND AREA DEVELOPMENT**  
9  
Need for command area development- Definition – Importance of CAD in agricultural production - On Farm Development – organization, operation and maintenance- Farmers participation- Turn over- case studies.

UNIT V     **SPECIAL TOPICS**  
10  
National water policy - Institutional aspects - Socio-economic perspective- Reclamation of salt affected soils- Seepage loss in command area- Irrigation conflicts- Water productivity – Water pricing.

TOTAL: 45 PERIODS

OUTCOMES:  
- The students will have knowledge and skills on planning, design, operation and management of a minor irrigation system.  
- The student will gain knowledge on different aspects of on farm development works.

TEXTBOOKS:  

**AI7010 REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM**  
L T P C: 3 0 0 3

OBJECTIVES:  
- To introduce the principles and basic concepts of Remote Sensing and GIS  
- To introduce the remote sensing systems, data products and analysis  
- To introduce the spatial data models, analysis and presentation techniques  
- To study the applications of Remote Sensing and GIS in agriculture, soil and water resources

UNIT I     **CONCEPTS OF REMOTE SENSING AND SATELLITES**  
9  
Definition- Historical background - Components of remote sensing – Energy source, electromagnetic spectrum, radiation principle, platforms and sensors - Active and passive remote sensing interference - Atmospheric effects on remote sensing – Energy interaction with earth surface feature - Data acquisition - Reflectance, spectral signatures for water, soil and vegetation.- Satellites - Types - Sun synchronous - Geo synchronous remote sensing satellites - LANDSAT,SPOT & IRS - Resolution - Spectral, spatial, radiometric and Temporal resolution - Recent satellites with its applications
UNIT II DATA PRODUCTS AND IMAGE ANALYSIS 9

UNIT III CONCEPTS OF GIS 9
Definition – Map and their influences – Characteristics of Maps – Elements – Map scale, Projection, Coordinate systems – Sources of spatial data – History and development of GIS – Definition – Components – Hardware and Software.

UNIT IV DATA INPUT AND ANALYSIS 9

UNIT V APPLICATION OF RS AND GIS 9

OUTCOMES:
- The students will understand the remote sensing principles, remote sensing systems satellite data processing and available data products.
- The students will understand decision making process using DBMS and utilization of these advanced techniques in addressing the real world problems.

TEXTBOOKS:

REFERENCES
OBJECTIVES:
- To expose the students to scope and importance of good quality seed production.
- To acquaint them with the principles and special techniques used in the process of production of good quality seed using specific examples.
- To familiarize them with planning, development and organization of seed programmes.

UNIT I
INTRODUCTION
9
Definition and characteristics of seed and how it differs from grain; Propagation of crop plants through true seed and vegetative means; Features of good quality seed; Importance of seed in successful crop production; Floral biology: self and cross pollination; Methods of genetic improvement of crop plants such as selection, hybridization, mutation and polyploidy; Seed legislations promulgated in India from 1966 to date and the purpose of each of these legislations.

UNIT II
SEED PRODUCTION AND CERTIFICATION
9
Multiplication of seed and seed material: systems of seed multiplication, classes of seed, multiplication models, multiplication ratio, field selection, planting ratio, isolation needs and rouging; Harvest and extraction of seed; Methods of hybrid seed production; Genetic deterioration during crop production cycles; Seed certification process: legal basis, pre-requisites for applicability, detailed description of the specific steps of the certification process (with particular emphasis on field inspection).

UNIT III
SEED PROCESSING AND TESTING
9
Components of seed processing in a broader sense; Steps in seed processing in its narrower sense: preliminary cleaning, basic cleaning and grading, and equipment used in each of the steps; Seed treatment; Seed drying; Seed sampling; Seed testing: details of specific tests conducted for different purposes (service, certification and seed law enforcement); Standards prescribed for different crops.

UNIT IV
DEVELOPING SEED PROGRAMMES
9
Types of organizations involved in seed production (public, quasi-governmental, private and cooperative), and their objectives and features; Organizational set up of a seed company; Steps involved in planning and developing a seed programme; Seed marketing activities, and analysis of seed demand and supply; Costing and pricing strategies; Economics of production of different crop seed; Seed packaging; Opportunities for Indian seed companies to have a greater share of world seed market; Visit to seed organizations; Preparing seed projects to obtain credit; Export procedures and formalities; Seed/plant quarantine methods.

UNIT V
SEED PRODUCTION IN SPECIFIC CROPS
9
Principles and special techniques used for seed production in important horticultural crops by selecting representatives of vegetable / flower / fruit / spice / condiment / plantation crops.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, students will be
- exposed to the biology of seed production and gain knowledge on seed legislation, various aspects of multiplication of seeds and their certification
- acquiring the knowledge on seed processing and testing methods.
- understand different seed programmes, special techniques for seed production and their cost economics

79
TEXTBOOKS:

REFERENCES:

AI7012 SUSTAINABLE AGRICULTURE AND FOOD SECURITY L T P C
3 0 0 3

OBJECTIVES:
- To study the importance of sustainable agriculture for the growing population, various resources required and their sustainability.
- Importance of science, food security and ecological balance.

UNIT I LAND RESOURCE AND ITS SUSTAINABILITY
Land Resources of India, Population and land, Land utilization, Net Area Sown, changes in cropping pattern, land degradation.

UNIT II WATER RESOURCE AND ITS SUSTAINABILITY
Rainfall forecasting - Adequacy of Rainfall for crop growth – Rainfall, Drought and production instability – Irrigation potential – Available, created and utilized – River basins; Watersheds and Utilizable surface water – Utilizable water in future (Ground water & Surface water)

UNIT III SUSTAINABLE AGRICULTURE & ORGANIC FARMING

UNIT IV FOOD PRODUCTION AND FOOD SECURITY

UNIT V POLICIES AND PROGRAMMES FOR SUSTAINABLE AGRICULTURE AND FOOD SECURITY

TOTAL: 45 PERIODS
OUTCOMES:
- Upon completion of this course, the students will gain knowledge on the need for sustainable agriculture.
- They will be able to comprehend the need for food security on global level and the Nutritional Security.
- The students will be able to demonstrate how ecological balance is required for sustainability of agriculture.

TEXTBOOKS:

REFERENCES:

AI7013 SYSTEMS ANALYSIS IN IRRIGATION ENGINEERING

OBJECTIVES:
- To introduce the students to the application of systems concept to irrigation planning and management.
- Optimization technique for modeling water resources systems, irrigation management and advanced optimization techniques to cover the socio-technical aspects will be taught.

UNIT I SYSTEM CONCEPTS
Definition, classification, and characteristics of systems – Scope and steps in systems engineering – Need for systems approach to water resources and irrigation.

UNIT II LINEAR PROGRAMMING
Introduction to operations research – Linear programming, problem formulation, graphical solution, solution by simplex method – Sensitivity analysis, application to design and operation of reservoir, single and multipurpose development plans – Irrigation water allocation- Cropping pattern optimization.

UNIT III DYNAMIC PROGRAMMING
Bellman’s optimality criteria, problem formulation and solutions – Application to design and operation of reservoirs, Single and multipurpose reservoir development plans – Applications in Irrigation management.

UNIT IV SIMULATION
UNIT V  ADVANCED OPTIMIZATION TECHNIQUES
Integer and parametric linear programming – Applications to Irrigation water management-Goal programming models with applications.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, students will
- have an understanding on systems approach methodology applied to water resources and irrigation
- be able to apply the Linear programming, Dynamic Programming and Simulation for water resources and irrigation problems.

TEXTBOOKS:

REFERENCES:

AI7071 INTEGRATED WATER RESOURCES MANAGEMENT  L T P C  3 0 0 3

OBJECTIVES:
- To introduce the students to the interdisciplinary analysis of water and design of intervention strategies.
- To develop knowledge base on capacity building on IWRM.

UNIT I  IWRM FRAMEWORK  9
Definition – meanings –objectives- evolution of IWRM- IWRM relevance in water resources management – Importance of paradigm shift in India: processes and prospective outcomes.

UNIT II  CONTEXTUALIZING IWRM  9
IWRM in Global and Regional water partnership - MDG goals - UN formulations-Institutional Transformation- bureaucratic reforms and inclusive development.

UNIT III  EMERGING ISSUES IN WATER MANAGEMENT  9

UNIT IV  IWRM AND WATER RESOURCES DEVELOPMENT IN INDIA  9
UNIT V ASPECTS OF INTEGRAL DEVELOPMENT

Capacity building - Solutions for effective Water Management. Case studies on conceptual framework of IWRM – IWRM and regional and global partnership – Emerging issues – IWRM and water resources development

TOTAL: 45 PERIODS

OUTCOME:

- At the completion of the course, the student will be able to apply appropriate management techniques different components of water resources under IWRM framework.

TEXTBOOKS:


REFERENCES:


AI7072 PARTICIPATORY WATER RESOURCES MANAGEMENT

OBJECTIVES:

- To gain an insight on local and global perceptions and approaches on participatory water resource management

UNIT I FUNDAMENTALS: SOCIOLOGY AND PARTICIPATORY APPROACH

Sociology – Basic concepts – Perspectives- Social Stratification – Irrigation as a Socio technical Process - Participatory concepts– Objectives of participatory approach

UNIT II UNDERSTANDING FARMERS PARTICIPATION


UNIT III ISSUES IN WATER MANAGEMENT

Multiple use of water – Issues in Inter-sectoral Water Allocation - domestic, irrigation, industrial sectors - modernization techniques – Rehabilitation – Command Area Development - Water delivery systems

UNIT IV PARTICIPATORY WATER CONSERVATION

UNIT V PARTICIPATORY WATERSHED DEVELOPMENT

Concept and significance of watershed - Basic factors influencing watershed development — Principles of watershed management - Definition of watershed management – Identification of problems - Watershed approach in Government programmes — People’s participation – Entry point activities - Evaluation of watershed management measures.

TOTAL: 45 PERIODS

OUTCOMES:
- The students shall gain knowledge on various processes involved in participatory water resource management.
- The students shall be aware of the issues related to water conservation and watershed development

TEXTBOOKS:

REFERENCE:

GE7071 DISASTER MANAGEMENT

OBJECTIVES:
- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
- To enhance awareness of institutional processes in the country and
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

UNIT I INTRODUCTION TO DISASTERS
Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don’ts during various types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR)
Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders- Institutional processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.
UNIT III  INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT  9
Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV  DISASTER RISK MANAGEMENT IN INDIA  9
Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V  DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS  9
Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:
The students will be able to
• Differentiate the types of disasters, causes and their impact on environment and society
• Assess vulnerability and various methods of risk reduction measures as well as mitigation.
• Draw the hazard and vulnerability profile of India, scenarios in the Indian context, Disaster damage assessment and management.

TEXTBOOKS:

REFERENCES:
1. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005

GE7074  HUMAN RIGHTS  L T P C
3 0 0 3

OBJECTIVES :
• To sensitize the Engineering students to various aspects of Human Rights.

UNIT I  9
UNIT II  

UNIT III  
Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV  
Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V  

TOTAL : 45 PERIODS

OUTCOME :
- Engineering students will acquire the basic knowledge of human rights.

REFERENCES:

GE7351  
ENGINEERING ETHICS AND HUMAN VALUES  
L T P C 
3 0 0 3

OBJECTIVES
- To emphasise into awareness on Engineering Ethics and Human Values.
- To understand social responsibility of an engineer.
- To appreciate ethical dilemma while discharging duties in professional life.

UNIT I  
HUMAN VALUES  
3  

UNIT II  
ENGINEERING ETHICS  
9  

UNIT III  
ENGINEERING AS SOCIAL EXPERIMENTATION  
9  
Engineering as experimentation - engineers as responsible experimenters - codes of ethics – Importance of Industrial Standards - a balanced outlook on law – anticorruption- occupational crime -the challenger case study.
UNIT IV  ENGINEER’S RIGHTS AND RESPONSIBILITIES


UNIT V GLOBAL ISSUES

Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-Sample code of conduct.

TOTAL : 45 PERIODS

OUTCOME

• Students will have the ability to perform with professionalism, understand their rights, legal, ethical issues and their responsibilities as it pertains to engineering profession with engaging in life-long learning with knowledge of contemporary issues.

TEXTBOOKS:


REFERENCES:


GE7072 FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT

L T P C
3 0 0 3

OBJECTIVES:

• To understand the global trends and development methodologies of various types of products and services
• To conceptualize, prototype and develop product management plan for a new product based on the type of the new product and development methodology integrating the hardware, software, controls, electronics and mechanical systems
• To understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification
• To develop documentation, test specifications and coordinate with various teams to validate and sustain up to the EoL (End of Life) support activities for engineering customer
UNIT I  FUNDAMENTALS OF PRODUCT DEVELOPMENT  9

UNIT II  REQUIREMENTS AND SYSTEM DESIGN  9

UNIT III  DESIGN AND TESTING  9

UNIT IV  SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT  9

UNIT V  BUSINESS DYNAMICS – ENGINEERING SERVICES INDUSTRY  9

OUTCOMES:
Upon completion of the course, the students will be able to:

- Define, formulate and analyze a problem
- Solve specific problems independently or as part of a team
- Gain knowledge of the Innovation & Product Development process in the Business Context
- Work independently as well as in teams
- Manage a project from start to finish

TEXTBOOKS:
1. Book specially prepared by NASSCOM as per the MoU.

REFERENCES: